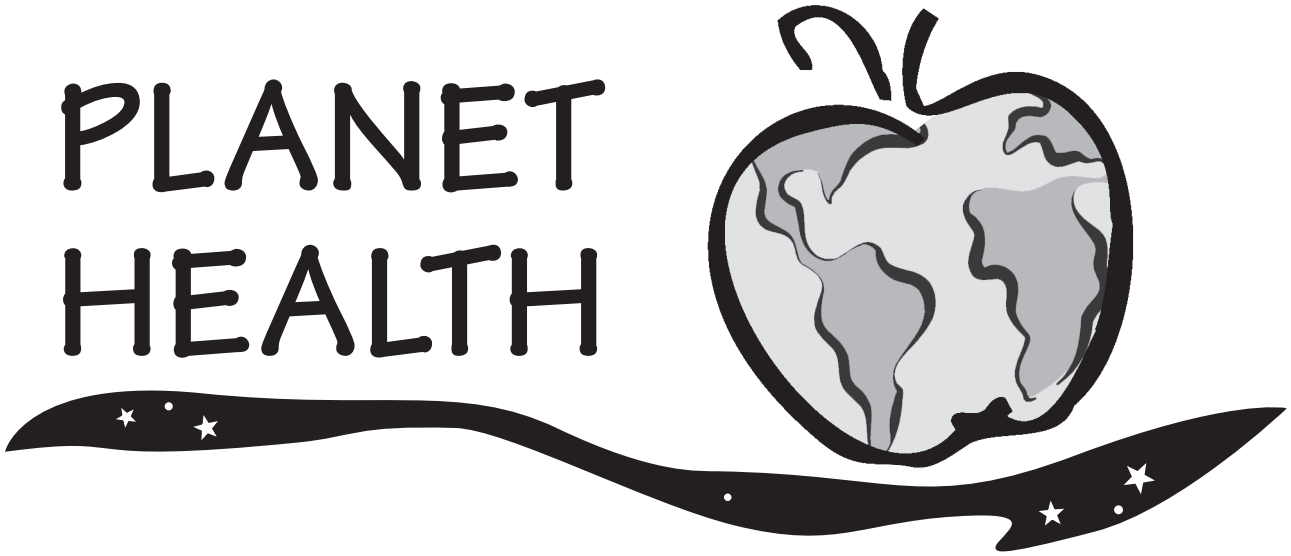
PLANET HEALTH



An Interdisciplinary Curriculum for Teaching Middle School Nutrition and Physical Activity

SECOND EDITION

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A Letter to Teachers

Dear Teachers,

Welcome to *Planet Health*, an innovative, interdisciplinary approach to health education. You can use this curriculum to teach students about nutrition and physical activity while building skills and competencies in language arts, math, science, social studies, and physical education. Focusing on this common instructional theme will strengthen connections among academic disciplines for students and teachers. Here's how it works.

Focusing on Wellness

Planet Health encourages students to think holistically about how health behaviors are interrelated. Exercises in self-reflection and skills-building help students choose healthy foods, increase physical activity, and limit TV and other screen time. Acquiring these habits in adolescence may increase lifelong health and wellness. Wellness, as we all know, makes everything else—including learning—possible.

Achieving Learning Standards

The *Planet Health* curriculum is aligned with the Massachusetts Department of Education Curriculum Frameworks (learning standards) for health, English language arts, mathematics, science and technology, and history and social science, and meets the standards in many other states.

Emphasizing Literacy Learning Across the Curriculum

Every *Planet Health* lesson incorporates a range of English language arts learning standards. Learning is accomplished through language—whether the subject is health, mathematics, science, or social studies—and literacy learning can be promoted in every major subject.

Fostering Constructivist Teaching and Learning

Planet Health draws on a constructivist approach to teaching and learning. Constructivist thinking emphasizes that students learn best when they actively construct meaning for themselves. Students come to the classroom with diverse knowledge and experiences. Constructivism encourages teachers to create learning environments that activate and build on this diversity in a manner that is active, inquiry based, and student centered.

Thus, each *Planet Health* lesson begins by activating and assessing prior knowledge. Lessons proceed to inquiry-based activities in which the students read, write, speak, listen, experiment, and reflect in order to answer health-related questions. *Planet Health* provides a range of teacher and student resources to support this inquiry.

Engaging Discussion and Cooperative Learning

Every *Planet Health* lesson specifies discussion ideas for small and large groups to cooperatively learn and solve health-related issues. Higher-level thinking and cognition are encouraged by using active discussion, and social development is enhanced by having students work with peers in groups.

We hope you enjoy *Planet Health!*

How to Use the CD-ROM

The *Planet Health* CD-ROM contains a PDF version of the book as well as other supplementary material that will help you teach the curriculum. When you're teaching lessons, you have two options for making student handouts and overheads. You can either photocopy them from the book itself, or you can print them out directly from the CD. In addition to handouts and overheads, the CD-ROM contains many other helpful resources:

- The complete *Planet Health, Second Edition*—This PDF version of the book makes it easy to print handouts and overheads.
- Parent Materials—Print these newsletters and fact sheets on healthy eating, physical activity, and screen time and send them home to parents so they can support you and your students on the journey to Planet Health!
- Teacher Training Materials—Also available at www.planet-health.org, this PowerPoint presentation will get you and your team started. You'll learn the science behind *Planet Health* and how to implement the program in your school.
- Web Resources for Healthy Eating and Active Living—Links to Web sites and other resources will help your school make space for fitness and nutrition and become a healthier environment.
- CDC School Health Index—The Centers for Disease Control and Prevention's School Health Index is an environmental assessment tool for schools concerned about their nutrition and physical activity policies.

Visit www.planet-health.org for more information about the *Planet Health* curriculum.

Acknowledgments

This has truly been a team effort if ever there was one.

The *Planet Health* curriculum was first developed and refined over a seven-year period by a team headed by Steven Gortmaker, Jean Wiecha, and Karen Peterson. Jill Carter, who patiently reviewed countless suggestions and edits resulting from endless discussions among all four authors, is the main writer of the curriculum. But this is just part of the story.

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Kate Crowley provided time, training, and technical assistance in the initial production phase of *Planet Health.* Will Beamer got us started, and Christopher Lavender provided "extreme" word processing and good cheer.

And then of course we began the process leading to the second edition. This time Suzanne Nobrega joined our team to coordinate the process of revising and updating. Some of our

first insights into what needed to change were provided by field work in implementing *Planet Health* in the Boston Public Schools. Invaluable assistance was provided by Allison El Ayadi, Bernard Fuemmeler, Shirley Handler, Stacey Johnson, Nancy Strunk (now deceased), and Deborah Korzec-Ramirez.

We then began our revision work by assembling the newest research on nutrition, physical activity, and television viewing to guide our health behavior goals for this edition. We are grateful to nutrition experts Dr. Walter Willett, Dr. Frank Hu, Dr. David Ludwig, and Dr. Dariush Mozzafarian, who advised us on the science that informed our updated health messages. The *Eat Well & Keep Moving* team of Dr. Lilian Cheung, Hank Dart, and Sari Kalin were our constant companions throughout the planning and writing of this book, collaborating on messaging, the CD-ROM, lesson revisions, and other aspects of the project. We appreciate their willingness to share ideas and work together to make *Planet Health* and *Eat Well & Keep Moving* true companion curricula.

We then spent several months testing our new messages for resonance in the community in the form of educational materials and guidelines to be used by parents and staff of youth-serving agencies. These materials are on the *Planet Health* CD-ROM. We would like to acknowledge our partnership with YMCA of the USA, which enabled us to field test and refine these materials. We want to thank several community partners for their expert critique of these materials: Vanessa Cavallaro, Jump Up and Go program director with Blue Cross, Blue Shield of Massachusetts; Elsie Taveras from Boston Children's Hospital; Margaret Dunn of Boston After School and Beyond; Jodi Figuerido of Massachusetts Office for Childcare Services; Daria Finelli of City of Boston; and Joan Orr from the Maine Youth Overweight Collaborative.

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Field testing of revised and new *Planet Health* lessons was done by numerous middle school teachers who were identified with the help of the Boston Public Health Commission's Healthy Choices program director, Chrissy Horan, working with regional coordinators Kimberly Mirsky, Eric Schiavino-Narvaez, June Skoropowski, and Courtney Cooke. Our sincere thanks to the middle school teachers across Massachusetts who tested our new (and newer) lessons, including Samantha Bailot, Elaine Goulas, Margaret Hagopian, Wendy Hanlon, Judy Hodgerney, Sharon Sarcinelli, Susan Strizzi, and Rhea Walia.

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Finally, we thank all of our families for those long hours when we seemed to disappear in the vicinity of a computer screen, and all the youth and families whose participation made *Planet Health* a reality. We're looking forward to trading this screen time for more active pursuits, and we hope you are too!

SECTION 1

Implementing *Planet Health* in Your School

Poor diet combined with physical inactivity are the second leading causes of death in the United States. These two risk factors contribute to the development of obesity, coronary heart disease, certain cancers, diabetes, and high blood pressure. Although the onset of these conditions may occur in adulthood, their roots may lie in childhood. Poor diet and inactivity are widespread among many children and youth.

Planet Health is an interdisciplinary middle school health curriculum that can counteract these trends by providing children with the knowledge and skills to develop healthy diet and activity habits for life. *Planet Health* is designed to fit easily into your existing math, science, social studies, language arts, health, and physical education curricula. Materials are aligned with the Massachusetts Department of Education (1999-2006) learning standards in these subject areas and fulfill standards in many other states. (See, for example, Texas Essential Knowledge and Skills at www.tea.state.tx.us/teks/index.html; Illinois Learning Standards at www.isbe.state.il.us/ils; California State Board of Education Content Standards at www.cde.ca.gov/be/st/ss; and Florida Department of Education Sunshine State Standards at www.cde.ca.gov/be/st/ss/.)

About the Curriculum

Through both classroom and physical education (PE) activities, *Planet Health* aims to improve students' fitness and nutritional status by improving dietary patterns, increasing physical activity, and decreasing inactivity, such as watching TV shows and playing computer games. Published research documents the program's effectiveness at changing these health behaviors and reducing obesity (Gortmaker et al., 1999).

Planet Health's success rests on the availability and interaction of its curriculum components. The *Planet Health* environment includes classroom lessons and physical education microunits. The classroom lessons start with the introductory lesson, Do You Make Space for Fitness and Nutrition? Next is Power Down, a TV-reduction lesson and campaign that offers a chance for students to chart their screen time and reflect on the role of this often overlooked health risk behavior in their lives. We recommend that this lesson be done a few months into the school year, after students have learned about *Planet Health*'s TV viewing health message. There are 33 additional classroom lessons in four subject areas: language

Facts About Children's Health

- Only one out of every five adolescents eats five or more fruits and vegetables (combined) each day.
- Three out of every four children are eating more saturated and trans fat than experts recommend.
- Only about one-half of young people participate regularly in vigorous physical activity.
- The percentage of young Americans who are overweight has more than tripled in the last 30 years.
- Many children spend more time watching TV than in any other activity besides sleep.

arts, math, science, and social studies. The physical education microunits contain 31 brief lessons and FitCheck, a tool for self-assessment of activity and inactivity.

Although implementing the full curriculum across grades and disciplines will maximize its potential impact on student health, your school may choose to pilot the curriculum on a smaller scale, teaching a selection of lessons in classes in one grade only, teaching the lessons only in health and physical education settings, or even beginning with classes in just one subject area.

Health Messages

Planet Health encourages students to "make space for fitness and nutrition" by reinforcing the following five health behaviors. These messages reflect the American Academy of Pediatrics' recommendation for TV viewing (1986), dietary goals in the U.S. Department of Health and Human Services and Department of Agriculture's *Dietary Guidelines for Americans* (2005), recommendations from the National Cancer Institute and the National Institutes of Health (1995), and newer science (Willett, 2005).

1. **Be physically active every day.** Adolescents should strive to accumulate 60 minutes or more of moderate to vigorous activity each day. To help achieve this, they should participate in at least three sessions per week of vigorous physical activity lasting 20 minutes or more. These guidelines are recommended minimum levels of activity for health (National Association for Sport & Physical Education, 2004; Sallis and Patrick, 1994; U.S. Department of Health and Human Services, 2000).
2. **Limit your screen time to no more than two hours per day** (American Academy of Pediatrics, 1986).
3. **Eat five or more servings of fruits and vegetables (combined) daily** (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2005; National Cancer Institute and National Institutes of Health, 1995).
4. **Eat more whole grains, less added sugar** (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2005). A simple way to reduce added sugar is to reduce intake of sugar-sweetened beverages.
5. **Eat foods low in saturated fat and containing no trans fat** (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2005; Willett, 2005).

Educational Approach

We use the term *interdisciplinary* to mean that key curriculum messages are presented using concepts from multiple subject areas. This approach amplifies opportunities to reinforce the health messages through diverse learning approaches. Students practice the behavioral skills of developing self-efficacy in making healthy food choices, being physically active, and trading screen time for active time. Self-assessment and goal setting encourage students to reflect on their current behaviors and make plans for change. Teaching these concepts across disciplines highlights their importance and establishes peer and teacher support for "lifestyle" changes in behavior.

Each classroom lesson incorporates subject-specific learning standards (i.e., the Massachusetts Curriculum Frameworks) so that skills and competencies that are required learning for middle school students are used as vehicles for conveying *Planet Health*'s messages. This strategy ensures that teachers will not lose valuable class time in implementing *Planet Health.*

Planet Health draws on a constructivist approach to teaching and learning (Phillips, 1995). The lessons begin with the activation and assessment of prior knowledge and build on what is known in an active, inquiry-based, student-centered manner. Students read, write, speak, listen, experiment, and reflect to answer health-related questions. They actively engage in brainstorming, debates, case studies, classroom demonstrations, games, group projects, and presentations. The lessons foster critical thinking and responsible decision making, in addition to offering skill-building exercises.

Planet Health also is rooted in social science theories of health behavior change. Behavioral choice theory was used by allowing youth to choose among alternative activities, a strategy that both increases a sense of control and reinforces healthy behaviors (Epstein et al., 1995). Social cognitive theory (Bandura, 1986) also was incorporated into the design of *Planet Health* to provide students with cognitive and behavioral skills that enable healthy change, strengthen competence, and foster support for healthy behaviors from other students, family members, and teachers in different subject areas (Gortmaker et al., 1999).

Planet Health is not about dieting or weight control. Putting the five *Planet Health* messages into practice can help everyone, children and adults, improve their current well-being and decrease their risks for many chronic conditions and diseases. When talking to students about these messages, teachers should emphasize the benefits of a healthy lifestyle and avoid conveying an attitude of restriction. Kids don't need to give up all high-sugar foods or TV. Moderation is the key. The *Planet Health* curriculum encourages students to think about their choices for nutrition and activity and gives them an opportunity to practice developing strategies for achieving these goals. As students gain knowledge and experience with healthy choices in a supportive social setting, these choices will become increasingly easier to maintain.

Program Background

Planet Health was first created under a grant from the National Institutes of Child Health and Human Development (NICHD) to the Harvard School of Public Health to develop, implement, and evaluate a curriculum designed to improve diet and physical activity in middle school students. The curriculum was tested by more than 100 teachers with about 2,000 students in four Boston-area school districts. During the two-year field-testing period, teachers contributed to curriculum revisions through written evaluations and focus groups. The recommendations made by these teachers helped create *Planet Health.*

Planet Health's effectiveness in five intervention schools was evaluated by comparing them with five similar schools that did not receive the curriculum during the field test ("delayed intervention" sites). This research design (randomized, controlled trial) is the best way to learn whether an intervention did its job. At the beginning and end of the two-year project, students at the 10 schools completed a questionnaire about their diet and activity patterns

and had their height, weight, and body fat measured by a professional team. Results from the intervention and delayed intervention schools were compared at the beginning of the study; students were similar to each other on characteristics important to the project. The project staff was therefore able to compare the results at the end of the study ("follow-up"). With this design, differences at follow-up are likely to be attributable to the *Planet Health* curriculum.

The randomized, controlled trial showed that *Planet Health* decreased obesity among girls over two school years. It reduced daily TV viewing hours in both girls and boys. Likewise, the program increased fruit and vegetable consumption and led to a smaller increase in girls' caloric intake. *Planet Health*'s impact on obesity seems to be due to reductions in screen time, because girls who reduced their TV time were less likely to be obese at the end of the study. Relative to students in delayed intervention schools, those in the intervention schools showed greater gains in their knowledge of diet and of physical activity. We found evidence for reductions in extreme dieting behavior in girls who participated in the *Planet Health* curriculum. These results were published in the April 1999 and March 2005 issues of the *Archives of Pediatrics and Adolescent Medicine* (Austin, Field, Wiecha, Peterson, and Gortmaker, 2005; Gortmaker et al., 1999). Further research is needed to explain the differences in *Planet Health*'s impact on boys and girls.

This second edition of *Planet Health* has been updated by taking into account our expanding knowledge of nutrition and physical activity among youth. Recent scientific studies have documented the importance of sugar-sweetened beverages as causes of overweight among youth (Ludwig, Peterson, and Gortmaker, 2001) and the importance of healthy and unhealthy fat and whole grains for preventing chronic disease (Willet, 2005), and continue to shed light on the role of television in children's nutrition (Bowman, Gortmaker, Ebbeling, Pereira, and Ludwig, 2004; Wiecha et al., 2006). Existing lessons have been revised and new lessons have been added to focus on these topics and provide students with the knowledge, skills, and experience to make healthy choices.

This edition contains an accompanying CD-ROM with teacher and student materials for easy use. New parental materials have been added so that teachers and principals can provide parents with better support. We have added a wealth of supportive materials so that teachers, students, and interested parents have tools that can help them improve their local food and physical activity environments, including the widely used School Health Index. Additional resources are provided to help in the development of local wellness policies.

Curriculum Components

Planet Health consists of two main sections: classroom lessons and physical education microunits. In the following section, we provide an overview of how to implement them in your school.

Classroom Lessons

Classroom lessons include the introductory class, Do You Make Space for Fitness and Nutrition?; lesson 2, Power Down, a TV-charting and -reduction activity; and 33 classroom lessons in four subject areas.

Part I: Foundation Lessons: Student Self-Assessment and Power Down

Do You Make Space for Fitness and Nutrition? (lesson 1) should be used to introduce students to the *Planet Health* curriculum and health messages. Students will assess their own nutrition and activity behaviors using a short questionnaire and demonstrate their understanding of these concepts by answering an open-ended, or "key," question. Students also graph the class's responses to the questionnaire, compare them to the *Planet Health* messages, and set

goals for improvement. The self-assessment can be repeated at the end of the school year to help students and teachers reflect on changes in students' knowledge and behaviors. This lesson can be taught in any subject area but is well suited for health, language arts classes that practice answering open-ended and key questions, and math or computer classes that incorporate student data and graphing as part of their curriculum.

Power Down (lesson 2) is a TV-charting and -reduction activity. We strongly encourage schools to consider Power Down a "must-do" lesson, preferably placed midway through the school year. Research indicates that *Planet Health*'s impact on obesity seems to be due to reductions in screen time. This lesson is a two-week exercise appropriate for use in a math, science, or health education class and is adaptable as a schoolwide campaign. Power Down asks students to assess and reflect on their current television, video, and computer habits in order to set goals for reducing their "screen time." This campaign complements the physical education FitCheck in section 3.

Parts II Through V

Parts II through V contain a total of 33 lessons in four major subject areas (language arts, math, science, and social studies) that address the *Planet Health* themes: eating five or more fruits and vegetables daily, more whole grains, less added sugar, and foods low in saturated fat and containing no trans fat; participating in daily physical activity; and limiting TV, videos, and computer games to no more than two hours per day. Health and consumer science teachers will find lesson options well suited for their curricula in each of the academic areas.

At the beginning of each part, a *Planet Health* At a Glance chart identifies for each lesson the subject area theme, level of difficulty, subject-specific skills, and materials. Lessons well suited for health classes are also highlighted with a ♡ on each chart. Additional background information is located in the appendixes at the back of this book.

All lesson plans provide the following:

- Summary paragraph
- Behavioral objectives
- Learning objectives
- Materials
- Teaching procedure
- Student activity sheets
- Teacher resources

Some lessons also include student resources, extension activities, answer keys, and overhead transparency masters.

Physical Education Lessons

The physical education curriculum contains the following:

- **31 physical education microunits.** Microunits are simple, five-minute lessons introduced by PE teachers during the warm-up or cool-down period of PE class. The microunits teach students about the health benefits of physical activity and motivate them to work toward their personal fitness potential. They encourage students to "make space" for physical activity in their lives by decreasing TV viewing and other "screen time" activities. These lessons help teachers assist students in meeting the National Association for Sport & Physical Education (NASPE) National Standards for Physical Education pertaining to health-related fitness. They can be easily integrated into other comprehensive health-related fitness education programs, such as *Physical Best* (Human Kinetics, 2005).

- **FitCheck.** This self-assessment tool coaches students to reflect on their current activity and inactivity levels and set goals for improving or maintaining healthy behaviors.

Students are encouraged to create goals that trade their inactive time for active time. They evaluate progress in meeting their personal goals by completing a FitCheck at least twice during the school year.

Each microunit includes:

- Fitness tip
- Fitness lesson
- How-To
- Questions for students

The microunits are designed to be taught during the warm-up or cool-down period of PE class. They take only five minutes to deliver, leaving as much time as possible for physical activity. The 31 lessons can be taught over two or three years and repeated in greater depth by using the lesson extensions provided in each microunit. We recommend that students complete FitChecks at least twice each school year.

For more information on how to use the PE curriculum, including the microunits and FitCheck, refer to page 444. Material in many of the microunits has been adapted from other sources (see page 448).

Getting Started

The *Planet Health* curriculum offers schools great flexibility in deciding which lessons are grade appropriate and when each lesson should be inserted into the ongoing academic curriculum. Ideally, each sixth-, seventh-, and eighth-grade teacher should teach two or three classroom lessons per year. However, schools new to the program may choose to pilot the curriculum on a smaller scale, teaching a selection of lessons in one grade only, teaching lessons only in health and physical education settings, or even beginning with classes in just one subject area.

We strongly recommend that clusters or departments coordinate to ensure that students first complete the introductory lesson, lesson 1, Do You Make Space for Fitness and Nutrition?, followed by language arts lesson 3, Food Power (this lesson is also well suited for a health or consumer science class). If this is not possible, teachers can spend a few minutes reviewing *Planet Health*'s five health messages as outlined in the introductory class, and the five food groups as outlined in lesson 3 before teaching one of the other lessons. (The next section addresses ideas on how to coordinate the program.) Departments should also coordinate efforts so that students will complete the two-week screen-time-reduction lesson, Power Down, midway through the school year. Schools new to the program may choose to do only the classroom lesson, but with more experience, they may want to expand their efforts to include screen-time-reduction contests and other schoolwide campaign activities. The CD-ROM provides links to additional resources on the Web that address TV-reduction strategies for youth.

The lessons within each subject area can be taught in any sequence. Some *Planet Health* teachers have preferred teaching two, three, or four lessons consecutively, whereas others preferred spreading them throughout the year. The choice is yours. For the most part, this decision will be driven by your own curriculum. Because the *Planet Health* lessons infuse health and fitness topics into activities that build middle school competencies and skills, you can teach them when you focus on the skills they address. For example, a social studies lesson on the democratic process focuses on nutrition and can be taught when you are teaching about citizen participation and lawmaking.

Even though *Planet Health* lessons include subject area skills, some teachers may be reticent about incorporating health topics into their already packed curriculum. This is understandable. We encourage you to stick with the curriculum for at least two years. Teachers who piloted the lessons reported that things generally seemed easier the second time through. Some believed that the curriculum strengthened their connections with students,

which made it easier to teach other subject matter. A large majority reported that *Planet Health* had a positive effect on their own health. For more information on how to use the *Planet Health* classroom curriculum, refer to Classroom Lessons on page 17.

Schoolwide Coordination

Planet Health's impact depends on how many opportunities students are given to learn in the program's environment. Ideally, students should experience the entire curriculum over two or three years. However, schools should be creative in starting *Planet Health.* If interdisciplinary teaching is new to your school, you may want to start small by beginning with just one or two subject area teachers and the physical education teacher. Additional subjects and teachers can then be added, building on your initial success.

As is true with all interdisciplinary curricula, implementing *Planet Health* in your middle school will take some initial planning. You may want to appoint one person to champion the program and coordinate the initial planning process. Nurses, health teachers, and PE teachers have taken on this role in many schools. We recommend that each department (language arts, math, science, social studies, and health and physical education) meet to review the lessons specific to its subject areas and decide which lessons should be taught at each of the three grade levels. Several planning tools have been included to help with this process.

The *Planet Health* At a Glance charts located at the beginning of each part in section 2 provide an overview, including a list of classroom lessons, *Planet Health* themes, level of difficulty, subject-specific skills, and materials. Some lessons are particularly well suited for teaching in health class. We've marked these with an icon ( ) for easy identification. We recommend that individual clusters or departments decide how (as a unit or spread throughout the year) and when during the year they plan to insert the lessons into the curriculum. Interdisciplinary coordination among physical education and major subject teachers can enhance the *Planet Health* experience for students and teachers alike.

At the end of the first year of implementation, teachers should meet to reevaluate their lesson choices and sequencing. Were they graded appropriately? Did they complement the existing curriculum?

Creating a Supportive Food and Activity Environment

It's easier to make healthy food and activity choices when you have a supportive school food service, physical education facilities, staff, and parents. Teachers of *Planet Health* may hear feedback from students about their local schools and communities. Typical questions include: Why do we have soda and sport drink machines at our school? Why do they sell soda and sport drinks at school events? Why don't they serve salads or whole grain breads in the cafeteria? Why don't they serve more fruits and vegetables? Why do the snacks in the vending machines have trans fat? Do the chicken nuggets contain trans fat?

Questioning students are motivated students, and teachers will recognize the opportunities to involve students, teachers, administrators, and parents in useful discussions about creating a healthier school environment. Tools included in the CD-ROM can be particularly useful. The School Health Index, developed by the U.S. government's Centers for Disease Control and Prevention, can assist in moving schools and communities toward healthier food and physical activity environments, and appropriate local wellness policies.

Addressing School Wellness Policy Requirements

As of September 2006, all U.S. schools that participate in the federal school lunch or breakfast program are required to establish a local school wellness policy (S.2507, Child Nutrition and WIC Reauthorization Act of 2004). The wellness policy must contain goals for nutrition education, physical activity, and other school-based activities designed to promote student wellness. Implementing *Planet Health* enables schools to address the educational component

of these requirements, using an interdisciplinary approach that minimizes the impact on other competing curricular demands. More important, *Planet Health* will provide students with the knowledge, skills, and behaviors they will need for lifelong wellness. Implementing *Planet Health* along with a supportive food and physical activity environment and policies will promote a school culture that encourages good nutrition and physical activity among students, staff, and parents.

Using the *Planet Health* Curriculum Guide

After reading this section, proceed to the section 2 opener, Classroom Lessons, or Teacher Introduction to the Microunits in the opener for section 3. These provide tips on how to coordinate, select, and teach the *Planet Health* lessons. Further implementation and training ideas can be found on the *Planet Health* Web site: www.hsph.harvard.edu/prc.

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Incorporating Planet Health Into Your School

Hold a training workshop.

↓

Departments meet to decide:
Which lessons will be taught in the 6th, 7th, and 8th grades?

↓

Clusters meet to decide:
Will the lessons be taught as a unit or spread throughout the year?

↓

Teacher decides:
How will I teach the lesson?
If there is more than one activity, which activities fit my students' skills and my time constraints?

Middle School Planner

					Grade		
Subject area	**Lesson**	**Lesson type**	**Page number**	**Lesson teacher**	**Sixth**	**Seventh**	**Eighth**
Section 2 Classroom Lessons							
Part I Foundation Lessons for Students	1 Do you Make Space for Fitness and Nutrition?		25				
	2 Power Down: Charting Screen Time	Lifestyle	54				
Part II Language Arts	3 Food Power	Balanced diet	71				
	4 Carbohydrate: Energy Food	Balanced diet	89				
	5 The Language of Food	Fruits and vegetables	105				
	6 Keep It Local	Fruits and vegetables	113				
	7 Write a Fable: Important Messages About Activity	Activity	120				
	8 Go for the Goal	Activity	131				
	9 Lifetime Physical Activities: Research One, Describe One, Try One!	Lifestyle	137				
	10 Choosing Healthy Foods	Lifestyle	144				
Part III Math	11 Problem Solving: Making Healthy Choices	Balanced diet	153				
	12 Figuring Out Fat	Balanced diet	169				
	13 Looking for Patterns: What's for Lunch?	Balanced diet	179				

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					Grade		
Subject area	**Lesson**	**Lesson type**	**Page number**	**Lesson teacher**	**Sixth**	**Seventh**	**Eighth**
	14 Apples, Oranges, and Zucchini: An Algebra Party	Fruits and vegetables	200				
	15 Plotting Coordinate Graphs: What Does Your Day Look Like?	Activity	204				
	16 Survey the Class	Activity	216				
	17 Circle Graphs: Where Did the Day Go?	Lifestyle	222				
	18 Energy Equations	Lifestyle	233				
Part IV Science	19 Passing the Sugar	Balanced diet	243				
	20 Mighty Minerals: Calcium and Iron	Balanced diet	259				
	21 Fat Functions	Balanced diet	282				
	22 Smart Snacks	Balanced diet	294				
	23 The Plants We Eat	Fruits and vegetables	311				
	24 Foods for Energy	Activity	325				
	25 Muscle Mysteries	Activity	337				
	26 The Human Heart	Lifestyle	351				
	27 How Far Can You Jump?	Lifestyle	360				
Part V Social Studies	28 Food Through the Ages	Balanced diet	371				
	29 Democracy and Diet	Balanced diet	382				
	30 Global Foods	Fruits and vegetables	391				

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(continued)

Middle School Planner *(continued)*

					Grade		
Subject area	**Lesson**	**Lesson type**	**Page number**	**Lesson teacher**	**Sixth**	**Seventh**	**Eighth**
Part V Social Studies *(continued)*	31 Around the World With Five a Day	Fruits and vegetables	404				
	32 Map Maker	Activity	413				
	33 Free to Be Fit	Activity	421				
	34 Impact of Technology	Lifestyle	426				
	35 Food Rituals and Society	Lifestyle	437				
Section 3 Physical Education Microunits							
Part VI Introducing Exercise and Fitness	1 Thinking About Activity, Exercise, and Fitness		453				
	2 Warm Up Before You Exercise		456				
	3 Cool Down After You Exercise		458				
Part VII FitCheck	4 Charting Your FitScore, Fit ★ Score, and SitScore		471				
	5 What Could You Do Instead of Watching TV?		474				
	6 Making Time to Stay Fit		476				
	7 Setting Goals for Personal Fitness		479				
Part VIII Getting Started	8 Let's Get Started on Being Fit		485				
	9 More About the Three Areas of Physical Fitness		488				

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

					Grade		
Subject area	**Lesson**	**Lesson type**	**Page number**	**Lesson teacher**	**Sixth**	**Seventh**	**Eighth**
	10 Frequency, Intensity, Time, and Type		490				
	11 Choose Activities You Think Are Fun		493				
	12 How Often Should I Exercise?		495				
Part IX Improving Fitness	13 Improving Cardiorespiratory Endurance		501				
	14 Improving Muscular Strength		504				
	15 Improving Flexibility		507				
Part X Measuring Fitness	16 Improving Your Overall Physical Fitness Levels		511				
	17 Knowing Your Resting Heart Rate		513				
	18 Exercise Makes Your Heart Beat Faster		515				
Part XI Be Active Now!	19 Be Active Now for a Healthy Heart Later		521				
	20 Be Active Now for Healthy Bones Later		523				
	21 Be Active Now to Stay in Shape		526				
Part XII Get Ready to Exercise	22 Energy for Exercise		531				
	23 Weather and Exercise		533				
	24 Getting Enough to Drink		536				
	25 Food and Supplement Myths		539				

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

(continued)

Middle School Planner *(continued)*

					Grade		
Subject area	**Lesson**	**Lesson type**	**Page number**	**Lesson teacher**	**Sixth**	**Seventh**	**Eighth**
Part XIII Fitness Is Fun!	26 Dance for Fitness		543				
	27 Calisthenics		545				
	28 Running, Jogging, and Fitness Walking		547				
	29 Swimming		549				
	30 Cycling		551				
	31 Yoga		554				

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Monthly Planner

	Language arts		Math		Science		Social studies	
Month	**Theme**	**Lesson**	**Theme**	**Lesson**	**Theme**	**Lesson**	**Theme**	**Lesson**
September								
October								
November								
December								
January								
February								
March								
April								
May								
June								

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Weekly Planners

Month of

Week	Language arts	Math	Science	Social studies
1: Theme Lesson				
2: Theme Lesson				
3: Theme Lesson				
4: Theme Lesson				

Weekly Planners

Month of

Week	Language arts	Math	Science	Social studies
1: Theme Lesson				
2: Theme Lesson				
3: Theme Lesson				
4: Theme Lesson				

Weekly Planners

Month of

Week	Language arts	Math	Science	Social studies
1: Theme Lesson				
2: Theme Lesson				
3: Theme Lesson				
4: Theme Lesson				

Weekly Planners

Month of

Week	Language arts	Math	Science	Social studies
1: Theme Lesson				
2: Theme Lesson				
3: Theme Lesson				
4: Theme Lesson				

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SECTION 2

Classroom Lessons

The *Planet Health* classroom curriculum is composed of an introductory lesson, Do You Make Space for Fitness and Nutrition?; a TV-reduction lesson, Power Down; and 33 lessons across the following subject areas: language arts, math, science, and social studies. Health and consumer science teachers will find lesson options well suited for their curricula in each of the academic areas. Read this section before proceeding to the lesson plans; it provides useful information on how to select and teach the lessons and how to incorporate them into your existing curriculum. Because the *Planet Health* curriculum also focuses on developing literacy across the curriculum, this introduction offers helpful suggestions on how to make every lesson literacy-rich.

Components of the Classroom Curriculum

The classroom curriculum contains an introductory lesson that includes Do You Make Space for Fitness and Nutrition? and lesson 2, Power Down, a TV-charting and -reduction activity, and four parts (one each for the subject areas of language arts, math, science, and social studies) with eight or nine lessons in each part.

The introductory lesson, Do You Make Space for Fitness and Nutrition?, should be used to introduce students to the *Planet Health* curriculum and health messages. Students will assess their own nutrition and activity behaviors using a short questionnaire and demonstrate their understanding of these concepts by answering an open-ended or key question. The self-assessment can be repeated at the end of the school year to help students and teachers reflect on changes in student knowledge and behavior. This lesson can be taught in any subject area, but is well suited for health classes, language arts classes that practice answering open-ended and key questions, and computer and math classes that incorporate student data and graphing into their curricula.

Each lesson addresses one of the five *Planet Health* themes: be physically active every day; limit your screen time to no more than two hours per day; eat five or more servings of fruits and vegetables (combined) daily; and eat more whole grains, less added sugar, and foods low in saturated fat and containing no trans fat.

At the beginning of each part, a *Planet Health* At a Glance chart identifies the subject area theme, level of difficulty, subject-specific skills, and materials needed for each lesson. Lessons well suited for health classes are also highlighted with an icon on each chart.

Lesson 2, Power Down, is a TV-charting and -reduction activity. This two-week exercise is appropriate for use in a math, science, or health education class, and is adaptable as a schoolwide campaign. Power Down asks students to assess and reflect on their current TV, video, and computer habits and strive to reduce their "screen time." You may choose to teach this in place of one of the other lessons listed under the activity or lifestyle theme. We recommend that schools view this as a "must-do" lesson and plan to incorporate it a few months into the school year.

Resources

Background information on nutrition (appendix A), physical activity (appendix B), TV viewing and other screen time (appendix C), useful in teaching lessons in all major areas, can be found at the back of this book. Appendix D contains resources for the social studies lessons. Appendix E contains a table that outlines how the lessons are aligned with the Massachusetts Curriculum Frameworks. Notes in the teacher resources for each lesson list the items in the appendixes that are most relevant. See page x for a list of contents available on the CD-ROM. New to this edition are parent resources that support the curriculum.

Lesson Design

All lesson plans provide the following:

- Summary paragraph
- Behavioral objectives
- Learning objectives
- Materials
- Procedure
- Teacher resources
- Student activity sheets, overhead transparencies, and student resources

Some lessons also include student resources, extension activities, answer keys, and overhead transparency masters.

Educational Approach

Each classroom lesson uses subject-specific skills and competencies to convey *Planet Health*'s messages. Innovative, student-centered teaching methods are used to engage students. For example, brainstorming, debates, case studies, classroom demonstrations, games, group projects, and presentations are incorporated into lesson activities. The lessons foster critical thinking and responsible decision making, in addition to offering skill-building exercises.

Planet Health addresses four major concerns in educational practice: achieving learning standards, emphasizing literacy learning across the curriculum, fostering constructivist teaching and learning, and emphasizing discussion and cooperative learning.

Achieving Learning Standards

The *Planet Health* curriculum is aligned with the Massachusetts Department of Education Curriculum Frameworks (learning standards). The lessons address learning standards in

health, English language arts, math, science, and social studies. As noted earlier, learning standards are similarly met in many other states.

Emphasizing Literacy Learning Across the Curriculum

In addition to encouraging learning standards from many curriculum areas, *Planet Health* emphasizes literacy learning in each lesson. With the recent nationwide focus on literacy, teachers seem to regularly ask themselves, How do I cover subject-area content while at the same time focusing sufficiently on literacy? A partial answer is that literacy learning should be a component of every lesson, whether the subject area is health, math, science and technology, or history and social science. Learning is accomplished through language, and literacy learning should be a part of all lessons. Every *Planet Health* lesson integrates a range of English language arts curriculum learning standards in a manner that will make classroom implementation easy. To assist you with long-term planning, the learning standards covered are outlined in appendix E.

Fostering Constructivist Teaching and Learning

Planet Health also draws on the constructivist approach to teaching and learning. Constructivist thinking emphasizes the idea that students learn best when they actively construct meaning for themselves. Students come to the classroom lessons with different knowledge and experiences. Constructivism encourages you to create learning environments that activate and build on this diversity in a manner that is active, inquiry based, and student centered.

Thus, *Planet Health* lessons begin by activating and assessing prior knowledge. Lessons proceed to inquiry-based activities in which the students read, write, speak, listen, experiment, and reflect in order to answer health-related questions. *Planet Health* provides a range of teacher and student resources to support this inquiry.

To promote this type of inquiry, multiple student resources are provided. *Planet Health* also points teachers to comprehensive nutrition and physical activity resources so that each teacher can knowledgeably facilitate students' learning experiences.

Emphasizing Discussion and Cooperative Learning

Every *Planet Health* lesson specifies discussion ideas for small and large groups to cooperatively learn and solve health-related issues. Higher-level thinking and cognition are encouraged by using active discussion, and social development is enhanced by having students work with peers in groups.

Incorporating *Planet Health* Into Your Curriculum

Ideally, each sixth-, seventh-, and eighth-grade classroom teacher should teach two or three lessons per year. The lessons within each subject area can be taught in any sequence. However, we strongly recommend that clusters or departments coordinate, to ensure that students first complete the introductory lesson, lesson 1, Do You Make Space for Fitness and Nutrition?, followed by language arts lesson 3, Food Power (this lesson is also well suited for a health or consumer science class). If this is not possible, teachers can spend a few minutes reviewing *Planet Health*'s five health messages as outlined in the introductory class, and the five food groups as outlined in lesson 3 before teaching one of the other lessons. Remember to coordinate lesson 2, Power Down, midway through the school year.

A middle school planner begins on page 10. It was designed to help you make your implementation plan and coordinate it with other *Planet Health* teachers. We recommend that you talk with other teachers to learn what lessons they are using and when they will

be introducing them. This approach will help you to build on and reinforce lessons taught in other classes. You will also need to be aware of which lessons other teachers introduced to your students last year.

Selecting Lessons

To help you identify lessons that best fit your curriculum objectives, consult the *Planet Health* At a Glance charts located at the beginning of each subject area. Each chart includes a list of lesson titles, themes, levels of difficulty, subject-specific skills, and materials needed. Lessons that are particularly well suited for health are identified with this icon: . You also may want to review the Massachusetts Curriculum Frameworks in appendix E for each lesson. These tables list the health, language arts, and subject-specific learning standards addressed by each lesson.

Familiarize yourself with the lesson(s) you have selected by reviewing the following sections in the order listed:

- Summary paragraph
- Behavioral objectives
- Learning objectives
- Materials
- Procedure
- Teacher resources
- Student activity sheets, overhead transparencies, and student resources

Many of the lessons offer a choice of activities. Adapt the lesson procedure to fit your teaching style, students' skills, and time constraints.

Resources

A teacher resource section follows the procedure in each lesson. This section contains health-related information specific to the lesson. The material in this section is meant to serve as a resource for teachers, not to be presented in its entirety to students. General resources on nutrition and physical activity are described in the appendixes.

Making Every Lesson a Literacy-Rich Experience

The *Planet Health* curriculum provides many opportunities to foster literacy learning. To make the most out of literacy-related activities, a teacher may choose to focus on reading comprehension, pose questions, emphasize key vocabulary prior to reading, refine word identification strategies, or encourage students to work through steps in the writing process.

Focusing on Reading Comprehension

Prepare your students for reading by giving them a framework (or umbrella idea) that helps them more easily understand what they will read. For example, you could say, "We will now read Carbohydrate: Energy Food (lesson 4). This lesson will help us to understand the role of carbohydrate in a healthy diet and will help us to understand what foods contain carbohydrate."

Posing Questions

A second way to focus on reading comprehension is to help students pose questions that will be answered by reading. A teacher may follow the framework for comprehension used earlier, requesting that students read Carbohydrate: Energy Foods with a mind toward answering the questions: What role does carbohydrate play in a healthy diet? and, What foods contain carbohydrate? Helping students to focus their reading in this manner will enhance their understanding of the specific material. Students can use this comprehension strategy with other reading materials.

Emphasizing Key Vocabulary Prior to Reading

Some words are more important to understanding text than others and are, at the same time, difficult to figure out using context and other word identification strategies. These words need to be taught prior to reading so that reading comprehension is not unnecessarily hindered. Examples of such words may be *balanced* (as in "balanced diet") or *glucose* (as in "blood glucose").

Refining Word Identification Strategies

Students can use several strategies to identify an unknown word. Teachers can model using a combination of the following strategies:

- Reading ahead and trying to figure out the word from context clues
- Sounding out the word or looking for "word chunks" and making a guess at how the whole word sounds

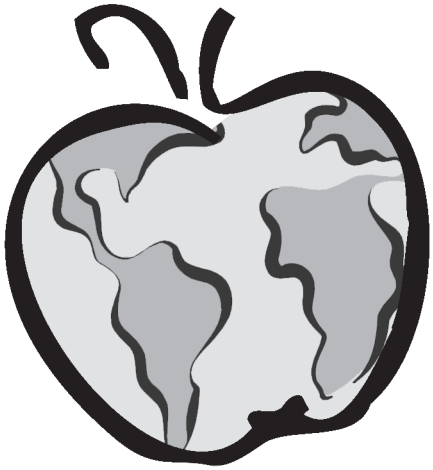
Encouraging Students to Work Through Steps in the Writing Process

In all writing activities, the teacher should encourage students to engage in prewriting activities (such as brainstorming and webbing), drafting (to get initial ideas down on paper), revising (to refine ideas), and editing and proofreading (to polish writing).

PART I

Foundation Lessons for Students

Lesson 1



Do You Make Space for Fitness and Nutrition?

Introduction: Student Self-Assessment

Use this lesson in the classroom to introduce students to the *Planet Health* curriculum and health messages. Students will assess their own nutrition habits and level of physical activity using a short questionnaire and demonstrate their current understanding of these concepts by answering an open-ended, or key, question. The self-assessment and open-ended question can be repeated at the end of the school year as a way of helping students and teachers reflect on changes in student behavior and knowledge in this area. This lesson can be taught in any subject and is well suited for science, math, and health classes or classes in which students practice answering open-ended, or key, questions. Student portfolios may also be used to document changes in student understanding and knowledge.

Behavioral Objective

For students to reflect on their eating habits and level of daily physical activity, and to be introduced to the *Planet Health* messages

Learning Objectives

Students will be able to do the following:

1. Accurately answer questions about their eating habits and level of daily physical activity
2. State the *Planet Health* messages
3. Interpret histograms and demonstrate their knowledge and understanding of the benefits of proper nutrition and physical activity by answering open-ended questions that require them to use higher-order thinking skills (interpret, analyze, evaluate, apply, connect, generalize, and predict)

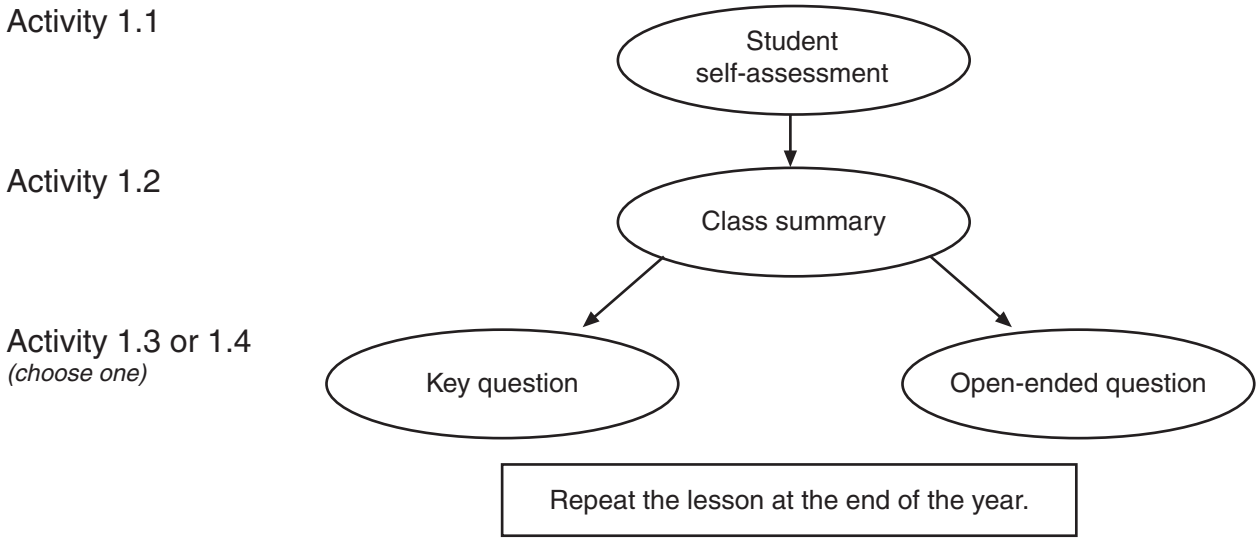
Materials

- Activity 1.1, Student Self-Assessment
- Activity 1.2, Class Summary
- Activity 1.3, Reflecting on Your Habits, a key question activity, or activity 1.4, What Do You Know?, an open-ended question activity
- Activity 1.5, What's in a Commercial?
- Parent letter (page 53)
- Overhead transparency 1.1, *Planet Health* Overview
- Overhead transparency 1.2, *Planet Health* Messages
- Overhead transparency 1.3, Yesterday I ate . . .
- Overhead transparency 1.4, In the past seven days . . .

Procedure

The purpose of this lesson is to introduce students to the *Planet Health* curriculum and health messages and to assess their current knowledge and behaviors related to eating and physical activity. To assess changes in student behavior, the lesson should be repeated at the end of the year.

Overview:

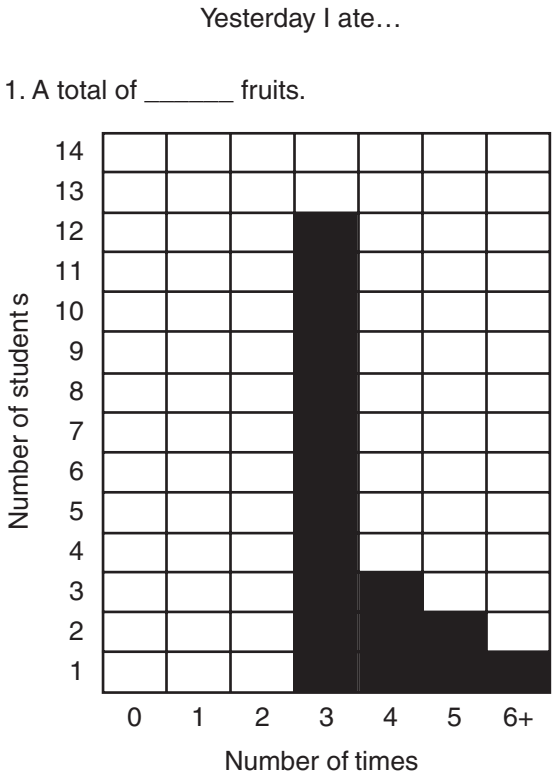


DAY 1

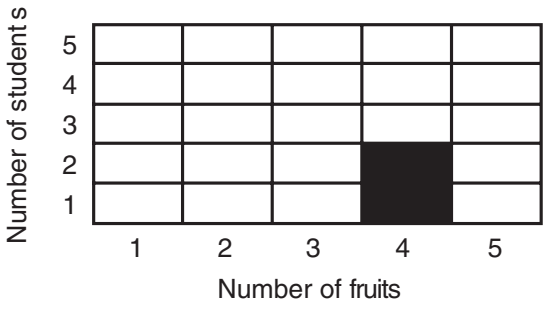
1. (5 minutes) Give a brief overview of the *Planet Health* curriculum. (See the Teacher Resources for help describing *Planet Health*.) You may want to display overhead transparency 1.1, *Planet Health* Overview, to help students see the big picture. Do not give much detail or background regarding the health messages at this point because this may affect student responses to the overview. Make the following points:
   - *Planet Health*'s goal is to encourage students to eat a healthy diet and be physically active.
   - Students will be involved with this curriculum in math, science, social studies, language arts, and physical education classes over the next few years.
2. (2-3 minutes) Hand out activity 1.1, Student Self-Assessment. Explain that the purpose of this activity is for students to reflect on their current eating and physical activity patterns.

3. (10 minutes) Have students complete activity 1.1.
4. (20 minutes) Graph the class data by having each student shade in the appropriate box on the histogram in activity 1.2, Class Summary. We recommend that you display an example of a completed histogram and go through a step-by-step explanation of how to graph student responses. For example, let's say your students totaled their fruit consumption and found the following:
   - Twelve students ate three fruits.
   - Three students ate four fruits.
   - Two students ate five fruits.
   - One student ate six or more fruits.

The graph would look like this:



Pass around the graphs on pages 43-48 so that students can graph their data anonymously. Each student locates the total number of fruits (or other food or activity) eaten on the *x*-axis, then shades in the blank box closest to the *x*-axis in that column. For example, if the first student ate four fruits, she would shade in the box that corresponds to four fruits (*x*-axis) and one student (*y*-axis). If the second student also ate four fruits, he would shade in the box that corresponds to four fruits (*x*-axis) and two students (*y*-axis). See the above graph.



As students take turns shading in their totals, a histogram representing the number of students in each category appears. This provides a method for anonymously tallying the class responses.

Other options for graphing class data are as follows:

- Use a show of hands to tally students' responses; then have a volunteer or volunteers graph the information.
- Collect the self-assessments and graph the data yourself.
- Make a graph with self-stick notes. This option is quick and easy but does not offer anonymity. Give each student a small self-stick note and ask them all to write their answers to the question (yesterday I ate . . .) on the note. Draw the axes of the graph on the board. Invite the students to come to the board and stick their notes in the column that corresponds to their answer. For example, for fruit, have them choose the column that corresponds to the number of times they ate fruit yesterday. Ask a student to copy the graphs on paper so that you can reflect back on them at the end of the year. Repeat this process for each graph.

5. While the graphs are being passed around, have students work on activity 1.3, Reflecting on Your Habits, or activity 1.4, What Do You Know?

   Activity 1.3 has a key question format. This activity requires students to do the following:

   - Compare their nutrition and physical activity patterns with the *Planet Health* recommendations and goals
   - Point out which goals they meet by providing supporting data from activity 1
   - Conclude whether "good nutrition and fitness" are a part of their lives
   - Identify issues in their daily habits or environment that make it difficult for them to achieve the goals

This activity gives students an opportunity to reflect on their own eating and activity patterns and practice answering key questions. Students will probably need to complete this assignment as homework.

Activity 1.4, What Do You Know?, consists of a brainstorming activity and an open-ended essay. Students will likely have very diverse background knowledge and experiences with nutrition and physical activity. This lesson will help you activate and assess their knowledge and understanding of good nutrition and adequate physical activity. It will also give students an opportunity to practice essay writing. Students will probably need to complete this assignment as homework.

For help grading these activities, see the answer keys on pages 34-36.

Activity 1.5, What's in a Commercial?, is an opportunity for students to collect advertising data during their normal television viewing time at home. Students write down the food and drink commercials they see while watching TV and compare each of the foods and drinks advertised with nutrition recommendations of *Planet Health.* They then rate each on whether it meets *Planet Health* recommendations by marking yes or no.

DAY 2

1. (10 minutes) Use overhead transparency 1.2, *Planet Health* Messages, to review the *Planet Health* goals for students. Display an overhead transparency of the class graphs from activity 1.2. Ask students to compare the class data with the *Planet Health* messages. What conclusions can they draw? What goals can the class set as a whole? Record and save these conclusions and goals on the Class Summary sheet.
2. (10 minutes) Discuss the following question: What are the benefits of a healthy diet and regular physical activity? Don't tell students the answer to this question. Use this as a brainstorming session, as well as an opportunity for you to get a feeling for what the class already knows about this subject.

3. (10 minutes) Discuss the following question: Why is television an important influence on health? Many students will state that TV gets in the way of being active or reading. Does anyone mention that the commercials they see are almost always for foods that are not healthy? Show a transparency with the activity 1.5 data collection options, and ask each student to name one memorable television commercial that advertises a food or a drink. Write these on the board. Now have the class discuss whether the advertised foods or drinks meet *Planet Health* recommendations. Do TV commercials promote healthy lifestyle choices? Ask the students whether they think the commercials affect the food choices they make.

END OF THE YEAR

1. Administer activities 1.1, 1.2, and 1.3 or 1.4 at the end of the year.
2. Discuss the class results. Ask students to compare the year-end graphs with those they made in the fall. Have the class's eating and activity habits changed? Did they reach their goals?
3. Grade activity 1.3 or 1.4 and assess whether students' knowledge, behavior, and ability to answer open-ended questions have improved during the year.

Extension Activities

1. Have students complete activity 1.3, 1.4, or 1.5 as homework.
2. Have each student take home a copy of the parent letter on page 53. Ask them to read it with their parents. You may want to ask them to get their parents' signatures acknowledging that they have seen the letter.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- U.S. Department of Health and Human Services and U.S. Department of Agriculture, *Dietary Guidelines for Americans* (see appendix A)
- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)
- Gortmaker et al., "Television Viewing as a Cause of Increasing Obesity Among Children in the United States, 1986-1990" (see appendix C)
- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix A)

SPECIFIC BACKGROUND MATERIAL

What Is Planet Health*?*

Planet Health is an interdisciplinary health curriculum that provides children with the knowledge and skills they need to choose nutritious diets and be physically active. Research shows that a good diet and adequate physical activity can significantly reduce the risk of obesity and chronic diseases, such as heart disease, high blood pressure, diabetes, and cancer. Yet many children today are not eating the fruits and vegetables or getting the physical activity they need to be healthy both now and in the future.

Planet Health provides children with the tools to turn this trend around! Through exciting lessons designed to be incorporated into math, science, social studies, language arts, and

physical education classes, the curriculum introduces and reinforces five simple health messages or goals:

1. Be physically active every day.
2. Limit your screen time to no more than two hours per day.
3. Eat five or more servings of fruits and vegetables (combined) daily.
4. Eat more whole grains and less added sugar.
5. Eat foods low in saturated fat and containing no trans fat.

Planet Health is *not* about dieting or weight control. Putting these five health messages into practice can help everyone, children and adults, improve their current well-being and decrease their risks for many chronic conditions and diseases. When talking to students about these messages, emphasize the benefits of a healthy lifestyle. Avoid conveying an attitude of restriction. Kids don't need to give up all high-sugar foods or eliminate TV. Moderation is the key. The *Planet Health* curriculum encourages students to think about their choices for nutrition and activity and gives them practice developing strategies for achieving these goals.

What Are the Benefits of Eating a Healthy Diet and Being Physically Fit?

Following are some benefits of good nutrition and physical activity:

- Eating well and being active help reduce the risk of obesity, heart disease, cancer, high blood pressure, and diabetes.
- Being physically active helps students feel better.
- Eating well helps children grow, develop, and do well in school.

Why Is Reduction of Television Viewing Included in This Curriculum?

Research has shown that television viewing affects both the physical activity and diet of youth (and children and adults too!) in very negative ways. Television advertising leads to excess energy intake and consumption of food low in nutritional value (e.g., soda, fast food). Television and other screen time leads to many hours per day of inactivity, limiting time for moderate and vigorous physical activity.

Why Do Children Need Encouragement and Education Around the Planet Health *Messages?*

Some facts about children's health in America:

- Only one in five adolescents eats the recommended number of daily servings of fruits and vegetables.
- Children are eating more saturated and trans fat than experts recommend.
- Only about one-half of young people regularly participate in vigorous physical activity.
- The percentage of young people who are overweight has more than tripled in the past 30 years.
- Many children spend more time watching television than in any other activity besides sleep.

How Does Your Personal Experience With Fitness and Nutrition Affect How You Teach Planet Health *Material?*

Many teachers are very interested in their diet and physical activity. Studies have documented that the same five strategies that work for youth in *Planet Health* are also relevant for adults. Your experiences in working on these issues for yourself, your family, and your friends can also be helpful as you guide students through the lessons. However, please refrain from talking about weight loss and dieting.

Children Are at Risk

The combination of poor diet and physical inactivity constitutes the second leading cause of death in the United States. Obesity, coronary heart disease, certain cancers, diabetes, and high blood pressure are affected by a person's diet and physical activity level. In many cases, disorders such as obesity and coronary heart disease begin early in childhood. Yet many children are not eating the food and getting the exercise they need to prevent these chronic diseases and promote lifelong good health.

It is especially troubling that as children age they become progressively less active and choose less healthy diets. Establishing healthy eating habits at a young age is critical because changing poor eating patterns in adulthood can be difficult.

Unfortunately, children do not always have the chance to benefit from a good diet and adequate physical activity. Food industry advertising encourages them to choose foods with unhealthy fat and added sugar. Inadequate safe play spaces may make it difficult for children to be physically active. Unlimited access to TV, videos, and computer games is also likely to make them less active. *Planet Health* encourages children to make healthy food choices, be physically active, and limit their screen time to less than two hours per day.

What Background Information Will Students Need to Complete the Planet Health *Lessons?*

The *Planet Health* curriculum teaches students how to eat a balanced diet based on the five food groups. Language arts lesson 3 provides teachers and students with an introduction to these principles and practice applying them. (This lesson is also well suited for a health or consumer science class.) We recommend that students begin with this lesson after the introductory class, because many of the other lessons assume that students are familiar with the five food groups. However, if it is not possible to fit lesson 3 into your schedule, spend a few minutes reviewing the food groups before teaching one of the other lessons. If you prefer, you can use the Food Guide Pyramid to teach about the food groups (see appendix A or go to www.mypyramid.gov). Teachers can also use the Balanced Plate for Health in appendix A (see page 559) to illustrate the food groups. Other lesson-specific background information is provided as student resource handouts within individual lessons.

The food groups provide a useful eating guide that helps people understand the various groups as well as the importance of variety, proportionality, and moderation in the diet. It tells us to choose foods from all of the food groups daily and to choose a variety of foods within each food group. Following these recommendations ensures that most people will consume essential nutrients sufficient to meet their dietary needs.

What Are the Five Planet Health *Messages?*

1. Be physically active every day.

How much activity is needed to obtain health-related benefits?

Moderate amounts of activity are recommended for people of all ages. However, physical activity need not be strenuous to be beneficial. Sixty minutes of moderately intense activity, such as walking, can generate genuine health benefits, such as reducing body weight and lowering the risk of heart attack, hypertension, and death. Some kind of regular vigorous activity, however, is the best way to improve cardiovascular fitness.

Physical activity recommendations for adolescents:

Adolescents should strive for 60 minutes or more of moderate to vigorous activity each day. To help achieve this, they should participate in at least three sessions of vigorous physical activity lasting 20 minutes or more each week. These guidelines are recommended minimum levels of activity for health.

What are the benefits of an active lifestyle?

Physical activity has the following benefits:

- Helps develop cardiovascular fitness, muscular strength, and confidence in physical ability
- Helps in maintaining a healthy body weight and reducing body fat
- Reduces stress and brightens a person's mood
- Lowers the risk of diabetes, high blood pressure, and colon cancer, which can lead to premature death

2. Limit your screen time to no more than two hours each day.

Why is television viewing a negative influence on health?

Research has shown that television viewing affects both the physical activity and diet of youth (and children and adults too!) in very negative ways. Television advertising leads to excess energy intake and consumption of food low in nutritional value (e.g., soda, fast food). Television and other screen time leads to many hours per day of inactivity, limiting time for moderate and vigorous physical activity.

How much time do adolescents spend watching TV?

According to Dietz (1991), American children spend more time watching TV than they do engaging in any other activity except sleeping. In 2005 the average adolescent viewed approximately 21 hours per week, but that number jumps to 28 hours when you include videos, DVDs, and prerecorded shows. This is nearly as much time as is spent in school. Add to this computers, video games, and other media that might be in use simultaneously and all together youth pack about eight and a half hours of media content into about six and a half hours of time every day. Essentially, for many children media consumption has become a full-time job!

What are the risks of a sedentary lifestyle?

Activity is required for health. Studies suggest that physically active people enjoy lower risks of developing cardiovascular disease, diabetes, colon cancer, osteoporosis, anxiety, and depression relative to sedentary people. Sedentary habits increase the risk of death from these diseases. TV viewing is one of the major causes of overweight (obesity) among youth. TV watching has also been associated with elevated cholesterol levels and poor cardiovascular fitness.

What are some examples of things you can do to increase your activity and decrease your inactivity?

Take the stairs; don't park next to the building; walk around the mall or the neighborhood with friends; watch only your favorite TV shows; remove or unplug the TV in your bedroom; play catch with a sibling, friend, or parent.

3. Eat five or more fruits and vegetables (combined) per day.

What are the main benefits of fruits and vegetables?

- Many are good sources of potassium, fiber, and vitamins C, A, and B.
- They are low in fat.
- They reduce the risk of certain forms of cancer.
- They provide nutrients important for immunity, healing, and healthy skin and eyes, among other functions.

How many fruits and vegetables should we eat daily?

The five-a-day campaign recommends five or more servings (combined) of fruits and vegetables a day. For adolescents, eating a fruit or vegetable with every meal and snack is a good goal to aim for without getting overly concerned with counting servings.

A serving size for foods in the fruit or vegetable group equals a medium-size piece of fruit, a small glass of 100 percent fruit juice, 1 cup of raw salad greens, 1/2 cup of cut-up fruit or vegetables, 1/2 cup of cooked vegetables or beans, or 1/4 cup of dried fruit. Many foods are typically eaten in portion sizes larger than one serving, so getting the recommended amount is easier than you may think.

4. Eat more whole grains and less added sugar.

Sugar-sweetened beverages (soda, sport drinks, fruit drinks) are the single largest source of added sugar in youths' diets. Because they offer so many calories and so little nutritional value, it is best not to drink more than two 8-ounce (250-milliliter) servings of sugar-sweetened beverages per week. Instead, choose water and low-fat (or fat-free) milk as primary beverage choices. Consume "sweets" only sometimes, and check food labels to avoid products with sugar in the first three ingredients.

Youth need between six and eight servings from the grains group every day, and at least three of those servings should come from whole grain sources to get the health benefits of fiber, plant oils, and other micronutrients that are not present in foods made with refined grains. A grains serving is equal to one slice of bread, 1 cup of breakfast cereal, or a 1/2 cup of cooked rice or pasta.

5. Eat foods low in saturated fat and containing no trans fat.

What are the recommendations for fat intake?

The type of fat you eat is more important to your health than the total fat in your diet. Unsaturated fat comes from plant and fish oils and includes both mono- and polyunsaturated forms. Unsaturated fat is liquid at room temperature (think of cooking oils). Research shows a strong association between these healthy oils and lower rates of heart disease and type 2 diabetes. Therefore, most of the fat you consume should be unsaturated. Sources include fish, vegetable cooking oils, nuts, seeds, and whole grains.

Saturated fat mostly comes from animal sources such as meat and dairy foods and is solid at room temperature (think of butter and lard). Eating too much saturated fat raises blood cholesterol and increases the risk for heart disease. Nutrition experts recommend limiting saturated fat to no more than 10 percent of calories in the diet to reduce the risk for heart disease. (Current American Heart Association guidelines are even lower.)

Trans fat is another type of unhealthy saturated fat. Most trans fat in the diet comes from vegetable oils that have been chemically modified through a process called

hydrogenation to improve the shelf life of foods such as baked goods, snack foods, and fast foods (think fried sandwiches and French fries). A much smaller amount comes from naturally occurring trans fat in certain types of meats. Trans fat is more heart unhealthy than saturated fat because it raises unhealthy LDL cholesterol and lowers protective HDL cholesterol. Because there is no recommended safe level of trans fat in the diet (Willett, 2005), it is best to eliminate it (at least what's commercially produced) completely.

Avoid trans fat by consuming only foods listing no partially hydrogenated vegetable oils in the ingredients, cooking with liquid vegetable oils instead of stick margarine or shortening, and choosing trans-fat-free foods when eating out (e.g., no French fries).

Should we try to eliminate fat from our diets?

No! Fat has many important functions in our bodies.

- Fat and oils (also called lipids) add flavor, aroma, and texture to food. Lipids provide a feeling of fullness because they take longer to digest than carbohydrate and protein and remain in the stomach for a longer time.
- Dietary fat is essential for the absorption of the fat-soluble vitamins A, D, E, and K.
- Fat is a major source of energy.
- Essential fatty acids are needed for normal tissue function throughout the body. Deficiency syndromes can develop if they are missing from the diet.

These are just a few important functions of fat. For a more complete list, see student resource 21.1, What's the Rap on Fat? (page 290). This lesson discusses the various types of fat and their impact on health.

Because saturated fat is contained in many foods that provide useful nutrients (meats and dairy products), it's not practical to eliminate these foods altogether. However, you can limit saturated fat to a healthy level by consuming low-fat or fat-free dairy foods and lean meats and by substituting vegetable oils for butter when cooking.

REFERENCES

Dietz, W. 1991. Physical activity and childhood obesity. *Nutrition* 7 (4): 295-296.

Willett, Walter C. 2005. *Eat, drink and be healthy: The Harvard Medical School guide to healthy eating.* New York: Free Press.

Answer Keys

TEACHER'S GUIDE TO GRADING THE KEY QUESTIONS (ACTIVITY 1.3)

You may design your own criteria for grading the key questions. We recommend assessing two criteria:

1. Comprehension and thoroughness of students' self-assessments of their eating and physical activity habits
2. Students' thesis statements

Tally the number of students who rate themselves as having healthy nutrition and physical activity habits and the number who don't think they have healthy habits. This assessment will give you information regarding your students' ability to answer key questions and their eating and activity behaviors. Repeat these tallies at the end of the year to determine whether there has been any change in your class profile.

Student Comprehension and Thoroughness

	Number of students	
Thorough understanding		
Basic understanding		
Basic but superficial understanding		
Little understanding		

Student Thesis Statements

	Number of students	
Yes, I have healthy eating and physical activity habits		
No, I don't have healthy eating and physical activity habits		
Other (make other categories as necessary)		

TEACHER'S GUIDE TO GRADING THE OPEN-ENDED ESSAY (ACTIVITY 1.4)

Decide whether you will grade the essay for content and style (grammar, punctuation, spelling, and format) or just content. We suggest that you grade the content as follows: Set the value of the content portion of the essay at 12 points. Students should address each of the five *Planet Health* messages in their essays. Give them a point for each correct piece of information. Subtract a point for incorrect information or misconceptions and for neglecting to mention any one of the messages. Credit a maximum of four points for any one health message; many points are possible.

Why Eat Five Fruits and Vegetables Every Day?

- Many are good sources of potassium, fiber, and vitamins C, A, and B.
- They are low in fat.
- They reduce the risk of certain forms of cancer. Eating more gets you more health benefits.
- They provide nutrients important for immunity, healing, and healthy skin and eyes, among other functions.

Why Eat Foods Low in Saturated Fat and Containing No Trans Fat?

- The U.S. *Dietary Guidelines* recommend consuming no more than 10 percent of calories from saturated fat, and there is no known safe level of trans fat. Future lessons will discuss the various types of fat in more detail.
- Fat has many important functions (see the Teacher Resources) in our bodies, so it should not be eliminated from our diets.
- Excess saturated fat can cause blocked arteries and the development of heart disease as well as certain cancers in the adult years.

- Arteriosclerosis, the process of fatty substances building up in the arteries, can begin early in life.
- Trans fat is more heart unhealthy than saturated fat because it raises unhealthy LDL cholesterol and lowers protective HDL cholesterol.

Why Be Physically Active Every Day?

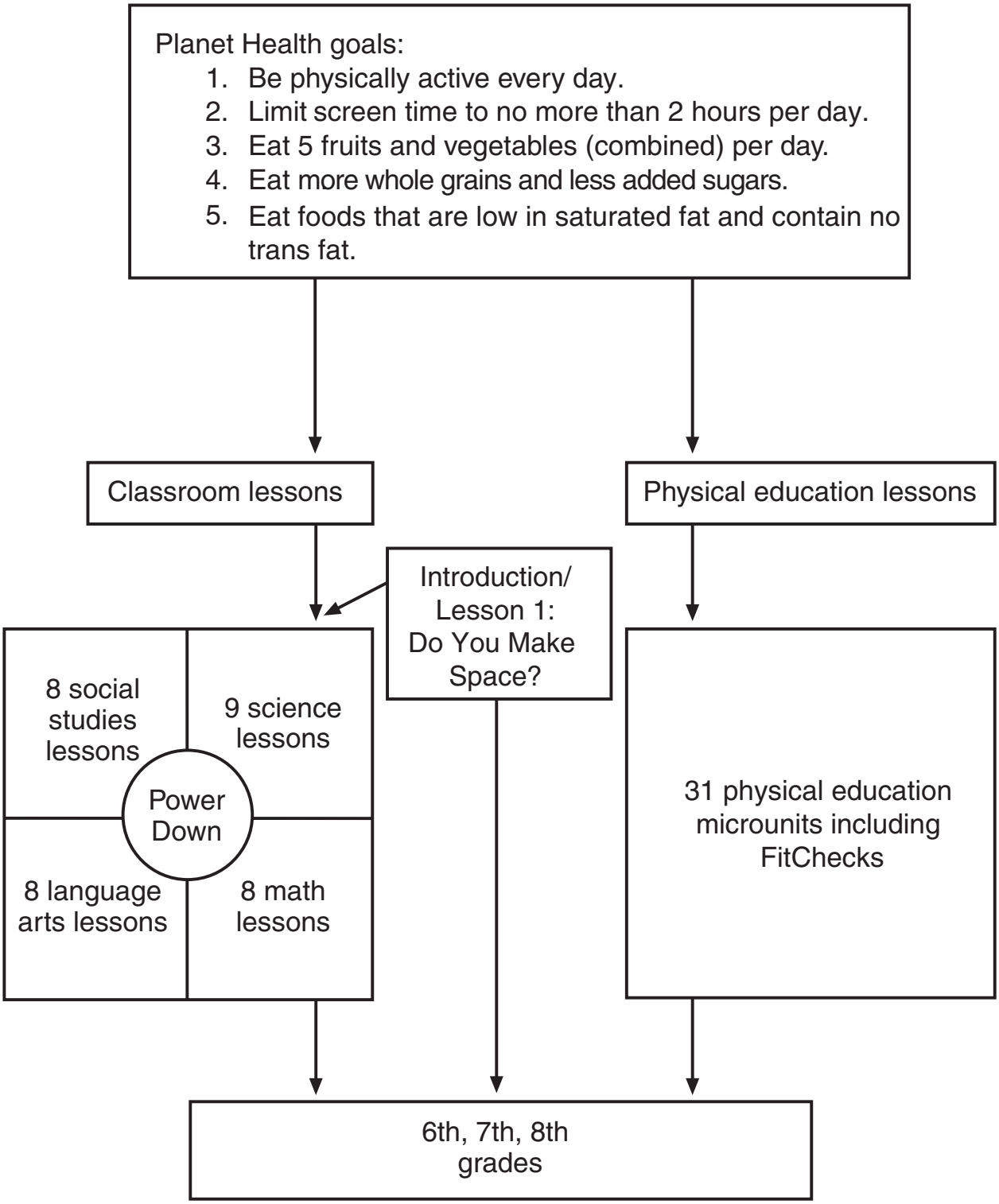
Physical activity has the following benefits:

- Helps develop cardiovascular fitness, muscular strength, and confidence in physical ability
- Helps maintain a healthy body weight and reduce fat
- Reduces stress and brightens a person's mood
- Lowers the risk of diabetes, high blood pressure, and colon cancer, which can lead to premature death
- Is fun

Why Limit Screen Time to No More Than Two Hours per Day?

- Activity is required for health. Studies suggest that physically active people enjoy lower risks of developing cardiovascular disease, diabetes, colon cancer, osteoporosis, anxiety, and depression relative to sedentary people. Sedentary habits increase the risk of death from these diseases.
- TV viewing has been linked to excess energy intake and consumption of food low in nutritional value (e.g., soda, fast food). Television and other screen time leads to many hours per day of inactivity, limiting time for moderate and vigorous physical activity.
- TV viewing is one of the major causes of overweight (obesity) among youth.
- TV watching has also been associated with elevated cholesterol levels, poor cardiovascular fitness, and less time spent reading and doing homework.

Planet Health Overview



From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Planet Health Messages

1. Be physically active every day.

2. Limit screen time to no more than two hours each day.

3. Eat five or more fruits and vegetables (combined) per day.

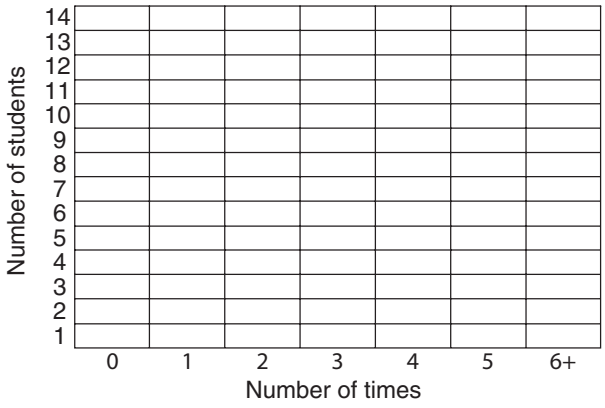
4. Eat more whole grains and less added sugar.

5. Eat foods low in saturated fat and containing no trans fat.

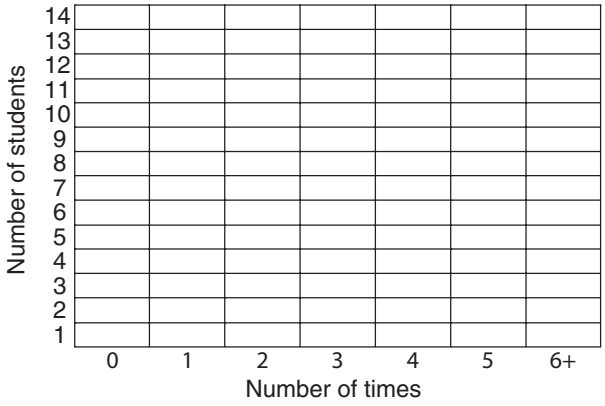
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Yesterday I ate . . .

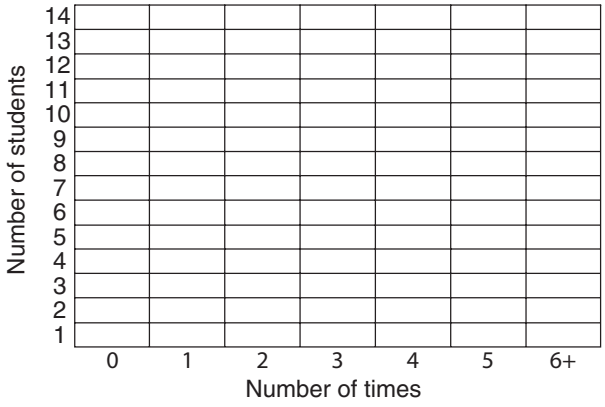
1. Fruit _____ times.



2. Vegetables _____ times.



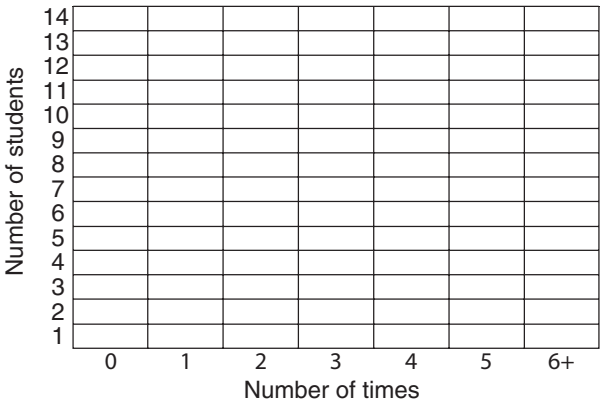
3. High-fat or high-sugar snack _____ times.



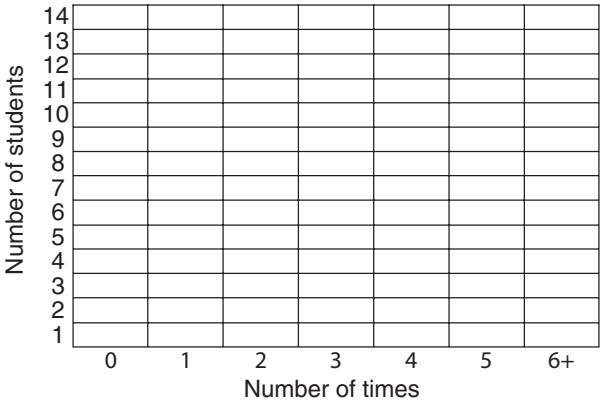
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

In the past seven days . . .

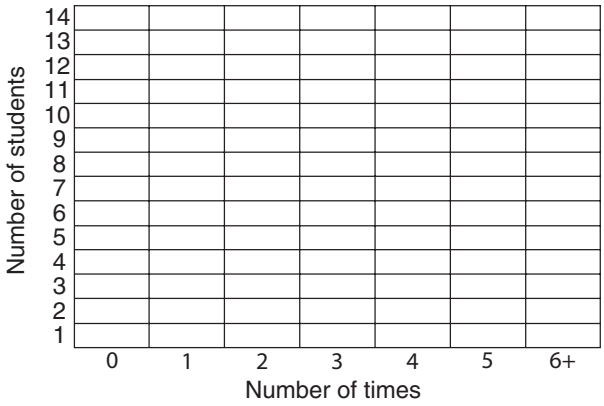
4. I participated in moderate physical activity for at least 60 minutes on _____ days.



5. I participated in vigorous physical activity for at least 20 minutes on _____ days.



6. I spent ***on average*** _____ hours each school day watching TV.



From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 1.1

Name _____

Student Self-Assessment

Do You Make Space for Fitness and Nutrition?

Think About Your Nutrition

Think about all the meals and snacks you ate yesterday from the time you got up until you went to bed. Answer the following questions as best you can. There are no right or wrong answers. Circle your response.

1. Yesterday, how many times did you eat fruit? (e.g., apples, oranges, grapes, bananas, melon, strawberries, peaches; *do not include fruit juice*)

   0 1 2 3 4 5 6 or more

2. Yesterday, how many times did you eat vegetables? (e.g., green salad, carrots, green beans, corn, broccoli, green peas; *do not include potatoes*)

   0 1 2 3 4 5 6 or more

3. Yesterday, how many times did you drink a sugar-sweetened beverage? (e.g., soda, punch, lemonade, Koolaid, other sweetened fruit drink)

   0 1 2 3 4 5 6 or more

Think About Your Physical Activity and Screen Time

Think about how active you have been during the past seven days. Think about the games you play, chores, sports, and other exercise or activity both in and out of school. Answer the following questions as best you can, and remember: there are no right or wrong answers. Circle your response.

4. On how many of the past seven days did you participate in physical activity for at least 60 minutes that did not make you sweat or breathe hard, such as fast walking, slow bicycling, skating, pushing a lawn mower, or mopping floors? (moderate activity)

   0 days 1 day 2 days 3 days 4 days 5 days 6 days 7 days

5. On how many of the past seven days did you exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard, such as basketball, soccer, running, swimming laps, fast bicycling, fast dancing, or similar aerobic activities? (vigorous activity)

   0 days 1 day 2 days 3 days 4 days 5 days 6 days 7 days

Think About Your Screen Time

Now think about a typical school day (Monday through Friday). Answer the following question, and remember that there are no right or wrong answers. Circle your response.

6. On an average school day, how many hours do you watch TV?

   None-1 hour per day 1-2 hours per day 2-3 hours per day 3-4 hours per day

   4-5 hours per day 5-6 hours per day 6 or more hours per day

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 1.2

Name _____

Class Summary

All class members should shade in one block on each graph. Have students refer to their self-assessments to determine how to respond to each statement.

Record the conclusions and goals emerging from the class discussion in the following tables.

	Conclusions
Vegetables	
Fruits	
High-fat and high-sugar snacks	
Daily activity	
Vigorous activity	
TV time	

	Goals
Vegetables	
Fruits	
High-fat and high-sugar snacks	
Daily activity	
Vigorous activity	
TV time	

(continued)

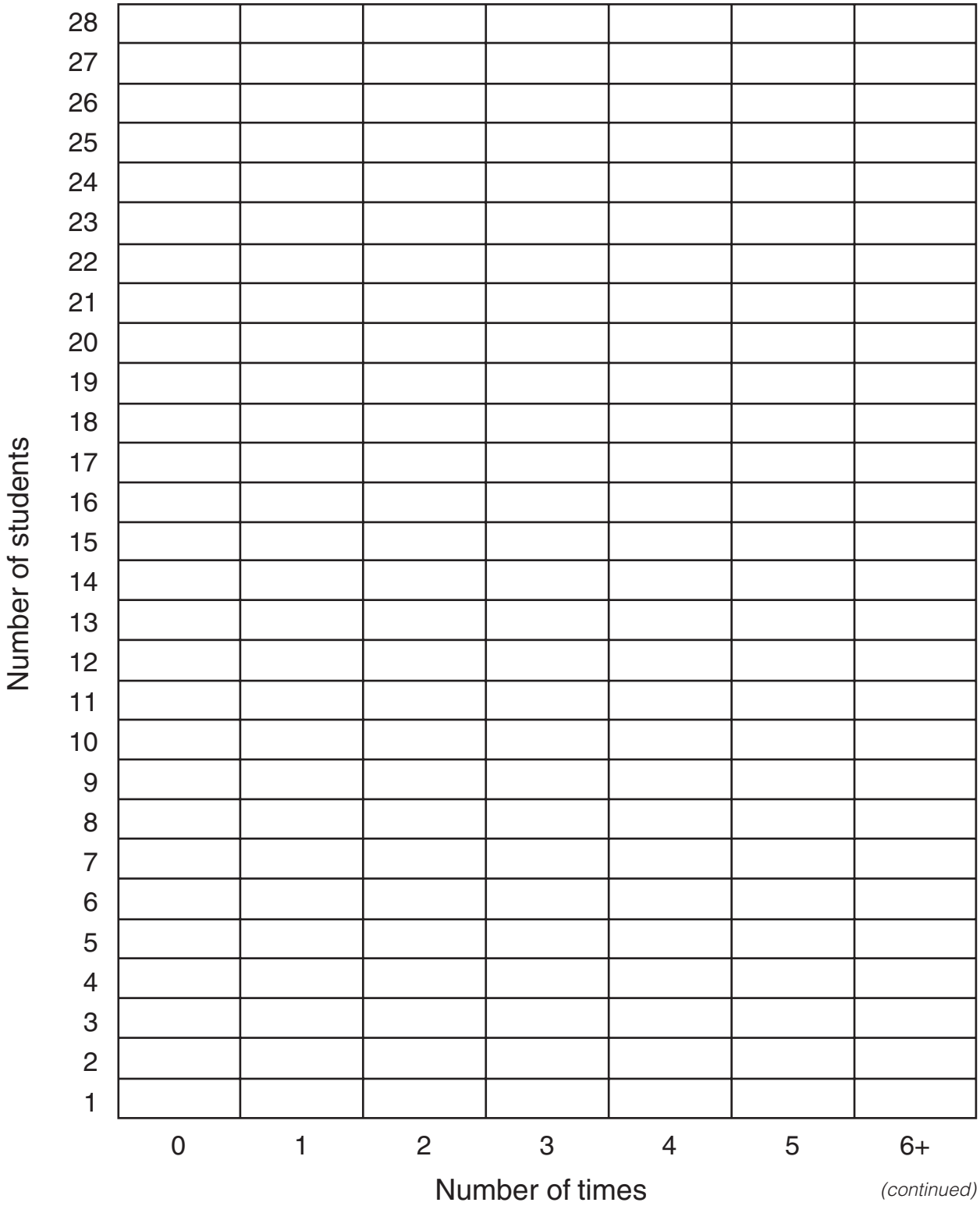
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Class Summary *(continued)*

Activity 1.2

Yesterday I ate…

1. Fruit _____ times.



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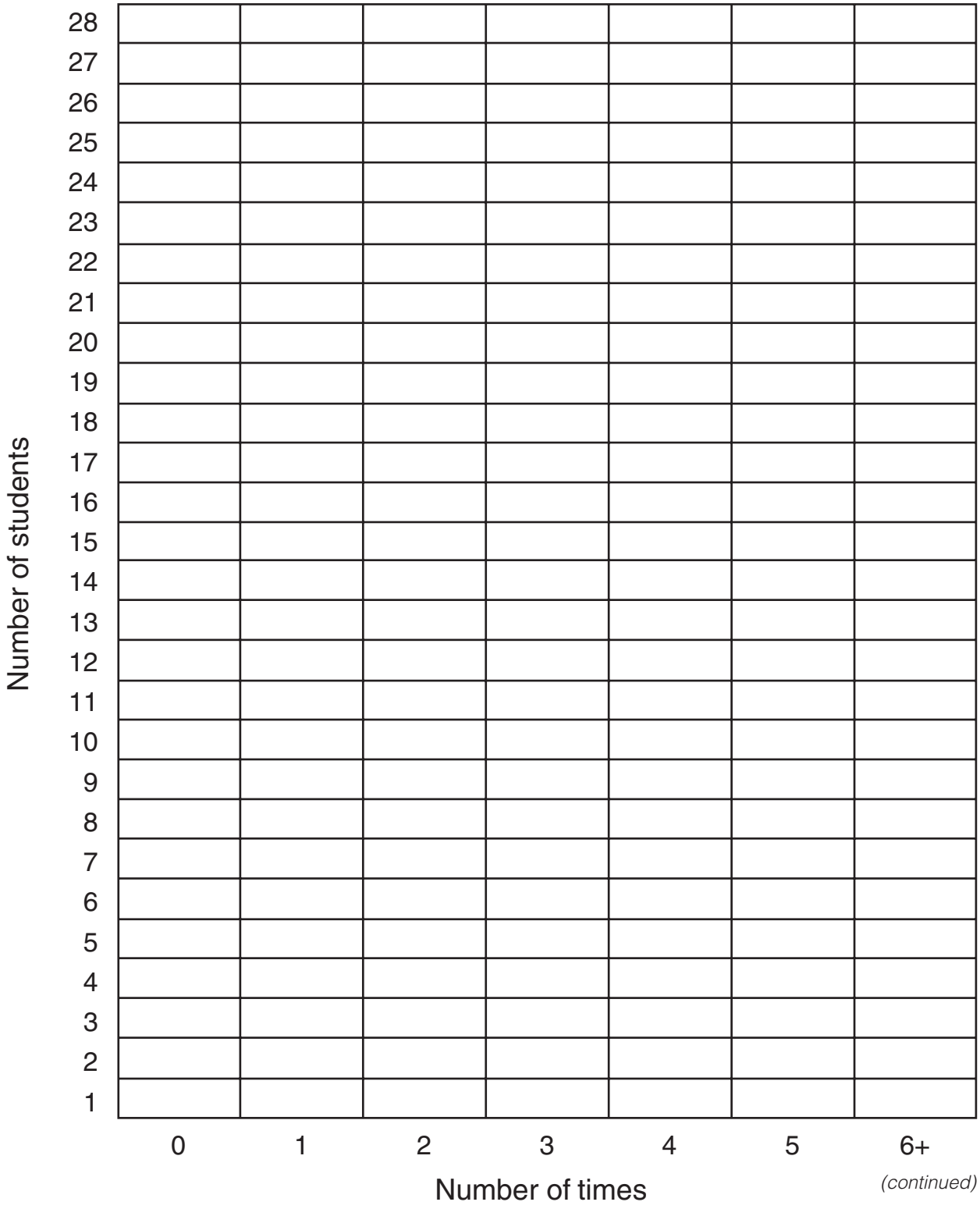
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Class Summary *(continued)*

Activity 1.2

Yesterday I ate…

2. Vegetables _____ times.



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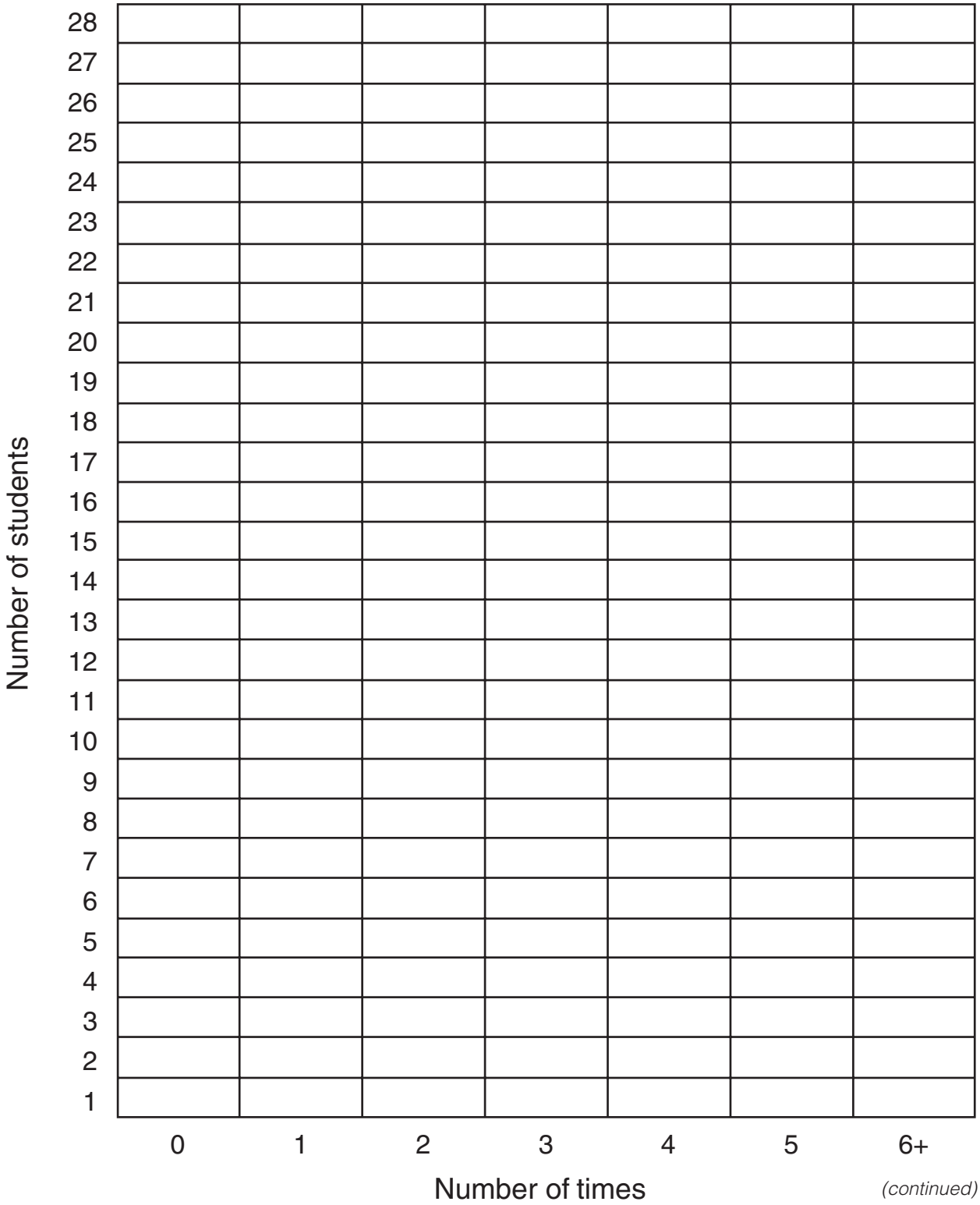
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Class Summary *(continued)*

Activity 1.2

Yesterday I drank…

3. Sugar-sweetened beverages (soda, punch, lemonade, etc.) _____ times.



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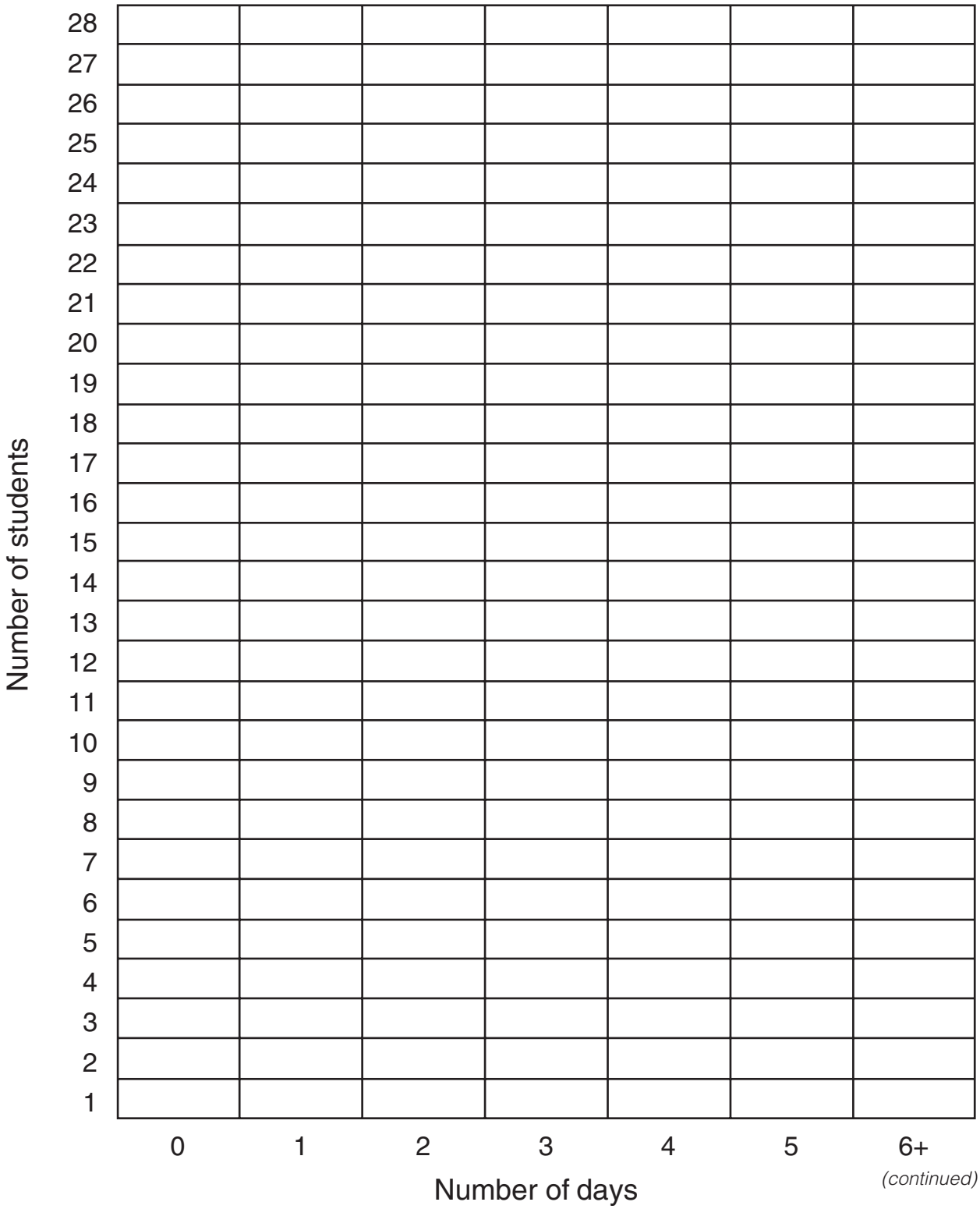
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 1.2

Class Summary *(continued)*

In the past 7 days…

4. I participated in moderate physical activity for at least 60 minutes on _____ days.



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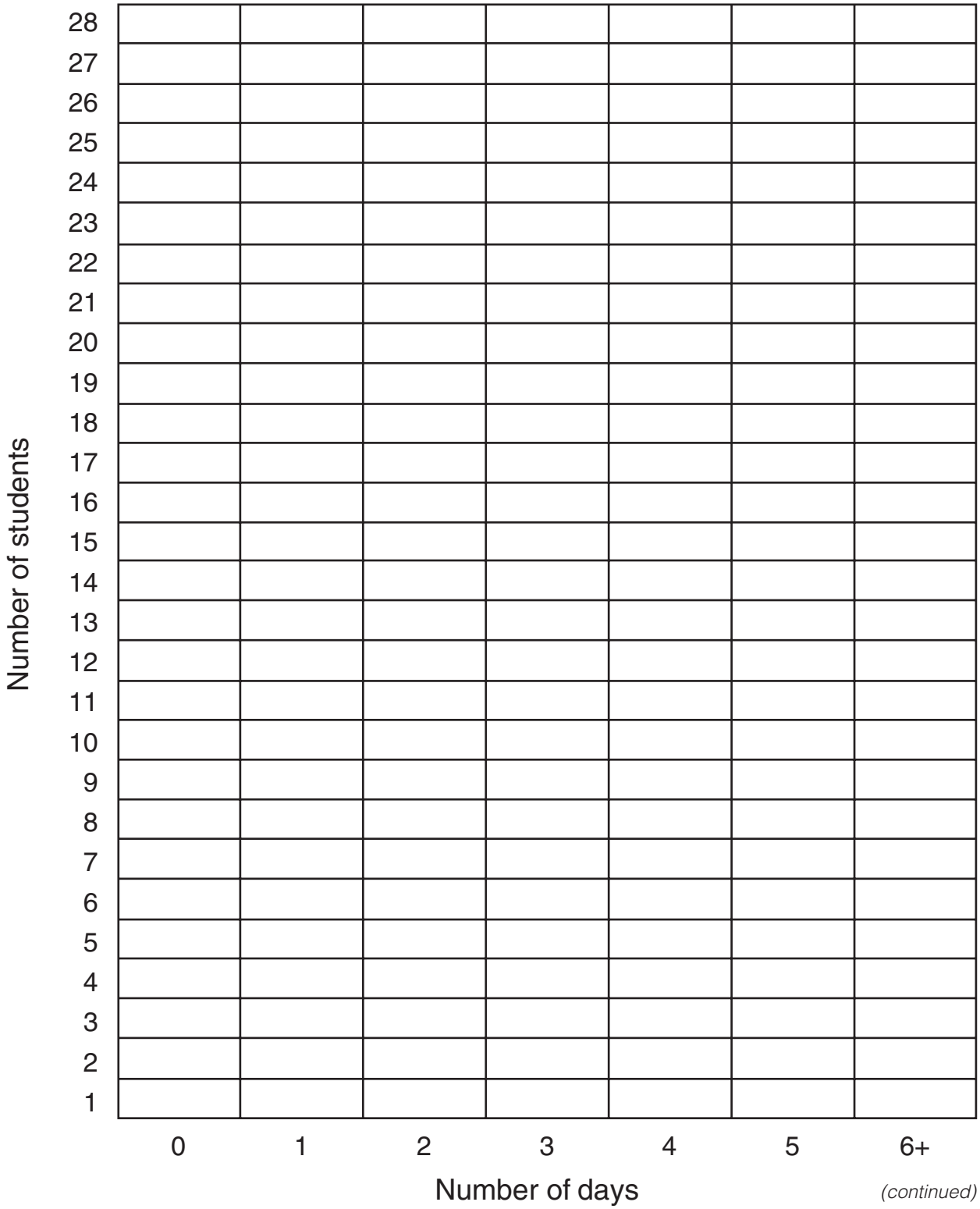
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 1.2

Class Summary *(continued)*

In the past 7 days…

5. I participated in vigorous activity for at least 20 minutes on _____ days.



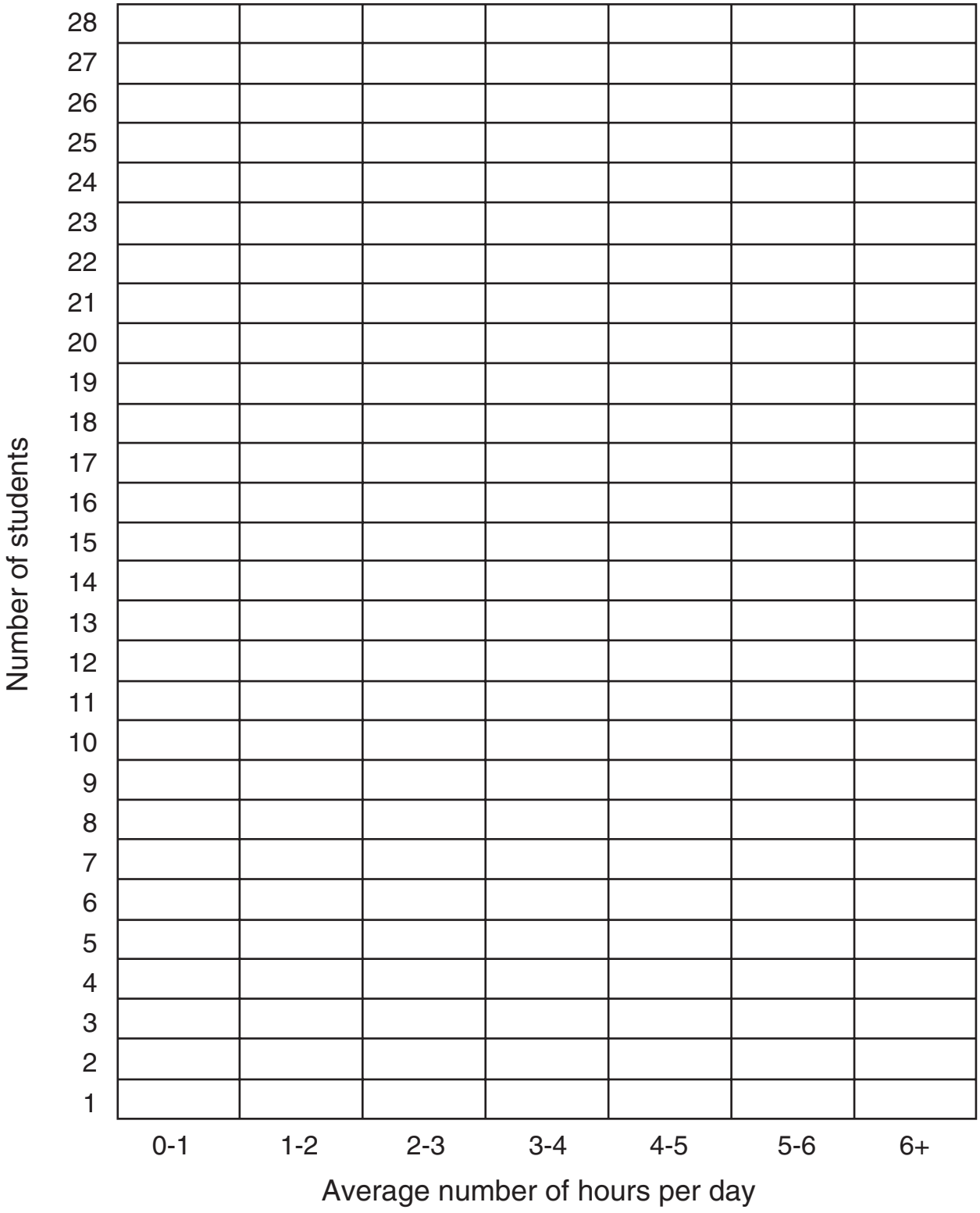
(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Class Summary *(continued)*

In the past 7 days…

6. I spent on average _____ hours each school day watching TV.



From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 1.3

Reflecting on Your Habits

Are You in the Habit of Eating Healthy Foods and Being Physically Active?

To help you answer this question, compare your eating and physical activity patterns in activity 1.1, Student Self-Assessment, with the following *Planet Health* recommendations. Point out which goals you meet by providing supporting information from activity 1.1. Conclude whether you are in the habit of eating healthy food and being physically active. Finally, if you don't meet one or more of the *Planet Health* recommendations, why not? Can you identify things in your daily habits or environment that make it difficult for you to reach these goals?

Planet Health Nutrition and Physical Activity Recommendations

1. Be physically active every day.
2. Limit your screen time to no more than two hours each day.
3. Eat five or more servings of fruits and vegetables (combined) daily.
4. Eat more whole grains and less added sugar.
5. Eat foods low in saturated fat and containing no trans fat.

Checklist for Answering Key Questions

Your answers should include the following:

_____ *Thesis statement:* A direct response to the question that includes your point of view.

_____ *Background:* A summary of important information related to the question that will help the teacher understand your point of view. This might be knowledge about nutrition and physical activity that you have learned in this class, in another class, or at home. The background information should be included at the beginning of a response, before or after the thesis statement.

_____ *Supporting details:* Evidence from activity 1.1 or other sources that supports your point of view.

_____ *Conclusion:* One or more sentences to bring the answer to a close, including a summary of your point of view and the most important details.

_____ *Correct format:* Use paragraphs; complete sentences; proper punctuation, spelling, and grammar; and clear penmanship.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 1.4

What Do You Know?

Complete the first chart by writing what you *know* about good nutrition in the "K" column, what you *think* you know in the "T" column, and what you *want* to know about this topic in the "W" column. Brainstorm what you know, think you know, and want to know about being physically active throughout your life in the second chart.

Topic: Good Nutrition		
K: I know	**T: I think I know**	**W: I want to know**

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

What Do You Know? *(continued)*

Activity 1.4

Topic: Being Physically Active Throughout Your Life		
K: I know	**T: I think I know**	**W: I want to know**

Open-Ended Essay

Examine the *Planet Health* recommendations for nutrition and physical activity. Based on what you know, explain why youth are encouraged to follow each of the following recommendations.

1. Be physically active every day.
2. Limit your screen time to no more than two hours each day.
3. Eat five or more servings of fruits and vegetables (combined) daily.
4. Eat more whole grains and less added sugar.
5. Eat foods low in saturated fat and containing no trans fat.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 1.5

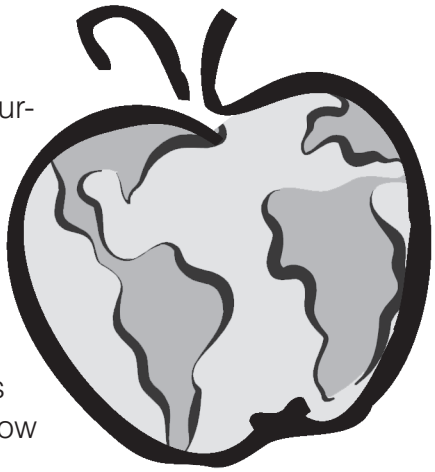
What's in a Commercial?

Write down the food and beverage commercials that you see while watching television at home. For each commercial, circle "yes" or "no" based on whether the advertised product meets *Planet Health*'s healthy eating guidelines.

Advertised foods and drinks	Meets *Planet Health*'s healthy eating guidelines?	
	YES	NO
	YES	NO
	YES	NO
	YES	NO
	YES	NO
	YES	NO
	YES	NO
	YES	NO
	YES	NO
	YES	NO
	YES	NO
	YES	NO
	YES	NO

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Information About *Planet Health*



Dear Parents,

Your children will be participating in an exciting health curriculum called *Planet Health*. *Planet Health* equips children with the knowledge and skills they need to choose nutritious diets and be physically active. Research shows that a good diet and adequate physical activity can significantly reduce the risk for overweight and chronic diseases, such as heart disease, high blood pressure, diabetes, and cancer. Yet many children today are not eating the fruits and vegetables or getting the physical activity they need to be healthy both now and in the future.

Planet Health provides children with the tools to turn this trend around! Through exciting lessons designed to be incorporated into math, science, social studies, language arts, and physical education classes, the curriculum introduces and reinforces simple health messages.

- Be physically active every day.
- Limit your screen time to no more than two hours each day.
- Eat five or more servings of fruits and vegetables (combined) daily.
- Eat more whole grains and less added sugar.
- Eat foods low in saturated fat and containing no trans fat.

Your child will receive up to 12 *Planet Health* lessons each year in grades 6, 7, and 8 as part of the math, science, social studies, and language arts curricula. The concepts will also be taught in physical education classes. These lessons give students the opportunity to read, write, speak, listen, experiment, work cooperatively, and think for themselves to answer health-related questions.

Planet Health was developed and evaluated by the Harvard Prevention Research Center on Nutrition and Physical Activity. The curriculum is a proven resource for improving student knowledge and helping students adopt healthier behaviors.

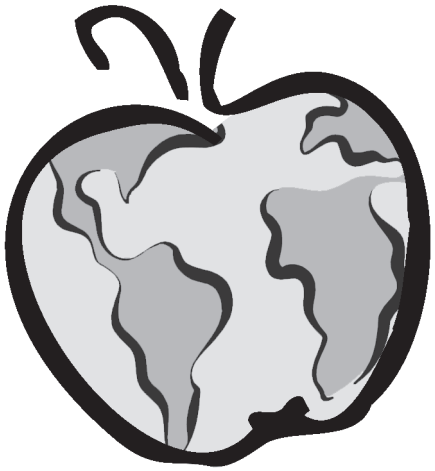
Please reinforce the *Planet Health* messages at home. Encourage your children to make healthy food choices, help them identify safe opportunities to be physically active, and limit screen time to no more than two hours per day.

Sincerely,

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 2

Power Down: Charting Screen Time



Lifestyle Theme

This lesson encourages students to keep TV, video, and computer game time to less than two hours per day. Students track and graph their own viewing time and try to decrease it for one week. This lesson is designed to infuse information about increasing physical activity and decreasing TV viewing into a math, science, or health class. Optional activities are also included for other subject areas.

Behavioral Objective

For students to keep their TV viewing and video game playing time to less than two hours per day

Learning Objectives

Students will be able to do the following:

1. Chart TV watching and video game playing for a two-week period
2. Create bar graphs, line graphs, or pie charts of their TV viewing time and video game playing time
3. Discuss the advantages and disadvantages of using the various types of graphs to represent data
4. Discuss the importance of accurate gathering and reporting of data
5. Calculate the amount of time they have spent watching TV and playing video games in their lifetime
6. Discuss the importance of increasing activity and decreasing TV viewing and video game playing to no more than two hours per day

Materials

- Graph paper, rulers, magic markers, poster paper, tape, protractor, and compass
- Activity 2.1, TV Viewing Charts (weeks 1 and 2)
- Activity 2.2, Interpreting Week 1 Data
- Activity 2.3, Interpreting Week 2 Data
- Overhead transparency 2.1
- Student resource 2.1, Graphing Data
- Optional: Class Data charts for extension activity 2.1 (weeks 1 and 2)

This lesson can also be implemented using a computer. Enter data into spreadsheets; then create charts and graphs.

Procedure

WEEK 1 (DAY 1)

1. (3 minutes) Ask students to estimate how many hours per day they spend watching TV and videos and playing video games. What is their hypothesis; how much TV do they think they watch? (Throughout this activity when we refer to TV viewing, we mean watching TV or videos or playing computer and TV video games.)
2. (5 minutes) Show overhead transparency 2.1. Point out the variables plotted on the *x*-axis and *y*-axis. Ask students the following:
   - In 1967 through 1970, how much TV was the largest group of children watching?
   - What about in 1990?
   - Where do you think you fall on this graph compared with children in 1990?
3. (2 minutes) Explain the following:
   - During the next two weeks you will record the actual time you spend on screen time: watching TV, movies, and videos and playing computer games and TV video games.
   - During the first week you should track your regular viewing pattern.
   - During the second week you will try to decrease your viewing time.
   - The purpose of this activity is for you to become aware of the time you spend in these sedentary activities and then to decrease that time.
   - You will have an exciting opportunity to participate in a scientific study, and accurate, honest reporting is as important as decreasing screen time. Statistics involves collecting, analyzing, and presenting data in an accurate manner. If you do not give honest information, the results won't be accurate.
4. (5 minutes) Hand out the TV viewing charts. Have students record their estimated viewing hours at the top of the chart for week 1. Explain that they should record their viewing daily for the next seven days on the top half of the chart. Remind them to round to the nearest half hour and to express numbers as fractions (e.g., 2 1/2 hours). We highly recommend that extension activity 2.1 be included during this week. Mention the first of the 10 Power Down Tips. You may choose to write a different one on the chalkboard every day or show them on an overhead. (See Teacher Resources.)

END OF WEEK 1

1. (5 minutes) At the end of the first week, ask students to calculate their total number of viewing hours for the week as well as their daily average.

2. (20 minutes) Have students graph their data. Student resource 2.1, Graphing Data, gives examples of types of graphs they might choose to construct. However, you may want to (a) ask students to brainstorm what types of graphs they think would best represent their data, or (b) assign students different types of graphs so that they can compare the advantages and disadvantages of representing data using bar graphs, pie charts, and line graphs.
3. (10 minutes) Have students complete activity 2.2, Interpreting Week 1 Data. This activity asks them to estimate the amount of time they have spent watching TV in their lifetime. It also asks them to interpret their graphs and brainstorm some alternative activities they might do in week 2 to replace some of their screen time. You could assign this for homework.
4. (5 minutes) Explain that during the second Power Down week, students should try to limit their viewing time to a maximum of two hours per day, as recommended by the American Academy of Pediatrics. Ask students why they think reducing viewing time is important. Refer them to their responses on activity 2.1.
5. After eliciting student ideas, emphasize the following:
   - Students should be active every day. Decreasing viewing time may encourage an increase in more active forms of entertainment.
   - Activity is required for health. Children need activity to develop cardiovascular fitness, muscular strength, flexibility, and confidence in their physical ability.
   - Just a small increase in physical activity can generate genuine health benefits. Refer to Teacher Resources for a further discussion of this topic.

WEEK 2

1. During week 2, have students record their viewing time on the bottom half of their TV viewing charts.
2. (5 minutes) Have the class brainstorm some alternative activities to replace watching TV (they should refer to the ideas they generated in activity 2.2). Record their suggestions on a large piece of paper that can be displayed in the classroom. We strongly recommend that extension activity 2.1 be included during week 2.

END OF WEEK 2

1. (15 minutes) At the end of the second week, have students calculate the number of hours watched per day and per week and graph their data.
2. (10 minutes) Students should compare their week 1 and week 2 graphs and use activity 2.3, Interpreting Week 2 Data, to help them analyze their results.
3. (5 minutes) Put students into groups of four. Have students share their graphs and results. Students should calculate the average change in TV viewing time for their group and report their findings to the class. If students used different types of graphs to display their data, they should discuss and record the advantages and disadvantages of each type of graphic representation.
4. (10 minutes) Have the groups report their findings to the class.
5. Ask students the following:
   - What conclusions can you draw from the class findings?
   - Did the class as a whole meet the goal of watching TV and playing computer games for two hours or less per day?
   - What recommendations about TV viewing patterns can you make?

Extension Activities

EXTENSION ACTIVITY 2.1

1. During week 1 and week 2, students should record their daily total viewing time on the Class Data charts. Having students record their data as they enter the classroom each day will help remind them of their assignment. (Consider making this an anonymous activity by assigning each student a number, so that they don't feel inclined to fabricate their data.)
2. At the end of week 1, ask several volunteers to calculate the class daily average for week 1 and to construct a bar graph of the results.
3. At the end of week 2, ask several volunteers to calculate the class daily average for week 2 and to add this information to last week's bar graph.
4. Collaborate with other classes to construct a display of the class graphs from all the classrooms participating in Power Down. Calculate the schoolwide average for weeks 1 and 2.

EXTENSION ACTIVITY 2.2

With your students, create a histogram that shows the frequency of total hours of screen time, comparing week 1 to week 2 of Power Down. Collect weekly totals for week 1 and week 2. Put the number of students on the vertical axis and the total range of hours on the horizontal axis. Separate the total number of viewing hours into five-hour ranges, beginning with 0-5 hours and ending with 20 hours or more. Shade your bars for week 1 to contrast them with week 2.

EXTENSION ACTIVITY 2.3

Have students ask older relatives or friends what they did as children to entertain themselves. They are likely to suggest good non-TV activities.

EXTENSION ACTIVITY 2.4

Have students make posters or collages of activities they could do instead of watching TV.

EXTENSION ACTIVITY 2.5

Have students create symbols, posters, or logos for the Power Down campaign.

EXTENSION ACTIVITY 2.6

Have students give their parents copies of the TV viewing charts and have them keep track of their viewing time.

Writing Activities

WRITING ACTIVITY 2.1

Ask students to write a report summarizing the purpose of the study, their hypothesis, graphs, calculations, and analysis questions on activities 1 and 2.

WRITING ACTIVITY 2.2

Write an essay about what life would be like without TV.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- Gortmaker et al., "Television Viewing as a Cause of Increasing Obesity Among Children in the United States, 1986–1990" (see appendix C)
- Henry J. Kaiser Family Foundation, *Generation M: Media in the Lives of 8- to 18-Year-Olds* (see appendix C)
- Institute of Medicine. 2005. *Food Marketing to Children and Youth: Threat or Opportunity?* (see appendix C)
- National Association for Sport & Physical Education. 2004. *Physical activity for children ages 5-12: A statement of guidelines,* 2nd ed. Reston, VA: National Association for Sport & Physical Education.

SPECIFIC BACKGROUND MATERIAL

Planet Health endorses the American Academy of Pediatrics' recommendation to limit TV viewing to no more than two hours per day of quality programming.

Planet Health's activity message: Physical activity promotes health and well-being and offers opportunities to socialize and have fun. Adolescents should be moderately to vigorously active for at least 60 minutes every day or nearly every day as part of play, games, sports, chores, transportation, and planned exercise. Vigorous activity should comprise at least 20 minutes of their total activity at least three days per week.

Included in the concept of TV time are the following: TV shows, videos, movies at theaters, and computer and video games. Students should aim for a daily average of two hours or less for all of these sources of "screen time" combined. Computer time spent doing homework is not targeted for reduction by Power Down.

POWER DOWN TIPS

These are 10 simple messages focused on decreasing TV viewing. You can write a different one on the chalkboard every day or use an overhead transparency.

Did You Know?

1. The average child spends more time watching TV than any other activity except sleeping.
2. Kicking the TV habit gets easier as time passes.
3. You don't have to sit still while watching TV—you can be dancing, cleaning, cooking, or doing something else.

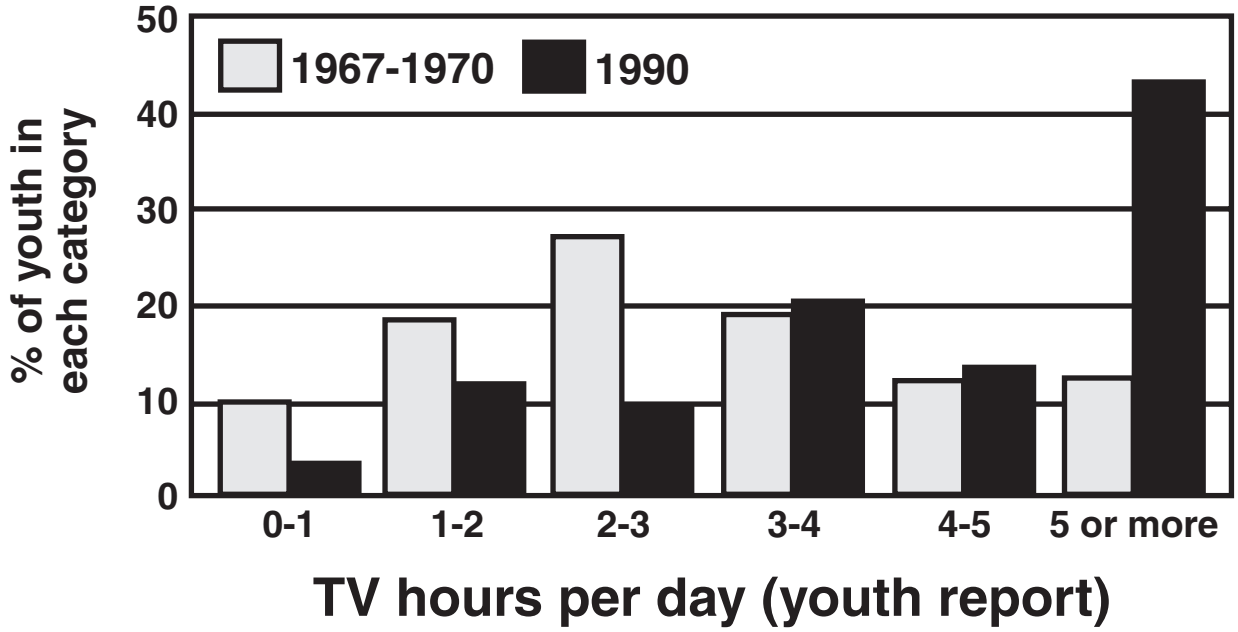
Strive to Decrease TV Time

1. In 2005 the average adolescent viewed TV approximately 21 hours per week, but that number jumps to 28 hours when you include videos, DVDs, and prerecorded shows.
2. One easy way to cut down on TV time is to take the TV out of the room where you sleep (if applicable). If you don't want to physically take it out of the room, you can just unplug it.
3. During Power Down week, post TV tracking reminders on refrigerators, bulletin boards, and near TV sets.
4. Watch TV only when your favorite show is on.

Trade TV Time for Active Time

1. Watching less than two hours of TV each day can help you get fit!
2. Take note of the times when you watch TV but you aren't really interested—when you channel surf or watch reruns. Take this as an opportunity to be physically active instead.
3. Physical activity builds fitness, is fun, and helps release energy! Just a small increase in physical activity can generate genuine benefits.

Hours of TV viewed per day in U.S. youth aged 12-17 in 1967-1970 vs. youth in 1990



From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics). Reprinted from S.L. Gortmaker, *National health examination survey, 1967-70* and *National longitudinal survey of youth, 1990.* Unpublished data.

Name _____

Student Resource 2.1

Graphing Data

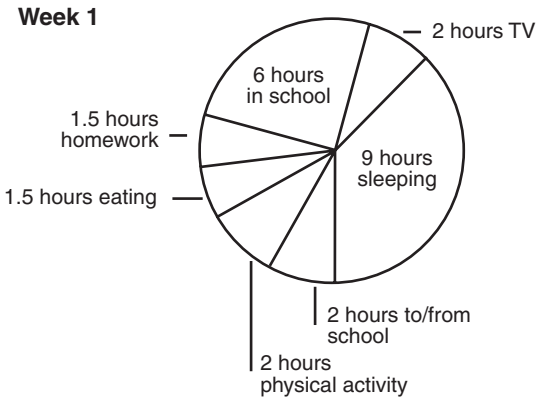
Choose one of the following types of graphs (pie chart, line graph, or histogram) to represent your TV viewing hours.

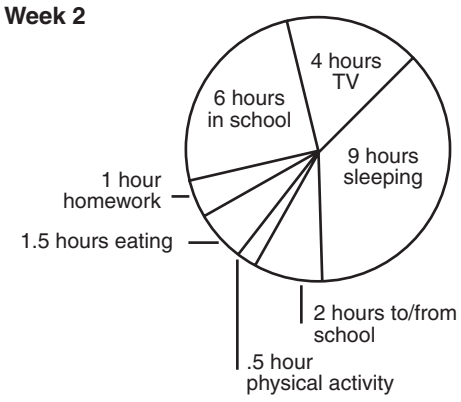
Pie Chart

How much time do you spend watching TV and videos and playing computer games?

- Take a *typical* day from week 1 and a *typical* day from week 2 (Power Down week).
- Create a pie chart for each week with the following categories: school; TV, computer games, and video games; sleeping; eating; homework; physical activity; going to and from school; and other. Round to the nearest half hour.
- Use a different color for each sector.

Daily Activity Pie Chart





Optional: Calculate the central angle of the sector for each activity. (Remember that the whole pie has 360 degrees.) Calculate the circumference and the area of your circle. Record your findings next to the pie charts.

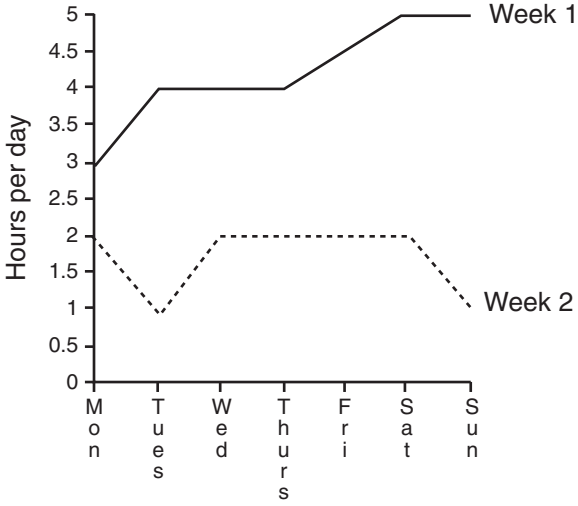
Line Graph

Create a line graph (or coordinate graph) comparing TV viewing time in week 1 and week 2 (Power Down week).

- Put the number of hours of TV watched on the vertical axis and the days of the week on the horizontal axis.
- Plot the hours per day you spent watching TV and videos and playing computer games.
- Use a solid line to connect week 1 data points and a dashed line to connect week 2 data points.

(continued)

Weekly TV Viewing Line Graph



From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

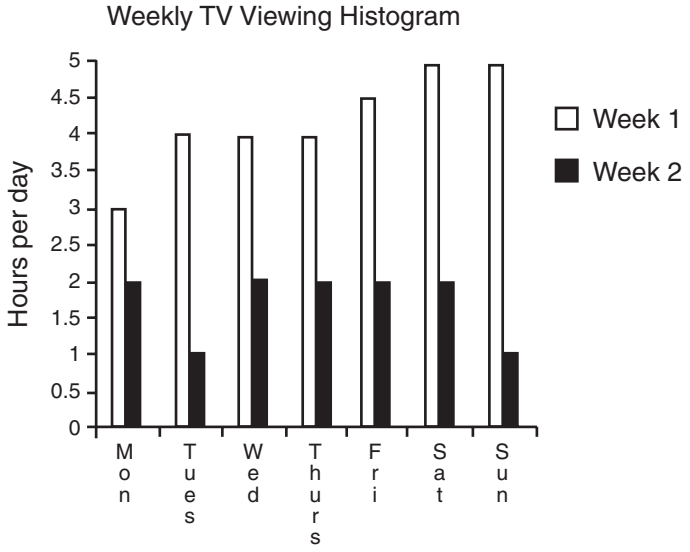
Student Resource 2.1

Graphing Data *(continued)*

Histogram

Create a histogram that compares the number of hours you spent watching TV during week 1 to the number of hours spent during week 2.

- Put the number of hours of TV watched per day on the vertical axis and the days of the week on the horizontal axis.
- Create one bar for each day you spent watching TV and videos and playing computer games. Do *not* shade week 1 bars.
- Add a shaded or colored bar next to each of your week 1 bars to represent your TV viewing for week 2 (see example).
- At the far right of the horizontal axis graph your week 1 and week 2 averages.



Optional: Chart the week 2 weekly averages as individuals and as a class.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 2.1

Name _____

Start date _____

TV Viewing Charts

Name:		Date started:		

Television Viewing Chart
Week 1

Estimated daily average prior to doing this activity:				
Day of week	**TV and videos on TV**	**Movies at the cinema**	**Computer/video games**	**Total time**
	(list time spent in each activity, rounded to the nearest half hour)			(add times across)
Saturday				
Sunday				
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Daily average:			**Weekly total:**	

Television Viewing Chart
Week 2

Day of week	**TV and videos on TV**	**Movies at the cinema**	**Computer/video games**	**Total time**
	(list time spent in each activity, rounded to the nearest half hour)			(add times across)
Saturday				
Sunday				
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Daily average:			**Weekly total:**	

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 2.2

Interpreting Week 1 Data

Answer the following questions based on the results of your week 1 TV viewing charts and graphs.

Graph Interpretation

1. On which days did you spend the most time in front of a TV, movie screen, or computer? Why did you watch more on those days?

2. On which days did you spend the least time on these activities? Why did you watch less on those days?

3. How did your daily *estimate* compare to your *actual* daily average?

4. How much higher or lower was your average daily viewing compared to the national recommendations?

5. Using your week 1 total viewing time as a weekly average, how much time have you spent on these activities in your lifetime? Explain how you came up with the answer.

Questions for Reflection

1. What is the role of TV and computers in your life?

2. Why is it important to limit your TV viewing and other screen time?

3. Compared to last year at this time, are you more or less active? Why do you think that your activity level went up or down?

4. Brainstorm five activities you enjoy doing that could replace screen time.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 2.3

Interpreting Week 2 Data

Answer the following questions based on the results of your week 1 and week 2 TV viewing charts and graphs.

Graph Interpretations

1. Describe how your viewing pattern changed during week 2.

2. How much higher or lower was your average daily viewing in week 2 compared to the national recommendations (two hours or less a day)?

3. Using your week 2 total viewing time as a weekly average, how much time have you spent on these activities in your lifetime? Explain how you came up with the answer. (Complete this on the reverse side.)

4. What is the difference between the total lifetime viewing calculated above and the total you calculated using week 1 data?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Extension Activity 2.1

Class Data Week 1

Student name	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly total
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
19.								
20.								
21.								
22.								
23.								
24.								
25.								
26.								

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Class Data *(continued)*

Extension Activity 2.1

Class Data Week 2

Student name	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly total
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
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18.								
19.								
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21.								
22.								
23.								
24.								
25.								
26.								

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

PART II

Language Arts

This part contains eight lessons. Use the following At a Glance chart to help you select the lessons that best fit your curriculum objectives. Lessons marked with a ♥ are especially well suited for health and PE classes. Some of the lessons offer a choice of activities. Adapt the lesson procedures to fit your teaching style, students' skills, and time constraints.

Lessons in this part meet many Massachusetts learning standards that may be similar to standards in your state. Refer to appendix E (page 571) to see which of the 1999-2006 Massachusetts Curriculum Frameworks (MCFW) each lesson incorporates. Please check the CD-ROM for parent information materials that support the lessons you teach.

Language Arts at a Glance

		Level of difficulty by grade*				
Theme	**Lesson**	**6th**	**7th**	**8th**	**Subject-specific skills**	**Materials needed**
Balanced diet ♥	3 Food Power	M	M	L	Persuasive writing	Posterboard
Balanced diet ♥	4 Carbohydrate: Energy Food	H	M	M	Reading comprehension, analyzing and interpreting nonfiction, concept mapping	Overhead transparency
Fruits and vegetables	5 The Language of Food	M	M	L	Writing and analyzing poetry	Dr. Seuss's *Green Eggs and Ham* (optional), assorted fruits and vegetables (optional)
Fruits and vegetables ♥	6 Keep It Local	H	M	M	Persuasive writing	Overhead transparency (optional)
Activity	7 Write a Fable: Important Messages About Activity	H	M	M	Reading comprehension; writing, critiquing, and revising fables	None
Activity ♥	8 Go for the Goal	M	M	L	Writing goals	None
Lifestyle	9 Lifetime Physical Activities: Research One, Describe One, Try One!	H	M	M	Research, writing nonfiction	Books on sports and leisure activities, access to the Internet (optional)
Lifestyle ♥	10 Choosing Healthy Foods	M	M	M	Persuasive writing	Advertisements (optional)

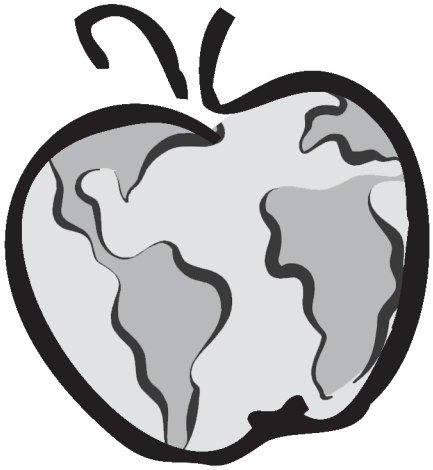
* Level of difficulty: L = low, M = medium, H = high.

Note: Some lessons require either a blank overhead transparency or a chalkboard.

Lesson 3

Food Power

Balanced Diet Theme



In this lesson students read an article on nutrition and apply the information contained in the article to categorize foods and plan menus. Through these activities they will be introduced to the concept of macronutrients (protein, carbohydrate, and fat) and micronutrients (vitamins and minerals) and learn how to choose foods from the five main food groups (grains, vegetables, fruits, dairy, and meat and beans group) that will provide them with a healthy balance of the nutrients they need. Finally, they will have the opportunity to write an opinion about whether their diets would be classified as a "healthy eating plan." Then, using the information provided in the nutrition article, they will be able to defend their assessment.

Behavioral Objective

For students to eat a balanced and varied diet based on the five food groups

Learning Objectives

Students will be able to do the following:

1. Read and understand informative and nonfictional text
2. Create a concept map using nutrition terms and vocabulary
3. Write clearly and persuasively
4. Categorize foods into the appropriate food groups, and use the information gathered to plan a varied and healthy snack menu

Materials

- Overhead transparency 3.1, A Balanced Plate for Health
- Student resource 3.1, What's With These Nutrients?
- Student resource 3.2, What's in a Group?
- Activity 3.1 Food Power: All You Need to Know for Health (informational reading)
- Activity 3.2, Nutrition Concepts and Vocabulary (worksheet and concept map)

- Activity 3.3, Food Group Categories and Situational Analysis
- Activity 3.4, Self-Reflection (can be given as homework)

Procedure

ACTIVITY 3.1: INFORMATIONAL READING AND ASSESSMENT

Activity 3.1 gives students the opportunity to discuss what they know about nutrition and healthy eating. They read an article that gives them an accurate description of what it means to eat healthfully and why they should pay attention to what they eat.

1. Begin the lesson by asking students to describe what "healthy eating" means to them and to list some things that they have heard about nutrition.
2. Explain how nutrition is an evolving science, and that the U.S. *Dietary Guidelines* and other nutrition recommendations are updated every few years to make certain that we take into account the latest science as we plan healthy meals and snacks.
3. Distribute the informational reading (activity 3.1) that outlines the *Planet Health* guidelines for healthy eating. You may want to read the material aloud as a group if your students are younger (sixth grade), taking time to explain key words and key concepts. Use overhead transparency 3.1, A Balanced Plate for Health to review the kinds of foods in each food group. Note that "sometimes foods" are on a separate side plate.
4. Discuss the reading by asking students to respond to the following questions:
   - What are the key components of a healthy eating plan? (See Specific Background Material under Teacher Resources for a description of the *Planet Health* guidelines for healthy eating.)
   - What are the two main categories of nutrients (macro- and micronutrients), and what makes them different from each other? *(Answer: Macronutrients provide energy; micronutrients include vitamins and minerals, which do not provide energy.)*
   - Name some examples of macronutrients and micronutrients.
   - What does it mean to eat a balanced diet? *(This can refer to the balance of food groups and to the balance between energy consumed and energy expended in activity.)*
   - How can you make sure you get enough of all the nutrients in your diet? *(Answer: Eat foods from all food groups plus different foods within each group.)*

ACTIVITY 3.2: NUTRITION CONCEPTS AND VOCABULARY

In this activity, students help you complete a concept map (part I) and also complete a worksheet (part II) that uses verbs to reinforce some of the nutrition concepts presented in the reading. The concept map will be most successful if your students are familiar with concept mapping or webbing. If they are not, you should precede the activity with the following explanation.

1. Explain the following:

Why should we do concept maps?

- They are important study tools that help you store information in your long-term memory.
- They help you figure out the main ideas in a piece of reading material.
- They help you organize new material and establish relationships among ideas.

How do you make a concept map? What are the rules?

- A feature of concept maps is that main ideas are placed at the top of the map. Smaller, more specific concepts and examples go below the main ideas.
- Concept words go in the circles or boxes. These are labels for ideas or concepts. All of these words are concepts because they cause a picture to form in your mind (examples: *car, dog, thinking, bread, carbohydrate).*
- Concepts should never contain more than three words.
- Linkage words connect, or link, concept words. They go on a line connecting the circles or boxes (examples: *are, the, when, is, to).*
- Concepts should not be repeated. Instead, extend the linkage line to where that concept first appeared.

2. Display the overhead transparency of the concept map that illustrates the breakdown of nutrients in foods (activity 3.2, part I). Ask students to choose concepts listed in the word bank to complete the concept map. Do this as a class activity or have students work in groups. (The answer key follows the teacher resources.)
3. Distribute activity 3.2, part II, and instruct the students to write a paragraph using four of the eight words in the word bank to explain a key aspect of healthy eating. You may want to assign this writing task as homework. Alternatively, you may choose to do this activity verbally as a class, calling on individual students to use the words in a sentence about healthy eating.

ACTIVITY 3.3: FOOD GROUP CATEGORIES AND SITUATIONAL ANALYSIS

In this activity students work in groups to categorize foods into a table that identifies each food by its food group and whether the food fits into an everyday healthy eating plan or is a "sometimes food." They then use this information to create a weekly snack plan.

1. Divide the class into groups and distribute activity 3.3, Food Group Categories and Situational Analysis. Each group should receive just one activity worksheet to promote teamwork.
   - Part I (categorization): Instruct the group to work together to determine in which food group each food or beverage belongs. The "other" group should be used for foods that have a lot of unhealthy fat or sugar, and therefore should be consumed only sometimes—meaning not every day. Share the answers prior to working on part II.
   - Part II (situational analysis): Instruct the groups to review the situation and, using the foods listed in part I as a guide, plan three snacks for their after-school club that offer healthy choices and variety. Remind the groups that each snack should include three food groups, and that over the three days, foods should not be repeated.
   - Be sure to include time for students to discuss their responses and review where they can go to get current and accurate nutrition advice.

ACTIVITY 3.4: SELF-REFLECTION

Activity 3.4 may be used as a homework assignment to save on class time. Students consider the information learned in the nonfiction reading to write a short essay that explains whether they are eating healthfully.

Instruct students to use specific details from the informational reading (activity 3.1) along with the student resources 3.1 and 3.2 to support their opinions. They should respond to the following questions:

- Are you eating a balanced diet? Why or why not?
- Are you eating the same foods each day?
- In which group do you get the most variety?
- In which group is it hardest to get variety? What could you try to add variety to your diet?
- List one to three things that you can do to improve your diet.
- List one to three things that you are doing well to eat healthfully.
- Name at least one Web site you could go to for accurate nutrition information.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans,* www.health.gov/dietaryguidelines/ (see appendix A)
- www.mypyramid.gov (interactive Web site from the U.S. Department of Agriculture on food groups and recommended servings for individuals)
- *Healthy People 2010* nutrition objectives: www.healthypeople.gov
- Produce for Better Health Foundation: www.5aday.com

SPECIFIC BACKGROUND MATERIAL

Healthy eating is just one component of a healthy lifestyle. But it is one that affects so many aspects of our health, including growth and development, the ability to fight infection, risk for disease, cognitive function, and even mood. Choosing the right mix of foods can promote health over a lifetime. Experts agree that a healthy diet includes grains (particularly whole grains), fruits, and vegetables as the base for all meals and snacks. These foods are balanced with relatively fewer servings of low-fat dairy and meat or protein foods, to minimize saturated fat in the overall diet. To help put nutrition research into practice, the U.S. *Dietary Guidelines for Americans* explain how to consume a balanced diet that can promote health, prevent disease, and maintain a healthy weight (see activity 3.1).

Answer Keys

ACTIVITY 3.1: INFORMATIONAL READING

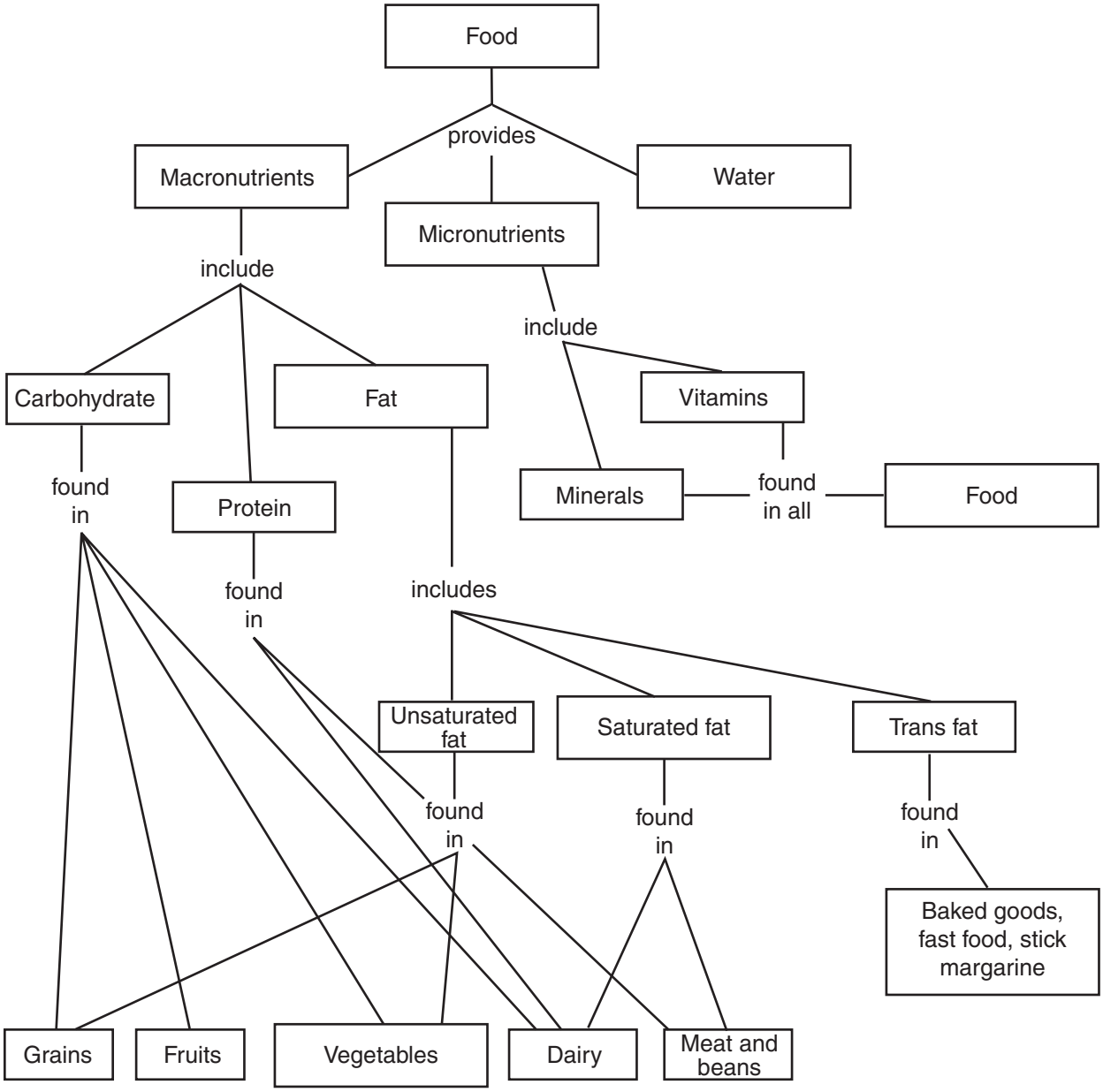
1. What are the key components of a healthy eating plan?
   - Eat a variety of foods from each food group every day.
   - Eat fruits and vegetables at every meal and snack.
   - Go for whole grains when choosing foods from the grains food group.
   - Minimize unhealthy saturated fat and avoid trans fat by choosing lean protein sources and avoiding processed and fast foods.
   - Limit foods and beverages with added sugars.
2. What are the two main categories of nutrients, and what makes them different from each other? (Macronutrients provide energy; micronutrients do not provide energy.)
3. Name some examples of macronutrients (carbohydrate, protein, fat) and micronutrients (vitamins A, C, etc., and minerals such as iron and calcium).

4. What does it mean to eat a balanced diet? (It means eating foods from all the food groups, emphasizing fruits, vegetables, and grains [especially whole grains]. It can also mean balancing energy consumed with the amount of energy used in activity.)
5. How can you get enough of all the nutrients in your diet? (Eat foods from all the food groups each day, eat different foods within each group, and choose foods without added sugar and fat most of the time.)

ACTIVITY 3.2, PART I: CONCEPT MAP SOLUTION

Overhead transparency word list:

Carbohydrate	Fat	Grains	Dairy	Meat and beans
Saturated	Unsaturated	Trans	Vitamins	Minerals
Micronutrients	Macronutrients	Protein	Fruits	Vegetables
Food	Water			



ACTIVITY 3.2, PART II: NUTRITION VOCABULARY

Possible sentences that use the listed verbs to explain a nutrition concept:

1. A healthy diet includes different foods from each of the food groups.
2. When I plan a meal, I should emphasize foods from the grain, fruit, and vegetable groups.
3. It is OK to eat fat, but I need to choose foods with healthy, unsaturated fat.
4. When I feel like something sweet, I can eat fresh fruit instead of candy.
5. In the cafeteria, I should balance my grains, fruits, and vegetables with some protein foods and milk.
6. To protect my heart, I limit unhealthy foods with trans fat and saturated fat.
7. Grains, fruits, and vegetables contain the energy nutrient carbohydrate.
8. Low-fat dairy foods provide the body with calcium.

ACTIVITY 3.3, PART I: FOOD GROUP CATEGORIES AND SITUATIONAL ANALYSIS

F = fruit, V = vegetable, G = grain, D = dairy, M/B = meat and beans, O = other (sometimes)

Foods	Food group					
	F	V	G	D	M/B	O
Spaghetti			X			
Baked fish					X	
Whole wheat bagel			X			
Banana	X					
Low-fat yogurt				X		
Hummus					X	
Raisins	X					
Low-fat popcorn			X			
Whole grain cereal			X			
Cheese stick				X		
Peanut butter					X	
Pop Tarts						X
Applesauce	X					
Donut						X
Fried eggplant						X
1% fat milk				X		
Broccoli		X				
Corn tortilla			X			
Orange juice	X					
Cream cheese						X
Chicken stir-fry		X			X	

(continued)

Foods	Food group					
	F	V	G	D	M/B	O
Lentil soup					X	
Carrot sticks		X				
Sweet potato		X				
Chocolate milk						X
Pancake						X
Grapes	X					
Scrambled eggs					X	

ACTIVITY 3.3, PART II: SITUATIONAL ANALYSIS

Create a weekly snack plan for the next three meetings of your after-school club. Healthy options include the following:

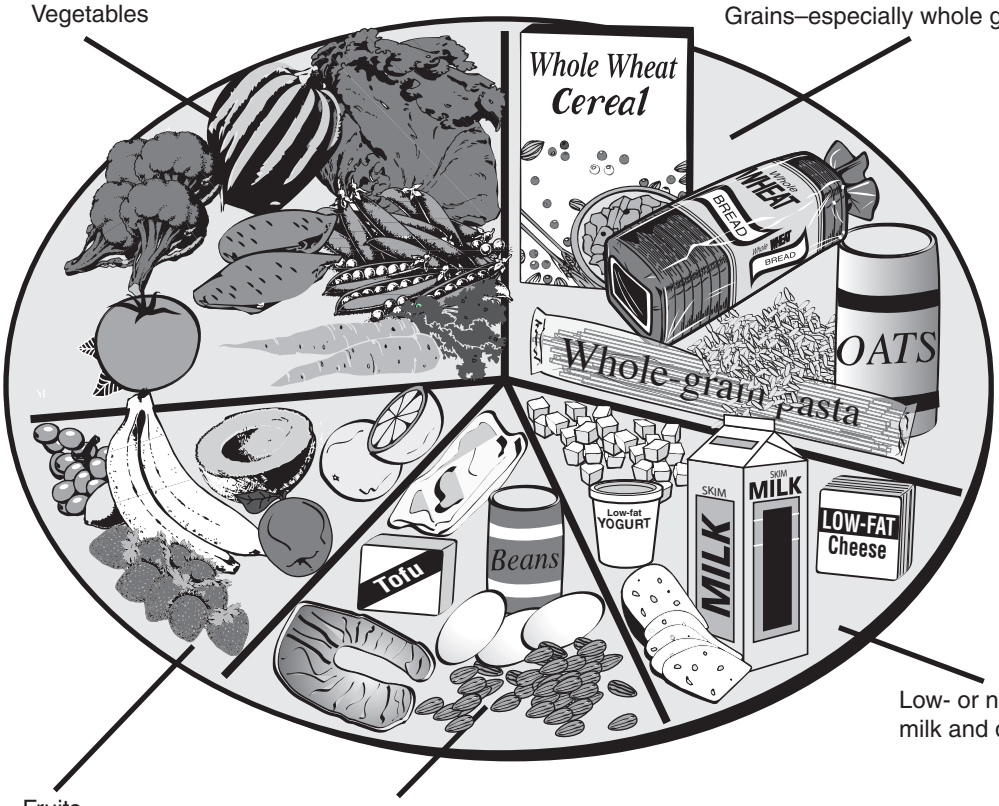
Food group	Snack: day 1	Snack: day 2	Snack: day 3
Grains	Graham crackers		Wheat crackers
Fruits	Sliced apple	Raisins	Orange juice
Vegetables		Celery sticks	
Dairy	Low-fat milk		Cheese stick
Meat, beans, and alternatives		Peanut butter	
Beverage	Milk	Water	Orange juice

Other healthy combinations: small bowl of whole grain cereal with milk and fruit; vegetables with hummus dip and juice; yogurt with fruit and mini whole wheat bagel.

A Balanced Plate for Health

A Balanced Plate for Health

Everyday foods



Vegetables

Grains–especially whole grains and cereals

Low- or non-fat milk and dairy foods

Fruits

Meat, fish, and beans–other protein sources include nuts, tofu, and eggs

"Sometimes" foods

The key to a balanced diet is to recognize that grains (especially whole grains),vegetables, and fruits are needed in greater proportion than are the foods from the meat, fish, and beans and milk groups.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 3.1

Name _____

Food Power: All You Need to Know for Health

What kind of fuel do you want to burn—French fries or fresh fruit? Do you see yourself as a tower built from whole grains, vegetables, lean meats, and milk or one relying on the strength of soda, French fries, and burgers? You get to choose.

Have you heard the saying, You are what you eat? Well it's true. The foods we eat contain many kinds of nutrients. Nutrients are the chemical substances in food that our bodies use to build our tissues and organs and fuel our growth, learning, and play. Macronutrients provide energy (calories) and include carbohydrate, fat, and protein. Macronutrients are the major components of food. Micronutrients include vitamins and minerals and are needed in very small amounts. Micronutrients are present in many, but not all, foods and do not provide energy. Both groups of nutrients are important for building a healthy body (see student resource 3.1).

Balance and Variety: The Key to Healthy Eating

So what should you eat to get all the macro- and micronutrients you need? Have you seen the magazine headlines in the supermarket checkout lines lately? Everyone seems to want to know. The secret to healthy eating is choosing the right mix of foods. As you probably realize, most foods can be classified into one of five food groups: grains, fruits, vegetables, dairy, and meat or beans (foods high in protein). Experts agree that you can achieve a healthy balance of nutrients by emphasizing whole grains, fruits, and vegetables (including legumes) in your meals, and choosing smaller amounts of lean meats, chicken, fish, eggs, nuts and seeds, and low-fat dairy foods.

Each food contains a unique set of nutrients, so to consume all you need, it's important to select foods from *all* the food groups and to eat *a variety* of foods within each group. This concept is shown in the Balanced Plate for Health on the following page.

Understanding Carbohydrate, Protein, and Fat: The Energy Nutrients

All foods provide energy in the form of carbohydrate, protein, and fat. These macronutrients are the building blocks for the body to use to make and repair cells and provide energy to function. Carbohydrate (starch and sugar) breaks down into glucose, which the brain uses exclusively for fuel; it also serves as the primary energy source for muscles and organs. Because of its extensive use in the body, carbohydrate should be the primary energy source consumed in the diet. Grains, fruits, and vegetables are excellent sources of carbohydrate. On the Balanced Plate for Health, you will see that these food groups together take up the biggest "slices" on the plate. They also come with fiber (especially whole grains) and lots of vitamins and minerals. Another place where we find carbohydrate is in milk and other dairy foods. They are rich in the sugar lactose, and also are good sources of protein and calcium.

The body requires a smaller proportion of energy from fat and protein. Therefore, foods that are high in protein and fat can be consumed in smaller quantities. This is why the meat and beans food group (foods naturally high in protein and fat) takes up only a small "slice" on the plate. Protein is necessary for making and repairing cells, such as muscle and skin cells. High-protein foods include meats, poultry, fish, eggs, nuts, beans, and legumes. Fat is important for protecting organs, for nerve function, and for transporting the vitamins A, D, E, and K. Keep in mind that some fat is healthier than other fat. Unsaturated fat found in vegetable and fish oils is beneficial to health, whereas fat from animal sources (such as red meat and dairy) tends to be

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Food Power: All You Need to Know for Health *(continued)*

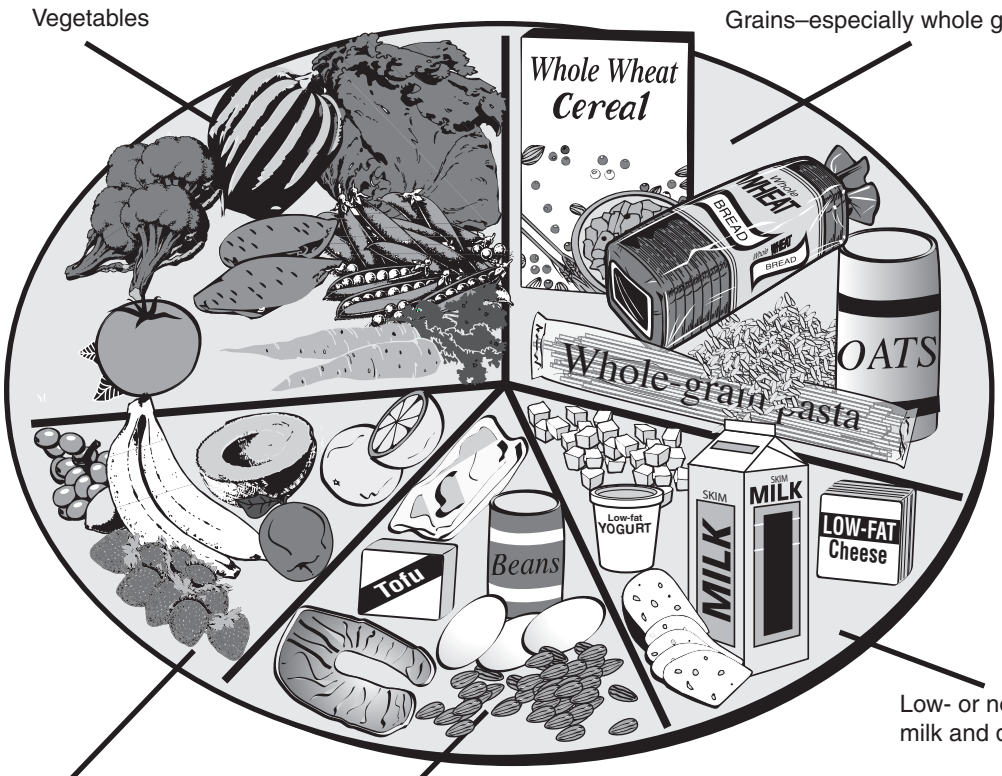
Activity 3.1

higher in unhealthy saturated fat. Trans fat, present in many processed and fast foods, is very unhealthy and should be avoided as much as possible. Note that there is a small "side" plate for these "sometimes foods."

Overall, a balanced diet focuses on foods from the grain, fruit, and vegetable groups and relies less on foods from the meat and dairy groups. These properties are shown in the following Balanced Plate for Health. Eating a variety of foods from the five food groups will provide all the nutrients you need to be healthy.

A Balanced Plate for Health

Everyday foods



Vegetables

Grains–especially whole grains and cereals

Low- or non-fat milk and dairy foods

Fruits

Meat, fish, and beans–other protein sources include nuts, tofu, and eggs

"Sometimes" foods

The key to a balanced diet is to recognize that grains (especially whole grains),vegetables, and fruits are needed in greater proportion than are the foods from the meat, fish, and beans and milk groups.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Put It All Together!
Planet Health Guide to Healthy Eating

Be a Food Star ★ by following these healthy eating guidelines:

- Eat for variety. Foods from all food groups are important. Eat foods from all of the food groups every day, and choose a variety of foods within each food group. For optimum nutrition, eat more foods from the grain, fruit, and vegetable groups than from the meat and dairy groups.
- Eat fruits and vegetables at every meal and snack. This will make it easy to eat five or more servings of fruits and vegetables combined each day. Select fruits and vegetables of various colors (especially deep green vegetables and orange and red ones), and select those without added sugars or fat most of the time.
- Go for whole grains. Eat six to eight servings of grains each day, with at least three servings being whole grains. Choose whole grain breads and cereals that have at least 3 grams of fiber per serving and that are low to moderate in sugar (5 to 10 grams per serving).
- Choose foods with healthy fat. The type of fat you eat is more important to your health than the total quantity. Include sources of healthy unsaturated fat every day from foods such as nuts, seeds, fish, whole grains, and vegetable oils (for cooking). Limit saturated fat by replacing butter and lard with liquid vegetable oil when cooking, and by choosing lean meats and low-fat or fat-free dairy products. Avoid foods containing trans fat by purchasing foods with no partially hydrogenated vegetable oils in the ingredients list. Limit foods with lots of saturated and trans fat by eating them only sometimes.
- Limit foods and beverages with added sugar. Sugar-sweetened beverages (soda, sport drinks, fruit drinks) are the single largest source of added sugar in children's diets, followed by candy, cakes, and cookies. Because they offer so little nutritional value, it is best not to drink more than two 8-ounce (250-milliliter) servings of sugar-sweetened beverages per week. Instead, choose water and low-fat (or fat-free) milk as your primary beverage choices. Consume "sweets" only sometimes, and check food labels to avoid products with sugar in the first three ingredients.

Keep in mind that the amount of food, or calories, a person needs depends on his or her age, gender, and activity level. A growing, active teenager will need more food than many sedentary adults, and boys and men typically need more food than girls and women do. For more specific information about serving sizes for an individual, go to the interactive Web site www.mypyramid.gov.

Finally, there is so much to know about healthy eating that it's a good idea to know how to find reliable sources. Many good Internet sites provide accurate nutrition information and tips for healthy eating. Here are a few:

www.kidshealth.org (Food, fitness, and general health information for young people and adults by the Neymours Foundation)

www.hsph.harvard.edu/nutritionsource (Up-to-date research information from the Harvard School of Public Health)

www.mypyramid.gov (Interactive Web site from the U.S. Department of Agriculture on food groups and recommended servings for individuals)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Student Resource 3.1

What's With These Nutrients?

Macronutrients	Functions and facts	Where can I get it?
Carbohydrate	Also known as starch or sugar Primary source of energy in the body It's the *only* fuel the brain will use	Grains (think whole grain breads, cereal, rice, and pasta) Fruit Veggies Milk
Protein	Building blocks for things such as muscle and even skin Repairs damage (think of a cut that heals)	Fish Poultry Meat Milk and dairy foods Nuts and seeds Eggs Tofu and other vegetarian alternatives
Fat	Stores energy in the body and protects internal organs Carries vitamins A, E, D, and K through the body Building block for cell membranes Can help or harm heart health	Healthy unsaturated fat: vegetable oils, fish, nuts Unhealthy saturated fat: meat, poultry (dark meat and skin), whole milk and cheese, butter, lard (used in baked goods) Very unhealthy trans fat: fried foods, processed baked goods (look for partially hydrogenated vegetable oils in ingredients)
Micronutrients	**Functions and facts**	**Where can I get it?**
Calcium (mineral)	Needed for strong bones and teeth Stored in bone, but can be removed from the bone if not enough is consumed in the diet	Low-fat milk, yogurt, cheese Broccoli Leafy greens (kale, mustard greens) Tofu Almonds Fortified juices or cereals
Iron (mineral)	Carries oxygen through the blood to the muscles	Meat, liver Dry beans Spinach Seafood Fortified grains, oatmeal
Vitamin A (vitamin)	Helps maintain vision and immune function Promotes healthy skin	Red and orange vegetables and fruits: sweet potatoes, carrots, cantaloupes, apricots Spinach and broccoli Liver Fortified milk
Vitamin C (vitamin)	Fights infection Maintains healthy cells	Citrus fruits Berries Melon
Folate (vitamin)	Forms DNA needed in blood cell formation; lack of folate causes anemia and, if a woman is pregnant, can cause neural tube defect (such as spina bifida) in the baby	Leafy greens (spinach, romaine lettuce) Fortified cereals and breads Oranges, orange juice Asparagus Broccoli

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Student Resource 3.2

What's in a Group?

Food group	Best choices	Watch out!
Grains	Whole grain bread (whole wheat bread or rolls, corn tortillas, wheat pitas) Whole grain cereals (whole grain oats, wheat, rice, corn, or bran varieties) Oatmeal Rice and other grains (brown rice, barley, millet, pilaf) Pasta (macaroni, spaghetti, whole wheat noodles, rice noodles) Crackers and snacks (whole wheat crackers, pretzels, corn chips, popcorn)	Refined grains (white flour, white bread, plain noodles, white rice) Processed grains that have added unhealthy fat or sugar (baked goods such as muffins, croissants, sweet breads, crackers)
Vegetables	Leafy greens (collard, kale, spinach) Dry beans or legumes (lima, kidney, black beans) Deep orange or yellow veggies (squash, sweet potatoes, carrots) Cruciferous (broccoli, cauliflower) Others: tomatoes, corn, turnips, string beans, cabbage, okra	Salad that lacks color also lacks nutrients Fried veggies (French fries) White potatoes (especially mashed with butter, sour cream, and salt)
Fruit	Deep orange or red (peaches, nectarines, cantaloupes) Citrus (grapefruits, oranges, tangerines, pineapples) Berries (strawberries, blueberries) Other colors (bananas, kiwis, grapes, apples, pears)	"Juice" blends that have more sugar than 100 percent fruit juice Limit juice to 6 oz (175 ml) per serving (about one juice box) and 12 oz (375 ml) per day
Fish, nuts, dry beans, poultry, eggs, and meat	Fish (finfish: salmon, trout, cod; shellfish: shrimp, crab, scallops; canned fish: tuna, sardines) Nuts (peanut butter, almonds, hazelnuts, walnuts) Seeds (sunflower or pumpkin seeds) Dry beans/legumes (kidney, navy, and black beans, lentils) Poultry (chicken, turkey, or fowl) Meat (beef, pork, ham) Eggs Tofu and other vegetarian alternatives (tempeh, falafel, veggie burgers)	Meat with visible fat Dark-meat poultry (leg meat) and skin
Dairy	Plain milk (nonfat or 1%) Cheese (reduced-fat mozzarella sticks, cottage cheese, cheddar cheese) Low-fat yogurt (includes low-fat frozen yogurt)	Full-fat and 2% milk Full-fat yogurt and cheese

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

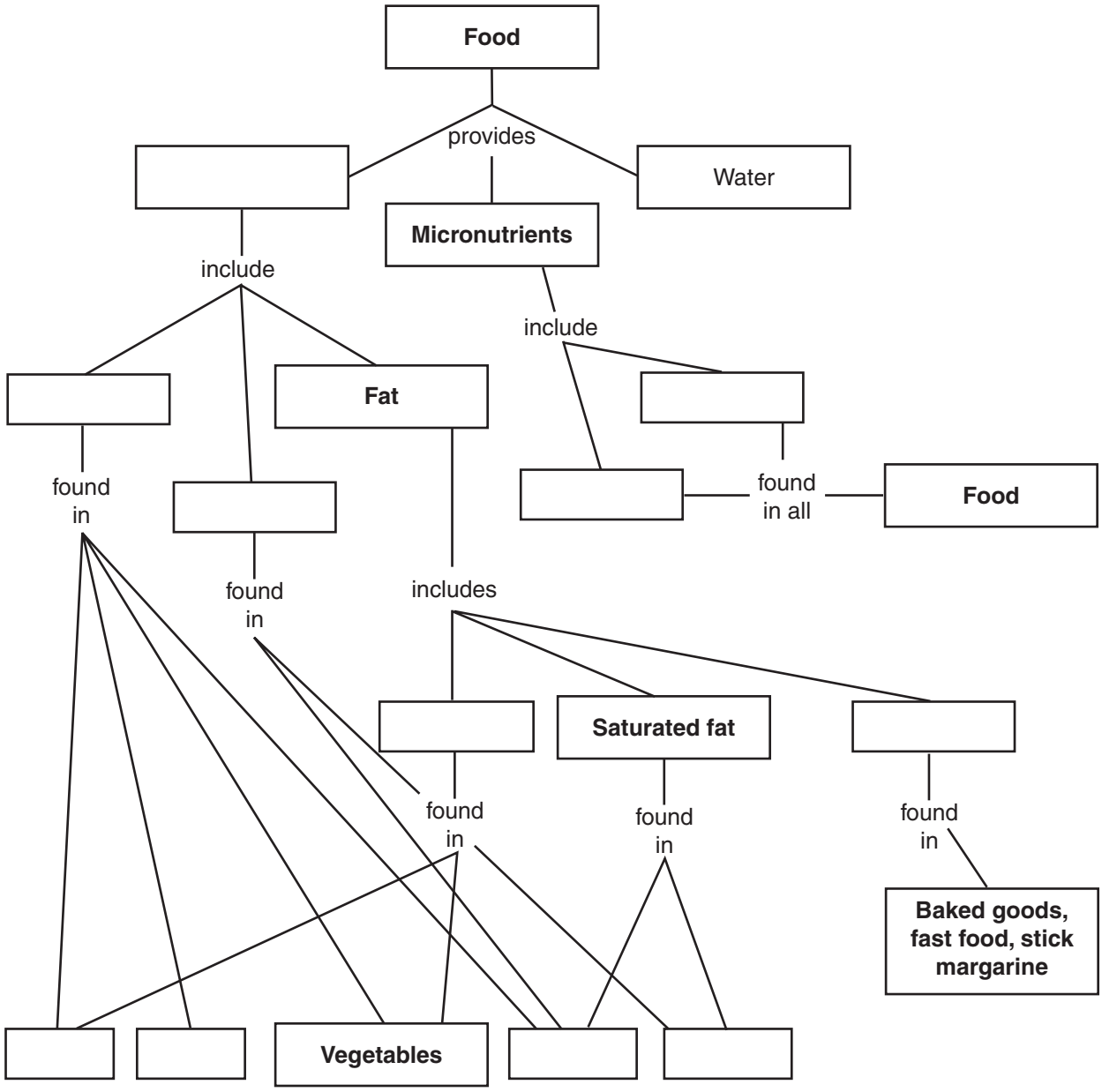
Activity 3.2

Nutrition Concepts

Part I

Instructions: Fill in the empty boxes with words from the word bank.

Carbohydrate	Fat	Grains	Dairy	Meat and beans
Saturated	Unsaturated	Trans	Vitamins	Minerals
Micronutrients	Macronutrients	Protein	Fruits	Vegetables
Food	Water			



From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 3.2

Part II

Nutrition Vocabulary

Choose four of the verbs in the word bank and use them to write a paragraph about healthy eating in the space below.

Word Bank

eat	choose	emphasize	limit
includes	balance	contain	provides

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 3.3

Food Group Categories and Situational Analysis

Part I: Categorize each of the foods and beverages listed in the following table by food group. Use the "Other" category for foods that are high in added sugar or fat, especially unhealthy saturated or trans fat. These foods are also referred to as "sometimes foods." Refer to student resource 3.2.

Foods	Food group					
	Fruits	Vegetables	Grains	Dairy	Meat, beans, and alternatives	Other (sometimes foods)
Spaghetti						
Baked fish						
Whole wheat bagel						
Banana						
Low-fat yogurt						
Hummus						
Raisins						
Low-fat popcorn						
Whole grain cereal						
Cheese stick						
Peanut butter						
Pop Tarts						
Applesauce						
Donut						
Fried eggplant						
1% fat milk						
Broccoli						
Corn tortilla						
Orange juice						
Cream cheese						
Chicken stir-fry						
Lentil soup						
Carrot sticks						
Sweet potato						
Chocolate milk						
Pancake						
Grapes						
Fried eggs						

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Food Group Categories and Situational Analysis *(continued)*

Activity 3.3

Name _____

Part II: You've been asked to plan the snacks (including beverages) for the next three meetings of your after-school club. Create a healthy snack plan that follows these rules:

1. Each day, the snack and drink includes options from three (or more) food groups.
2. Over the entire three days, snacks and drink include at least one option from each of the food groups.
3. List the beverage for each day and remember that the beverage may also fit into one of the food groups. (See part I for ideas on healthy snack options.)

Food group	Snack: day 1	Snack: day 2	Snack: day 3
Grains			
Fruits			
Vegetables			
Dairy			
Meat, beans, and alternatives			
Beverage			

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 3.4

Self-Reflection

Using what you learned in activities 3.1, 3.2, and 3.3, write a short essay that explains whether you are eating healthfully. Use specific details from the informational reading, Food Power: All You Need to Know for Health (activity 3.1), along with the student resources to support your opinions.

Be sure to respond to the following questions in your essay:

1. Are you eating a balanced diet? Why or why not?

2. Are you eating the same foods each day? If so, how could you add variety to your diet?

3. In which group do you get the most variety?

4. In which food group is it hardest to get variety?

5. List one to three things that you are doing well to eat healthfully.

6. List one to three things that you can do to improve your overall diet.

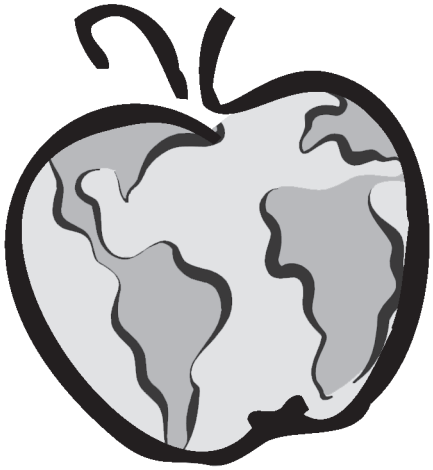
7. Name at least one Web site you could go to for accurate nutrition information.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 4

Carbohydrate: Energy Food

Balanced Diet Theme



Students read a passage that describes the importance of carbohydrate in a healthy diet. The reading is preceded and followed by activities designed to improve reading comprehension and retention. Then, you choose whether to have students build their vocabulary (crossword puzzle), make connections (concept mapping), or apply the information (discussion or skits) presented in the reading to make recommendations about healthy eating choices. The final activity offers students the opportunity to practice their critical thinking skills.

Behavioral Objective

For students to eat more whole grains

Learning Objectives

Students will be able to do the following:

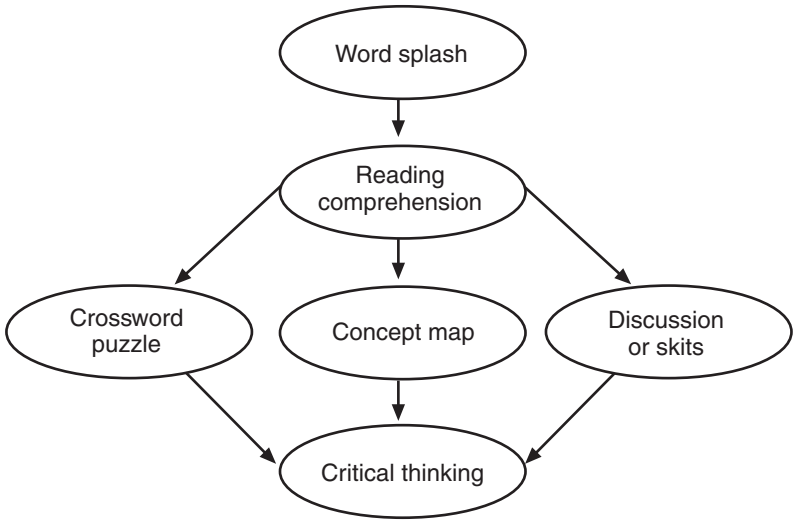
1. Comprehend and identify basic facts and ideas introduced in a nonfiction essay
2. Use vocabulary introduced in a reading assignment to complete a crossword puzzle
3. Complete a concept map to illustrate the connections among major ideas presented in a reading assignment
4. Apply information obtained from reading to make recommendations for healthy food choices
5. Discuss their thoughts and opinions and persuade others to follow their recommendations
6. Explain why it's important to include complex carbohydrate in their diet
7. Use their new understanding of carbohydrate to explain why grains form the base of healthy eating

Materials

- Overhead transparency 4.1, *Planet Health* Guide to Healthy Eating
- Activity 4.1, Word Splash (overhead transparency 4.2 or handout, or use chalkboard)
- Activity 4.2, Carbohydrate: Energy Food (reading comprehension)
- Activity 4.3, Crossword Puzzle, or activity 4.4, Concept Map, or activity 4.5, What Would You Say? (discussion or skits)
- Activity 4.6, Critical Thinking (blank overhead transparency or chalkboard)
- *Optional:* Overhead transparency 4.3, Good and Poor Sources of Carbohydrate

Procedure

Overview (modify this to fit your needs):



1. Point out the goals of this lesson:
   - To improve reading comprehension
   - To learn about the importance of carbohydrate
   - To make healthy food choices in the future
2. Post an itinerary of the activities. This helps students who need to see the big picture of what's going to happen in order to be able to focus on the details.

ACTIVITY 4.1: WORD SPLASH

This activity is designed to help students access their prior knowledge of carbohydrate, get them to make predictions about concepts they will read about, and develop a purpose for reading the new information. This type of activity facilitates the comprehension of expository text (Stern, 1996). It is a good idea to tell students why this type of activity is useful. This will help them reflect on the learning process, as well as on the specific material they are learning.

1. Display the overhead transparency of activity 4.1, Word Splash
2. Ask students to predict connections among at least five of the words in the splash and the topic in the center (carbohydrate). They should write down their predictions; for example: Pasta is a food that contains a lot of carbohydrate.

ACTIVITY 4.2: READING COMPREHENSION

Activity 4.2, Reading Comprehension, gives students practice reading nonfiction materials. Combining this activity with activity 4.3, Crossword Puzzle, will help their vocabulary development.

1. Have students read the passage to check the accuracy of their predictions from activity 4.1. As they read, they can revise their statements as needed.
2. Discuss the reading by asking students some of the following questions. (This discussion may take place after students complete activity 4.3 or 4.4, but should take place before activity 4.5.)
   - What was the main idea?
   - What's the difference between simple and complex carbohydrate?
   - What types of foods are high in simple carbohydrate? complex carbohydrate?
   - How many servings of grain products should you eat daily?
   - Why do experts say that whole grains should comprise at least half of the grain products you eat each day?

   You also may want to give students some examples of good and poor sources of carbohydrate. To do this, you may display overhead transparency 4.3, Good and Poor Sources of Carbohydrate (or use the chalkboard).

Choose activity 4.3, 4.4, or 4.5 to help reinforce information (activity 4.3), make connections (activity 4.4), or apply information (activity 4.5) about carbohydrate.

ACTIVITY 4.3: CROSSWORD PUZZLE

Activity 4.3, Crossword Puzzle, requires students to reread parts of the passage on carbohydrate. It emphasizes the important points in the reading by asking students to recall vocabulary. This would make a good homework assignment.

1. Have students complete the crossword puzzle.
2. If you haven't already discussed the reading passage in activity 4.2, please do so now. Then proceed to activity 4.6, Critical Thinking.

ACTIVITY 4.4: CONCEPT MAP

Activity 4.4, Concept Map, will be most successful if your students are familiar with concept mapping or webbing. If they are not, you should precede the activity with the following explanation.

Why should I do concept maps?

- They are important study tools that help you store information in your long-term memory.
- They help you figure out the main ideas in a piece of reading material.
- They help you organize new material and establish relationships among ideas.

How do you make a concept map? What are the rules?

- A feature of concept maps is that main ideas are placed at the top of the map. Smaller, more specific concepts and examples go below the main ideas.
- Concept words go in the circles or boxes. These are labels for ideas or concepts. All of these words are concepts because they cause a picture to form in your mind (examples: *car, dog, thinking, bread, carbohydrate).*
- Concepts should never contain more than three words.

- Linkage words connect, or link, concept words. They go on a line connecting the circles or boxes (examples: *are, the, when, is, to).*
- Concepts should not be repeated. Instead, extend the linkage line to where that concept first appeared.

1. Have students complete the concept map. (The answer key follows the references.)
2. If you haven't already discussed the reading passage in activity 4.2, please do so now. Then proceed to activity 4.6, Critical Thinking.

ACTIVITY 4.5: WHAT WOULD YOU SAY?

Activity 4.5, What Would You Say?, requires students to apply the information they read in the passage on carbohydrate in activity 4.2. They must read the situations listed on the activity sheet and make recommendations about appropriate food choices.

1. If you haven't already discussed the reading passage in activity 4.2, please do so now. Then you may proceed with this activity.
2. Divide the class into groups of three or four students. Assign each group one of the situations listed on the activity sheet. Ask each group to discuss the situation and come up with a recommendation. You may want to have each group present their recommendation in the form of a short skit. Proceed to activity 4.6, Critical Thinking.

ACTIVITY 4.6: CRITICAL THINKING

This activity provides students the opportunity to interpret and apply what they have learned about carbohydrate in the other activities.

1. Use overhead transparency 4.1 to present the *Planet Health* Guide to Healthy Eating
2. Ask students the following question: Based on what you know about carbohydrate, why do grains form the base of healthy eating?
3. Write students' responses on the board. (Be sure to clarify any misconceptions. See the Teacher Resources for an answer to this question.)

Extension Activities

Ask students to write a few paragraphs answering the following:

- Why do grains form the basis of healthy eating?
- How many servings of grain products do you usually eat each day? What proportion is whole grain?
- Are you consuming an appropriate amount of carbohydrate in your diet?

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the U.S. Department of Agriculture and the U.S. Department of Health and Human Service's *Dietary Guidelines for Americans*. See appendix A for information on obtaining this resource.

SPECIFIC BACKGROUND MATERIAL

For an overview of the types of carbohydrate, their function in the body, dietary recommendations, and examples of foods high in carbohydrate, see activity 4.2.

Dietary Recommendations for Carbohydrate

Despite the bad reputation generated by some popular weight-loss strategies, carbohydrate is an important component of a healthy diet if selected with care. Carbohydrate provides 4 calories per gram. For an adolescent boy eating 2,200 calories per day, carbohydrate intake would be as much as 330 grams. Carbohydrate is our major source of energy and includes sugars (simple carbohydrate) and starches (complex carbohydrate). Fruits, vegetables, and grain products (whole grain breads, cereals, pasta, and rice) are excellent sources of carbohydrate.

One of the most dramatic changes in children's eating habits over the past 20 years is the steady increase in the consumption of sugar-sweetened beverages. More children are drinking beverages sweetened with sugar on a daily basis, at younger ages, and in double the quantity than children in the past. Sugar-sweetened drinks are the single largest source of added sugar in children's diets. Adolescents who drink excessive amounts of sugary drinks (two or more 8-ounce [250-milliliter] servings per day) are at higher risk for becoming overweight, for getting too little calcium (because they drink less milk), and for developing cavities in their teeth.

Dietary Recommendations for Fat

Fat provides 9 calories per gram. It's important for cell structure, transporting fat-soluble vitamins (A, D, E, and K), and insulating our bodies. Body fat also functions as an energy store. However, it's important to note that calories from any source—protein, carbohydrate, fat, or alcohol—are stored as fat when energy intake exceeds expenditure.

Not all fat is created equal. The U.S. *Dietary Guidelines* recommend a diet that is low in saturated and trans fat (no more than 10 percent of calories), low in cholesterol, and moderate in total fat (no more than 35 percent of calories). Foods comprised of saturated fat (for example, butter or lard) tend to be solid at room temperature and come from animal sources. Foods high in dietary cholesterol, such as meat and dairy products, also come from animal sources. Foods high in saturated fat and dietary cholesterol raise blood cholesterol. Consequently, eating a diet high in these foods increases the risk of heart disease.

Trans fat is found in baked goods, snack foods, and fast foods; it is also solid at room temperature. Trans fat is created through a commercial process called hydrogenation to improve the shelf life of foods. Trans fat promotes heart disease more strongly than saturated fat because it raises unhealthy LDL cholesterol and lowers protective HDL cholesterol. Americans typically get about 33 percent of their total calories from fat, 11 percent from saturated fat and 2.6 percent from trans fat. There is no recommended safe level of trans fat in the diet, and it is best to limit it to no more than 1 gram per day. In January 2006, all nutrition labels began declaring trans fat by law.

Unsaturated fat, such as olive, peanut, and vegetable oils, tends to be liquid at room temperature. Unsaturated fat helps keep blood cholesterol low, and substituting it for saturated fat has been shown to decrease the risk of heart disease. Foods high in unsaturated fat include fish, nuts, and vegetables oils (with the exception of palm and coconut oils).

An adolescent girl whose total calorie requirement is 2,000 calories can get about 600 calories from fat each day, which is 67 grams. No more than 22 grams of this should come from saturated fat. Food labels list total fat, saturated fat, trans fat, and unsaturated fat in grams per serving.

Dietary Recommendations for Protein

Protein provides 4 calories per gram. Protein is essential to growth, building and repairing cells, making enzymes and hormones, and other processes. Proteins are produced by cells. Dietary protein needs vary over the life span. Generally expressed in terms of grams needed per kilogram of body weight (g/kg), protein needs are highest during infancy, at about 2.2 g/kg, and decline to 0.8 g/kg in adulthood. Adolescents need to consume about 1 g/kg per day.

Experts recommend that 10 to 15 percent of daily calories come from protein. During a growth spurt, adolescents may require more calories from protein. However, they should consult with their pediatricians before increasing their protein consumption. American

diets usually exceed protein requirements and are rarely deficient in this nutrient. Lean red meat, chicken, fish, nuts, and legumes are excellent sources of protein. Low-fat dairy products such as cheese and milk are also good sources of protein. To avoid consuming excess amounts of saturated fat and cholesterol, eat red meat in moderation and choose low-fat dairy products.

An active adolescent boy who needs 2,500 calories per day needs about 250 calories from protein each day, which is 63 grams. Food labels list protein in grams per serving.

Alcohol

Alcohol provides 7 calories per gram. There is no dietary requirement for alcohol, and children and youth should not consume any alcohol. Evidence suggests that moderate consumption by healthy adult men and healthy, nonpregnant, nonlactating adult women (equivalent to one glass of wine per day for women, two for men) may lower the risk of heart disease in some people. Higher levels of alcohol consumption increase the risk of high blood pressure, stroke, heart disease, liver disease, certain cancers, accidents, violence, suicide, birth defects, and death.

Grains Form the Base of Healthy Eating

Experts recommend that 45 to 65 percent of our daily energy intake come from carbohydrate. Grains contain large amounts of carbohydrate, the energy food. Grains are usually low in fat and provide protein, fiber, some vitamins (riboflavin, thiamin, and niacin), and some minerals (iron and magnesium). The U.S. *Dietary Guidelines* recommend consuming 6 to 11 servings of grain per day depending on calorie needs, with about half of the servings coming from whole grain food products. For middle-school-age youth, this translates to roughly 6 to 8 "ounce equivalents," with a minimum of 3 ounce equivalents being whole grain options. ("Ounce equivalents" are amounts of foods that contain about an ounce of grains.) The guidelines also recommend that grain products be prepared with little to no fat or sugar.

Whole Grain Options

Whole grain products are made from intact kernels of grain. The germ and bran from the kernels make these foods naturally high in nutrients and higher in fiber than refined breads, cereals, pasta, and rice. Eating whole grain, high-fiber foods reduces the risk of developing diabetes and heart disease. According to *Healthy People 2010* (U.S. Department of Health and Human Services, 2000), some clinical evidence suggests that eating food with water-soluble fiber decreases blood glucose and blood lipid levels. Currently only about 7 percent of Americans two years old and older eat three or more servings of whole grain each day.

Try eating 3 ounce equivalents of whole grain foods each day such as whole wheat bread, whole grain ready-to-eat cereal, long-cooking oatmeal, corn tortillas, whole wheat pasta, whole grain tabouli salad, whole barley soup, popcorn, and brown rice. An ounce equivalent is one slice of bread, a cup of breakfast cereal, or a half cup of cooked rice or pasta. Check food labels. Don't be fooled by foods made from wheat flour, enriched flour, or degerminated corn meal. These are not whole grains.

Some Common Grain Foods

Bread usually contains flour, water, yeast, salt, and some sugar. Although breads are generally good sources of carbohydrate, vitamins, and protein, whole grain bread contains about four times as much fiber as white bread. One slice of bread counts as one serving of grain. Check the ingredients list on bread packages and select brands that offer at least 3 grams of fiber per serving.

For whole wheat bread, the label must specify that the product is made from whole wheat flour. Other whole grain breads include rye and oat as well as popular multigrain blends.

Many commercial wheat breads use enriched white flour and brown syrup, so that they have the brown appearance of wheat bread. White bread is made from bleached white flour, which loses 70 percent of its nutrients in the milling process. Although some nutrients are added back in a process called fortification, enriched white bread contains less fiber and nutrients than whole grain breads.

Pasta means "paste" in Italian and is very nutritious. It is rich in carbohydrate, high in protein, and low in unhealthy fat and sodium. The fat content of pasta dishes depends on the toppings selected. Meat, cheese, and tomato sauce are often used but can be high in sodium and saturated fat. Note that some tomato sauces are made with olive oil—a good source of healthy unsaturated fat. Check the labels. Adding vegetables to pasta dishes adds taste, nutritional value, and fiber.

Rice is the grain of choice in most damp tropical climates. In the United States, white rice is usually enriched with iron and other nutrients after the bran or germ is removed. Brown rice, a whole grain, is unpolished, which means that it retains the bran and germ that contains much of the fiber in rice. Brown rice also takes longer to cook than white rice (40 to 50 minutes).

Breakfast cereals vary greatly in their nutritional value. Although grains are naturally high in fiber and low in fat, sodium, or sugar, the final product on the supermarket shelf may not have these characteristics. Breakfast cereals may be made from rice, wheat, corn, or oats, or a combination of these. The grains are often exploded into puffs, pressed into flakes, shredded and spun into biscuits, or baked into various shapes. They are commonly toasted, and sweeteners, nuts, raisins, salt, fat, and preservatives are often added. Hot cereals are usually made from unrefined grains (e.g., oats and wheat), which are high in fiber, vitamins, and minerals and low in fat. Instant varieties of hot cereals, however, may have various sweeteners and other ingredients added to them.

For all cereal products, check the label for the following items:

- Ingredients list (products with sugar as one of the first three ingredients are high in sugar)
- Amount of fiber (this varies widely—look for 2 to 3 grams of fiber per serving)
- Amount of saturated and trans fat (e.g., granola products could be high in saturated fat because of added coconut oil)
- Amount of sodium
- Amount of sugar (look for options that are lower in sugar: less than 10 grams per serving)

Many breakfast cereals are fortified with vitamins and minerals. The following table lists examples of good and poor sources of carbohydrate.

Good and Poor Sources of Carbohydrate

Good sources	Good sources	Poor sources
Baked potatoes	Mangoes	Beef
Bananas	Potatoes	Celery
Black beans	Oatmeal	Cheese
Blackberries	Oranges	Chicken
Black-eyed peas	Pancakes	Cucumbers
Whole grain bread	Pasta	Eggs
Whole grain cereal	Pinto beans	Fish
Corn	Plums	Hot dogs
Garbanzo beans	Polenta	Lettuce
Grapes	Brown rice	Nuts
Green beans	Squash	Pork
Lima beans	Strawberries	
Low-fat milk	Sweet potatoes	
Low-fat yogurt	Waffles	

REFERENCES

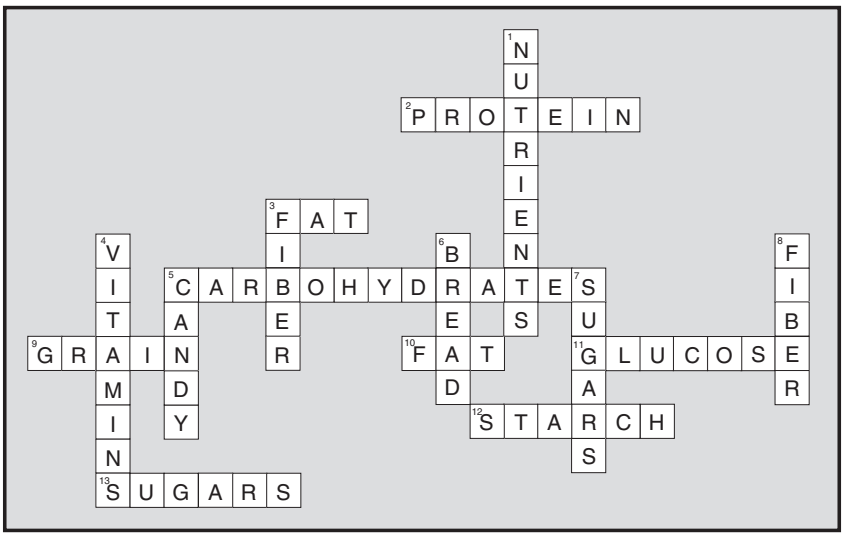
Stern, A. 1996. Instructional strategies and techniques to enhance motivation and achievement. Workshop, Weston, MA.

U.S. Department of Health and Human Services. 2000. *Healthy people 2010,* conference edition, vols. I and II, www.health.gov/healthypeople.

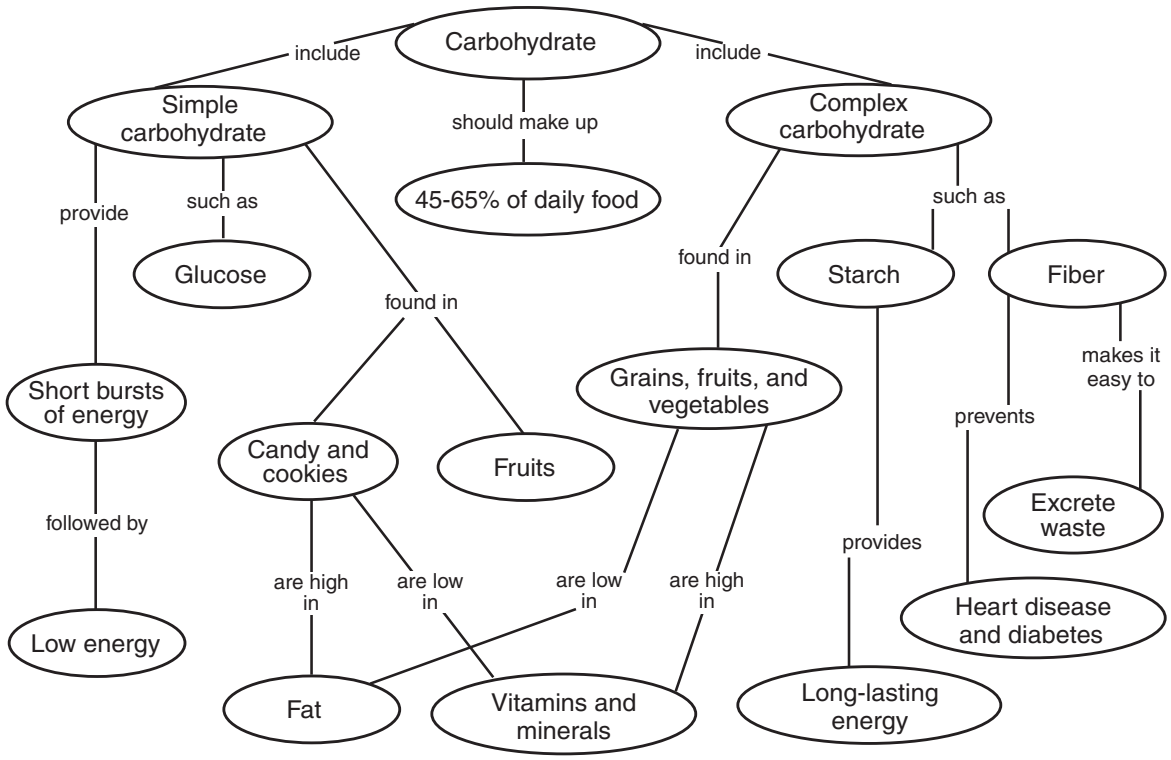
Answer Keys

ACTIVITY 4.3: CROSSWORD PUZZLE

Solution to the crossword puzzle



ACTIVITY 4.4: CONCEPT MAP



ACTIVITY 4.5: WHAT WOULD YOU SAY?

Situation 1

Carbohydrate should be the largest part of each day's total energy intake in a healthy diet. It provides us with an excellent energy source. Because we are going to be hiking all day, we need to make sure we will have enough energy. Bringing fruit is a good snack idea. Fruit has carbohydrate, vitamins, minerals, and fiber, but we need to eat more than just fruit. We should bring some sandwiches on whole grain bread for lunch and unsweetened dry cereal and rice cakes for snacks. Bread and cereals are members of the grain group. They contain a large amount of complex carbohydrate, vitamins, minerals, and fiber and are low in fat. According to the U.S. *Dietary Guidelines,* we should eat 6 to 11 servings of grains per day and about half from whole grains. As for protein, we need some protein, but not lots. If the sandwiches have peanut butter or some type of meat, we'll be OK. We also should bring some raw veggies and lots of water.

Situation 2

Carbohydrate should be the largest part of each day's total energy intake in a healthy diet. Experts recommend that 45 to 65 percent of your total day's calories should come from carbohydrate, 10 to 15 percent should come from protein, and no more than 35 percent should come from fat. I recommend that you eat a balanced diet by choosing foods from every food group each day and by making sure you are doing some physical activity every day. Eat sweets and foods with lots of unhealthy fat in moderation; these are "sometimes foods." Stay away from diets! You don't need to starve yourself.

Situation 3

Eating foods that are high in sugar causes a sharp increase in blood glucose, followed by a sharp decrease. Eating sweets prior to participating in sporting events may result in a feeling of low energy in some people. Athletes should be encouraged to eat foods that are high in complex carbohydrate during daily meals. This will ensure that they have plenty of carbohydrate stored (glycogen) to get them through their sporting events. They should eat a pregame meal two to three hours prior to the event, and it should be high in carbohydrate and relatively low in fat and protein (no steak-and-egg pregame meals).

Planet Health Guide to Healthy Eating

- Eat for variety.
- Eat fruits and vegetables at every meal and snack.
- Go for whole grains.
- Choose foods with healthy fat.
- Limit foods and beverages with added sugar.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

whole-grain foods

pasta

protein

grains

fat

starch

balanced diet

candy

Carbohydrate

sugar

rice

bread

energy source

low in fat

45-65%

complex carbohydrate

vitamins

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Good Sources of Carbohydrate

- Baked potatoes
- Bananas
- Black beans
- Blackberries
- Black-eyed peas
- Bread
- Cereal
- Corn
- Garbanzo beans
- Grapes
- Green beans
- Lima beans
- Low-fat milk
- Low-fat yogurt
- Mangoes
- Mashed potatoes
- Oatmeal
- Oranges
- Pancakes
- Pasta
- Pinto beans
- Plums
- Polenta
- Rice
- Squash
- Strawberries
- Sweet potatoes
- Waffles
- Whole grain (cereal, bread, pasta)

Poor Sources of Carbohydrate

- Beef
- Celery
- Cheese
- Chicken
- Cucumbers
- Eggs
- Fish
- Hot dogs
- Lettuce
- Nuts
- Pork

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 4.2

READING COMPREHENSION

Carbohydrate: Energy Food

The foods we eat contain many kinds of nutrients. Nutrients are the chemical substances in food that our bodies use to keep us healthy. Macronutrients (carbohydrate, fat, and protein) are the major food components and are the ones that provide us with calories. Micronutrients (vitamins and minerals) are the nutrients that we need in very small amounts and are present in many foods. Both groups of nutrients are important for a healthy body.

All foods are made up of one, two, or all three of the macronutrients. Protein provides the body with the building blocks for making and repairing tissue (such as muscle and skin). Fat helps keep the body warm, helps protect the internal organs (such as the heart and liver), helps the body transport certain vitamins, and is a rich source of energy. Carbohydrate provides the body with energy. Protein and fat can also provide energy, but carbohydrate is the quickest source of energy and the only nutrient that can be used for energy in every cell in the body. Carbohydrate should make up the largest part (45 to 65 percent) of each day's total calorie intake in a healthy diet. Only 10 to 15 percent of daily calories should come from protein, and no more than 35 percent should come from fat.

There are two kinds of carbohydrate: simple and complex. Simple carbohydrate is composed of one or two small molecules and is also called sugar. Glucose, fructose, maltose, and sucrose are examples of sugars commonly found in the foods we eat. They are found in especially large quantities in sweet foods such as soda, cookies, and candy. However, they are also found naturally in fruits and other foods made from plants. Sugars are easily absorbed into the blood from the digestive system. Eating a meal high in simple carbohydrate gives us a short burst of energy. Unfortunately, this is sometimes followed by a feeling of drowsiness or low energy. There is no dietary requirement for simple carbohydrate.

Complex carbohydrate, such as starch, is made up of long chains of simple sugars that are linked together. These large molecules provide us with a longer-lasting source of energy. Breads, cereals, pasta, rice, and other grain products are high in complex carbohydrate; so are many fruits and vegetables. Foods that are high in complex carbohydrate are usually low in fat and provide small amounts of protein, some vitamins (folic acid, riboflavin, thiamin, and niacin), and some minerals (iron and magnesium).

The starches found in foods made from whole grains, such as whole wheat bread, bran cereal, popcorn, and brown rice, are surrounded by intact kernels of grain. They are broken down more slowly than the starches found in foods made from refined grains, such as white bread and white rice. Whole grain foods and some fruits and vegetables are high in fiber, a complex carbohydrate that helps the digestive system function properly. Fiber can't be broken down by our digestive juices, so it passes through our intestines, soaking up water and making it easier for waste to pass from our bodies. Eating plenty of fiber may help prevent heart disease and diabetes.

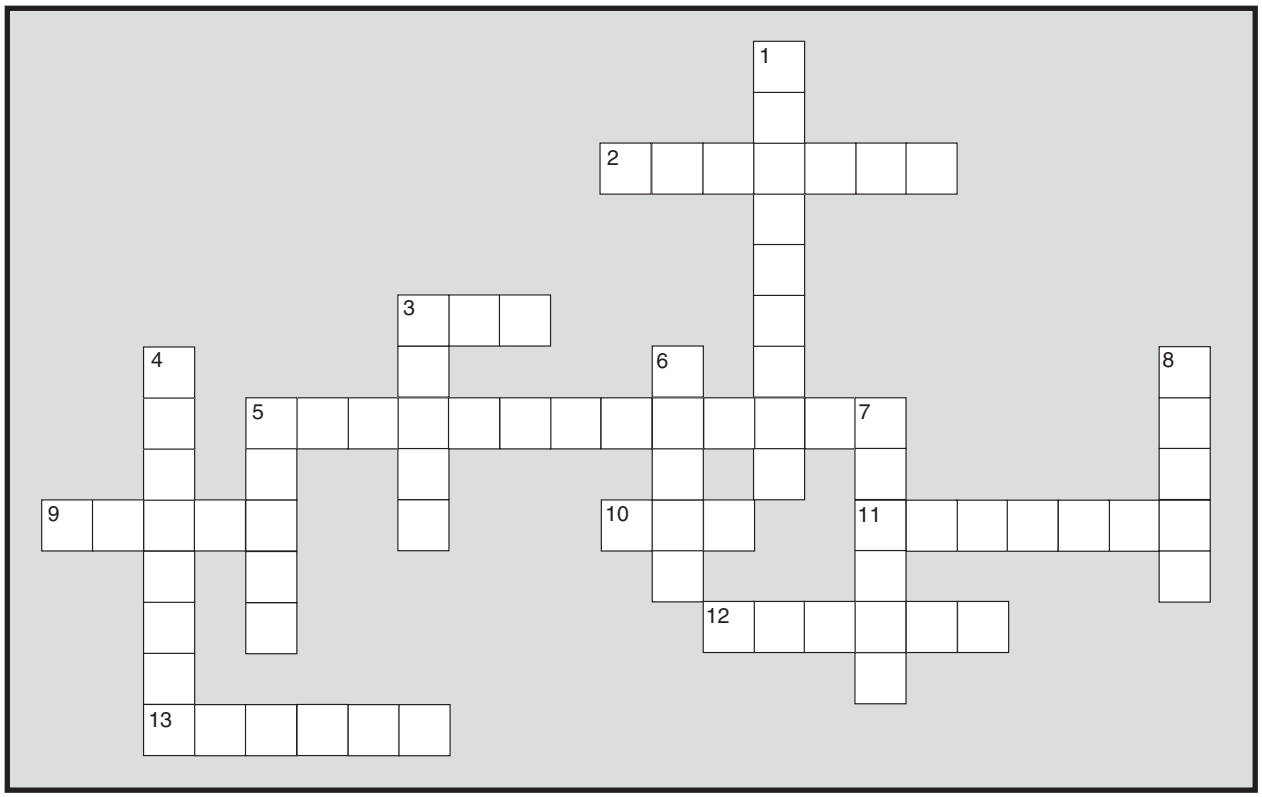
Carbohydrate is found in many foods and in all food groups. However, the grain, fruit, and vegetable groups contain the greatest amount of carbohydrate and are the foundation of a healthy diet. Eat six or more servings of grain products daily, and include at least three whole grain varieties. Eat five or more servings (combined) of fruits and vegetables daily. Be sure to choose a variety of foods within these groups. This will help you get the nutrients and fiber you need. Go easy on sweet foods such as soda, cookies, and candy. These are "sometimes foods"—not to be eaten every day! Although these foods are a source of carbohydrate, they are low in vitamins and minerals and can be high in saturated and trans fat. A single bottle of a sugar-sweetened beverage can contain all of the daily added sugar allowance for an adolescent.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).
Adapted from C. Cheung and S. Gortmaker, 2001, *Eat Well & Keep Moving* (Champaign, IL: Human Kinetics).

Name _____

Activity 4.3

Crossword Puzzle



Across

2. Provides the body with building blocks for repairing tissue.
3. Helps keep the body warm.
5. The macronutrient that should make up the largest part of each day's total food intake.
9. A food group that contains foods high in complex carbohydrate.
10. Foods that are high in complex carbohydrate are usually low in ____.
11. Blood sugar; a simple carbohydrate.
12. Provides us with long-lasting energy and fiber.
13. Carbohydrate that is easily absorbed into the blood.

Down

1. Chemical substances in food that our bodies need to stay healthy.
3. May lower your risk for heart disease and some cancers.
4. Grains usually contain these micronutrients.
5. Foods that contain large amounts of simple sugars.
6. An example of a food high in complex carbohydrate.
7. Provide short bursts of energy.
8. Absorbs water and makes it easy for waste to pass from our bodies.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

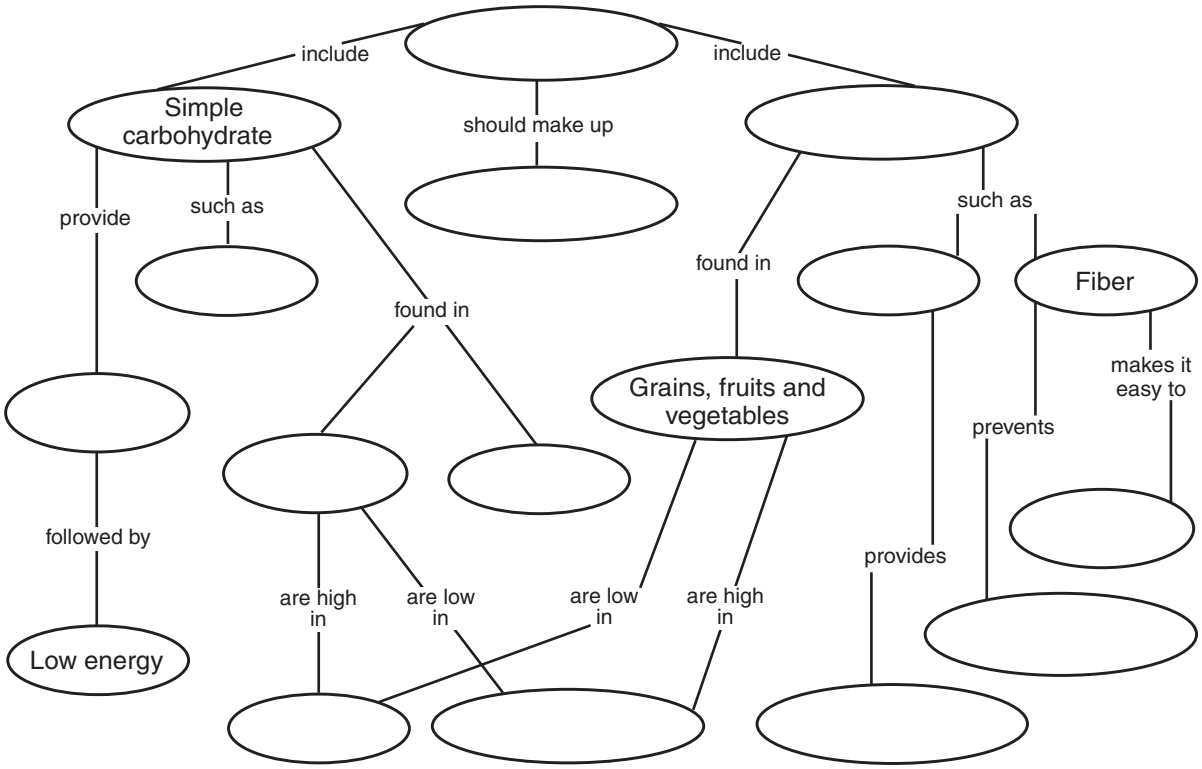
Activity 4.4

Concept Map

Fill in the empty ovals using the words in the word bank.

Word Bank

Fat	Low energy	Short bursts of energy
Fiber	Carbohydrate	Candy and cookies
Starch	Fruits	Grains, fruits, vegetables
Glucose	Excrete waste	Vitamins and minerals
Complex carbohydrate	Heart disease and diabetes	Long-lasting energy
	45-65% of daily food	Simple carbohydrate



From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 4.5

What Would You Say?

What would you say or do if you were presented with the following situations?

Situation 1

You and a group of your friends are planning a day hike into the White Mountains. Everyone is trying to decide what to bring for lunch and snacks. One of your friends thinks you should bring food high in protein. Another friend says she just wants to bring fruit. What would you recommend? What would you say to convince your friends that they should follow your suggestions?

Situation 2

Your sister tells you she is interested in going on a "Zone Diet." She explains that the diet is a high-protein, low-carbohydrate diet. The diet recommends that 40 percent of daily calories come from protein, 30 percent from carbohydrate, and 30 percent from fat. She asks you whether you think this is a good idea. What would you recommend and why?

Situation 3

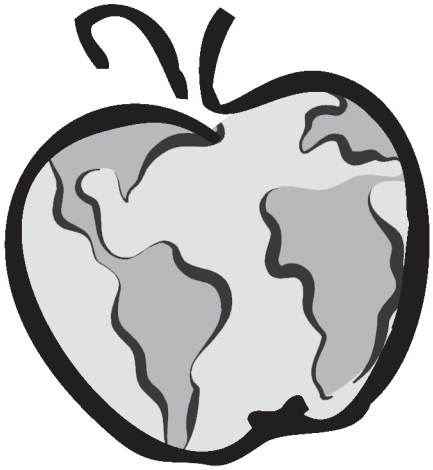
Your soccer game begins in 30 minutes. Your friend offers you a candy bar. He says it will give you a quick burst of energy for the game. Should you accept his offer? Why or why not?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 5

The Language of Food

Fruits and Vegetables Theme



This lesson teaches students about the importance of eating fruits and vegetables and encourages them to taste new and different varieties of these foods. It is designed to be integrated into a poetry unit. Students read and interpret poems that describe the feelings associated with trying new foods. They taste a fruit or vegetable that they have never eaten before and write a poem that describes the fruit or vegetable and their experience tasting it.

Behavioral Objectives

- For students to eat five or more servings of fruits and vegetables (combined) every day
- For students to try a variety of fruits and vegetables

Learning Objectives

Students will be able to do the following:

1. Read and analyze poems to determine common themes
2. Observe foods critically and list adjectives to describe their characteristics
3. Write poems that depict emotions and experiences associated with trying new foods
4. Explain why it's important to eat fruits and vegetables
5. Cite the 5-A-Day recommendation for fruits and vegetables

Materials

- Activity 5.1, Poetry Writing
- Poems (included): "The Sad Tale of Jonathan Who Wouldn't Eat His Vegetables," "Something Green for Dinner," "Celery," "Stuart McGroo," "I'd Never Eat a Beet," "Taste of Purple," *or*
- *Green Eggs and Ham* by Dr. Seuss (not included)
- Optional: assorted exotic fruit and vegetables for students to taste

Procedure

DAY 1

1. (5-10 minutes) We recommend that you read aloud Dr. Seuss's *Green Eggs and Ham* or two of the poems included in the lesson.
2. (5 minutes) Discuss the main points of the selected poems or *Green Eggs and Ham.*

Themes From Selected Poems

When discussing the selected poems, ask students what themes are common to all of them. Here are four answers to elicit:

- Children often don't like to eat vegetables or green things.
- Children often don't like to try new foods.
- Sometimes it's hard to try unfamiliar foods or foods that look different.
- Try it, you might like it.

Green Eggs and Ham

When discussing *Green Eggs and Ham,* ask students to respond to some of the following questions:

- Why did Dr. Seuss choose the color green for the new food the main character is asked to try?
- Does the green food symbolize vegetables?
- Which is more difficult: trying foods that look different from those we usually eat or trying foods that look similar to those we usually eat?
- Who does Sam represent?
- Have you ever had a similar experience when someone tried to get you to taste a new food?

3. Then, ask students to point out the sensory imagery used in the poem(s).
4. Point out the lesson goals:
   - To understand the importance of eating fruits and vegetables
   - To try a new fruit or vegetable.
   - To write a poem that describes the appearance, smell, feel, and taste of the fruit or vegetable they tried
5. (5 minutes) Ask students the following:
   - Why is it important to eat fruits and vegetables? (See the Teacher Resources.)
   - How many fruits and vegetables do you eat on a typical day?
   - How many fruits and vegetables should you eat daily? (See the Teacher Resources.)
6. (5 minutes) Discuss the correct answers to the questions. To get students thinking about the kinds of vegetables and fruits they eat, have students complete part I of activity 5.1.
7. For homework, ask students to try one fruit or vegetable that they have never tasted before (part II of activity 5.1). (If you are worried students might not be able to buy one of these foods, you can bring in several unusual fruits or vegetables to class. Before sharing what you bring in, wash foods and ask if anyone has relevant food allergies.) Ask students to list at least three adjectives that describe the appearance, taste, feel or texture, and smell of their food choice and to bring this list to class.

DAY 2

1. (Time will vary: at least 20 minutes) In part III of activity 5.1, ask students to write a poem that describes the fruit or vegetable they tried and their feelings associated with the experience. Did they like the food? Were they surprised by its taste? You may want to make certain style or length requirements that fit your students' skills or previous experiences with poetry writing (possible poetic forms: free verse, rhymes, shape poems; possible literary elements to include: alliteration, onomatopoeia, metaphors). *Optional:* To give students more time to work on their poems or reduce class time spent on this activity, you may want to have students complete their poem for homework.
2. (5 minutes) To give students an example of what you're asking them to do, read one or two of the poems included in the lesson.
3. (Time will vary: at least 5 minutes) Have some or all of the students share their poems with the class.
4. (5 minutes) To help students realize that their food preferences will change as they get older, ask students some of these questions:
   - If you didn't like the fruit or vegetable you tried, does that mean you will never like it?
   - Are there any foods or drinks that you like now that you used to dislike?
   - Can you think of any foods or drinks that adults like that you might like when you get older?

   Suggest that they continue to try new foods and foods that they haven't liked in the past. They may change their opinions. Who knows, maybe someday they'll even like spinach!

Extension Activities

Ask students to do one of the following:

1. Use a scoring rubric to evaluate their own and others' poems.
2. Illustrate their poems.
3. List 10 fruits and vegetables and write down three adjectives for each.
4. Make a poster telling people about the benefits of eating fruits and vegetables. (See Teacher Resources.) Use persuasive writing and appealing graphics.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the National Institutes of Health and National Cancer Institute's *Time to Take Five.* (See appendix A.)

SPECIFIC BACKGROUND MATERIAL

What are the main benefits of fruits and vegetables?

- Many are good sources of vitamin C: oranges, lemons, grapefruits, cantaloupes, raspberries, strawberries, tomatoes, cabbage, potatoes, spinach, cauliflower, peppers, radishes, and green leafy vegetables such as spinach and kale.
- Many are good sources of vitamin A: bright orange vegetables such as carrots, sweet potatoes, and pumpkin; dark green leafy vegetables such as spinach, collards,

and turnip greens; and bright orange fruits such as mangoes, cantaloupes, and apricots.

- Many fruits and vegetables are important sources of the B vitamins: leafy vegetables, cooked dried beans and peas, and oranges.
- They are an important source of potassium and fiber.
- They are low in unhealthy fat.
- They help protect against chronic diseases such as heart disease, stroke, high blood pressure, diabetes, and possibly some types of cancer.
- They provide nutrients important for immunity, healing, and healthy skin and eyes, among other functions.

How many fruits and vegetables should we eat daily?

The 5-A-Day campaign promotes consumption of five to nine servings of fruits and vegetables combined every day. For middle-school-age youth, this translates into portions of roughly 2 cups of fruit and 3 cups of vegetables. Reaching the 5-A-Day goal can be as simple as including a fruit or vegetable at every meal and snack.

How should we select fruits and vegetables?

- The U.S. *Dietary Guidelines* advise that in many cases "the brighter the color, the higher the content of vitamins and minerals." However, no one food supplies all the necessary nutrients, so try many colors and kinds.
- Choose fresh, frozen, or canned fruits and vegetables, fruit and vegetable juices, or dried fruits. All provide vitamins and minerals.
- Canned fruits in fruit juice or light syrup are more nutritious than canned fruits in heavy syrup.
- Choose whole or cut-up fruits and vegetables more often than juices because they are higher in fiber than juices.
- Fruit punch and fruit sodas contain little fruit juice and plenty of added sugars. They don't count as a serving of fruit juice.

How can we include plenty of different fruits and vegetables in our meals and snacks?

The U.S *Dietary Guidelines* provide this advice:

- Keep ready-to-eat raw vegetables handy in clear containers in the front of your refrigerator for snacks or meals on the go.
- Keep a day's supply of fresh or dried fruit handy on the table or counter.
- Enjoy fruits as a naturally sweet end to a meal.
- When eating out, choose a variety of vegetables at a salad bar.
- Serve raw vegetables with dip.
- Mix fruits or vegetables with other foods in salads, casseroles, soups, and sauces (for example, add shredded vegetables to pasta sauces).

REFERENCES

Produce for Better Health Foundation, www.5aday.com.

U.S. Department of Agriculture and U.S. Department of Health and Human Services. 2005. *Dietary Guidelines for Americans,* 6th ed., www.healthierus.gov/dietaryguidelines.

Sample Poems

The Sad Tale of Jonathan Who Wouldn't Eat His Vegetables

Jonathan hated vegetables,
I mean he HATED vegetables!
"I'll NEVER eat a vegetable,"
He said, "of any kind!"
"You won't grow up," our mother sighed.
She served them boiled and stewed and fried,
But Jonathan said, "I won't! I won't!
And you can't make me mind!"
Every day our sister, Sue,
Said, "Vegetables are good for you!
You won't grow up without them."
But he said, "I'd rather die!"
"Try some, Jonathan," begged our dad,
"These vegetables are not so bad."
But Jonathan cried, "I hate them!
You'll never make me try!"
"You won't grow up," our brother said,
But nothing got through Jonathan's head.
He kicked and screamed and pitched a fit
And drove the family wild.
And so it grieves me to report
That Jonathan met the saddest sort
Of fate because he wouldn't eat
His veggies as a child.

Our friends all gobbled vegetables,
They slurped and swallowed vegetables,
And that's the reason, I suppose,
They grew up one and all.
While Jonathan, as I'm sure you know,
Never did begin to grow,
And now he's ninety-seven,
But he's only two feet tall.

David L. Harrison

Something Green for Dinner

They served something green for dinner
And we wondered what it was.
Kenny whispered that it looked like
Someone's old lawn-mower fuzz.
Dad said, "Try a bite, you'll like it!"
We said, "Tell us, please, what is it?"
Dad said, "Ground up alien fern-tips
From the Martian spaceship's visit."
(They tasted great with the burgers.)

Jeff Moss

Celery

Celery, raw,
Develops the jaw,
But celery, stewed,
Is more quietly chewed.

Ogden Nash

Taste of Purple

Grapes hang purple
In their bunches,
Ready for
September lunches.
Gather them, no
Minutes wasting.
Purple is
Delicious tasting.

Leland B. Jacobs

(continued)

Sample Poems *(continued)*

Stuart McGroo

Let me tell you the story of Stuart McGroo,
A person who never tried anything new.
As a boy he ate nothing but gooseberry pie,
Not one bit of any new food would he try,
Not one pea or donut, not one brussels sprout,
And that's what young Stuart McGroo was about.
He would make no new friends so you couldn't invite
Stuart over to your house to stay for the night.
"I like my own bed!" cried young Stuart McGroo.
"I'm a person who never tries anything new!
I will stay safe at home! I will never go out!"
And that's what young Stuart McGroo was about.
Well, Stuart grew up but his heart did not throb
To raise a nice family or have a good job.
He just stayed in bed with his gooseberry pie
Saying, "Families and jobs are just new things to try
And I *never* try new things, there can be no doubt!"
And that is what Stuart McGroo was about.
The years hurried by, Stuart grew old alone
But he wondered about things that he'd never known.
And one day an old man with beard and a cane

Was seen strolling slowly down Tea Garden Lane.
He smiled at the people, they smiled at him, too,
And he made some new friends, did old Stuart McGroo.
Then a family he met asked him home for a meal.
For the first time he tasted spaghetti and veal
And pudding and milk and he loved every bite.
And Stuart dreamed happy dreams all through the night
Till he woke with a start and let out a shout,
"Now I finally see what the world's all about!"

Jeff Moss

I'd Never Eat a Beet

I'd never eat a beet, because
I could not stand the taste,
I'd rather nibble drinking straws,
or fountain pens, or paste,
I'd eat a window curtain
and perhaps a roller skate,
but a beet, you may be certain
would be wasted on my plate.
I would sooner chew on candles
or the laces from my shoes,
or a dozen suitcase handles
were I ever forced to choose,
I would eat a Ping-Pong paddle,
I would eat a Ping-Pong ball,
I might even eat a saddle,
but a beet? No! Not at all.
I would swallow talcum powder
and my little rubber duck,
I'd have doorknobs in my chowder,

I would eat a hockey puck,
I would eat my model rocket
and the socks right off my feet,
I would even eat my pocket,
but I'd never eat a beet!

Jack Prelutsky

Name _____

Activity 5.1

Poetry Writing

Part I

1. Put a check next to the fruits and vegetables listed below that you have tried.
2. Circle the ones that you like.

- ❑ Apple
- ❑ Apricot
- ❑ Artichoke
- ❑ Asparagus
- ❑ Avocado
- ❑ Bamboo shoots
- ❑ Banana
- ❑ Beets
- ❑ Black-eyed peas
- ❑ Blueberry
- ❑ Broccoli
- ❑ Brussels sprouts
- ❑ Cabbage
- ❑ Carrots
- ❑ Cassava
- ❑ Cauliflower
- ❑ Celery
- ❑ Cherries
- ❑ Chiles
- ❑ Collard greens
- ❑ Corn
- ❑ Cucumber
- ❑ Currant
- ❑ Date
- ❑ Eggplant
- ❑ Endive
- ❑ Fig
- ❑ Garbanzo beans
- ❑ Gooseberry
- ❑ Goya beans
- ❑ Grapefruit
- ❑ Grapes
- ❑ Green beans
- ❑ Huckleberry
- ❑ Jalapeno
- ❑ Jicama
- ❑ Kidney beans
- ❑ Kiwifruit
- ❑ Kohlrabi
- ❑ Kumquat
- ❑ Leek
- ❑ Lemon
- ❑ Lettuce
- ❑ Lima beans
- ❑ Lime
- ❑ Mango
- ❑ Melon
- ❑ Mushrooms
- ❑ Nectarine
- ❑ Okra
- ❑ Onion
- ❑ Orange
- ❑ Papaya
- ❑ Parsnip
- ❑ Patchoi
- ❑ Pea
- ❑ Peach
- ❑ Pear
- ❑ Pepper
- ❑ Persimmon
- ❑ Pineapple
- ❑ Plantain
- ❑ Plum
- ❑ Pomegranate
- ❑ Pumpkin
- ❑ Radicchio
- ❑ Radish
- ❑ Raspberry
- ❑ Red chili
- ❑ Rhubarb
- ❑ Rutabaga
- ❑ Scallions
- ❑ Snow peas
- ❑ Spinach
- ❑ Squash
- ❑ Star fruit
- ❑ Strawberry
- ❑ Sweet potatoes
- ❑ Swiss chard
- ❑ Tangerine
- ❑ Tomato
- ❑ Turnip
- ❑ Ugli fruit
- ❑ Water chestnuts
- ❑ Watercress
- ❑ Watermelon
- ❑ Wax beans
- ❑ Xigua
- ❑ Yam
- ❑ Yuca
- ❑ Zucchini

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 5.1

Poetry Writing *(continued)*





Part II

1. Choose one of the foods from the list that you *have not tasted* and try it. If you have tried them all or if you can't find one that you haven't tried in your local store, pick one that you don't like and try it again!
2. List as many adjectives as you can think of to describe the food's taste, smell, appearance, and texture.

Part III

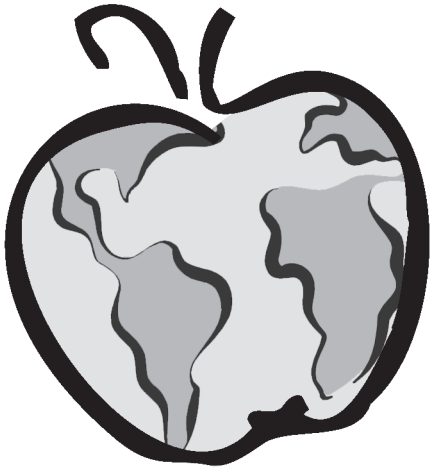
Write a poem that describes the food you tried and present it in class. Include your feelings about the experience. Did you like it?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 6

Keep It Local

Fruits and Vegetables Theme



Students write public service announcements to promote the 5-A-Day theme of eating five or more fruits and vegetables every day, with a focus on produce grown in Massachusetts (or your home state). This lesson is designed to infuse information about choosing healthy foods into a classroom unit on writing promotional messages.

Behavioral Objective

For students to eat five or more servings of fruits and vegetables (combined) per day

Learning Objectives

Students will be able to do the following:

1. List some locally grown fruits and vegetables
2. Organize their ideas and write them clearly and persuasively
3. As a group, write a public service announcement
4. Explain the 5-A-Day fruit and vegetable recommendation

Materials

- Student resource 6.1, Massachusetts Grown . . . and Fresher!
- Student resource 6.2, What Is a PSA?
- Activity 6.1, Writing a PSA
- *Optional:* Overhead transparency of Teacher Resources

Procedure

To make this more relevant to your students, contact your state department of agriculture to obtain information about foods grown in your state. Go to the Web site! You can modify the procedure by substituting information on your state for the Massachusetts resources we provide.

1. (8 minutes) Review the 5-A-Day recommendation with students, making sure they understand that "five a day" refers to eating fruits and vegetables combined, not to eating five a day each of fruits and vegetables. This is equivalent to roughly 2 cups of fruit and 3 cups of vegetables. Discuss the Massachusetts Agriculture Facts and the Fruit and Vegetable Facts (see Teacher Resources) and relate them to the 5-A-Day theme. If possible, provide students with copies of the Teacher Resources or display them on an overhead.
2. (5 minutes) Pass out student resource 6.1, Massachusetts Grown . . . and Fresher!, which details the months when you can buy fresh Massachusetts-grown produce. Highlight the variety and diversity of fruits and vegetables grown in Massachusetts using the following discussion questions (some of these questions could be used for homework):
   - What produce is available locally in each of the seasons? Why are locally-grown fruits and vegetables available at certain times and seasons? (Remind students that nutritious produce is available year-round via imported foods.)
   - What are your favorite fruits and vegetables that are grown in Massachusetts?
   - What fruits and vegetables do you consume that aren't from Massachusetts?
   - If you are not originally from the United States, what other fruits and vegetables did you grow up eating that you can't buy here?
   - Which locally grown fruits and vegetables have you tried for the first time in the past two years?
3. (15-20 minutes) Distribute student resource 6.2, What Is a PSA?, and discuss the sample PSA. Have students analyze the sample PSA and how it incorporates the tips for developing PSAs (in What Is a PSA?). (See the Teacher Resources for additional examples of PSAs.)
4. Hand out activity 6.1, Writing a PSA.
   - Have students form groups of four or five and, as a group, write a PSA for the radio promoting eating five-a-day with Massachusetts-grown fruits and vegetables.
   - Allow 15 minutes for students to brainstorm and write their PSAs. Each group then will present its PSA to the class.
   - Students can record messages on audiotapes or videotapes and replay them for the class. They can also perform them over the public announcement system to encourage all students to purchase fruits and vegetables in the cafeteria.

Extension Activities

Videotape or audiotape student presentations. You might involve the art or music teachers in a project in which students produce a visual representation or select or create music to go along with their PSAs.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the National Institutes of Health and National Cancer Institute's *Time to Take Five*. (See appendix A.)

SPECIFIC BACKGROUND MATERIAL

Massachusetts Agriculture Facts

Massachusetts ranks

- second in the United States for production of cranberries,
- ninth for production of squash,
- tenth for production of raspberries, and
- twelfth for production of apples.

Massachusetts farms average 85 acres in size (1 acre is about the size of a football field). There are about 6,000 farms and 500,000 acres of farmland in the state of Massachusetts. There are about 400 roadside farm stands in Massachusetts as well as over 100 farmers' markets.

(For information on other states, check their Web sites; for example, Texas: www.pick-texas.com/; California: www.cdfa.ca.gov/kids/; Illinois: www.agr.state.il.us/; New York: www.agmkt.state.ny.us/.)

The 5-A-Day Recommendation

The 5-A-Day campaign promotes eating five to nine servings of fruits and vegetables every day. For middle-school-age youth, this translates into portions of roughly 2 cups of fruit and 3 cups of vegetables. Reaching the 5-A-Day goal can be as simple as including a fruit or vegetable at every meal and snack.

Fruit and Vegetable Facts

- Massachusetts-grown fruits and vegetables that are good sources of vitamin C include cantaloupes, raspberries, strawberries, tomatoes, cabbage, potatoes, cauliflower, peppers, radishes, and green leafy vegetables such as spinach and mustard greens.
- Some Massachusetts-grown fruits and vegetables that are good sources of vitamin A include cantaloupes, carrots, asparagus, red peppers, tomatoes, and green leafy vegetables such as spinach and kale.
- Most fruits and vegetables contain large amounts of fiber and are low in fat.
- Eating at least five servings of fruits and vegetables a day may reduce the risk of certain forms of cancer.
- Fruits and vegetables provide nutrients important for immunity, healing, healthy skin and eyes, and other functions.

Selecting Fruits and Vegetables

- According to the U.S. *Dietary Guidelines* (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2005), in many cases "the brighter the color, the higher the content of vitamins and minerals." However, no one food supplies all the necessary nutrients, so try many colors and kinds.
- Choose fresh, frozen, or canned fruits and vegetables, fruit and vegetable juices, or dried fruits. All provide vitamins and minerals.
- Canned fruits in fruit juice or light syrup are more nutritious than canned fruits in heavy syrup.

- Choose whole or chunked fruits and vegetables more often than juices because they are higher in fiber.
- Fruit punch and fruit sodas contain little fruit juice and plenty of added sugars. They don't count as a serving of fruit juice.

Including Different Fruits and Vegetables in Meals and Snacks

Here are some tips from the U.S. *Dietary Guidelines:*

- Keep ready-to-eat raw vegetables handy in a clear container in the front of your refrigerator for snacks or meals on the go.
- Keep a day's supply of fresh or dried fruit handy on the table or counter.
- Enjoy fruits as a naturally sweet end to a meal.
- When eating out, choose a variety of vegetables at a salad bar.
- Serve raw vegetables with dip.
- Mix fruits or vegetables with other foods in salads, casseroles, soups, and sauces. (For example, add shredded vegetables to pasta sauces.)

SAMPLE PUBLIC SERVICE ANNOUNCEMENTS

- CBS TV 7-9 p.m.: And now some helpful hints on recycling from Danny DeVito and Rhea Pearlman . . . DO IT!
- NBC TV 8-10 p.m.: "The More You Know," Courtney Cox says: "What if I told you that you could save a friend's life with these?" (car keys). "Be a designated driver."

REFERENCES

U.S. Department of Agriculture and U.S. Department of Health and Human Services. 2005. *Dietary Guidelines for Americans,* 6th ed., www.healthierus.gov/dietaryguidelines.

Name _____

Student Resource 6.1

Massachusetts Grown . . . and Fresher!

Buying Guide

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Student Resource 6.2

What Is a PSA?

Public Service Announcements (PSAs) are usually 10-, 30-, or 60-second radio or TV advertisements that create awareness around a health problem or issue. Nonprofit and government agencies often sponsor PSAs to provide new information; to reinforce prevailing knowledge or attitudes; or to promote programs, services, activities, or issues of community interest. Commercial advertisements, on the other hand, try to sell an actual product. Radio and TV stations and networks donate the broadcast air time for PSAs. In recent years, public service campaigns have been used frequently by health promotion and disease prevention programs. Some campaigns you might be familiar with promote stopping smoking and drinking more milk. For example, the message "got milk?" is probably familiar to you. What other PSAs do you recall?

Tips for Developing PSAs

1. Keep messages short and simple—just one or two key points.
2. Identify the main issue (health problem) in the first 10 seconds in an attention-getting way and summarize or repeat the main point or message at the close.
3. Use a memorable slogan, theme, music, or sound effects to aid recall.
4. Present the solution as well as the problem.

Sample Public Service Announcement

From the Northeast Food Council

Is a Vegetarian Diet a Healthy Way to Eat? (60-Second PSA)

Is a vegetarian diet a healthy way to eat? This is Jill Sonneville of the Northeast Food Council with the September Nutrition Report. According to the new U.S. *Dietary Guidelines* released in January 2005, vegetarian diets can be a healthy way to eat. However, the guidelines said people who eat only vegetarian foods need to make sure that they are consuming enough calcium, protein, iron, zinc, and B vitamins. This can easily be done by choosing foods from the five food groups. Beans, nuts, and soy products help to provide protein—and milk and eggs are good for vegetarians who eat dairy products. Good sources of calcium include fortified breakfast cereals and dairy products. Fortified breads and cereals can help meet B vitamin requirements. If you decide to go vegetarian, keep nutrition in mind and the five food groups by your side.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 6.1

Student names _____

_____

_____

_____

_____

Writing a PSA

1. Break into groups of about four or five students.
2. Your assignment for the next 10 minutes is to address the need for middle school students to eat more fruits and vegetables by writing a 60-second public service announcement (PSA) for a local radio station, TV station, or your school. Your PSA should target middle school students and promote the 5-A-Day theme with Massachusetts-grown fruits and vegetables. (When surveyed, one group of local middle school students reported eating 3.3 servings instead of 5 servings of fruits and vegetables a day.)
3. Create a humorous advertisement if you like. Each group will present its final PSA draft to the class. Everyone must have a part in the presentation.
4. Choose a local radio station where you will broadcast this PSA. _____ Why did you choose this station?

5. Create a 30- to 40-second ad (five to seven short sentences) that will promote the 5-A-Day theme and write it below. Include information highlighted under Fruit and Vegetable Facts as well as any other helpful information that you would like to add.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 7

Write a Fable: Important Messages About Activity

Activity Theme

In this lesson students learn what it means to be physically fit and why an active lifestyle is important. They read a short essay about the topic and use their knowledge to write three important lessons, or "morals," about physical fitness. Finally, they write a fable that illustrates one important lesson. An alternative activity is included for teachers who want to work only on reading comprehension.

Behavioral Objective

For students to be physically active every day

Learning Objectives

Students will be able to do the following:

1. Comprehend and identify basic facts and ideas introduced in a nonfiction essay
2. Write a fable that illustrates the importance of physical fitness and an active lifestyle
3. Critique and edit one another's work
4. Revise their writing to improve organization, diction, sentence structure, mechanics, and spelling
5. List the four components of physical fitness
6. Suggest ways to improve their own physical fitness

Materials

- Activity 7.1, Reading Comprehension
- Activity 7.2, Reading Review, or activity 7.3, Writing a Fable
- *Optional:* Activity 7.4, Guidelines for Critiquing Fables

Procedure

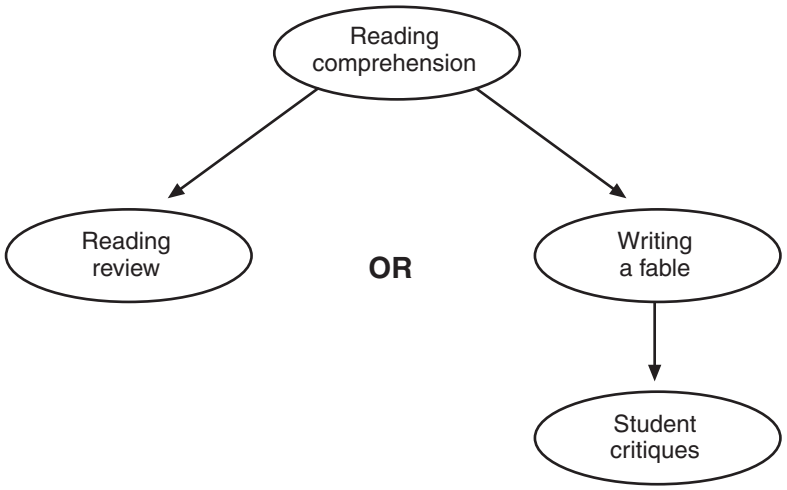
Modify this to fit your time constraints and students' skill levels. If you are short on time, you may want to do only activity 7.1 and activity 7.2.

1. Decide which activities best fit your curriculum and your students' abilities.
2. Point out the goals of the activity:

Activity 7.1

Activity 7.2 OR 7.3
(choose 1)

Activity 7.4 (optional)



- Discuss the importance of physical fitness and an active lifestyle
- Comprehend and identify basic facts and ideas introduced in a nonfiction essay (activities 7.1 and 7.2)
- Write a fable that illustrates the importance of physical fitness and an active lifestyle (activity 7.3)

ACTIVITY 7.1: READING COMPREHENSION

(10-15 minutes) Hand out activity 7.1, Reading Comprehension. Have students read this silently and underline statements they think convey an important message. (*Optional:* You could assign this for homework to be done the night before you plan to do this lesson.)

ACTIVITY 7.2: READING REVIEW

1. (10-15 minutes) Hand out activity 7.2, Reading Review. Have students work in pairs or groups to complete these questions.
2. Discuss students' answers to the questions. (See Teacher Resources for answers.)

ACTIVITY 7.3: WRITING A FABLE

1. (5-10 minutes) This lesson is designed to be incorporated into a unit on fables. However, if your students are not familiar with fables, read a short fable aloud (for example, *The Tortoise and the Hare,* an Aesop fable). Discuss this literary style. Remind students that fables are fictitious short stories designed to teach an important lesson, or "moral," and impart some wisdom. The moral of the story is usually clearly stated at the end of the story. Frequently, the characters in these stories are animals that speak and act like humans.
2. (10 minutes) Hand out activity 7.3, Writing a Fable. Have students work in pairs to develop three important lessons, or "morals to the story," based on the statements they underlined in activity 7.1.
3. (10-15 minutes) Have each student choose one of the three morals to write a fable about. Partners should work together to brainstorm plots and characters they might use in writing their individual fables. Each student should write an outline of his or her story.
4. Ask students to write a first draft of their fable for homework. (*Optional:* You may choose to give students an opportunity to do the writing in class.)

ACTIVITY 7.4: GUIDELINES FOR CRITIQUING FABLES

1. If you want to shorten this lesson, you could choose to have students hand in their drafts to you and skip the peer-review activity.
2. (15 minutes) Hand out activity 7.4, Guidelines for Critiquing Fables. Have students exchange fables with their partners and make comments and suggestions for revision based on the specified criteria.
3. Have students revise their stories during class or for homework.
4. *Optional:* Ask a few students to read their stories to the class.

Extension Activities

1. Have students write their fables in a storybook format with illustrations.
2. Choose one of the fables to have students act out in class.
3. Take a field trip to a local elementary school or preschool. Have students read their fables to the younger children.
4. Ask students to write a reflective essay about the amount of physical activity they participate in regularly. What types of physical activities do they do? How can they increase the amount of physical activity in their lives? Have them make a plan for the next five days.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)
- Gortmaker et al., "Television Viewing as a Cause of Increasing Obesity Among Children in the United States, 1986-1990" (see appendix C)

- Henry J. Kaiser Family Foundation, *Generation M: Media in the Lives of 8- to 18-Year-Olds* (see appendix C)
- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix B)

SPECIFIC BACKGROUND MATERIAL

What is physical fitness? Why is it important?

See activity 7.1, Reading Comprehension.

How much activity is needed to obtain health-related benefits?

Moderate amounts of daily activity are recommended for people of all ages. However, physical activity need not be strenuous to be beneficial. Just a small increase in physical activity can generate genuine health benefits, including reducing the risk of heart attack, hypertension, diabetes, and death. For adults, 30 minutes or more of moderately intense activity, such as walking, is beneficial for health when performed regularly. Some kind of regular vigorous activity, however, is the best way to improve cardiorespiratory fitness. Children and adolescents should strive for 60 minutes or more of moderate to vigorous activity on most, preferably all, days of the week. This is beneficial for physical development, maintaining proper energy balance, and enjoying the feelings of fun and well-being that physical activity provides. For adolescents, active time should include 20 minutes or more of vigorous activity (greater in intensity than brisk walking) at least three times a week to improve cardiorespiratory fitness.

How much activity is needed for fitness?

See activity 7.1, Reading Comprehension.

What are some examples of things you can do to increase your activity and decrease your inactivity?

Take the stairs; don't park next to the building; walk or ride your bike to school if there is a safe route; walk around the mall or the neighborhood with friends; watch only your favorite TV shows; remove or unplug the TV in your bedroom; play catch with a sibling, friend, or parent. See activity 7.1, Reading Comprehension.

What changes in society have brought about a decrease in daily physical activity?

In the latter part of the 20th century, there was a dramatic reduction in the amount of physical activity performed in daily life. The number of sedentary white-collar jobs has since increased, and the number of blue-collar and farming jobs that required physical work has decreased. Modern appliances, machinery, and motorized transportation have decreased the amount of activity required to complete household chores and work-related tasks. The growth of technology and inactive leisure activities has also been enormous, with computers, video, and TV being the major factors. The Internet, video games, and continued expansion of the TV channel market will help these trends continue.

How much time do adolescents spend watching TV?

According to a recent Henry J. Kaiser Family Foundation study (2005), American children spend more time watching TV than they do engaging in any other activity except

sleeping. In 2005 the average adolescent viewed approximately 21 hours per week, but that number jumps to 28 hours when you include videos, DVDs, and prerecorded shows. On top of this, youth average one hour a day of computer use (outside of school work), just under one hour (50 minutes) a day of video games, and 45 minutes of non-school-related reading. Altogether youth pack about eight and a half hours of media content into about six and a half hours of time by using more than one medium at a time. Essentially, for many children media consumption has become a full-time job! On average, adolescents spend nearly as much time watching television as they spend in school. The American Academy of Pediatrics recommends limiting TV viewing to no more than two hours per day.

Why is excess television viewing damaging to health?

Television viewing is one of the major causes of overweight (obese) youth. Excessive TV viewing contributes to a sedentary lifestyle and promotes poor nutrition by exposing children to food advertising for high-calorie, low-nutrient foods. TV watching has also been associated with elevated cholesterol levels, cigarette smoking, and poor cardiorespiratory fitness.

What are the risks of a sedentary lifestyle?

Activity is required for health. Studies suggest that physically active people enjoy lower risks of developing heart disease, diabetes, colon cancer, osteoporosis, anxiety, and depression relative to sedentary people.

What are the alternatives to TV viewing?

Anything that involves movement! Limiting TV time can ensure that you do other activities that involve more physical activity. Also, you don't have to sit still while you watch TV—you can be dancing, cleaning, cooking, and so on. One easy way to cut down on TV time is to take the TV out of the room where you sleep. If you don't want to physically remove it, just unplug it. Watch TV only when your favorite show is on.

Answer Key

ACTIVITY 7.2: READING REVIEW

1. __T__ To improve your physical fitness, you must exercise every day for 60 minutes.

   Experts recommend that children and adolescents be moderately active for 60 minutes or more every day or nearly every day. For adolescents, this should include 20 or more minutes of intense activity (that makes you sweat) at least three days a week. How long, how hard, and how often you are active will determine how fit you are! You can improve fitness by increasing the frequency (if you are not exercising regularly), increasing the intensity (doing something faster, doing more repetitions), or increasing the time you spend on each exercise.
2. __T__ To be physically fit, you must work on aerobic fitness, muscular strength and endurance, and flexibility.
3. __T__ Walking to school, climbing stairs, chasing after younger brothers and sisters, and walking the dog are all physical activities that provide the health benefits of exercise.

4. __F__ To strengthen your heart, lungs, and circulatory system, you need to do at least two sessions per week of vigorous physical activity lasting for 20 minutes or more.

   At least three sessions of vigorous activity are recommended to improve cardiorespiratory fitness.

5. __T__ Physical activity helps relieve stress.
6. __T__ Regular physical activity *now* will help you develop an active lifestyle, something that will help prevent heart disease later in life.
7. __F__ Flexibility is the ability of the heart, lungs, and circulatory system to deliver oxygen and nutrients to all areas of your body.

   Aerobic fitness is the ability of the heart, lungs, and circulatory system to deliver oxygen and nutrients to all areas of your body.

Activity 7.1

Reading Comprehension

What exactly is physical fitness? Being fit means you have more energy to do daily tasks, you can be more active, and you do not tire as easily during the day. Being fit also helps you build a positive self-image and feel better about yourself.

You can gain the health benefits of physical activity without spending hours in a gym. Every time you throw a softball, swim a lap, or climb up a flight of stairs, you improve your health and fitness level. How long, how hard, and how often you are active will determine how fit you are!

As you read the following information, underline the statements you think convey an important message.

Benefits of Physical Activity

Physical activity has many proven benefits. Physical activity can help

- prevent high blood pressure;
- strengthen your bones;
- ward off heart disease, some cancers, and diabetes;
- relieve stress;
- make you feel and look better;
- keep you active as an adult; and
- maintain or achieve an appropriate weight for your height and body build.

Regular physical activity can help you be more self-confident, organize your time better, learn new skills, and meet people with similar interests. It also helps reduce stress. Learning to cope with stress is an important part of healthy living. Family problems, conflicts with friends, and school pressures can cause stress. Major changes in your life, such as moving to a new home or school, are also sources of stress. Exercise helps you relax by causing physical changes inside your body that help it react to and handle stress.

Overeating, not exercising enough, or both, often lead to more body fat. Being overweight increases your risk of diabetes, high blood pressure, and heart attack. Physical activity can help you maintain or achieve an appropriate weight for your height and body type.

Physical activity also helps ward off heart disease, the leading cause of death in the United States. You might say, “I don’t need to worry about having a heart attack. That only happens to people when they get old.” But research has shown that risk factors for developing heart disease as an adult start during childhood. A lack of physical activity is one of the major risk factors influencing heart disease. So being active now will help you develop an active lifestyle that you can maintain throughout your life, something that will help prevent heart disease later.

Physical Fitness Is a Balance of Many Areas

To be physically fit, you must work on all aspects of fitness, including the following:

- **Aerobic fitness.** This is the ability of the heart, lungs, and circulatory system to deliver oxygen and nutrients to all areas of your body. When you are active, you breathe harder and your heart beats faster so that your body is able to get the oxygen it needs. If you are not fit, your heart and lungs have to work extra hard during physical activity.
- **Muscular strength and endurance.** This is the amount of work and the amount of time that your muscles are able to do a certain activity before they get tired, such as lifting heavy objects or in-line skating.

(continued)

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- **Flexibility.** Flexibility is the ability of joints and muscles to move and stretch through a full range of motion. For example, people who are very flexible can bend over and touch the floor easily. A person with poor flexibility is more likely to get hurt during physical activity.

What Can I Do to Become More Fit?

First, you have to make the commitment to become *more* physically active. Try to do some physical activity every day, whether it is through physical education classes in school or an activity on your own. Choose an activity you like. You are more apt to stay in the habit of doing it if it's one you enjoy. Anything that involves movement qualifies as physical activity. You do not have to be on a sport team, have expensive athletic clothes or shoes, or be good at sports to become more fit. Any type of regular physical activity is good for your body. Household chores, such as mowing the lawn, vacuuming, or scrubbing, involve exercise and may have fitness benefits, depending on how vigorously you do them. The most important thing is that you keep moving. Walking is better than riding in a car, and using the stairs is better than taking the elevator. Making small changes like these in your everyday life can make you more fit.

It may help to plan a physical activity with a friend. Many people find that it is more fun to exercise with someone else.

You should incorporate moderate and vigorous aerobic exercise into your regular activity plans. Aerobic activity is continuous. It makes you sweat, causes you to breathe harder, and increases your heart rate. Examples of aerobic activities are brisk walking, basketball, bicycling, swimming, in-line or ice skating, jogging, and aerobic dancing. Baseball and football sometimes do not involve as much continuous exercise because you are not active the whole time.

To make more time for physical activity, limit the amount of time you watch TV or play computer or video games.

How Often Should I Exercise?

Make physical activity a part of your lifestyle. Your goal should be to do some type of moderately intense activity for at least 60 minutes every day or nearly every day and aim for at least three sessions per week of vigorous physical activity lasting 20 minutes or more. If you are not exercising now, increase your level of activity gradually.

Include stretching exercises in your daily routine. Stretching during your warm-up time helps protect against injury, and makes your muscles and joints more flexible. It is especially important to stretch after you exercise to cool down your muscles.

Muscular strength increases when you do all types of regular physical activity. However, you may want to include strength training as part of your exercise regimen. Strength training, also called weight training and resistance training, involves using free weights or weight machines to increase muscular strength and muscular endurance. You should always have a trained adult supervise you.

You can improve fitness by increasing the frequency (if you are not exercising regularly), increasing the intensity (doing something faster, doing more repetitions), or increasing the time you spend on each exercise. You might choose more types of exercise to do.

Physical activity is an important part of keeping your body healthy. It should be part of your daily lifestyle. Like all things, exercise can be overdone. You may be exercising too much if

- your weight falls below what is normal for your age, height, and build;
- exercise starts to interfere with your normal school and other activities; or,
- your muscles become so sore that you risk injuring yourself.

If you notice any of these signs, talk with your parents or pediatrician before health problems occur.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics). Adapted, by permission, from the American Academy of Pediatrics' brochure *Better Health and Fitness Through Physical Activity* © 1996.

Name _____

Reading Review

Fact or Fiction?

Read through each of the following statements. Put a T in front of the true statements. Put an F in front of the false statements, and rewrite the statements so that they are correct.

1. ____ To improve your physical fitness, you must exercise every day for 60 minutes.
2. ____ To be physically fit, you must work on aerobic fitness, muscular strength and endurance, and flexibility.
3. ____ Walking to school, climbing stairs, chasing after younger brothers and sisters, and walking the dog are all physical activities that provide the health benefits of exercise.
4. ____ To strengthen your heart, lungs, and circulatory system, you need to do at least two sessions per week of vigorous physical activity lasting for 20 minutes or more.
5. ____ Physical activity helps relieve stress.
6. ____ Regular physical activity *now* will help you develop an active lifestyle, something that will help prevent heart disease later in life.
7. ____ Flexibility is the ability of the heart, lungs, and circulatory system to deliver oxygen and nutrients to all areas of your body.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Writing a Fable

Fables are fictitious short stories that teach an important lesson, or "moral," and share some wisdom. The moral of the story is usually clearly stated at the end of the story. Frequently, the characters in these stories are animals that speak and act like humans. For example, in the fable *The Tortoise and the Hare,* an Aesop fable, the important lesson is, "Hard work and perseverance bring reward."

Step 1

1. Read activity 7.1, Reading Comprehension, and underline statements that you think convey important messages about physical fitness.
2. Work with a partner to write three important lessons about physical fitness.

Important Lessons

1.

2.

3.

Step 2

Choose one of the preceding important lessons. Brainstorm plots and characters you could use to tell a story that teaches this lesson. Each student must write his or her own fable.

Step 3

Make an outline of the fable you plan to write.

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Name _____

Activity 7.4

Guidelines for Critiquing Fables

Help your partner revise his or her fable. As you read the fable, keep the following guidelines in mind.

1. Read the fable at least twice.
2. Remember that when you critique someone else's work, it's a good idea to share your positive reactions first, and then discuss your constructive criticisms.
3. Write down what you like about the story below.
4. The first time you read the story, think about what message the story is trying to get across. Does the story clearly portray the wisdom stated in the important lesson? Is the story easy to follow, or does it need to be reorganized? Make your suggestions for improving the story.
5. The second time you read the story, examine the details of how the story is told.
   - Make any suggestions for changes in vocabulary.
   - Are there any run-on or incomplete sentences?
   - Check for correct usage of punctuation (commas, apostrophes, periods, quotation marks).
   - Check for correct spelling.

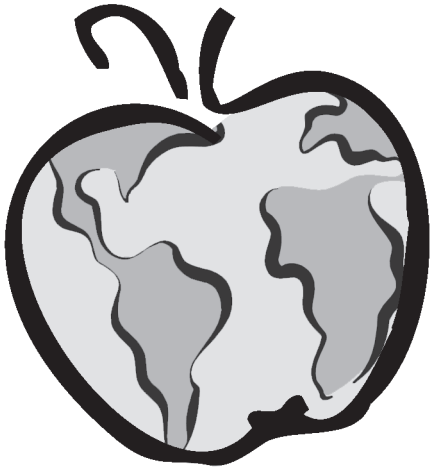
Write your suggestions on the story itself, but be sensitive about the way you make your comments. Write legibly, and do not cross out words so that they are no longer readable. Choose words that are not hurtful.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 8

Go for the Goal

Activity Theme



This lesson examines setting fitness goals using activities that complement the goal setting students may be doing in their physical education classes. Although this lesson may stand alone, consider checking with the PE teachers to verify that they are using *Planet Health*. You may be able to coordinate timing this lesson for maximum impact in language arts and PE. This lesson is designed to infuse information about increasing physical activity into a language arts class. Students will read several case studies and write physical activity goals aimed at increasing the physical activity of the people discussed in the case studies.

Behavioral Objectives

For students to increase their physical activity by

- learning how to set realistic goals and
- trading inactive time for time participating in some physical activity

Learning Objectives

Students will be able to do the following:

1. Read and comprehend case studies
2. Understand the concept of goal setting and its components, including planning, setting, and evaluating progress toward a goal
3. Write clear and realistic physical activity goals

Materials

- Activity 8.1, Making Time to Stay Fit
- Activity 8.2, Choosing a Lifestyle That Helps You Stay Fit (case studies)

Procedure

Because this lesson asks students to set a goal over a 24-hour period, it is best not to teach it on a Friday.

1. (Up to 5 minutes) Write "goal" on the board and have students brainstorm what the word means to them. Write each response on the board.
2. (5 minutes) Give examples of a few simple goals, especially goals related to physical activity. Ask students to give examples of goals they've set and achieved in the past and to explain why they were successful. What motivated them to achieve their goals in those cases? Ask students to also think of goals they failed to achieve and to explain why they failed.
3. (5 minutes) Review the acronym GoAL (*Go* for an *A*ctivity you *L*ike!) and the concept of "trading time."
4. (7-10 minutes) Distribute activity 8.1, Making Time to Stay Fit. Have the students complete the activity, and instruct them *not* to fill in section D. They will reflect on their progress tomorrow in class. Explain that they should create goals for themselves that they can complete by class the next day. Make sure students understand that their homework is to pursue their goals over the next 24 hours. These goals can be similar to the goals they set in PE class, but they need to be goals they can realistically reach in a day. PE goals are for four to six weeks. Collect the activity 8.1 worksheets for class tomorrow.
5. (7-10 minutes) Distribute activity 8.2, Choosing a Lifestyle That Helps You Stay Fit. Have the class review each case study. Have students write solutions to the problems individually or, as a group, develop and discuss solutions for the problems presented.
6. (7 minutes) During the next class period, pass out the activity 8.1 worksheets and have students fill in section D to reflect on their progress. Discuss the goals and evaluation with the class. Were their goals realistic, or would they like to change them? What things get in the way of being more physically active?

Extension Activity

Have students interview a member of their family to find out whether they have any goals for themselves (e.g., to be more physically active, to go to college, to get an A on the next math test, to get a promotion, to better their time in the 100-yard dash).

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- National Association for Sport & Physical Education, *Physical Activity for Children Ages 5-12: A Statement of Guidelines*.
- U.S. Department of Health and Human Services, *Healthy People 2010,* physical activity objectives.

See appendix B for information on obtaining these documents. You also may want to refer to microunits 4 through 7 in part VII.

SPECIFIC BACKGROUND MATERIAL

Planet Health*'s Activity Message*

Physical activity promotes health and well-being and offers opportunities to socialize and have fun. Adolescents should strive for at least 60 minutes or more of moderate to vigorous activity every day as part of play, games, sports, chores, transportation, and planned

exercise. As part of this, they should participate in at least three sessions per week of vigorous physical activity lasting 20 minutes or more. These guidelines are recommended minimum levels of activity for health.

Goal Setting

- A goal is defined as a purpose to which an endeavor is directed.
- A goal is something you are trying to achieve, and the strategy is the plan for how to get there. People set goals and carry out plans all the time. You can remind students that friends, parents, teachers, and other adults all set goals, too.
- Some examples of goals are getting to school on time or reaching the top of Mount Monadnock on a hike.
- It feels good to achieve a goal.
- Students may find it difficult to set realistic goals. Setting goals involves a process of refining and defining. A goal that initially seems realistic may later need adjustment. For example, you may think that you will be able to run a mile three times a week by the end of the month, but come to realize that you need more time to reach that goal. You might need to change your goal to half a mile three times a week.
- Difficult goals can be achieved with patience and diligence. Focusing on and achieving goals takes mental discipline.
- Students are also practicing goal setting in PE as part of *Planet Health.* This lesson helps reinforce the PE component.
- The most important part of a goal is to *Go* for an *A*ctivity you *L*ike (GoAL)!

Inactivity and Trading Time

- Strive to decrease inactivity. On average, youth watch three to four hours of TV a day; they spend additional time on the computer, playing video games, or both.
- Some amount of physical activity is required for health. Children need activity to develop and retain cardiorespiratory fitness, muscular strength, flexibility, and confidence in their physical ability.
- Physical activity builds fitness, is fun, and helps release energy! Just a small increase in physical activity can generate genuine health benefits.
- To prevent disease, it is important for students to create lifestyle patterns now that they will carry into adulthood.
- Encourage students to think about trading some time they currently spend on activities such as TV, computer games, and video games for some moderately intense or vigorous activity that they like. This is one way to help set achievable fitness goals and to make space for fitness. Physical activity is a cure for boredom.

Name _____

Activity 8.1

Making Time to Stay Fit

Physical activity builds fitness! It's good for your health, and it's fun! To improve your physical fitness, you need to be more active. There are many ways to do this. You could

- trade some screen time for active time, such as riding your bike instead of watching TV, or simply walk and visit a friend;
- do more of what you're already doing, such as in-line skating for 30 minutes instead of 15;
- work harder at what you're already doing; or
- add new activities, such as walking to school instead of getting a ride.

A. Using the preceding strategies, come up with four ways you could be more active. Write them below. Remember to choose activities you like!

For example: My goal is to be more active.

I could	*ride my bike instead of watching TV*
(for how long?)	*for 30 minutes*
(when?)	*after school on Mondays, Wednesdays, and Fridays*

My goal is to be more active. Here are some of my options:

1. I could _____
   (for how long?) _____
   (when?) _____
2. I could _____
   (for how long?) _____
   (when?) _____
3. I could _____
   (for how long?) _____
   (when?) _____
4. I could _____
   (for how long?) _____
   (when?) _____

B. Which of your options do you think you would actually do? Why?

Now that you know your options, write a physical activity goal for yourself.

(continued)

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Activity 8.1

Making Time to Stay Fit *(continued)*

C. My goal is to be more active.

I will _____

(for how long?) _____

(when?) _____

Example of physical activities:

- Chores: shoveling snow, raking leaves, cleaning, vacuuming
- Conditioning: running, sit-ups, jumping rope, weightlifting
- Recreation: tag, skiing, sledding, skateboarding, dancing
- Sports: soccer, swimming, hockey, basketball
- Transportation: walking, biking, in-line skating, climbing stairs

D. Now that you've tried to meet your goal, reflect on your progress.

- Did you meet your goal?

- How did you reach your goal, or what kept you from reaching it?

- Was your goal realistic?

- What things get in the way of being more physically active?

- What is your next goal?

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Name _____

Activity 8.2

Choosing a Lifestyle That Helps You Stay Fit

Case Studies

Case Study 1

Julie spends her weekends hanging out with her friends. Her favorite activities include going to movies, shopping at the mall, and watching her little brothers play baseball. When she is at home, she does not watch very much TV. She prefers to read mystery books instead. Julie often feels tired and does not have much energy.

List at least one activity goal for Julie.

Case Study 2

John is in the eighth grade. Every day at school he plays cards with his friends after lunch. After school he comes home and turns on the TV. His parents let him eat in front of the TV, and he has also convinced them that he can do a good job on his homework if he does it while watching TV. John's father has recently asked him to keep track of the number of hours he spends in front of the TV each day. On weekdays, John watches TV from 3:30 until 10:00 p.m., and on the weekends, when he is not playing computer games, John spends about six hours per day in front of the TV.

List at least one activity goal for John.

Case Study 3

David lives three blocks from school. His mother has offered to drive him to school, but David prefers to walk, even in the rain. David participates in after-school sports such as soccer and basketball every day except Friday. He relaxes each night by watching about one hour of TV. On the weekends, David plays in a basketball league. Do you have any suggestions for David regarding his level of physical activity?

List at least one activity goal for David.

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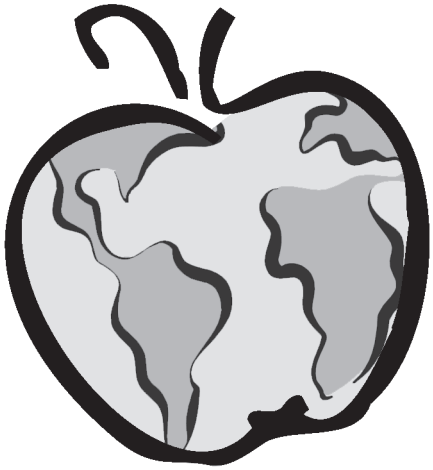
Lesson 9



Lifetime Physical Activities: Research One, Describe One, Try One!

Lifestyle Theme

In this lesson students discuss the benefits of being physically active throughout life. They research one type of "lifetime" physical activity and write an article describing the activity for a health fitness newsletter. (An extension activity suggests publishing a health fitness newsletter as a way of displaying the students' *Planet Health* work and passing on what students have learned about *Planet Health* concepts to the school community.)

Behavioral Objective

For students to be involved in a lifetime physical activity that will help them maintain an active lifestyle

Learning Objectives

Students will be able to do the following:

1. Obtain information that draws from a variety of sources (experts, observations, experiments, libraries, online databases)
2. Take notes and summarize information gleaned from reference works and experts
3. Write a coherent composition about a lifetime physical activity
4. Be independent learners
5. Discuss the importance of being physically active throughout their lives

Materials

- Activity 9.1, Lifetime Physical Activities
- Access to encyclopedias or books that discuss various physical activities
- *Optional:* Access to the Internet or other electronic research tools

Procedure

1. Point out the goals of this activity:
   - To discuss the benefits of being physically active throughout life
   - To practice being independent learners by researching a lifetime physical activity
   - To write a coherent composition describing the lifetime physical activity they researched
2. (5-7 minutes) Conduct the following brainstorming activity. Display a model of the K-T-W chart shown. Ask the class what they know, think they know, or want to know about this topic.

   As students offer ideas, they should identify the column in which the idea should be placed. After eliciting a number of responses, validate or correct the "I Know" and "I Think I Know" responses. The materials listed in the Teacher Resources will help you with this task. If you are unsure of the accuracy of some of their comments, you may want to ask students to research their questions or verify their statements as part of the research and writing activity. If possible, save a copy of the chart to review at the end of the lesson.
3. (5 minutes) Hand out activity 9.1 and describe the assignment as outlined on the sheet.
4. (Time will vary) Allow students to begin their research in the library, computer room, or classroom. Assign a deadline for when their research must be completed. You also may want to require students to record and report their sources of information to you in a standard format of your choosing. (See the Teacher Resources for a list of reference works you may want to borrow from local libraries.)
5. (Time will vary) Give students time to write their compositions in class or assign them as homework.
6. (5-10 minutes) Review the K-T-W chart. What new information can you add to the "I Know" column?

Topic: The Benefits of Being Physically Active Throughout Your Life

K: I Know	T: I Think I Know	W: I Want to Know

Adapted from A. Stern, 1996, *Instructional strategies and techniques to enhance motivation and achievement.* Workshop, Weston, MA.

Extension Activities

1. Publish a *Planet Health* newsletter. Include student compositions from this lesson, student poems from lesson 5, public service announcements from lesson 6, fables from lesson 7, and activity goals from lesson 8. Send copies home to parents.
2. Have students make a poster that visually reports the findings of their research on lifetime activity.
3. Have students give oral reports to share their findings.

Teacher Resources

GENERAL BACKGROUND MATERIALS

In preparing for this lesson, you may want to refer to the following resources:

- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)
- Gortmaker et al., "Television Viewing as a Cause of Increasing Obesity Among Children in the United States, 1986-1990" (see appendix C)
- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix B)

SPECIFIC BACKGROUND MATERIAL

What are lifetime physical activities?

Unlike many competitive team sports, lifetime activities can be done throughout your life. Examples of lifetime activities are running, walking, dancing, hiking, bicycling, swimming, skiing, gardening, and canoeing (see activity 9.1 for more examples). Team sports require facilities and a number of people, both of which may be difficult to find. Many lifelong activities can be done alone or with a small group of people. You can walk right out your door to participate in many lifetime activities, such as jogging, hiking, bicycling, and swimming. People at various levels of fitness can participate in these types of physical activities by varying the intensity of the activity. Finding a lifetime activity that you enjoy will help you maintain an active lifestyle.

What changes in society have brought about a decrease in daily physical activity?

In the latter part of the 20th century, there was a dramatic reduction in the amount of physical activity performed in daily life. An increase in the number of white-collar jobs has occurred, whereas blue-collar and farming jobs, which require physical work, have decreased. Modern appliances, machinery, and motorized transportation have reduced the amount of activity required to complete household chores and work-related tasks. The growth of technology and inactive leisure activities has also been enormous, with computers, video, and TV being the major factors. The Internet, CDs, DVDs, video games, and continued expansion of the TV channel market will help these trends continue.

How much time do adolescents spend watching TV?

According to a study by the Henry J. Kaiser Family Foundation (2005), American children spend more time watching TV than they do engaging in any other activity except sleeping. In 2005 the average adolescent viewed approximately 21 hours per week,

but that number jumps to 28 hours when you include videos, DVDs, and prerecorded shows. This is nearly as much time as is spent in school. Add to this one hour a day of computer use (outside of school work), about one hour (50 minutes) a day of video games, and 45 minutes a day of non-school-related reading. Altogether youth pack about eight and a half hours of media content into about six and a half hours of time by using more than one media at a time. Essentially, for many children media consumption has become a full-time job! The American Academy of Pediatrics recommends limiting TV viewing to two hours or less per day.

What are the benefits of a more active lifestyle?

Activity helps children develop and retain cardiorespiratory fitness, muscular strength, and confidence in their physical ability. Regular activity helps people maintain a healthy weight, build lean muscle, and reduce fat. It can reduce stress and brighten a person's mood. Regular exercise helps build and maintain dense bones, which helps prevent osteoporosis. Active adults have a lower risk of dying prematurely and developing diabetes, high blood pressure, and colon cancer.

What are the risks of a sedentary lifestyle?

Activity is required for health. Studies suggest that physically active people enjoy lower risks of developing heart disease, diabetes, colon cancer, osteoporosis, anxiety, and depression relative to sedentary people. Sedentary habits increase the risk of premature death.

Why is television viewing damaging to health?

Television viewing is one of the major causes of overweight (obese) youth. Excessive TV viewing contributes to a sedentary lifestyle and promotes poor nutrition by exposing children to food advertising for high-calorie, low-nutrient foods. TV watching has also been associated with elevated cholesterol levels, cigarette smoking, and poor cardiorespiratory fitness.

What are the alternatives to TV viewing?

Anything that involves movement! Participate in lifetime physical activities that you enjoy (dancing, bicycling, walking, hiking, gardening, swimming). Limiting TV time ensures that you'll do other activities that involve more physical activity. Also, you don't have to sit still while you watch TV—you can be dancing, cleaning, cooking, and so on.

How much activity is needed to obtain health-related benefits?

Moderate amounts of daily activity are recommended for people of all ages. However, physical activity need not be strenuous to be beneficial. Just a small increase in physical activity can generate genuine health benefits, such as a reduction of body weight and the risk of heart attack, hypertension, and death. For adults, 30 minutes or more of moderately intense activity, such as walking, is beneficial for health when performed regularly. Some kind of regular vigorous activity, however, is the best way to improve cardiorespiratory fitness. Children and adolescents should strive for 60 minutes of moderate to vigorous activity on most, preferably all, days of the week. This is beneficial for physical development, maintaining proper energy balance, and enjoying the feelings of fun and well-being that physical activity provides. For adolescents, active time should include 20 minutes or more of vigorous activity (greater in intensity to brisk walking) at least three times a week to improve cardiorespiratory fitness.

How much activity is needed for fitness?

Experts recommend that children and adolescents be moderately to vigorously active for 60 minutes or more on most, preferably all, days of the week. For adolescents, this should include 20 or more minutes of intense activity (that makes you sweat) at least three days a week. How long, how hard, and how often you are active will determine how fit you are! You can improve fitness by increasing the frequency (if you are not exercising regularly), increasing the intensity (doing something faster, doing more repetitions), or increasing the time you spend on each exercise.

What are some examples of things you can do to increase your activity and decrease your inactivity?

Try a new physical activity; take the stairs; don't park next to the building; walk around the mall or the neighborhood with friends; watch only your favorite TV shows; remove or unplug the TV in your bedroom; play catch with a sibling, friend, or parent.

STUDENT RESEARCH ACTIVITY: BIBLIOGRAPHY

These reference books are available at many town libraries.

- *The everything you want to know about sports encyclopedia.* 1994. New York: Bantam Books.
- Mood, D. 1991. *Sports and recreational activities for men and women,* 10th ed. St. Louis: Mosby.
- *Sports encyclopedia.* 1976. New York: Praeger.
- *Sports Illustrated for kids: The everything you want to know about sports encyclopedia* [interactive multimedia]. 1994. Windows CD-ROM. Portland, OR: Creative Multimedia.
- Sullivan, G. 1979. *The complete sports dictionary.* New York: Scholastic.
- *Webster's sports dictionary.* 1976. Springfield, MA: Merriam.

REFERENCE

Henry J. Kaiser Family Foundation. 2005, March. *Generation M: Media in the lives of 8- to 18-year-olds.* A Kaiser Family Foundation study, www.kff.org.

Name _____

Activity 9.1

Lifetime Physical Activities

What Are Lifetime Physical Activities?

Unlike many competitive team sports, lifetime activities can be done throughout your life. Examples of lifetime activities are running, walking, dancing, hiking, bicycling, swimming, skiing, gardening, and canoeing. Team sports require facilities and a number of people, both of which may be difficult to find. Many lifelong activities can be done alone or with a small group of people. You can walk right out your door to participate in many lifetime activities such as jogging, in-line skating, and bicycling. People at various levels of fitness can participate in these types of physical activities by varying the intensity of the activity. Finding a lifetime activity that you enjoy will help you maintain an active lifestyle and keep physically fit.

Directions

1. Examine the following list of lifetime activities. Choose one of the activities that you enjoy or one that you would like to know more about.

Handball, racquetball, squash	Archery
Table tennis	Scuba diving
Skating: in-line, ice, roller	Gardening
Jogging	Horseback riding
Judo, karate, taekwondo	Mountain climbing
Fencing	Walking
Tennis	Orienteering
Swimming	Hiking
Canoeing, kayaking, rowing	Bicycling: road, mountain
Golf	Skiing: downhill, cross-country
Snorkeling	Dancing: aerobic, ballroom, jazz, line, etc.

2. Research the lifetime activity to determine answers to part *a* and *one* of the other topics of your choosing (*b, c,* or *d*).
   a. **Describe the activity.** Where is it done? When is it done? Are there any rules? What equipment or facilities are required?
   b. **History of the activity.** When did people begin doing this activity? In what country did it originate? Where is it currently popular?

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lifetime Physical Activities *(continued)*

c. **Interview someone who does the activity.** Why did he or she choose to do the activity? Why is it fun? How long has the person been doing it? How much does the equipment cost?

d. **Try the activity yourself.** Describe your experience. Where did you do it? Who did you do it with? Did you like it? Would you like to do it regularly?

3. Pretend you are a columnist for a health fitness magazine. Based on your research, write an article that does the following

- Informs people about the activity (be sure to add personal quotes if you researched parts *c* or *d* in section 2)
- Encourages people to participate in lifetime activities by pointing out the benefits of maintaining an active lifestyle throughout life

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 10

Choosing Healthy Foods

Lifestyle Theme

In this lesson students invent a healthy fast-food product along with an advertising campaign that incorporates the theme of adopting a healthy lifestyle. Students learn that TV can be a poor dietary influence and can keep children from being active. This lesson is designed to infuse information about choosing healthy foods into a writing activity in a language arts class.

Behavioral Objectives

- For students to limit foods high in saturated fat and trans fat in their diets
- For students to recognize how TV viewing can affect food choices

Learning Objectives

Students will be able to do the following:

1. Discuss the importance of limiting unhealthy fat in the diet
2. Discuss how to incorporate fast-food meals into a healthy diet that includes a variety of foods
3. Organize ideas, collaborate on projects, and write clearly and persuasively
4. Discuss the media's influence on their diets

Materials

- Student resource 10.1, Fast-Food Menus
- Activity 10.1, Invent a Food
- *Optional:* Bring in magazine ads, products, taped TV commercials, or other advertising examples to show students.

Procedure

1. (8-10 minutes) Using the following questions (and sample advertisements), discuss the overview of the fast-food industry as well as the marketing strategies used by the fast-food industry to reach potential customers. See Teacher Resources for this information.
   - How do you think TV shows and ads affect your choice of foods to eat?
   - If you watched less TV, how might your diet change?
2. (8-10 minutes) Use student resource 10.1 to review fast-food menus and see how they can be incorporated into a varied diet when eaten in moderation.
3. (20 minutes) Put students into groups of four or five and ask them to invent a healthy fast-food product using student resource 10.1, Fast-Food Menus, and the activity 10.1 worksheet, Invent a Food.
4. (20 minutes) In the next class period, the groups present the food they invented to the class.

Extension Activities

1. Engage students in a discussion using the following questions:
   - Do you think TV affects the amount of activity you engage in? If so, how? Does it affect what you eat? How?
   - Besides TV, what other parts of your life influence your food choices? *(Answers: family, friends, lifestyle, chores, activity schedule)*
   - Can you think of two ways that TV affects your health? *(Answers: Keeps us from being active and encourages poor food choices. Some amount of activity is required for health. TV watching has been associated with increased food intake, elevated cholesterol levels, diabetes risk, and poor cardiorespiratory fitness, among other things.)*
2. Show the educationally enhanced movie *Super Size Me* and lead a discussion using the student materials and educator's manual provided. The educationally enhanced *Super Size Me* can be ordered online at http://www.hartsharpvideo.com/catalog/specialInterest/SUPERSIZEMESCHOOLEDITION.php or by calling 800-444-0653.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- Henry J. Kaiser Family Foundation, *Generation M: Media in the lives of 8- to 18-year-olds* (see appendix C)
- Student resource 13.2, How Much Fat Is OK? (pages 196-199)
- Institute of Medicine, *Food Marketing to Children and Youth: Threat or Opportunity?* (see appendix C)
- Wiecha et al., "When Children Eat What They Watch: Impact of Television Viewing on Dietary Intake in Youth" (see appendix C)

SPECIFIC BACKGROUND MATERIAL

Planet Health endorses the recommendation of the American Academy of Pediatrics to limit TV viewing to two hours or less per day.

Planet Health also encourages adolescents to be moderately to vigorously active for at least 60 minutes every day or nearly every day as part of play, games, sports, chores, transportation, and planned exercise. This amount of activity should include at least three sessions per week of vigorous physical activity lasting 20 minutes or more. Physical activity promotes health and well-being and offers opportunities to socialize and have fun.

Fast-Food Facts

- McDonald's opened its first restaurant in 1955 in Des Plaines, Illinois. The company now has over 30,000 restaurants in more than 119 countries.
- On a typical day, 30 percent of children and adolescents eat fast food.
- Eighty-three percent of the time that children under 17 eat out, they eat at fast-food restaurants.

Fast-Food Marketing Strategies Targeting the General Population

- **Customizing menus and service to suit local tastes.** McDonald's serves teriyaki burgers and corn soup in Japan and pasta salads in Rome, and has live piano music in Paris and cappuccino and espresso machines in the financial district in New York City.
- **Famous people in TV ads.** Basketball players Michael Jordan and Larry Bird have done TV ads for McDonald's.
- **Discount coupons.** In newspapers, magazines, and stores.
- **Flashy billboards.** Colorful logos displaying attractive foods, often with sports heroes prominently displayed along roadways and in front of the restaurants.
- **Sponsorship.** McDonald's runs TV ads during the Olympic Games to promote the fact that it is a proud sponsor of the Olympics.

Fast-Food Marketing Strategies Targeting Children

- **Toys.** Fast-food restaurants often offer toys in connection with popular movies or TV shows; for example, Pokemon, Furbys, Teletubbies, Star Wars, and Harry Potter figures.
- **Images.** Ronald McDonald is known by schoolchildren everywhere.
- **Special meals for children.** McDonald's sells "Happy Meals" for children; other fast-food chains offer similar meal deals for children.
- **TV ads during prime viewing time.** Companies that make soda, candy, cereal, and other highly processed foods spend billions of dollars annually on television advertising. Much of this advertising is aimed at children and youth.

Name _____

Student Resource 10.1

Fast-Food Menus

Fast-Food Menus: Can Fast Food Contribute to Good Nutrition?

Meals at fast-food restaurants can contribute to good nutrition if they are chosen carefully and not eaten too often (try to keep it to one time per week). When you go, eat in moderation by avoiding "supersized" menu selections. If you choose foods that are high in unhealthy fat or sugar, balance them with other foods low in unhealthy fat and high in nutrients. For example, order low-fat milk or water instead of soda.

Strengths of Fast Foods

Fast-food restaurants may be easy for you to get to because they are near your school. Some of the foods served are reasonably nutritious; many are cheap and tasty; and they are often served in clean, safe environments. Choose wisely! Examples of nutrient-rich foods include McDonald's Caesar Salad with Grilled Chicken, which is high in vitamin A and protein. In addition, some fast-food restaurants, like Wendy's, have salad bars with fruits and vegetables that can provide fiber as well as vitamins A and C.

Weaknesses of Fast Foods

Fast foods are typically high in calories, saturated fat, trans fat (especially the deep-fried items) and sodium, and therefore should be consumed infrequently. Soda is served in portion sizes of at least 16 ounces (500 milliliters) and is very inexpensive to "supersize." This makes it very easy to overconsume soda, which is extremely high in sugar, with no other beneficial nutrients. In addition, fast foods often have chemical additives and artificial coloring.

Recommended Fat Intake

There is no reason to eliminate fat from your diet. In fact, having some fat in your diet is important. The total amount of fat you eat and the type of fat you eat are both important. Choose a diet that is low in saturated fat (10 percent or less of total calories) and as low as possible in trans fat, because this fat can increase your chances of developing heart disease. Trans fat is found in stick margarines; shortening; and many bakery goods, packaged snack foods, and fried fast food. There is no recommended safe level of trans fat, and it's best to eliminate it from the diet altogether because it is more damaging than saturated fat to the cardiovascular system.

Substituting unsaturated fat (found in most vegetable oils, most nuts, olives, avocados, and some fish) for saturated and trans fat can decrease your risk of developing heart disease. Of course, eating too much of any type of fat will give you more energy than you need, so choose a diet moderate in total fat (less than 35 percent of total calories).

- Adults should limit fat intake to about 15 teaspoons per day, or 65 grams per day (30 percent of 2,000 calories).
- Girls 11 to 14 years old who are moderately active should shoot for no more than about 15 teaspoons per day of fat, or 65 grams per day (30 percent of 2,000 calories). Saturated fat should be limited to no more than 20 grams of the 65-gram total.
- Boys 11 to 14 years old who are moderately active should shoot for no more than about 19 teaspoons per day of fat, or 80 grams per day (30 percent of 2,400 calories). Saturated fat should be limited to no more than 25 grams of the total 80 grams.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Student Resource 10.1

Fast Foods to Cut Back on and Avoid

It's OK to eat a high-fat food once in a while (that's why they're called "sometimes foods") and choose a lower-fat alternative most of the time. High-fat foods include any fried food item, larger hamburgers (especially those made with cheese or bacon), and items made with high-fat dressings (such as mayonnaise) or with a lot of cheese.

Company and product	Fat (grams)
Jack in the Box Ultimate Cheeseburger	71
McDonald's Bacon Ranch Salad With Crispy Chicken and Ranch Dressing	47
Taco Bell Fiesta Taco Salad	46
Burger King TENDERCRISP Chicken Sandwich	43
KFC Extra Tasty Crispy Thigh and Wing	38
Dunkin' Donuts Chocolate Chip Muffins	26

Fast Foods That Can Be Selected Most of the Time

Not all fast foods are high in fat. Become a "fast-food sleuth."

Company and product	Fat (grams)
Jack in the Box Hamburger	14
Burger King TENDERGRILL Chicken Sandwich with no sauce	7
KFC Honey BBQ Sandwich	6
Taco Bell Grilled Steak Soft Taco	5
Dunkin' Donuts Cinnamon Raisin Bagel	3
McDonald's Fruit 'n Yogurt Parfait	2

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 10.1

Invent a Food

As a team of experts, your task is to invent a healthy fast-food product low in saturated fat and with no trans fat. Draw up a sample design of your food product and plan your own advertising campaign. Remember to think about who you would like to buy this product. Use additional paper if necessary. Have fun! Be creative! Be ready to report back to the class.

Names of consultants:	

Use the following to help you guide your thinking:

1. Name and describe your product.

2. Why is your product healthy? What ingredients does it have? How will it fit into a healthy diet?

3. Why is your product unique? What strategies will you use to get potential customers to buy your product?

4. Where will you advertise?

5. Draw a picture of your product on the other side of this sheet.

6. Think about a logo that will go with your product.

7. Write a rap song, TV or radio commercial, or print advertisement for your product.

8. How much will your product cost?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Math

This unit contains eight lessons. Use the following At a Glance chart to help you select the lessons that best fit your curriculum objectives. Lessons marked with a ♡ are especially well suited for health and PE classes. Some of the lessons offer a choice of activities. Adapt the lesson procedures to fit your teaching style, students' skills, and time constraints.

Lessons in this unit meet many Massachusetts learning standards that may be similar to standards in your state. Refer to appendix E (page 571) to see which of the 1996-2006 Massachusetts Curriculum Frameworks (MCFW) each lesson incorporates. Please check the CD-ROM for parent information materials that support the lessons you teach.

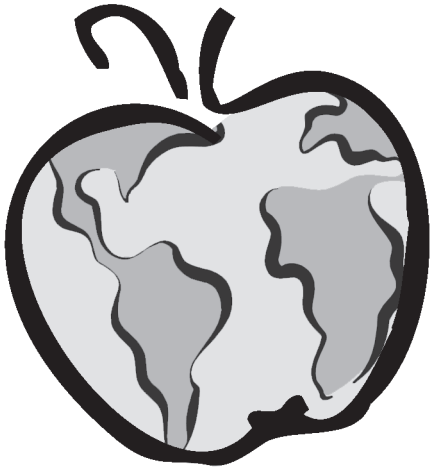
Math at a Glance

		Level of difficulty by grade*				
Theme	**Lesson**	**6th**	**7th**	**8th**	**Subject-specific skills**	**Materials needed**
Balanced diet ♡	11 Problem Solving: Making Healthy Choices Activity 11.1 Activity 11.2 Extension activity	 H H M	 M H L	 M M L	Five-step problem approach; addition, subtraction, and multiplication of integers; the concept of proportionality	Calculators, overhead transparencies
Balanced diet ♡	12 Figuring Out Fat	H	M	L	Percentages, graphing	Calculators
Balanced diet ♡	13 Looking for Patterns: What's for Lunch? Case study 13.1 Inequalities Statistics Case study 13.2	 M H M	 M M-H M	 L M M	Analyzing real-world data from tables and histograms; using inequalities; calculating range, average, difference, and percentage	Calculators, copies of school weekly lunch menu, overhead transparency, graph paper
Fruits and vegetables	14 Apples, Oranges, and Zucchini: An Algebra Party	H	H	M	Two-variable equations	Calculators (optional)
Activity	15 Plotting Coordinate Graphs: What Does Your Day Look Like?	H	M	M	Constructing a coordinate system; graphing	Graph paper, ruler, overhead transparencies
Activity	16 Survey the Class	H	M	M	Basic statistical analysis: means, percents, range, ranking	None
Lifestyle	17 Circle Graphs: Where Did the Day Go? Activity 17.1 Activity 17.2	 H M-H	 H M	 M L-M	Constructing circle graphs; fractions, percentages, decimals, and interconversions	Five pieces of large paper or overhead transparencies, calculator, compass, protractor, plain paper, colored pencils or crayons
Lifestyle	18 Energy Equations	H	M	M	Calculating averages; graphing	Overhead transparencies
♡	2 Power Down: Charting TV Viewing Time (See page 54)	M	M	L	Charting data; creating bar graphs, line graphs, circle graphs	Graph paper, rulers, markers, poster paper, tape, protractor, and compass

* Level of difficulty: L = low, M = medium, H = high

Lesson 11

Problem Solving: Making Healthy Choices



Balanced Diet Theme

This lesson focuses on the different types of fat in the diet and highlights where and how students can choose healthy fat. This lesson reinforces the importance of eating a balanced diet by including a variety of foods from each food group. It also reinforces that healthy eating relies on grains (especially whole grains), fruits, and vegetables for the majority of food selections, a concept introduced in lesson 3, Food Power. Students work cooperatively to solve a problem that requires them to use their previous knowledge of the food groups and the five-step problem-solving strategy. Students apply mathematical thinking and calculations (adding and multiplying whole numbers and fractions) to make healthier menu choices at a fast-food restaurant. This activity requires students to interpret information, plan a problem-solving strategy, draw conclusions, and defend their conclusions.

Behavioral Objective

For students to make healthy food choices, with an emphasis on healthy fat, that contribute to a well-balanced diet

Learning Objectives

Students will be able to do the following:

1. Use the five-step problem-solving approach to make thoughtful decisions
2. Use their knowledge of healthy eating to select meals at fast-food restaurants
3. Defend their decisions by calculating differences to compare their food selections with the recommended number of fruit and vegetable servings and the recommended levels of total, saturated, and trans fat
4. Read and interpret word problems and data tables

5. Use basic math skills (addition and multiplication of whole numbers and fractions) to solve a word problem
6. Work cooperatively to solve problems

Materials

- One copy of student resource 11.1, Healthy Eating Guidelines, and student resource 11.2, Servings of Fast Foods, per group of three
- Activity 11.1, Making Healthy Choices (requires students to add and multiply fractions and may require a calculator)
- Student resource 11.3, What Counts as One Serving?
- Overhead transparency of food groups
- *Optional:* Extension activity 11.1, Daily Food Log

Procedure

1. (3 minutes) Remind students of their previous knowledge about healthy eating and experience with the food groups (refer to lesson 3, Food Power). Explain that today they will be participating in a problem-solving session that requires them to use their previous knowledge of healthy eating based on balancing food groups and emphasizing the intake of healthy fat, and their previous experience with problem-solving strategies. Ask them, "Why is it important to eat a well-balanced diet?" (See Teacher Resources for possible answers.) Key answer: To get the nutrients you need to stay healthy (energy from carbohydrate, protein, and fat, and vitamins and minerals), you need to eat different foods from all five food groups, plus healthy fat, each day.
2. (3 minutes) Review the five steps involved in problem solving:
   - **Explore.** Read carefully. What do you know? What do you need to know?
   - **Plan.** Design a strategy. Arrange information in tables. Draw pictures. Make an estimate of the answer.
   - **Solve.** Test your strategy.
   - **Check solutions.** Have you answered the question? Does your answer make sense?
   - **Extend.** What have you learned? How can you apply what you've learned?
3. Divide the class into groups of three. Hand out student resource sheets 11.1 and 11.2 and activity 11.1. Give each group only one copy of the problem to increase their need to work cooperatively. You may want to review the student resource sheets with the class.
4. Point out the goals of the activity:
   - To work cooperatively to design a strategy that makes efficient use of class time and all team members. The processes of planning and evaluating choices are the most important parts of the problem.
   - To apply their knowledge of healthy eating to select a balanced dinner that contains low amounts of saturated and trans fat at a fast-food restaurant.
   - To use their math skills to determine their food needs and evaluate their menu options.
5. (30 minutes) Have students work in their groups to solve the problem. The Menu Analysis section of the activity will help them summarize their meal selections by

food group and content of different types of fat and can be posted on a bulletin board for other students to look at. (See selected answers in Teacher Resources.)

6. (Time depends on the size of the class) Have students write their group's meal selection on the chalkboard. Choose a reporter from each group to defend the group's selections. (To save time, groups can hand in their worksheets instead.)
7. (5 minutes) Discuss student responses to the questions asked in step 5 of the problem-solving steps (extend).
   - What was the most difficult part of making this decision in your group? How could you have improved your approach to solving this problem?
   - Is it possible to eat at fast-food restaurants and still have a healthy diet overall?
8. (5 minutes) Help students understand that fast foods generally are high in total fat, saturated fat, trans fat, and calories. (See Teacher Resources for a discussion of the different kinds of fat.) They should limit their visits to fast-food restaurants to a maximum of once per week. Occasional visits are OK, especially if they choose carefully when eating out and eat a healthy, balanced diet most of the time.

Extension Activities

1. Hand out the extension activity and student resource sheet 11.3. Have students keep a log of their food consumption for one day and analyze its completeness by comparing it to the healthy eating guidelines in student resource 11.1.
2. Ask students to go to the local shopping center or mall and do the following:
   - Record the names of fast-food restaurants.
   - Record the menu items that include vegetables and fruits at each restaurant.
   - Record the menu items that are labeled low fat, no fat, or low in saturated or trans fat.
   - Determine which restaurants offer the largest number of healthy eating options.
   - Determine which restaurants are the least and most expensive to eat at.

This would work best if students work in teams.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- Washington State Dairy Council, "Fat: Where It's At" (see appendix A)
- U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans* (see appendix A)

SPECIFIC BACKGROUND MATERIAL

Why Is Eating a Balanced Diet Important?

1. Balanced diets include a variety of foods from all five food groups to provide the vitamins, minerals, healthy fat, fiber, protein, and carbohydrate you need for good health.
2. Making healthy choices from each food group and limiting empty calories from sugary foods or unhealthy fat can help you maintain a healthy body weight.
3. A balanced diet can reduce the risk of developing certain conditions and diseases such as obesity, diabetes, certain cancers, hypertension, heart disease, and osteoporosis.

Healthy Eating Guidelines

1. **Eat for variety.** Foods from all food groups are important. Eat foods from all of the food groups every day, and choose a variety of foods within each food group. For optimum nutrition, eat more foods from the grain, fruit, and vegetable groups than from the meat and dairy groups.
2. **Eat fruits and vegetables at every meal and snack.** Fruits and vegetables are packed with vitamins, minerals, and antioxidants; plus they provide fiber to help keep our bowels regular. Experts recommend that we get at least five servings of fruits and vegetables combined each day. Fruits and vegetables that are deep green or orange or red pack the most vitamins and minerals (aim to make one-third of your vegetables a deep green or orange or red variety). It is important to select fruits and vegetables of different colors to get all of their beneficial nutrients.
3. **Go for whole grains.** Whole grains contain more nutrients and fiber than processed or refined grains because the milling process removes the most nutritional part of the grain. Aim to make half of all the grain foods that you eat whole grain.
4. **Limit foods and beverages with added sugar.** Sweet drinks such as soda, fruit punch, lemonade, iced tea, and sport drinks have a lot of sugar but no vitamins or minerals. Consuming too many sweet drinks (especially if they replace milk) makes it hard to get all of the vitamins and minerals that your body needs. Soft drinks and sweets such as candy, cake, cookies, and donuts can cause dental cavities, and they add to calorie intake, which makes it hard to keep a healthy weight.
5. **Choose foods with healthy fat.** The fat in our bodies serves several purposes: It protects our organs, keeps us warm, and stores energy. Fat in food provides a feeling of fullness and it adds flavor. Some fat—namely, unsaturated fat—is healthy for the heart, but other fat—the saturated kind—can damage arteries and lead to heart disease over time. Trans fat does the most damage and should be avoided.

Keeping Fat to Within the Recommended Level

The U.S. *Dietary Guidelines* recommend that children and teenagers consume between 25 and 35 percent of calories from total fat (unsaturated, saturated, and trans fat) and no more than 10 percent of calories from saturated fat. Although the guidelines don't mention a specific limit for trans fat, new scientific evidence points to the harmful effects of trans fat. Therefore, it is particularly important to limit or omit entirely foods containing trans fat. Instead, eat foods with healthy polyunsaturated and monounsaturated fat that comes from plant sources and fish.

The midrange limits (30 percent) for total daily fat intake for adolescents are as follows:

- **Girls 11 to 14 years old:** About 65 grams per day of total fat with 20 or fewer grams of saturated fat (based on a 2,000-calorie diet)
- **Boys 11 to 14 years old:** About 80 grams per day of total fat with 25 or fewer grams of saturated fat (based on a 2,400-calorie diet)

Not All Fat Is Created Equal

The fat found naturally in foods contains a mixture of saturated and unsaturated (monounsaturated and polyunsaturated) fatty acids, commonly called fat. Many animal products, such as fatty meat, whole milk, butter, and lard, are high in saturated fat. This kind of fat is typically solid at room temperature. Eating too much saturated fat increases the risk of developing heart disease because it raises LDL (bad) cholesterol. Therefore, the U.S. *Dietary Guidelines* recommend eating a diet low in saturated fat.

Most of the fat you eat should be unsaturated because substituting unsaturated fat for saturated fat decreases the risk of developing heart disease. Most plant fat or oil is high in unsaturated fat and generally is liquid at room temperature. Vegetable oils (olive, canola, corn, peanut), fish, most nuts, olives, and avocados are good sources of unsaturated fat.

Eating excessive amounts of any type of fat may not be healthy, so try to get no more than 35 percent of your calories from total fat (saturated, unsaturated, and trans fat). Look at food labels to identify foods low in saturated fat, trans fat, and cholesterol (5 percent of the daily value or less is low; 20 percent of the daily value or more is high).There are exceptions to the rule. Not all animal foods are high in saturated fat. Some ocean fish, such as salmon, mackerel, and tuna are high in a polyunsaturated fat—called omega-3 fatty acid—that may protect you against heart disease. So choose these foods when you get the chance.

Not all plant fat is healthy. Through a commercial process called hydrogenation, plant oils can be converted into solids called trans fat (also called partially hydrogenated vegetable oil). This is how some margarines are made. Trans fat is more damaging than saturated fat because it raises LDL (bad) cholesterol *and* lowers HDL (good) cholesterol, therefore increasing the risk of heart disease. To avoid trans fat, check the ingredients lists on packaged foods such as cookies and crackers for partially hydrogenated vegetable oil. Trans fat is more stable than regular vegetable oil so it is used frequently for frying and to enhance the shelf life of foods. Finally, watch out for coconut oil and palm oil and limit foods containing these oils because they are naturally high in saturated fat.

Answer Key

SELECTED ANSWERS TO ACTIVITY 11.1

Step 2 (Plan)

1. Based on the information in the problem, how many servings of fruits and vegetables have you already eaten today? How much should you try to get at dinner?

	Consumed today	Need at dinner
Fruit	2/3 × 2 = 1.3 (round to 1.5)	2 – 1.5 = .5
Vegetable	2/3 × 3 = 2	3 – 2 = 1

2. How much fat have you eaten? (Round your answer to the nearest whole number.) How many grams of total fat and saturated fat should you try to limit your dinner to?

Solution	Girls	Dinner limit
Total fat	2/3 × 65 = 42.9 (round to 43)	65 – 43 = 22
Saturated fat	2/3 × 20 = 13.2 (round to 13)	20 – 13 = 7

	Boys	Dinner limit
Total fat	2/3 × 80 = 52.8 (round to 53)	80 – 53 = 27
Saturated fat	2/3 × 25 = 16.5 (round to 17)	25 – 17 = 8

Name _____

Activity 11.1

Making Healthy Choices

Situation

You are at the mall with a group of friends. You promised your mom that you would buy a nutritious meal with the $6 she gave you to spend on dinner. McDonald's, Domino's Pizza, and Subway are your favorite restaurants. Is it possible to buy a meal at one of these fast-food restaurants that is well balanced (focusing on grains, fruits, and vegetables) and contains only a moderate amount of fat and minimizes the intake of unhealthy fat? Assume you've already eaten two-thirds of the recommended servings for fruits and vegetables in the meals and snack that you had today, and you have consumed two-thirds of the recommended daily total fat and saturated fat intake.

Look at the healthy eating guidelines and the fast-food menus on the student resource sheets. Plan a meal that helps you meet the minimum requirements for fruits and vegetables and that does not exceed the recommended daily grams of total fat and saturated fat. Be prepared to defend your choices.

Use the five-step problem-solving process to help you reach a decision.

Step 1: Explore

1. What is the question?

2. What data are presented that will help you answer the question?

Step 2: Plan

Making the best meal choice requires you to solve three smaller problems. Design a strategy to answer each question.

1. Based on the information in the problem, how many servings of fruits and vegetables have you already eaten today? How many do you need each day? How many should you try to eat at dinner to meet this goal?

2. How much fat have you eaten? (Remember, when determining the amount of fat consumed based on the recommended amount, you need to use the value appropriate for your gender. Round your answers to the nearest whole number.) How many grams of total fat, saturated fat, and trans fat should you try to limit your dinner to?

3. Which menu selections should you make? (Hint: Tables can help you keep track of information. You might want to make a table that resembles student resource 11.2 to keep track of the nutritional information for each of your choices.)

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Making Healthy Choices *(continued)*

Step 3: Solve

Try your strategy. Make your meal choice.

1. Show your work below or on a separate sheet of paper.
2. Report your decisions on a separate sheet of paper and complete the menu analysis on the next page.

Step 4: Examine and Defend Your Decision

Defend your menu selections by comparing the daily recommended number of fruits and vegetables with the total number you would eat for this day. Similarly, compare your total fat and saturated fat intakes to the amount recommended for people your age. Express these comparisons in words and fractions. Use separate paper if necessary. Did you consume any trans fat in your dinner meal? Also, did you consume any whole grains?

For example: My meal selection provided me with enough servings to fulfill the recommended five servings of fruits and vegetables a day, even though I had three fruits and two vegetables instead of the other way around. I ate 80 grams of total fat, 15 grams more than recommended for a boy my age (80 / 65), and I ate 28 grams of saturated fat, more grams than recommended (28 / 25). I did consume some trans fat, and I ate no whole grain foods.

Step 5: Extend

What have you learned? How can you apply it?

1. What was the most difficult part of making this decision for your group? How could you have improved your approach to solving this problem?

2. Is it possible to eat at fast-food restaurants and still have a healthy diet overall? Explain your opinion.

Menu Analysis

This healthy menu is served at _____.

Menu selections: _____.

Total cost: _____.

Total grams of fat: _____.

Total grams of saturated fat: _____.

Total grams of trans fat: _____.

Determine How Well You Met the Recommended Fruit and Vegetable Intake

What fraction of the total number of recommended servings is provided by your fast-food meal? Record your answer in the following table.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Making Healthy Choices *(continued)*

Activity 11.1

For example: If your menu selections provided one vegetable serving and three were recommended, write 1/3 in the vegetable food group.

Food group	Recommended servings for someone your age	Fraction of total recommended servings from your fast-food meal
Fruit	3	
Vegetable	4	

In the following table, sum the fraction of servings provided by the menu you designed and the fraction of servings provided by the food you ate the rest of the day, based on the information provided earlier (example of a vegetable: 2/3 + 1/3 = 1). Is this less than, greater than, or equal to the goal?

Food group	Equation to describe the total fraction of the recommended servings that you consumed this day	Fraction of total recommended servings from your entire day	Is the total less than, greater than, or equal to the recommendations?
Fruit			
Vegetable			

Determine How Well You Stayed Within Healthy Limits for Fat Intake

What was your total daily fat intake? _____ grams

How much fat is recommended for someone your age? _____ grams

Calculate the percentage of total fat that you consumed in this day compared to the recommended amount.

What was your total daily saturated fat intake? _____ grams

How much saturated fat is recommended for someone your age?_____ grams

Calculate the percentage of saturated fat that you consumed in this day compared to the recommended amount.

How much trans fat (if any) did you eat at the fast-food restaurant? _____ grams

How much trans fat should you eat?

Based on these results, do you believe it is possible to maintain healthy eating habits when you include a fast-food meal in your day?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Extension Activity 11.1

Daily Food Log

Keep a log of your food for one day. Do your best to record the number of servings of each food that you consume (use student resource 11.3, What Counts as One Serving?, as a guide).

	Food group (number of servings)					
Food	**Grains**	**Fruits**	**Veggies**	**Meat**	**Dairy**	**Sometimes foods**
Example: 1 large slice of pizza with green peppers (1/8 of 14-inch large pizza)	*1*		*1*		*1*	
Breakfast						
Lunch						
Dinner						
Snacks						
Total number of servings						

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Making Healthy Choices *(continued)*

Analyzing the Data

Analyze the completeness of your diet by comparing it to the healthy eating guidelines (student resource 11.1) and the recommended number of dairy servings necessary to meet your calcium requirements.

Grains, total servings: ____

Number of whole grain servings: _____

Percentage of whole grains (of total servings of grains) consumed:_____

Fruit, total servings: _____

Vegetable, total servings:_____

Number deep green or orange or red: _____

Dairy, total servings: _____

Healthy fat (list foods giving you healthy fat): _____

Unhealthy fat (list foods giving you unhealthy fat): _____

In the following table, use the inequality symbols <, >, = to indicate how your servings compare to the healthy eating guidelines.

	Student	**<, >, =**	**Healthy eating guidelines**
Example: whole grains	*30%*	*<*	*50%*
Whole grains (%)			
Fruit (#)			
Vegetable (#)			
Deep green, orange, or red vegetable (%)			
Dairy (#)			

Discussion

1. Describe the differences between your diet and the healthy eating guidelines.

2. Was the way you ate this day typical for you? Explain.

3. What foods were highest in saturated and trans fat? Suggest some possible substitutions.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Student Resource 11.1

Healthy Eating Guidelines

1. Eat for variety.

Foods from all food groups are important. Eat foods from all of the food groups every day, and choose a variety of foods within each food group. For optimum nutrition, eat more foods from the grain, fruit, and vegetable groups than from the meat and dairy group.

2. Eat fruits and vegetables at every meal and snack.

Fruits and vegetables are packed with vitamins, minerals, and antioxidants to keep you healthy; plus they provide fiber to help keep your bowels regular. Experts recommend that you eat at least five servings of fruits and vegetables combined each day. Fruits and vegetables that are deep green or orange or red pack the most vitamins and minerals (aim to make one-third of your vegetables a deep green or orange or red variety). It is important to select fruits and vegetables of different colors to get all of their beneficial nutrients.

3. Go for whole grains.

Whole grains contain more nutrients and fiber than processed or refined grains because the milling process removes the most nutritional part of the grain. Aim to make half of all the grain foods you eat whole grain.

4. Limit foods and beverages with added sugar.

Sweet drinks such as soda, fruit punch, lemonade, iced tea, and sport drinks have a lot of sugar but no vitamins or minerals. Consuming too many sweet drinks (especially if they replace milk) makes it hard to get all of the vitamins and minerals your body needs. Drinking soft drinks and eating sweets such as candy, cake, cookies, and donuts can cause dental cavities, and they add to calorie intake, which makes it hard to keep a healthy weight.

5. Choose foods with healthy fat.

The fat in our bodies serves several purposes: It protects our organs, keeps us warm, and stores energy. Fat in food provides a feeling of fullness and adds flavor. Some fat—namely, unsaturated fat—is healthy for the heart, but other fat—the saturated kind—can damage arteries and lead to heart disease over time. Trans fat does the most damage and should be avoided.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Healthy Eating Guidelines *(continued)*

Student Resource 11.1

What Makes a Fruit or Vegetable Serving?

Fruit	1 medium apple, orange, or pear (size of tennis ball)
	1/2 grapefruit
	1/2 cup of raw, canned, cooked, or frozen fruit (think cut strawberries, canned peaches, or applesauce)
	1/4 cup dried fruit such as raisins
	1/4 cantaloupe
	3/4 cup (6 oz or 175 ml) 100% fruit juice
Vegetable	1 cup raw leafy vegetables
	1/2 cup chopped raw or cooked vegetables
	3/4 cup (6 oz or 175 ml) vegetable juice

How Much Fat Is OK?

The U.S. *Dietary Guidelines* recommend consuming no more than 35 percent of calories from total fat (unsaturated, saturated, and trans fat) with no more than 10 percent from unsaturated fat. Individual foods may have more or less fat than this. Don't worry about occasional indulgences, but try to keep your average intake at 30 percent. On average, adolescents should consume the following amounts of fat:

- **Girls 11 to 14 years old:** About 65 grams per day of total fat with 20 or fewer grams of saturated fat (based on a 2,000-calorie diet)
- **Boys 11 to 14 years old:** About 80 grams per day of total fat with 25 or fewer grams of saturated fat (based on a 2,400-calorie diet)

Where Do I Find Fat in Foods?

Unsaturated fat	Plant foods (whole grains, vegetables, and nuts)
	Vegetable oils (corn, olive, soybean, canola)
	Fish
Saturated fat	Animal foods (meat, poultry, dairy)
	Butter
	Lard (used in baked goods)
Trans fat	Partially hydrogenated vegetable oil
	Processed baked goods and snack foods
	Fried foods and fast foods

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

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Student Resource 11.2

Servings of Fast Foods

Note: For all restaurants, prices are estimated and may vary by location.

Subway

			Number of servings			
Product	**Price ($)**	**Total fat (grams)**	**Saturated fat (grams)**	**Trans fat (grams)**	**Veggie**	**Fruit**
Veggie Delite salad	4.24	1	0	0	2	0
Oven-roasted chicken	3.69	2.5	.5	0	0	0
Club sandwich	3.89	6	2	0	.5	0
Ham sandwich	3.49	5	1.5	0	.5	0
Veggie Delite sandwich	2.99	3	1	0	.5	0
Roast Beef deli sandwich	3.49	5	2	0	.5	0
Turkey wrap	3.29	6	1.5	0	.5	0
Meatball sub	3.29	24	11	1	0	0
Cheese steak sandwich	4.29	12	6	.5	.5	0
Chili con carne	1.99	8	3.5	0	0	0
Minestrone soup	1.99	1	.5	0	0	0
Chicken noodle soup	1.99	2	0.5	0	0	0
Ranch dressing	n/a	22	3.5	0	0	0
Honey mustard dressing	n/a	22	3	0	0	0
Fat-free Italian dressing	n/a	0	0	0	0	0
Mustard	n/a	0	0	0	0	0
Mayonnaise (1 tsp or 5 ml)	n/a	4	.5	0	0	0
Cheddar cheese	n/a	5	3	0	0	0
Fruit juice (16 oz, or 500 ml, bottle)	1.49	0	0	0	0	2.5
Soda, small	1.29	0	0	0	0	0

All sandwiches are 6 inches (15.2 centimeters) long and come with a choice of toppings (lettuce, tomatoes, onions, green peppers, pickles, and olives). Values do not include condiments, dressings, or added cheese.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Servings of Fast Foods *(continued)*

Student Resource 11.2

McDonald's

			Number of servings			
Product	**Price ($)**	**Total fat (grams)**	**Saturated fat (grams)**	**Trans fat (grams)**	**Veggie**	**Fruit**
Hamburger	0.89	9	3.5	0.5	0	0
Cheeseburger	0.99	12	6	1	0	0
Quarter pounder	2.99	18	7	1	0	0
Big Mac	2.99	30	10	1.5	0	0
Big 'n tasty	2.19	23	8	1.5	0	0
Filet-o-fish	2.59	18	4	1	0	0
Grilled chicken club	3.99	22	8	0	0	0
Grilled chicken classic sandwich	3.49	10	2	1.5	0	0
Chicken McNuggets (six pieces)	3.69	15	3	1.5	0	0
Chicken selects (three strips)	3.29	20	3.5	2.5	0	0
Caesar salad	4.09	4	2.5	0	3	0
Bacon ranch salad with crispy chicken	4.19	16	5	1.5	3	0
Asian salad with grilled chicken	4.39	10	1	0	3	0
Side salad	1.00	0	0	0	1	0
Fruit & walnut salad	1.99	8	1.5	0	0	1.5
French fries, small	1.00	13	2.5	3.5	0	0
Vanilla shake, small	1.00	10	6	0.5	0	0
Milk, 8 oz (250 ml), 1% fat	1.00	2.5	1.5	0	0	0
Orange juice, 6 oz (175 ml)	1.69	0	0	0	0	1
Soda, small	1.00	0	0	0	0	0
Caesar dressing	n/a	18	3.5	0	0	0
Ranch dressing	n/a	15	2.5	0	0	0
Low-fat balsamic vinaigrette	n/a	3	0	0	0	0
Apple pie	0.50	11	3	4.5	0	1
Fruit 'n yogurt parfait	1.00	2	1	0	0	0.3
Oatmeal raisin cookie	0.50	6	1	1.5	0	0

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Servings of Fast Foods *(continued)*

Student Resource 11.2

Domino's Pizza

			Number of servings			
Product	**Price ($)**	**Total fat (grams)**	**Saturated fat (grams)**	**Trans fat (grams)**	**Veggie**	**Fruit**
Cheese pizza (slice)	3.00	19	7		0	0
Green pepper & mushroom pizza	4.00	19	7		.25	0
Pepperoni pizza	4.00	29	10		0	0
Cheese-stuffed pizza	4.00	30	18		0	0
Garden salad	5.00	2	1.5		2	0
Italian dressing	n/a	12	2		0	0
Light Italian dressing	n/a	1	0		0	0
Ranch dressing	n/a	12	2		0	0
Cinnamon bread sticks	4.49	7	1.5		0	0

Information based on two slices of a large pizza. Many locations do not sell pizza by the slice.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Student Resource 11.3

What Counts as One Serving?

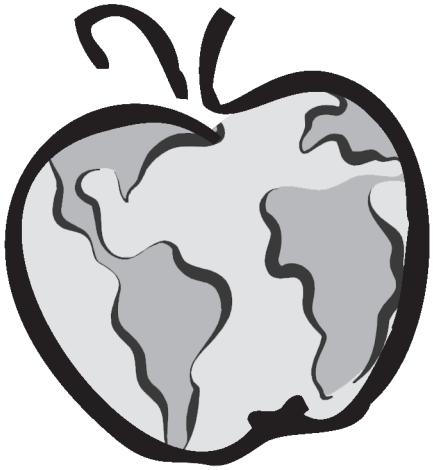
Food group	One serving
Grains (bread, cereal, rice, and pasta)	1 slice of bread
	1 tortilla, roll, muffin
	1/2 bagel, English muffin, hamburger bun
	1/2 cup cooked cereal, grits, rice, pasta
	1 oz (about 1 cup, or 30 g) ready-to-eat breakfast cereal
Vegetable	1 cup raw leafy vegetables
	1/2 cup other chopped vegetables
	1/2 cup other cooked vegetables
	3/4 cup vegetable juice
Fruit	1 medium apple, banana, orange, pear
	1/2 grapefruit
	1/4 cantaloupe
	1/2 cup raw, canned, cooked, frozen fruit
	1/4 cup raisins, dried fruit
	3/4 cup fruit juice
Dairy (milk, yogurt, and cheese)	1 cup milk or yogurt
	1.5 oz (45 g) natural cheese (e.g., cheddar)
	2 oz (60 g) processed cheese (e.g., American)
	1/2 cup pudding
	1/2 cup ice cream, ice milk, frozen yogurt
Meat, beans, and alternatives (meat, poultry, fish, dry beans, eggs, and nuts)	2.5 oz (75 g) cooked, lean meat, poultry, or fish
	1/2 cup cooked dry beans, peas
	1 egg
	2 tablespoons (30 ml) peanut butter
	1/3 cup nuts, seeds

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 12

Figuring Out Fat

Balanced Diet Theme



This lesson contains paired group activities. Calculators are recommended. Students use percentages to examine the fat content of two imaginary diets. This lesson is designed to infuse information about eating healthy fat into a unit on percentages.

Behavioral Objective

For students to choose a diet low in saturated fat and containing no trans fat

Learning Objectives

Students will be able to do the following:

1. Calculate the percentage of calories from total fat and saturated fat
2. Interpret tables and graphs
3. Make inferences about fat intake

Materials

- Activity 12.1, Fat: It All Adds Up, part I and part II
- Calculators recommended
- *Optional:* Student resource 21.1, What's the Rap on Fat?, from lesson 21 (page 290)

Procedure

1. (3 minutes) Point out the goals of this lesson:
   - To practice calculating percentages by figuring out how much fat is in foods
   - To learn the upper limits for total fat and saturated fat intake
   - To choose a diet low in saturated fat and containing no trans fat

2. Review the dietary fat recommendations with students. Ask them the following questions:
   - What percentage of your total calories should come from fat? *(Answer: A range of 25 to 35 percent (30 percent average) of total calories is recommended for adolescents, with no more than 10 percent of calories from saturated fat. The range for adults' intake of total fat is 20 to 35 percent.)*
   - Why should we eat less saturated and trans fat than unsaturated fat? *(Answer: Eating too much saturated and trans fat increases the risk of developing heart disease.)*

   Make sure students understand that total dietary fat refers to the sum of unsaturated, saturated, and trans fat consumed. You may choose to have students read What's the Rap on Fat? (lesson 21, page 290). This student resource describes the different types of dietary fat.
3. (5 minutes) Using examples 1 and 2 that follow, review math techniques needed to calculate the percentage of calories from fat.

   Ask students how many of them have had a bagel in the past week and if they think bagels are high-fat foods. Read the following two examples aloud and demonstrate how to calculate the percentage of the total fat in foods. (Note: 1 gram [g] of fat = 9 calories [cal]).

   Example 1. A cinnamon and raisin bagel with nothing on it has 250 calories and 2 grams of fat. If 1 gram of fat provides 9 calories, what percentage of the calories in the bagel comes from fat?

   $$2 \text{ g} \times 9 \text{ cal/g} = 18 \text{ cal}$$

   $$18 \text{ cal} / 250 \text{ cal} = 0.072$$

   $$0.072 \times 100 = 7.2\%$$

   Because 7.2 percent of the bagel's calories come from fat (total fat), this is a low-fat food.

   Example 2. A fried chicken breast has 412 calories and 24 grams of fat. What percentage of the calories in the chicken breast comes from fat?

   $$24 \text{ g} \times 9 \text{ cal/g} = 216 \text{ cal}$$

   $$216 \text{ cal} / 412 \text{ cal} = 0.524$$

   $$0.524 \times 100 = 52.4\%$$

   Because 52.4% of the chicken breast's calories come from fat, fried chicken is a high-fat food.
4. (5 minutes) Have the class work in pairs. Copy the following examples 3 through 6 on the board. Have students calculate the percentage of calories from fat in each of the foods. Go over the answers to the examples with students.

   Example 3. 2% milk (8 oz or 250 ml): 110 calories and 4 grams of fat

   $$4 \text{ g} \times 9 \text{ cal} = 36 \text{ cal}$$

   $$36 \text{ cal} / 110 \text{ cal} = 0.327$$

   $$0.327 \times 100 = 32.7\%$$

Example 4. Whole milk (8 oz or 250 ml): 157 calories and 9 grams of fat

$$9 \text{ g} \times 9 \text{ cal} = 81 \text{ cal}$$

$$81 \text{ cal} / 157 \text{ cal} = 0.516$$

$$0.516 \times 100 = 51.6\%$$

Example 5. Plain baked potato with skin: 212 calories and 1 gram of fat

$$1 \text{ g} \times 9 \text{ cal} = 9 \text{ cal}$$

$$9 \text{ cal} / 212 \text{ cal} = 0.042$$

$$0.042 \times 100 = 4.2\%$$

Example 6. French fries (4 oz or 125 g): 360 calories and 17 grams of fat

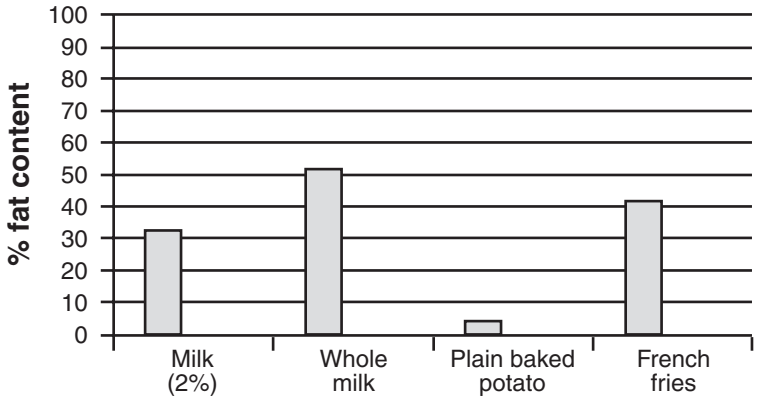
$$17 \text{ g} \times 9 \text{ cal} = 153 \text{ cal}$$

$$153 \text{ cal} / 360 \text{ cal} = 0.425$$

$$0.425 \times 100 = 42.5\%$$

Review calculations and answers with the class to ensure that the data are correct.

5. (5 minutes) The following bar chart shows the percentage of calories from fat for the items in examples 3 through 6. Draw the chart on the board or enlarge the one shown here and make a transparency. Discuss the differences in the percentage of calories from fat.



6. (15 minutes) Hand out parts I and II of activity 12.1. Read the directions as a class. In the previous examples, students calculated the percentage of calories from fat in one serving of food. Make sure students understand that in this activity they will calculate the percentage of calories from fat in food eaten in one day and compare it to fat intake on a second day. They will also calculate the percentage of calories from saturated fat in food eaten on days 1 and 2. In part II, make sure students understand that they are multiplying by 9 because each gram of fat provides 9 calories. Have students work together in pairs to complete the activity. Calculators are strongly recommended.
7. (10 minutes) Discuss the imaginary diets in activity 12.1. Look at the actual fat intake compared to the recommended amounts. Ask students what they learned from this exercise. On day 1, imaginary total fat intake was 32 percent and total saturated fat

intake was 10 percent. On day 2, both total fat and saturated fat intake were way above recommended levels. Advise students to reduce fat intake by cutting back on foods high in saturated and trans fat. Discuss substitutions that could have been made to keep total fat intake at about 30 percent and saturated fat intake at about 10 percent. Examples of substitutions are a whole-wheat bagel instead of a cinnamon nut Danish, low-fat or skim milk instead of whole milk, grilled chicken instead of fried chicken, brown rice instead of French fries, and low-fat frozen yogurt with fresh fruit instead of a banana split. Suggest that when students choose a high-fat food (such as a hamburger), they pair it with a lower-fat food (such as a salad with dressing) instead of another high-fat food (such as French fries). These substitutions would reduce saturated fat and total fat intake.

8. Discuss question 6 from activity 12.1: Is one day of high-fat eating a bad thing? *(Answer: No, don't worry about occasional indulgences, and don't starve yourself to make up for them. Keep your average total fat intake at 30 percent of calories and average saturated fat intake at 10 percent of calories.* Average *refers to a period of a few days.)*

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans* (see appendix A)
- Student resource 13.2, How Much Fat Is OK? (pages 196-199)

SPECIFIC BACKGROUND MATERIAL

Refer to student resource 21.1, What's the Rap on Fat?, in lesson 21 (page 290).

Fat Recommendations

The U.S. *Dietary Guidelines* recommend that adolescents consume a range of 25 to 35 percent of calories from total fat with no more than 10 percent of calories from saturated fat. The recommended range for adults is 20 to 35 percent. The guidelines recommend limiting trans fat as much as possible because trans fat raises LDL (bad) cholesterol and lowers HDL (good) cholesterol. This is double trouble for risk of heart disease. Therefore, it is important to avoid trans fat intake whenever possible.

Individual foods may have more or less fat than the recommended levels. Strive to eat a total diet that stays within the recommendations, balancing higher-fat food selections with lower-fat choices.

The recommended maximum number of total fat and saturated fat grams per day depends on the amount of calories eaten daily. A person who eats 2,000 calories should try to get no more than 600 calories (30 percent of 2,000) from all dietary fat sources combined (total fat). Up to 200 calories (10 percent of 2,000) of the total fat calories could come from saturated fat. Because fat provides 9 calories per gram, a person eating 2,000 calories a day should eat no more than 67 grams of total fat (600 calories / 9 calories per gram) and of this, no more than 22 grams of saturated fat (200 calories / 9 calories per gram) each day. (Note: Nutrition labels round numbers to the nearest 5 grams.)

The recommended fat intakes for adolescents are as follows:

- **Girls 11 to 14 years old:** About 65 grams per day of total fat with 20 or fewer grams of saturated fat (based on a 2,000-calorie diet)
- **Boys 11 to 14 years old:** About 80 grams per day of total fat with 25 or fewer grams of saturated fat (based on a 2,400-calorie diet)

Remind students that some fat in the diet is beneficial. Students should aim for fat to be about 30 percent of their total calories; they should not try to remove fat entirely from their diets. Thirty percent is OK. If they need to reduce fat intake to meet this level, encourage them to cut back on foods high in saturated and trans fat.

Tips for Lowering Saturated Fat Intake

The U.S. *Dietary Guidelines* offer these tips for lowering saturated fat intake:

- Eat plenty of grains, fruits, and vegetables.
- Cook with vegetable oils instead of butter.
- Add little or no butter to foods.
- Check food labels. Choose foods lower in saturated fat.
- Trim fat from meat and remove skin from poultry.
- Choose fat-free or low-fat milk, yogurt, and cheese.
- Choose fruit desserts most often.
- Choose two to three servings of fish or other lean meats daily.
- Choose dried beans, peas, or lentils often.
- Limit intake of processed meats such as sausage, salami, and hot dogs.
- Limit intake of candy, cookies, cake, and chips.
- Limit intake of foods with creamy sauces.
- Limit intake of liver and other organ meats.
- Use egg yolks and whole eggs in moderation. Use egg whites and egg substitutes freely when cooking because they contain no cholesterol and little or no fat.

Tips for Avoiding Foods With Trans Fat

- Read food labels and eat only foods that do not list partially hydrogenated vegetable oil in the ingredients. Because by law products labeled with 0 grams of trans fat may contain up to 0.49 grams of trans fat per serving, it is better to check the ingredients list than to rely solely on the nutrition label.
- When eating out, avoid items that are deep fried (such as fried fish or chicken sandwiches and French fries). Frying oil often contains trans fat.

Comparing Saturated Fat in Foods

According to the U.S. *Dietary Guidelines*, the following food categories are among the major food sources of saturated fat for American adults and children (the bottom food in each category is the lower saturated fat alternative):

Cheese

- Regular cheddar cheese (1 oz, or 30 g): 6.0 grams saturated fat
- Low-fat cheddar cheese (1 oz, or 30 g): 1.2 grams saturated fat

Ground beef

- Regular ground beef (3 oz, or 90 g, cooked): 6.1 grams saturated fat
- Extra-lean ground beef (3 oz, or 90 g, cooked): 2.6 grams saturated fat

Milk

- Whole milk (1 cup, or 250 ml): 4.6 grams saturated fat
- Low-fat (1%) milk (1 cup, or 250 ml): 1.5 grams saturated fat

Bread

- Croissant (1 medium): 6.6 grams saturated fat
- Bagel (1 medium): 0.2 grams saturated fat

Frozen desserts

- Regular ice cream (1/2 cup): 4.9 grams saturated fat
- Frozen yogurt (1/2 cup): 2.0 grams saturated fat

Table spreads

- Butter (1 tsp, or 5 ml): 2.4 grams saturated fat
- Trans-fat-free butter substitute such as Smart Balance (1 tsp, or 5 ml): 0.83 grams saturated fat

Calculating % Daily Value for Fat

Food labels list the % daily value (%DV) for nutrients next to the amount (in grams) of each nutrient. This percentage lets you know what portion (how much) of the recommended daily amount is present in a serving of the food. The %DV listed on food labels is always based on a 2,000-calorie diet, the recommended diet for adult females. The average 11- to 14-year-old girl also requires a 2,000-calorie diet, unless she is either very sedentary or highly active. The average 11- to 14-year-old boy requires 2,400 calories; again, this can vary higher or lower depending on physical activity level. Therefore, the %DV on the label is lower than what the average adolescent boys needs. In other words, a serving of food will provide adolescent boys with less of the recommended daily amount than the label indicates, because the label describes a 2,000-calorie diet. Even so, the %DV listed on food labels is a safe, approximate guideline for adolescents to use to compare the nutrient content of similar foods.

To calculate %DV for total fat, divide the number of grams of total fat per serving by the daily allowance for total fat and multiply by 100.

(Grams of total fat / daily recommended grams of total fat) × 100 = %DV

For example, a person eating a 2,000-calorie diet needs no more than 65 grams of total fat. This person chooses to eat chicken nuggets that have 15 grams of total fat. What percentage of the daily value for total dietary fat will this food provide?

15 g / 65 g = 0.23

0.23 × 100 = 23%

The chicken nuggets will provide this person with 23 percent of his or her total fat %DV.

To calculate the %DV of saturated fat, divide the grams of saturated fat by the daily recommended total grams of saturated fat and multiply by 100.

(Grams of saturated fat / daily recommended grams of saturated fat) × 100 = %DV

The chicken nuggets have 3.5 grams of saturated fat. The daily recommended total of saturated fat for a person eating a 2,000-calorie diet is 20 grams. What percentage of the daily value of saturated fat will this person get from the nuggets?

3.5 g / 20 g = 0.175

0.175 × 100 = 17.5% (round up to 18%)

The nuggets will provide 18 percent of the daily value of saturated fat for this person.

As mentioned previously, the recommended fat intakes for adolescent boys are slightly higher because their calorie needs are higher.

Answer Key

ACTIVITY 12.1: FAT: IT ALL ADDS UP

Day 1 Totals

- 2,080 total calories
- 73 grams total fat
- 23.7 grams saturated fat
- 0 grams trans fat

Day 2 Totals

- 2,415 total calories
- 105 grams total fat
- 42 grams saturated fat
- 13 grams trans fat

5. Day 1: Both the percentage of calories from fat and the percentage of calories from saturated fat were within the recommended levels. Day 2: Both the percentage of calories from fat and the percentage of calories from saturated fat were above recommended levels.
6. No, don't worry about occasional indulgences, and don't starve yourself to make up for them. Keep your average total fat intake at 30 percent of calories and average saturated fat intake at 10 percent of calories. *Average* refers to a period of a few days.
7. You could drink 1 percent milk instead of whole milk and substitute lower-fat food items at any or all of the meals. For example, substitute a bagel with apple butter for the cinnamon nut Danish, a roll for French fries, grilled chicken for fried chicken breast, a ham sandwich for a hot dog, or frozen yogurt for the ice cream in the banana split.
8. The substitutions listed for the Danish, the fried chicken breast, and the French fries would also eliminate trans fat. Cooking oil used for frying often contains trans fat.

1	2	3	4	5
Diet	**Calories**	**Total fat (grams)**	**Total fat (grams) × 9 = calories from fat**	**Calories from fat / total calories × 100 = % calories from fat**
Day 1	2,080	73	73 × 9 = 657	657 / 2,080 = 0.3158653 (round to 0.32) 0.32 × 100 = 32%
Day 2	2,415	105	105 × 9 = 945	945 / 2,415 = 0.3913043 (round to 0.39) 0.39 × 100 = 39%

1	2	3	4	5
Diet	**Calories**	**Saturated fat (grams)**	**Saturated fat (grams) × 9 = calories from saturated fat**	**Calories from saturated fat / total calories × 100 = % calories from saturated fat**
Day 1	2,080	23.7	23.7 × 9 = 213.3	213.3 / 2,080 = 0.1024038 (round to 0.10) 0.10 × 100 = 10%
Day 2	2,415	42	42 × 9 = 378	378 / 2,415 = 0.1565217 (round to 0.16) 0.16 × 100 = 16%

Name _____

Activity 12.1

Fat: It All Adds Up

Part I

Look at the following two imaginary daily menus. The total calories, grams of total fat, and grams of saturated fat are listed for each food item.

Calculate totals for calories, grams of fat, and grams of saturated fat for the imaginary day 1 and day 2 diets. Transfer totals to tables A and B in part II.

Day 1

Food	How much	Calories	Total fat (grams)	Saturated fat (grams	Trans fat (grams)
Breakfast					
Shake: 1/2 cup (125 ml) skim milk, 1/2 cup (125 ml) strawberries, 6 oz (175 ml) low-fat yogurt, ice cubes	12 oz (375 ml)	275	5	3	0
Cinnamon raisin bagel	1	194	1	0.2	0
Cream cheese	2 Tbsp (30 ml)	100	10	6	0
Lunch					
Chicken fajita	1	260	4	1	0
Milk (2% low fat)	8 oz (250 ml)	121	5	3	0
Small garden salad	1	80	4	1	0
Lite vinaigrette salad dressing	2 oz (60 ml)	48	2	0	0
Split pea with ham soup	6 oz (175 ml)	131	3	1	0
Snacks					
Apple	1	81	1	0	0
Milk (2% low fat)	8 oz (250 ml)	121	5	3	0
Dinner					
Baked potato with skin	1	220	0	0	0
Coleslaw	3 oz (90 ml)	83	7	0	0
Carrot sticks	1/2 cup	24	0	0	0
Tuna sandwich with regular mayonnaise	1	339	23	4	0
Strawberry frozen yogurt (low fat)	5 oz (150 ml)	3	3	1.5	0
Day 1 totals	**N/A**				

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Fat: It All Adds Up *(continued)*

Day 2

Food	How much	Calories	Total fat (grams)	Saturated fat (grams	Trans fat (grams)
Breakfast					
Cinnamon nut Danish Whole milk	1 8 oz (250 ml)	280 150	16 8	4 5	2 0
Lunch					
Fried chicken breast French fries Orange juice	1 4 oz (125 ml) 8 oz (250 ml)	436 350 112	17 17	5 3 0	5 4 0
Snacks					
Chocolate chip cookie	2	92	6	2	2
Dinner					
Hot dog with cheese Whole milk Banana split	1 8 oz (250 ml) 13 oz	335 150 510	22 8 11	10 5 8	0 0 0
Day 2 totals	**N/A**				

Part II

1. Transfer the total calories and total grams of fat for day 1 and day 2 to columns 2 and 3 in table A.
2. Using the formulas in columns 4 and 5, calculate the total calories from fat and the percentage of calories from fat for day 1 and day 2.

Table A

1	2	3	4	5
Diet	**Calories**	**Total fat (grams)**	**Total fat (grams) × 9 = calories from fat**	**Calories from fat / total calories × 100 = % calories from fat**
Day 1				
Day 2				

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Fat: It All Adds Up *(continued)*

Activity 12.1

3. Transfer the total calories and total grams of saturated fat for day 1 and day 2 to columns 2 and 3 in table B.
4. Using the formulas in columns 4 and 5, calculate the total calories from saturated fat and the percentage of calories from saturated fat for day 1 and day 2. Round to the nearest whole percent (less than 0.5 round down; 0.5 or greater, round up).

Table B

1	2	3	4	5
Diet	**Calories**	**Saturated fat (grams)**	**Saturated fat (grams) × 9 = calories from saturated fat**	**Calories from saturated fat / total calories × 100 = % calories from saturated fat**
Day 1				
Day 2				

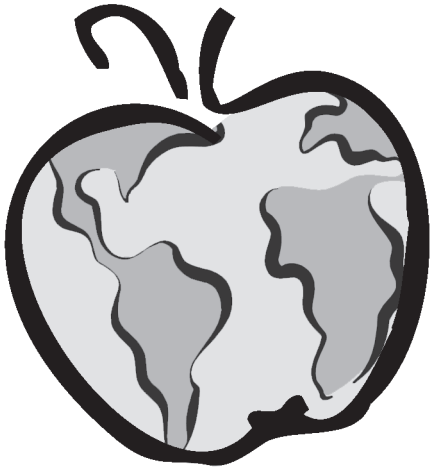
5. Compare the total fat and saturated fat intakes with the recommended amounts (30 percent of calories from total fat with 10 percent from saturated fat). Were the recommendations met on day 1? How about day 2?
6. Is one day of high-fat eating a bad thing?
7. What are some ways to reduce the amount of saturated fat on day 2?
8. Looking at your calculations in table A, compare the grams of trans fat on day 1 with the grams of trans fat on day 2. Which day is higher? What food substitutions could you make to avoid trans fat?

Workspace

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 13

Looking for Patterns: What's for Lunch?



Balanced Diet Theme

In this lesson students use statistics and graphs to look for evidence of healthy patterns in the foods being offered for lunch at the school cafeteria. In an attempt to provide activities that are accessible and challenging to a wide range of math students, we have included two case studies to choose from. Case study 13.1 focuses on the concept of balance in the diet. The analysis of case study 13.1 can be completed at two levels of difficulty, depending on your students' abilities. Case study 13.2 focuses on analyzing the fat content in lunch menus—both quantity and quality. The goal of this lesson is to promote eating a balanced "total diet" that takes into account food consumed over several days or a week. Students are encouraged to eat a variety of foods and learn that they can eat "sometimes foods" occasionally without feeling guilty.

Behavioral Objective

For students to establish healthy eating patterns

Learning Objectives

Students will be able to do the following:

1. Solve problems that involve collecting and analyzing data from real-world situations
2. Use inequalities to compare recommendations with the actual number of servings provided
3. Construct and interpret tables and histograms

4. Calculate the range, average, difference, and percentage of a data set
5. Make inferences and convincing arguments that are based on data analysis
6. Explain why statistical methods are powerful aids for decision making
7. Think critically about what eating patterns are necessary to maintain a balanced "total diet"
8. Work cooperatively to solve problems

Materials

- Copies of your school's weekly lunch menu
- Calculators (recommended)
- Overhead transparency 3.1 (see page 78), A Balanced Plate for Health

For case study 13.1, you need the following:

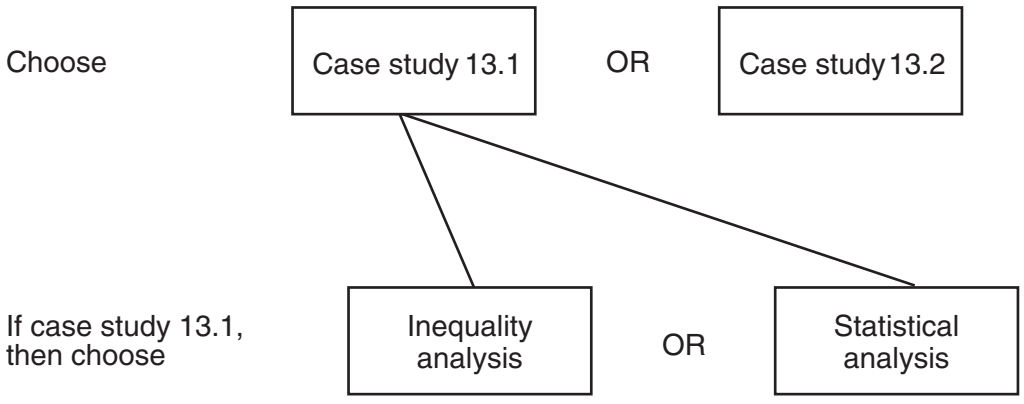
- One copy of student resource 13.1, What Counts as One Serving?, per group of three
- One copy of case study 13.1 per group
- The section from activity 13.1 on inequality analysis *or* the one on statistical analysis

For case study 13.2, you need the following:

- One student resource 13.2, How Much Fat Is OK?, per group
- One copy of case study 13.2 per group

Procedure

1. Overview



2. Choose whether to use case study 13.1 or case study 13.2, and then proceed to that section.

CASE STUDY 13.1: SCHOOL LUNCH: A BALANCING ACT

All students should begin the activity by completing the first page of case study 13.1. Use either the inequalities analysis section *or* the statistical analysis section of case study 13.1 to analyze the results of this case. Choose the one that best fits your students' skills.

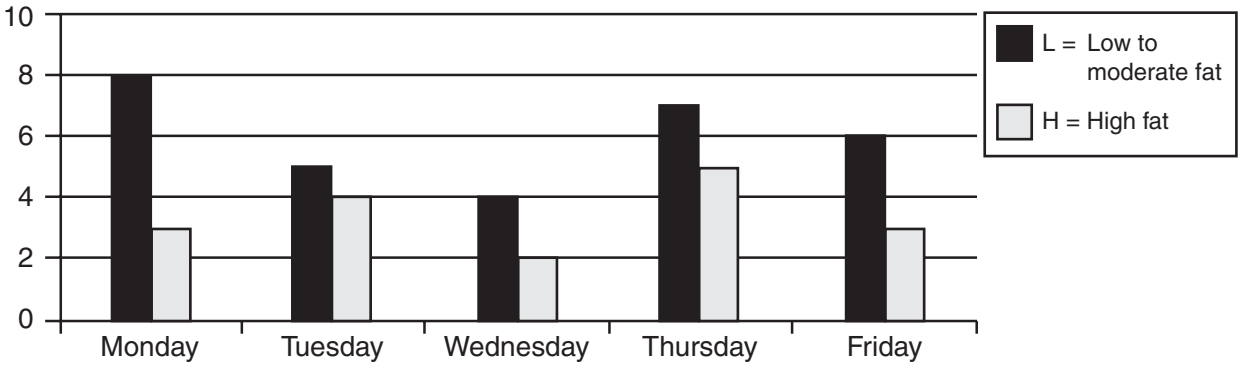
1. (5 minutes) Ask students to complete the following statement in writing: A balanced diet is . . . . Have students share their answers. This will give you an idea of what information students remember from previous lessons and will set the stage for you to correct their misconceptions and clarify the idea of a balanced diet.
2. (5 minutes) To make sure students understand what is meant by "balanced," briefly review the *Planet Health* Guide to Healthy Eating (see Specific Background Material in the Teacher Resources section). More detailed information is provided in lesson 3, Food Power. You do not need to spend a great deal of time reviewing these guidelines or the food groups because students have been exposed to these topics in previous lessons and a student resource sheet will be available to them during the activity. However, because sweets and fat do not represent food groups (see overhead transparency 3.1, A Balanced Plate for Health; "sometimes foods" such as sweets and unhealthy fat are on a side plate), you may need to remind students about the types of foods that would fall into these categories. You may also want to show this overhead (see page 78) as a quick way to remind students of the five food groups.
3. Explain that a healthy diet may be balanced over the course of several meals or even several days. Inform the class that the school's meal program follows this principle of a balanced diet by balancing the lunch menu over the course of one week to limit total fat, saturated fat, and salt, while meeting recommended levels of key nutrients such as protein, calcium, iron, vitamin A, and vitamin C.
4. (3 minutes) Introduce the case study. Point out the goals of the activity:
   - To work cooperatively as a class to examine one week's school lunch menu
   - To analyze the patterns of foods offered in a week
   - To determine in what ways school lunches help or hinder them from eating a balanced diet
5. Divide the class into five groups and hand out student resource 13.1 and case study 13.1 to each group. Assign one day's school lunch menu to each group (each group should have one copy of the school's lunch menu). Give each group the inequalities section *or* the statistical analysis section, but not both. You may want to read the instructions for the case study and discuss how they will estimate food group servings from combination foods (see the pizza example on the student worksheet).
6. (5 minutes) Have each group complete an analysis of the one day's lunch menu by determining the number of servings from all of the food groups in their assigned day. Have each group complete the analysis of the lunch menu assigned to them and record their results on the board (draw the summary table on the board for the teams to fill in). Remind students that to complete this problem in the time allowed, they must work together as a team. If students have difficulty determining serving size, they can talk to the food services staff or you can refer them to the resource Seven Ways to Size Up Your Servings on page 561 in appendix A.
7. (20 minutes) Have students complete the analysis of the class data using inequalities or statistics. (Note on inequalities analysis: Students may need you to clarify what they should do for the food groups that contain ranges for the recommended servings. Example 1: Monday's lunch had three servings of vegetables. Three is more than the one or two servings recommended, so they should put a > in the column for Monday. Example 2: Tuesday's lunch had 0 servings of meat. Zero is less than 1, so students would put a < in the column for Tuesday.)
8. (5-10 minutes) Discuss the students' conclusions.

CASE STUDY 13.2: SCHOOL LUNCH: FAT MATTERS

1. (5 minutes) Ask students to complete the following statement in writing: Eating a healthy mix of fat means . . . . Have students share their answers. This will give you an idea of what information students remember from previous lessons and will set

the stage for you to correct their misconceptions and clarify the idea that the type of fat in the diet matters more than the total amount of fat.

2. (5 minutes) Review the fat recommendations and try to get students to understand that a moderate amount of fat in the diet is acceptable. The important thing to focus on is the type of fat students eat. Remind students that eating too much saturated fat (found mainly in animal products such as meat, butter, and whole milk) or trans fat (found in fried and packaged foods that contain partially hydrogenated vegetable oil) can increase the risk of developing heart disease later in life. Substituting unsaturated fat (found in fish, vegetable oil, nuts, olives, and avocados) for saturated fat decreases the risk of developing heart disease. The fat content in individual foods will vary, but it's the percentage and quality in the overall diet that is important. The U.S. *Dietary Guidelines* recommend that a range of 25 to 35 percent of calories come from total fat, and no more than 10 percent of calories come from saturated fat. There is no recommended safe level of trans fat, and therefore they should be avoided as much as possible. (See lesson 21, student resource 21.1, What's the Rap on Fat? (page 290), for more information on the different kinds of fat.)
3. (3 minutes) Introduce the case study. Point out the goals of the activity:
   - To work cooperatively as a class to examine one week's school lunch menu
   - To use statistics to analyze the patterns of foods offered in a week
   - To determine whether school lunches are helping them moderate saturated fat consumption as part of a balanced diet
4. Divide the class into at least five groups and assign each group one day of the week. (To keep the groups small, you may need to have more groups, with several groups working on a particular menu.) Hand out How Much Fat Is OK? (student resource 13.2) and case study 13.2 along with a copy of your school's lunch menu. Tell students that the resource sheet categorizes foods by the percentage of calories that come from saturated fat, although total grams of fat and saturated and trans fat are listed for use in the extension exercise. You may want to read the case study instructions out loud to the class. (Suggestion: Collect the How Much Fat Is OK? sheets at the end of the period and keep one class set to be used the next time you teach this lesson.)
5. (15 minutes) Have each group complete the analysis of the lunch menu assigned to them and record their results on the board (draw the summary table on the board for the teams to fill in). Remind students that to complete this problem in the time allowed, they must work together as a team. You might suggest that each student be responsible for determining the saturated fat content of an equal number of foods in their menu.
6. (10 minutes) Have students complete the analysis of the class data by creating histograms and answering the questions in the case study. (Note: You may want to make an overhead transparency of the following histogram to show students.)



7. (5-10 minutes) Discuss the students' conclusions (questions 1 through 4). Before they answer question 5, ask students to go back to the menu and circle all the foods that contain high amounts of saturated fat (for example, meat, whole milk, butter) plus those that are likely to contain trans fat (fried foods and bakery goods). Remind them that this is the fat they want to try to limit. Have students complete questions 5 and 6 and discuss the ways that they can make healthy choices in the cafeteria and at home. (See Teacher Resources in this lesson and in lesson 12 for ideas.)

Extension Activities (Case Study 13.1 or 13.2)

1. Have students make predictions about the patterns of food selections they would expect to see in next week's cafeteria menus. Have them test the accuracy of their predictions. Is there a lot of variability in the patterns observed from one week to the next?
2. Have students test the accuracy of their results by comparing what is printed on the menu to the items available at lunch. Is there variability between what is posted and what is served? Do the changes represent substitutions (carrots expected but green beans served), omissions (green salad expected but no salad available), or additions (raw apples not on the menu but are offered)? Do the changes in menu help students eat a healthy diet? Explain.
3. Consider how well the school lunch program helps students meet their healthy eating goals. For instance, one way to meet your goal of eating five or more fruits and vegetables each day is to get three at school. Can students get three different fruits and vegetables at lunch? When it comes to grains, half or more should be whole grain. Are whole grains offered at lunch? If not, what could they eat at breakfast, snack, and dinner to meet the goal of eating more whole grains?
4. Make a poster of their results and ask if you can post it in the cafeteria. Compliment the cafeteria staff on their effort to provide healthy menus. If possible, ask the food service manager to visit the class to discuss the menus. What challenges does this person face when planning healthy menus? Have the class offer some ideas of healthy foods that they would eat.

CASE STUDY 13.1: SCHOOL LUNCH: A BALANCING ACT

In the statistical analysis option for case study 13.1, students calculated the number of servings of fruits and vegetables they would need to eat on average outside of school to reach the five-a-day recommendations (question 3 under the heading Looking for Patterns: Interpreting Your Findings). Based on their findings, have students plan two days of breakfast, dinner, and snack menus that would provide them with the balance of the number of fruits and vegetables they need. They should provide the names and serving sizes of foods they enjoy eating.

CASE STUDY 13.2: SCHOOL LUNCH: FAT MATTERS

1. As a group, have students review the food items on their menu and record the actual percentage value of calories from saturated fat (use the midrange—for instance, 13 percent for items in the 11 to 15 percent category). Have them calculate the average percentage of calories from saturated fat in that meal. Students then pool the results for each day of the week and calculate the weekly average. Is the weekly average greater than or less than the recommended 10 percent of calories or less from saturated fat?
2. Have individual students analyze the total and saturated fat content of a lunch that they eat at school by doing the following:
   - Record each menu item and create a chart that lists the total grams of fat and saturated fat in each food choice.

- Sum the total and saturated fat grams.
- Compare this to their daily limits for fat (student resource 13.2). Divide the number of grams from their meal by the recommended limit (for a boy or girl) and multiply by 100. Does their meal provide more or less than 33 percent of their daily limits? (Note: Because lunch is one of three main meals, it should provide approximately one-third of their daily needs.) If their meal is a high-fat meal, how can they balance this meal with healthy choices at dinner that night or in their meals the next day?

3. Have individual students analyze the saturated fat content of the food they eat outside of school by doing the following:
   - Record what they eat for breakfast, dinner, and snacks on two days.
   - Make a frequency table to tally the number of servings that fall into each of the following categories: low saturated fat (10 percent of calories or less) and moderate to high (>10 percent) saturated fat.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans* (see appendix A)
- Washington State Dairy Council, "Fat: Where It's At" (see appendix A)
- Seven Ways to Size Up Your Servings (see appendix A)

SPECIFIC BACKGROUND MATERIAL

School Lunch Program

The National School Lunch Program was established in 1946 "to safeguard the health and well-being of the nation's children and to encourage domestic consumption of nutritious agricultural commodities and other food" (Section 2 of the Act, 42 U.SC 1751). In June 1995 the U.S. Department of Agriculture (USDA) finalized a new policy ensuring that school meals would meet the latest U.S. *Dietary Guidelines for Americans* and offer a greater variety of healthy foods. The National School Lunch Program was renewed in 2004 as part of the Child Nutrition and WIC Reauthorization Act (P.L. 108-265).

Case Study 13.1: Specific Background

Bear in mind that *Planet Health* lessons in other subjects teach students about the principles of healthy eating and the importance of selecting a balanced diet that includes different foods from each of the five food groups. Hence, assuming that students have already completed at least one of those lessons, this lesson can serve as a practical application. Math teachers need to spend only a few minutes reminding students about the key principles of healthy eating.

One concept presented here is the idea of balancing the diet over the course of several meals or even a week, which is how the school menus are balanced. (Note: Here the term *balance* refers to specific nutrients, such as fat or calcium. Some foods, such as fruits and vegetables or whole grains, are needed daily.) This concept offers flexibility and helps us to recognize that eating an occasional nutrient-sparse food or meal can be balanced with nutrient-dense foods or meals for an overall healthy eating plan.

Why Is Eating a Balanced Diet Important?

1. A balanced diet provides the vitamins, minerals, fat, fiber, protein, and carbohydrate you need for good health today.
2. Making healthy choices from each food group and limiting empty calories from added sugars can help you maintain a healthy body weight.
3. A balanced diet can reduce the risk of developing certain conditions and diseases such as obesity, diabetes, certain cancers, hypertension, heart disease, and osteoporosis.

What does it mean to eat a healthy diet?

The *Planet Health* Guide to Healthy Eating on page 81 provides some good rules to live by.

Number of Servings From Each Food Group

The USDA suggests that a school lunch offer foods from each food group, and that the nutrients in the meal be balanced over the course of a week to provide one-third of a child's or adolescent's nutritional requirements. The lunch program must meet the U.S. *Dietary Guidelines* as well as key nutrients such as calcium and vitamin A. In this case study, students will see how many servings should be offered from each food group. Student resource 13.1 will give them examples of the foods and amounts that make up one serving.

Combination Foods

Combination foods are made from ingredients that fit into more than one food group. One example is pizza, which provides refined grains, dairy, and vegetable servings. Learning the components of combination foods can help with comparing intake to the recommended food group servings.

Five-a-Day Recommendations

The 5-A-Day campaign recommends 5 to 13 servings (combined) of fruits and vegetables a day. The recommended daily number of servings is based on body size and age. For adolescents, eating a fruit or vegetable with every meal and snack is a good goal to aim for without getting overly concerned with counting servings. A serving size for foods in the fruit or vegetable group equals a medium-size piece of fruit, a small glass of 100 percent fruit juice, 1 cup of raw salad greens, 1/2 cup of cut-up fruit or vegetable, 1/2 cup of cooked vegetables or beans, or 1/4 cup of dried fruit. Many foods are typically eaten in portion sizes larger than one serving, so getting the recommended amount is easier than you may think.

Whole Grains

Whole grain foods are superior to those made with "enriched," or refined, flour because they contain fiber, healthy plant oils, and other micronutrients that are stripped away during milling. The U.S. *Dietary Guidelines* recommend that people of all ages consume at least three servings of whole grain foods daily (an ounce equivalent is one slice of bread, 1 cup of cereal, or 1/2 cup of cooked pasta or rice). Adolescents ages 11 through 14 need a total of six to eight servings of grain foods each day.

Healthy Fat

It is important not only to moderate total fat intake, but also to pay attention to the types of fat consumed. The U.S. *Dietary Guidelines* recommend a diet low in saturated fat (less than 10 percent of calories). Most of the fat you eat should be unsaturated because substituting this type of fat for saturated fat lowers the risk of developing heart disease and type 2 diabe-

tes. Case study 13.2 assesses the level of fat in the school lunch menus, but students can still assess the options provided for added fat (such as spreads or dressing) and types of foods served (for instance, whole milk contains more saturated fat than 1 percent or skim milk).

Sweets

Foods and beverages with added sugar should be limited in a healthy diet because these foods provide little to no nutritional value. Although desserts are certainly offered in school, they rarely contribute to meeting the USDA's meal requirements.

CASE STUDY 13.2: SPECIFIC BACKGROUND

Bear in mind that other *Planet Health* lessons teach students about the importance of choosing a diet low in saturated fat and moderate in total fat. Hence, assuming that students have already completed at least one of those lessons, this lesson can serve as a practical application. Math teachers need to spend only a few minutes reminding students about healthy fat recommendations and moderating their total and saturated fat intakes.

Keeping Fat to Recommended Levels

The U.S. *Dietary Guidelines* recommend a range of 25 to 35 percent of calories from total fat (unsaturated, saturated, and trans fat), with no more than 10 percent of calories from saturated fat. The recommended upper limits for daily fat intake are as follows:

- **Girls 11 to 14 years old:** About 65 grams per day of total fat with 20 or fewer grams of saturated fat (based on a 2,000-calorie diet)
- **Boys 11 to 14 years old:** About 80 grams per day of total fat with 25 or fewer grams of saturated fat (based on a 2,400-calorie diet)

Determining the Percentage of Calories From Saturated Fat

When reading a food label, the percentage of calories from fat is listed, but you may want to calculate the percent of calories from saturated fat. To do this, multiply the grams of saturated fat by 9 calories per gram and divide by the number of calories in the product; multiply by 100 to get the percentage of calories from saturated fat. Student resource 13.2 provides a chart of food categories by the percentage of calories from saturated fat, but knowing this equation may be helpful in determining the fat content of other foods or snacks.

Not All Fat Is Created Equal

The fat in foods contains a mixture of saturated and unsaturated (monounsaturated and polyunsaturated) fatty acids commonly called fat. Many animal products, such as fatty meat, whole milk, butter, and lard, are high in saturated fat. This kind of fat typically is solid at room temperature. Eating too much saturated fat increases the risk of developing heart disease. Therefore, the U.S. *Dietary Guidelines* recommend a diet low in saturated fat (less than 10 percent of calories) and limiting trans fat. Most of the fat you eat should be unsaturated because this type of fat lowers the risk of developing heart disease and type 2 diabetes. Most plant oils are high in unsaturated fat and generally are liquid at room temperature. Vegetable oils (such as olive, canola, corn, and peanut), most nuts, olives, avocados, and fish are good sources of unsaturated fat.

There is an exception to the rule that plant fat is healthier than animal fat. Through a commercial process called hydrogenation, healthy plant oils can be converted to a more stable (and saturated) form known as trans fat (technically called partially hydrogenated vegetable oil). This is how some margarines are made, and this form of fat is used in many processed baked goods and snack foods to improve shelf life. Unfortunately, trans fat is even more strongly associated with heart disease than saturated fat and therefore should be avoided as much as possible. Steer clear of trans fat by consuming only foods listing no partially hydrogenated vegetable oils in the ingredients, and cooking with liquid vegetable oils instead of stick margarine or shortening. When eating out, avoid ordering fried foods (French fries, fried fish, or chicken sandwiches).

Why Should We Moderate Fat Intake?

Excess saturated fat increases the risk of certain diseases and health problems, particularly heart disease. Eating too many calories from any source can lead to weight gain, and fat has more than twice the calories as the same amount of carbohydrate or protein. Eating many high-fat foods quickly increases calorie intake.

Be Cautious About Consuming a Very Low-Fat Diet

Very low-fat diets contribute to nutritional deficiencies if they are restricted in foods that contribute essential nutrients needed by children, growing teens, pregnant women, and the elderly. Students should aim for a total fat intake of no less than 25 percent of their total calories. Fat provides essential fatty acids and transports vitamins A, D, E, and K. It is also an important energy source, providing 9 calories per gram. Fat makes food more palatable and flavorful and provides a feeling of fullness.

"Sometimes Foods" Are OK Now and Then

Experts agree that the occasional indulgence can be balanced by an overall healthy eating plan. "Sometimes foods" is a simple way to describe foods that should be eaten in moderation because they are high in unhealthy fat or added sugar, are low in vitamins and minerals, or are not considered nutrient dense (i.e., the ratio of nutrients to calories is low). Examples include French fries, soda and other sweetened beverages, hot dogs, and candy bars.

How Do You Moderate Unhealthy Fat in Your Diet?

Here are some ways to reduce total fat, saturated fat, and trans fat consumption and thereby reduce your risk of heart disease:

- Eat smaller amounts of high-fat sauces or creamy toppings with pasta and salad.
- Select snack foods wisely; look at labels and avoid foods with trans fat.
- Eat at fast-food restaurants very infrequently (one meal a week maximum).
- Bake or roast food instead of frying.
- Remove poultry skin and trim visible fat from red meats.
- Replace butter or stick margarine with oil-based soft-tub margarine or olive oil.
- Choose low-fat menu selections to complement higher-fat foods (e.g., choose a salad instead of French fries to go with a hamburger).

REFERENCES

U.S. Department of Agriculture and U.S. Department of Health and Human Services. 2005. *Dietary guidelines for Americans,* 6th ed., www.healthierus.gov/dietaryguidelines/.

U.S. Department of Agriculture, Food and Nutrition Service, School Meals Programs, www.fns.usda.gov/cnd/Lunch/.

Name _____

Case Study 13.1

School Lunch: A Balancing Act

School lunch programs work hard to provide healthy, good-tasting meals for students. Of course, it's hard to please everybody! This is your opportunity to analyze the nutritional content of your school's lunches and appreciate the challenges that the people who prepare them face. What's for lunch this week? Can you choose from a variety of foods with selections from each of the food groups? To answer these questions, you will analyze this week's lunch menus (five days) and report your findings on the attached form. You will work in groups to complete this assignment. Each group will evaluate one day's menu; then the class will pool all the findings.

Group Assignments

1. In table 1, list all the foods from the day's menu assigned to your group. If your school offers multiple entrees for a given day, choose one meal.
2. Use student resource 13.1 to determine which food groups are represented and the number of servings of each food group provided by this meal.

Table 1 Servings From All Food Groups in One Day's Lunch Menu

	Food group						
Food	**Quantity**	**Grain**	**Fruit**	**Veggie**	**Meat**	**Dairy**	**"Sometimes foods"**
Example: Cheese pizza with peppers	*1 slice*	*1*		*1*		*1*	
Total							

Sweets include dessert foods as well as soft drinks and nonjuice fruit punches.

Fat includes butter, margarine, salad dressings, and oil- or butter-based sauces.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Case Study 13.1 *(continued)*

Case Study 13.1

3. Figure out the total number of servings for each food group. Record your findings and the findings of the other groups in your class in table 2.

Table 2 Servings From Each Food Group for All Days of the Week

	Days of the week					Total number
Food groups	Monday	Tuesday	Wednesday	Thursday	Friday	
Grains						
Vegetables						
Fruits						
Dairy						
Meat, fish						
"Sometimes foods"						

Inequalities Analysis

Because lunch is one of our three daily meals, it should provide approximately one-third of the recommended daily servings for each food group. Use table 3 to compare the number of servings provided in each lunch menu with the number of recommended servings.

- If the number of servings provided in the lunch is *less than* the USDA National School Lunch Program recommendations, put a (<) sign in the appropriate column.
- If the number of servings provided in the lunch is *greater than* the USDA National School Lunch Program recommendations, put a (>) sign in the appropriate column.
- If the number of servings provided in the lunch is *equal to* the USDA National School Lunch Program recommendations, put an (=) sign in the appropriate column.
- Total the number of (>), (<), and (=) signs for each food group.

For example: If three servings of vegetable were served on Monday, you should put a (>) sign in the row for vegetables because three is greater than the one or two servings recommended.

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Case Study 13.1

Case Study 13.1 *(continued)*

Table 3 Inequalities Analysis

		Days of the week					Total		
Food groups	**Recommended servings for school lunch**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**<**	**>**	**=**
Grains	3								
Vegetables	1-2								
Fruits	1-2								
Dairy*	1-2								
Meat, fish	1								
"Sometimes foods"									

* The USDA National School Lunch Program requires that 8 fluid ounces (250 ml) of milk be served; low-fat products are recommended.

Analyzing Your Results

What patterns do you notice for each food group? Do the foods offered meet the healthy eating guidelines? For example: Is the number of vegetables offered usually greater than, less than, or equal to the USDA National School Lunch Program recommendations? Are a variety of vegetables served? (Look at the menus.) Are whole grains offered? Do whole grains represent more or less than half of all grain choices? (Look at the menus.)

Grains: _____

Vegetables: _____

Fruits: _____

Dairy: _____

Meat: _____

"Sometimes foods": _____

(continued)

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Case Study 13.1

Statistical Analysis

Complete the analysis of your school lunch menus for the week by doing the following calculations:

1. Record the **range** of servings offered for each food group in table 4.
2. Calculate the **average** number of servings offered for each food group (total number of servings / 5). Record your results in table 4.
3. Calculate the **difference** between the number of daily servings recommended by the USDA lunch program and the average number of servings offered for each food group.
4. Calculate the **percentage** of the daily recommended servings offered in the average lunch menu (Average number served / recommended number × 100 = % of recommended servings offered at lunch). For food groups that allow a range of servings, use the midpoint (for instance, one or two vegetables may be served, so use 1.5 in your calculation).

Table 4 Statistical Analysis

Food groups	Recommended servings for school lunch	Range	Average	Difference (Average – recommended)	Percent (Average / recommended × 100)
Grains	3				
Vegetables	1-2				
Fruits	1-2				
Dairy*	1-2				
Meat, fish	1				
"Sometimes foods"					

* The USDA National School Lunch Program requires that 8 fluid ounces (250 ml) of milk be served; low-fat products are recommended.

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Case Study 13.1 *(continued)*

Looking for Patterns: Interpreting Your Findings

1. Is a large range of daily servings offered in any food groups? Which ones?
2. Are there any food groups that offer fewer than the recommended settings, on average? Which groups?
3. Although a balanced diet can take place over the course of several meals or even several days, there are some daily recommendations that you should try to meet. On average, how many more servings would you need to eat in a day (at breakfast, lunch, snack, and dinner) to get the following?
   - Five servings of fruits and vegetables
   - Three servings of dairy for calcium

Conclusions

1. What comments would you make to the U.S. Department of Agriculture (USDA) about your school's lunch program? Cite specific information that demonstrates how your school lunches are designed with the *Dietary Guidelines for Americans* in mind. Explain how they are adhering to these principles:
   - Eat a variety of foods from each food group.
   - Eat fruits and vegetables at every meal and snack.
   - Go for whole grains for most of the time.
   - Choose foods with healthy fat.
   - Limit foods and beverages with added sugar.
2. Based on your analyses, what recommendations for improvements would you make?

_____

_____

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Case Study 13.2

School Lunch: Fat Matters

School lunch programs work hard to provide healthy, good-tasting meals for students. Of course, it's hard to please everybody! Your class has been hired by the U.S. Department of Agriculture (USDA) to examine the fat content of your school cafeteria lunch menus. Over the course of one week, the meals should provide no more than 30 percent of their calories from total fat and 10 percent of their calories from saturated fat. Are your lunch menus meeting these goals? To answer this question, you will look at the saturated fat content (as a percentage of calories) of this week's lunch menus (five days) and report your findings on the attached form. You will work in groups to complete this assignment. Each group will evaluate one day's menu; then the class will pool all the findings.

Group Assignments

1. List the foods from the meal assigned to your group in table 1.
2. Use student resource 13.2, How Much Fat Is OK?, to determine what percentage of saturated fat calories comes from each of the foods. Use student resource 13.1 to determine how many servings of each item are offered. Put one check for each serving in the column that corresponds to the saturated fat content of each food item. (For example, if two slices of cheese pizza are offered, place two checks in the column.) For combination foods, you may have to estimate the saturated fat content by comparing them to similar foods listed in the charts. If your school provides nutrition information on its menu, then use that information to complete this activity.
3. Determine the total number of servings in each category by counting the number of checks in each column. Report your findings to the class.

Table 1 Saturated Fat Content in Foods on One Day of the Week

Foods	Low to moderate (10% calories from saturated fat or less)	High (11% calories from saturated fat or more)
Example: 1 slice cheese pizza		✓
Total number of servings		

(continued)

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Case Study 13.2 *(continued)*

Case Study 13.2

4. Use the information from the other groups in the class to complete table 2. Record the total number of servings in each category.

Table 2 Saturated Fat Summary: All Days of the Week

Day of the week	Low to moderate (10% calories from saturated fat or less)	High (11% calories from saturated fat or more)
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Total number of servings		

5. Make a histogram to display the data from table 2.
   - Label the *y*-axis "Number of servings" and the *x*-axis "Day of the week."
   - Use a different color bar to represent the two categories of saturated fat content.
   - Plot the frequency for each category in Monday's menu.
   - Leave a space between Monday's and Tuesday's bars. Repeat for each day of the week.

Complete the analysis of your school lunch menus by doing the following:

1. Look at the histogram. What patterns do you notice? Is there day-to-day variability in the number of servings offered in each category?
2. Which day of the week were the following offered:
   - The largest number of servings with high saturated fat content
   - The lowest number of servings with high saturated fat content
   - The largest number of servings with low to moderate saturated fat content
   - The lowest number of servings with low to moderate saturated fat content
3. What percentage of the weekly total of servings was in the high saturated fat category? (Total number of high saturated fat servings / total number of servings $\times$ 100 = % in high-saturated-fat category.)
4. What percentage of the weekly total servings was in the low to moderate saturated fat category? (Total number of low to moderate saturated fat servings / total number of servings $\times$ 100 = % in low to moderate saturated fat category.)
5. Based on your analysis, write a paragraph that defends or refutes the following statement: *Although our school lunches contain some foods high in saturated fat, most of the food selections contain a balance of healthy (unsaturated) fat with low to moderate quantities of unhealthy fat.* (Hint: You may also want to look at the menu to identify foods containing healthy fat.)
6. If you chose a meal with a high percentage of saturated fat, how could you balance that choice during the rest of the day (snack and dinner)? What lunch meals could you choose on subsequent days?

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Student Resource 13.1

What Counts as One Serving?

Food group	Example of one serving	Healthy choices
Grains: Bread, cereal, rice, and pasta	1 slice of bread 1 tortilla, roll, muffin 1/2 bagel, English muffin, hamburger bun 1/2 cup cooked cereal, grits, rice, pasta 1 oz (about 1 cup) ready-to-eat breakfast cereal	Whole grain breads Whole grain cereals Whole grain pasta, brown rice, bulgur, quinoa Grains with limited processing that adds unhealthy fat or sugar
Vegetable	1 cup raw leafy vegetables 1/2 cup other chopped vegetables 1/2 cup other cooked vegetables 3/4 cup vegetable juice	Dark leafy greens Deep orange or yellow vegetables Cruciferous vegetables Dry beans
Fruit	1 medium apple, banana, orange, pear 1/2 grapefruit 1/4 cantaloupe 1/2 cup of raw, canned, cooked, frozen fruit 1/4 cup raisins, dried fruit 3/4 cup fruit juice	Deep orange or red fruit Citrus Berries
Dairy: Milk, yogurt, and cheese	1 cup milk or yogurt 1.5 oz (45 g) natural cheese (e.g., cheddar) 2 oz (60 g) processed cheese (e.g., American)	Plain low-fat (1%) or nonfat milk Low-fat yogurt Reduced-fat cheese
Meat, poultry, fish, dry beans, eggs, and nuts	2.5 oz (75 g) of cooked, lean meat, poultry, or fish 1/2 cup cooked dry beans, peas 1 egg 2 tablespoons (30 ml) peanut butter 1/3 cup nuts, seeds	Fish (omega-3 fatty acids), nuts, dry beans Light-meat poultry without the skin Lean meats

Note: Foods with added sugar or unhealthy fat can be found in most groups, so it is important to choose carefully. Sweets should be eaten in limited amounts because they do not provide nutrients such as minerals or vitamins. Foods from animal sources (meat, chicken, milk) can have high amounts of the unhealthy saturated fat. Foods from plants (vegetables, olive oil, whole grains) and fish are sources of healthy unsaturated fat.

Combination Foods

Some founds contain a mix of ingredients from different food groups. For instance:

Chili con carne: meat (from meat and beans), vegetable (tomato sauce), and dairy (if topped with cheese)

Chicken pot pie: grain (pie crust), vegetable (carrots, peas), meat (chicken)

Vegetarian burrito: grain (tortilla), vegetable (tomatoes), meat (beans), dairy (cheese), and fat (if sour cream is added)

Yogurt parfait: fruit (berries) and dairy (yogurt)

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Student Resource 13.2

How Much Fat Is OK?

The U.S. *Dietary Guidelines* recommend a range of 25 to 35 percent of calories from total fat and no more than 10 percent of calories from saturated fat. For adolescents, this translates as follows:

- **Girls 11 to 14 years old:** About 65 grams per day of total fat and 20 or fewer grams of saturated fat (based on a 2,000-calorie diet)
- **Boys 11 to 14 years old:** About 80 grams per day of total fat and 25 or fewer grams of saturated fat (based on a 2,400-calorie diet)

Table 1 Saturated Fat (%DV) in the Five Food Groups

Type of food or meal option	Total fat (grams)	Saturated fat (grams)	Trans fat (grams)
Low to moderate (10% of calories from saturated fat or less)			
Fruits and vegetables			
Fruits: Apples, applesauce, bananas, fruit cocktail, orange juice, peaches, raisins, strawberries			
Vegetables (account for added fat such as butter or salad dressing separately): Broccoli, carrots, celery, green beans, lettuce, peppers, spinach, tomatoes, tossed salad (no dressing), zucchini			
Avocado (1/4)	8	1	
Cole slaw	2		
Mashed potatoes	2	0.5	
Sweet potato, candied	1.5	3.5	
Vegetable stir fry	2	0.5	
Grains			
Bagel (1/2)	1		
Bran or whole grain cereal	1		
Breakfast cereal (cold)			
Cereal bar with fruit	3	0.5	
Corn tortilla	1		
English muffin (1/2)	1		
Graham crackers	1		
Granola (1 oz, or 30 g)	7	1	
Hamburger or hot dog bun			
Hot cereal	1		
Plain noodles			

(continued)

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How Much Fat Is OK? *(continued)*

Student Resource 13.2

Type of food or meal option	Total fat (grams)	Saturated fat (grams)	Trans fat (grams)
Low to moderate (10% of calories from saturated fat or less)			
Grains (continued)			
Popcorn, microwave (1 cup)	2.5	1	
Pretzels	1		
Rice pilaf (1 cup)	4	2	
Rice, brown (1/2 cup)	1		
Rice, white (1/2 cup)			
Saltines			
Sweet roll, cinnamon (1)	10	2	
Waffles, frozen, toasted (2)	6	1.5	2
Wheat Thins (1 serving)	6	1	
Whole wheat crackers	1		
Whole wheat or white bread	1		
Dairy			
1% fat milk	3	2	
Cottage cheese, 1% low fat (1/2 cup)	1.5	1	
Frozen yogurt	4	2	
Low-fat yogurt	1.5	1	
Nonfat milk, white or flavored			
Nonfat yogurt			
Parmesan cheese (1 Tbsp, or 15 ml)	2	1	
Pudding, instant chocolate, prepared with 2% low-fat milk	3	2	
Meat/protein/entree			
Baked beans	1	1	
Black, kidney, or pinto beans			
Bologna	7	2	
Chicken breast, roasted	3	1	
Chicken leg, roasted	8	2	
Egg, hard boiled (1)	5	2	
Egg, scrambled (1)	7.5	2	
Fish filet, baked (3 oz, or 90 g, flounder, sole, cod)	1		
Fish sticks (3)	11	2	

(continued)

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How Much Fat Is OK? *(continued)*

Student Resource 13.2

Type of food or meal option	Total fat (grams)	Saturated fat (grams)	Trans fat (grams)
Low to moderate (10% of calories from saturated fat or less)			
Meat/protein/entree (continued)			
Refried beans (1/2 cup, canned)	1		
Roast turkey, no skin (1 oz, or 30 g)	1		
Salmon (3 oz, or 90 g)	7	1	
Shrimp, breaded and fried (3 oz, or 90 g)	10	2	
Tofu, fried (1 oz, or 30 g)	6	1	
Tuna, white meat, canned in water (3 oz, or 90 g)	2	1	
Veggie dog			
Other			
Beverages: water, tea, black coffee, punch, soda			
Brownies	7	1.5	0.5
Condiments: catsup, mustard, jelly, honey			
Honey bun	22	5	8
Mayonnaise (1 Tbsp, or 15 ml)	5	1	
Olive oil (1 Tbsp, or 15 ml)	14	2	
Pickles			
Sugar			
High (11% of calories from saturated fat or more)			
Fruits and vegetables			
French fries	13	2.5	3.5
Grains			
Biscuit	11	2.5	5
Blueberry muffin	17	3	
Croissant	18	4.5	7
Doughnut	12	3	4
Dairy			
2% milk	5	3	
American cheese (1 oz, or 30 g)	9	5.5	
Cheddar cheese (1 oz, or 30 g)	10	5.5	
Cream cheese (1 Tbsp, or 15 ml)	15	9	
Mozzarella cheese stick	6	3.5	
Regular ice cream	8	5	

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How Much Fat Is OK? *(continued)*

Student Resource 13.2

Type of food or meal option	Total fat (grams)	Saturated fat (grams)	Trans fat (grams)
High (11% of calories from saturated fat or more)			
Dairy (continued)			
Swiss cheese (1 oz, or 30 g)	8	5	0.5
Vanilla milkshake (12 oz, or 375 ml)	10	6	
Whole-fat milk	8	5	
Meat/protein/entree			
Almonds (1/4 cup)	15	9	
Beef taco	10	4	1
Chicken nuggets (6 pieces)	15	3	1.5
Chicken patty	9	2	0.5
Chicken pot pie	40	15	14
Fried chicken breast	19	6	2.5
Fried chicken leg	10	3	
Ham and cheese sandwich	6	3	
Hot dog (1)	14	6	
Macaroni and cheese	8	3.5	1
Peanut butter (1 Tbsp, or 15 ml)	16	3	
Pizza	8	4.5	0.5
Popcorn chicken	21	5	4.5
Pork chop, broiled (3 oz, or 90 g)	11	4	
Roast beef, lean (1 oz, or 30 g)	7	3	
Sausage link (2)	15	5	
Sirloin steak, broiled (3 oz, or 90 g)	13.5	5	
Spaghetti with meat sauce	8	3	
Sunflower seeds	16	2	
Other			
Butter (1 pat)	4	2.5	
Cheesecake (1 slice)	18	8	
Chocolate candy bar	13	6	
Pecan pie, homemade (1 slice)	27	5	
Potato chips (1 oz, or 30 g)	10	3	
Ranch dressing	18	3	

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 14

Apples, Oranges, and Zucchini: An Algebra Party

Fruits and Vegetables Theme

This lesson uses individual and group math activities. Calculators are desirable. Students use algebra to plan a real-life activity (budgeting and buying food for a party) that incorporates the 5-A-Day theme of eating at least five fruits and vegetables every day. This lesson is designed to infuse information about choosing healthy foods into a classroom pre-algebra or algebra unit.

Behavioral Objective

For students to practice selecting five or more fruits and vegetables a day

Learning Objectives

Students will be able to do the following:

1. Write and solve one- and two-variable equations combining addition with multiplication
2. Apply math skills to using a budget
3. Use unit pricing for fruits and vegetables

Materials

- Activity 14.1, Plan Your Party!
- Calculators (optional)

Procedure

1. (3-5 minutes) Review the 5-A-Day recommendation with students, making sure they understand that eating at least five a day refers to fruits and vegetables *combined,* not to eating five fruits and five vegetables. See the Teacher Resources in lesson 6 (page 114) for a description of the 5-A-Day campaign message. Encourage students to eat at least one serving of fruit or vegetable with every meal and snack to get the nutrition they need. Make sure students are familiar with the terms *sometimes foods* and *everyday foods* (see Teacher Resources).
2. (5-10 minutes) As needed, review algebra used in this lesson: two-step equations combining addition with multiplication.
3. (10 minutes) Scenario (read aloud and use the board): *Your class deserves to have a party! You can have the party at your house, as long as you pay for the food. Searching for ways to raise money, you ask around and find out that your neighbors will pay you 75 cents for every bag of leaves you rake.*

   Example 1. Using algebra, write an expression that shows how much money you can earn for the party by raking leaves. Let x be the number of bags of leaves that students rake. Then,

   $$\$0.75x = \text{party budget in dollars}$$

   You are allowed to serve a few "sometimes foods" at the party (foods you should try not to eat every day, such as potato chips). If you also serve five different fruits and vegetables, everyone will get an extra 10 cents for every bag of leaves they rake and be allowed to stay an hour longer at the party! Hooray! Eating five a day will help keep you healthy. In fact, nutrition experts say that everybody should try to eat at least five servings of fruits and vegetables every day.

   Example 2. With the extra 10 cents per bag, the math formula for your party budget has changed. What is it now?

   $$\$0.75x + \$0.10x = \text{new party budget in dollars}$$

   $$\text{Simplify: } \$0.85x = \text{new party budget in dollars}$$

   Example 3. Your goal as a class is to raise $50 for the party. How many bags of leaves does your class need to rake? Use math to figure it out. Let x = the number of bags of leaves.

   $$\$0.85x = \$50$$

   $$x = \$50 / \$0.85$$

   $$x = 58.8 \text{ bags of leaves}$$

   Round off 58.8 to the nearest whole number. As a group, you need to rake 59 bags of leaves. (Bonus: How many bags does each person need to rake? Make up and solve the math expression for this question.)

   $$59 / x, \text{ where } x = \text{the number of students in the class}$$

4. (15-20 minutes) Carry out the following group activity:
   a. Divide the class into groups of up to four.
   b. Pass out activity 14.1, Plan Your Party!, to each group. Review the worksheet.
   c. On the board, work out the following example with the class:

Example 4. How many pounds of apples can you buy with $4 if apples cost $1 per pound ($1/lb)? Write this as an equation, using z to stand for the number of pounds you can buy:

$$\$1/\text{lb} \times z \text{ lb} = \$4$$

$$\$1/\text{lb} / \$1/\text{lb} \times z \text{ lb} = \$4 / \$1/\text{lb}$$

$$z = 4 \text{ lb}$$

Example 5. If you substitute y for the unit price of apples, you have a two-variable expression you could use to figure out how many pounds of any item (for example, oranges or zucchini) you can buy with $4. Remember that z still stands for the solution in pounds:

$$\$y / \text{lb} \times z \text{ lb} = \$4$$

d. Complete activity 14.1, Plan Your Party!, in groups.
e. Discuss your answers to the activity with the entire class.

Extension Activity

Have a class party and serve the food from one of the groups' menus.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to National Institutes of Health and National Cancer Institute, *Time to Take Five* (see appendix A).

SPECIFIC BACKGROUND MATERIAL

Definitions:

- "Sometimes foods" is a simple phrase describing foods that should be eaten in moderation because they are high in unhealthy fat or sugar, are low in vitamins or minerals, or are not nutrient dense (i.e., the ratio of vitamins or minerals to calories is low). Examples include French fries, soda and other sweetened beverages, hot dogs, and candy bars.
- "Everyday foods" is a simple way to describe foods such as fruits, vegetables, whole grain foods, fish or chicken, and so on, that can be eaten daily because they provide plenty of nutrition and adequate amounts of healthy fat and calories for health.

Bear in mind that *Planet Health* lessons in other subjects teach students about the 5-A-Day recommendation in more depth. Hence, assuming that students have already been exposed to at least one of those lessons, this lesson can serve as a practical application. Math teachers need to spend only a few minutes reminding students about the 5-A-Day theme. See lesson 5, The Language of Food (page 105), for more information on the 5-A-Day theme.

Name _____

Activity 14.1

Plan Your Party!

Apples, Oranges, and Zucchini: An Algebra Party

You've finished raking and you have $50! Congratulations! So now it's party time! You've spent $30 on chips, dips, drinks, cups, napkins, balloons, and streamers, and now you have $20 left for your five fruits and vegetables. That's $4 for each type of fruit or vegetable you pick. Each group will spend the $20 using algebra and following the directions below. Here is a list of fruits and vegetables and their unit prices (remember, lb = pound).

Item	Unit price	Item	Unit price
Apples	$0.85/lb	Cherry tomatoes	$1.85/lb
Bananas	$0.45/lb	Grapes	$1.30/lb
Bell peppers	$1.10/lb	Green beans	$1.10/lb
Broccoli	$0.95/lb	Oranges	$0.75/lb
Carrots	$0.80/lb	Mangoes	$0.75/lb
Cauliflower	$1.10/lb	Strawberries	$1.50/lb
Celery	$0.80/lb	Zucchini	$0.80/lb
		Watermelon	$0.30/lb

1. Pick any combination of five fruits and vegetables (four fruits and one vegetable, two fruits and three vegetables, etc.).
2. Write your five picks in the following table and fill in the rest of the table.
3. Using the unit prices (y), figure out how many pounds of each of your choices you can buy (x).
4. Remember, x = $4 / y.

Item name	**$4 /** y	**=** x **pound(s)**
Example: green beans	*$4 / $1.10*	*= 3.64 lb*
1.	$4 /	= lb
2.	$4 /	= lb
3.	$4 /	= lb
4.	$4 /	= lb
5.	$4 /	= lb

Bonus

1. Which two items can you buy the most of with $4?
2. Which two items can you buy the least of with $4?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 15

Plotting Coordinate Graphs: What Does Your Day Look Like?

Activity Theme

In this lesson students learn that they can maintain a healthy body weight by balancing the amount of energy they consume with the amount of energy they expend. Students examine their own activity patterns and energy expenditure by making coordinate graphs of a given day's activity intensity. This lesson is designed to complement a graphing unit.

Behavioral Objective

For students to be more aware of their own activity levels and to be physically active every day

Learning Objectives

Students will be able to do the following:

1. Construct a coordinate system with a labeled *x*-axis and *y*-axis
2. Graph ordered pairs on a coordinate system
3. Draw inferences and reason with tables and graphs that summarize personal activity data
4. Discuss the role physical activity plays in maintaining a healthy body weight
5. Describe the physical activity recommendations for adolescents

Materials

- Overhead transparencies 15.1, 15.2, and 15.3 (or use handout or chalkboard)
- Activity 15.1, What Does Your Day Look Like?
- Graph paper
- Ruler

Procedure

1. (2-3 minutes) Get students thinking about why physical activity is important by displaying overhead transparency 15.1.
2. (2 minutes) Point out the goals of this activity:
   - To discuss the role physical activity plays in maintaining a healthy body weight
   - To discuss the physical activity recommendations
   - To graph physical activity intensity for yesterday
3. (5-7 minutes) Use overhead transparency 15.2 to explain the concept of energy balance and the role physical activity plays in maintaining a healthy body weight. Elicit student responses to fill in the blanks on the transparency. Test their understanding of your explanation by asking selected students to complete the sentences on overhead transparency 15.3.
4. (3 minutes) Display the activity recommendations for adolescents listed at the bottom of overhead transparency 15.3. Discuss some examples of activities that require moderate to vigorous levels of exertion.
5. (3 minutes) Hand out activity 15.1, What Does Your Day Look Like? Review the definition of MET units described at the top of activity 15.1.
6. (25-45 minutes) Have students complete the activity sheets and the corresponding coordinate graphs of their activity data. (Note: In part II do not have students estimate the average METs expended over half-hour intervals. Have students record what they were doing at each time point only.)
7. (5 minutes) Discuss student responses to the discussion questions at the end of activity 15.1.

Extension Activity

Have students design and implement a plan for increasing their daily activity. Require them to keep a diary of their activity for one, two, or three days during this time and graph their data. How has their energy expenditure changed as a result of their increase in activity?

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)
- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix B)
- Ainsworth et al., "Compendium of Physical Activities: An Update of Activity Codes and MET Intensities" (see appendix B)

SPECIFIC BACKGROUND MATERIAL

Maintaining an Energy Balance

The human body requires energy for physical activity, growth, digestion, respiration, and many other body functions. Food provides us with our energy supply as well as other essential minerals and vitamins. Energy is stored in the carbohydrate, fat, and protein contained in food. The amount of energy stored in foods is measured in calories. Fat provides 9 calories per gram, whereas carbohydrate and protein each provide 4 calories per gram. To maintain an energy balance, the amount of calories consumed *(energy input)* in food must equal the amount of calories expended *(energy output)*. If more calories are taken in than are expended, they are stored by the body primarily as fat and a person could gain excess weight.

In children and youth, excess fat stores would be evident from weight gain greater than that expected for healthy growth. The amount of energy required to contract muscles during physical activity accounts for the second largest component (20 to 50 percent) of total energy expenditure (the largest component being metabolic processes) and the largest component that we have control over. Growth adds only 1 percent to daily energy requirements. We can use, or "burn," more of the calories that we consume by increasing our physical activity. More vigorous activities require more energy expenditure and therefore burn more calories than less vigorous activities over the same time period.

Calorie Requirements and Dietary Sources of Energy

People have different energy requirements depending on age and sex. The *Dietary Guidelines for Americans* (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2005) notes that on average girls 11 to 14 years old need 2,000 calories per day, whereas boys this age need 2,400. These are averages that can vary from day to day. They also vary according to a person's activity level and size. Compared to her peers who don't exercise, an athletic adolescent girl may need an additional 300 to 1,000 calories, and an athletic adolescent boy may need an additional 600 to 1,500 calories per day! Less active teens will have lower requirements. Active teens use their energy stores at a faster rate than less active youth.

The *Planet Health* Guide to Healthy Eating reminds us to eat a variety of foods from each of the five major food groups each day. People with higher energy needs require more servings than less active people do to get all the calories they need. The extra calories should come from a healthy balance of foods, maintaining the balance of fat, carbohydrate, and protein. Active adolescents need more calories than their less active peers; they should get them by increasing overall consumption, not by filling up on snacks loaded with unhealthy fat and sugar. Athletes who consistently need lots of extra calories should look to complex carbohydrate (starchy foods such as bread and pasta) and lean sources of protein, to take up the slack.

Some daily dietary variation in energy and food intake is normal. Exercise helps regulate appetite. Your body will need more energy and will tell you by feeling hungrier!

Planet Health'*s Activity Message*

Physical activity promotes health and well-being and offers opportunities to socialize and have fun. Adolescents should be moderately to vigorously active for at least 60 minutes every day or nearly every day as part of play, games, sports, chores, transportation, and planned exercise. This should include at least three sessions per week of vigorous physical activity lasting 20 minutes or more. Adolescents should aim for a total of 60 minutes or more of activity on five to seven days a week.

What is a MET value?

(Note: Students do not need to understand how METs relate to calories to complete this activity. They need only understand that a MET is a unit used to compare the

exercise intensities or energy expenditures of various activities.) A MET is an intensity unit assigned to all activities and is based on the rate of energy expenditure required for a given activity. Vigorous activities require more energy, or METs, than less intense activities. Sitting quietly requires 1 MET of energy expenditure and is defined as your resting metabolic rate, or RMR (Ainsworth et al., 2000). For the average adult, the RMR is approximately 1 kilocalorie (kcal) per kilogram (kg) of body weight per hour. Activities "are classified as multiples of one MET or the ratio of the . . . metabolic rate for a specific activity divided by the resting metabolic rate" (Ainsworth et al., 2000). Dancing requires five times as much energy as sitting, or 5 METs of energy expenditure. Pate and associates (1995) defined moderate activity as 3 to 6 METs and vigorous activity as more than 6 METs.

By multiplying the body weight in kilograms by the MET value and duration of activity, a person can estimate his or her energy expenditure (kcal). For example, bicycling at a 4 MET value expends 4 kcal/kg of body weight per hour. A 45-kilogram youth (approximately 100 pounds) bicycling for 40 minutes expends the following:

$$4 \text{ METs} \times (45 \text{ kg body weight}) \times (40 \text{ min} / 60 \text{ min}) = 120 \text{ kcal}$$

What are the risks of a sedentary lifestyle?

Activity is required for health. Studies suggest that physically active people enjoy lower risks of developing heart disease, diabetes, colon cancer, osteoporosis, and anxiety and depression relative to sedentary people. TV viewing, a major component of inactivity, is one of the major causes of overweight among youth. TV watching also has been associated with excess energy intake, elevated cholesterol levels, and poor cardiorespiratory fitness.

What are the benefits of a more active lifestyle?

Activity helps children develop and retain cardiorespiratory fitness, muscular strength, and confidence in their physical ability. Regular activity helps people maintain a healthy weight, build lean muscle, and reduce fat. It can reduce stress and brighten a person's mood. Regular exercise helps develop and maintain dense bones and thereby helps prevent osteoporosis. Likewise, active adults have a lower risk of developing diabetes, high blood pressure, and colon cancer, and are at lower risk of dying prematurely.

What are some examples of things you can do to increase your activity and decrease your inactivity?

Take the stairs; don't park next to the building; walk or ride your bike to school if there is a safe route; walk around the mall or the neighborhood with friends; watch only your favorite TV shows; remove or unplug the TV in your bedroom; play catch with a sibling, a friend, or a parent.

REFERENCES

Ainsworth, B.E., Haskell, W.L., Whitt, M.C., Swartz, A.M., Strath, S.J., O'Brien, W.L., Bassett, D.R. Jr, Schmitz, K.H., Emplaincourt, P.O., Jacobs, D.R. Jr., and Leon, A.S. 2000. Compendium of physical activities: An update of activity codes and MET intensities. *Medicine and Science in Sports and Exercise* 32 (9 Suppl): S498-504.

Pate, R., et al. 1995. Physical activity and public health: A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *Journal of the American Medical Association* 273 (5): 402-407.

U.S. Department of Agriculture, U.S. Department of Health and Human Services. 2005. *Dietary guidelines for Americans*. Washington, DC: Author.

Answer Key

ANSWERS TO BLANKS ON OVERHEAD TRANSPARENCIES

Overhead transparency 15.1: Increases, decreases

Overhead transparency 15.2: Decreases, increases, increases, decreases

Overhead transparency 15.3: Physical activity

ANSWERS TO ACTIVITY 15.1, PART I

1. B, 1.5 METs
2. C, 10
3. D, 4
4. A, 2.5
5. E, 1.0

Overhead Transparency 15.1

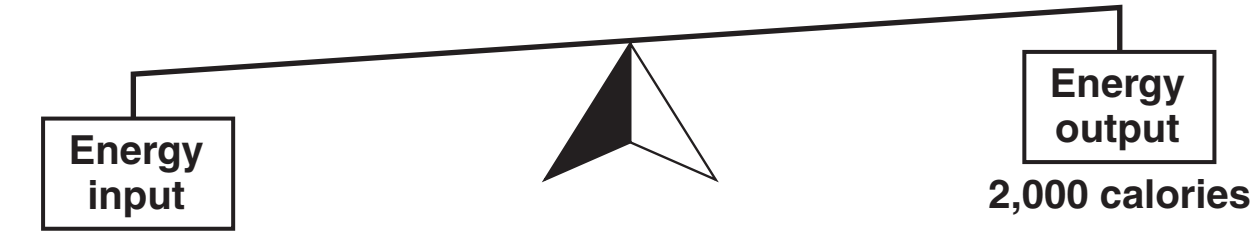
Maintaining an Energy Balance

Energy input = Food

Energy output = Physical activity + Growing + Other body functions

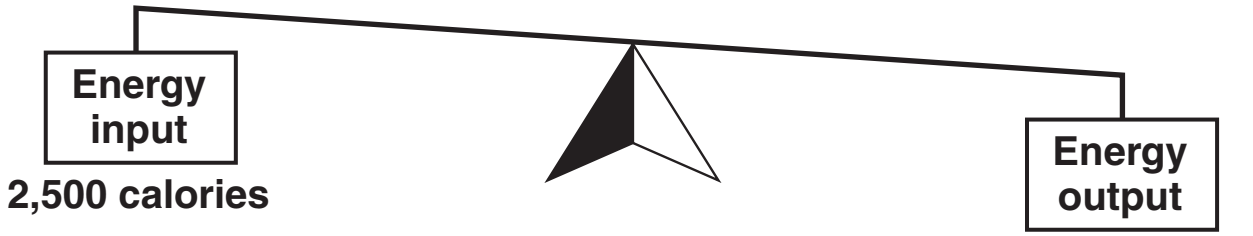
2,500 calories **2,500 calories**

Energy input at recommended levels = Energy output
This maintains a healthy body weight



2,500 calories **2,000 calories**

Energy input > Energy output
Excess energy is stored as fat and weight _____



2,500 calories **3,000 calories**

Energy input < Energy output
Body weight _____

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Choose the word *increases* or *decreases* to complete each of the following sentences.

Watching TV _____ energy output.

Climbing stairs _____ energy output.

Growing _____ energy output.

If physical activity increases and food consumption stays the same, then body weight _____.

Physical Activity Recommendations

- Aim for a total of 60 minutes or more of activity every day.

- Include at least three sessions per week of vigorous physical activity lasting 20 minutes or more. These activities make you sweat and breathe hard.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Overhead Transparency 15.3

What two words can be used to start each of these sentences?

_____ _____ is fun!!!

_____ _____ puts you in a better mood.

_____ _____ helps your heart get stronger.

_____ _____ builds strong muscles and bones.

_____ _____ uses energy which helps you maintain a healthy body weight.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 15.1

What Does Your Day Look Like?

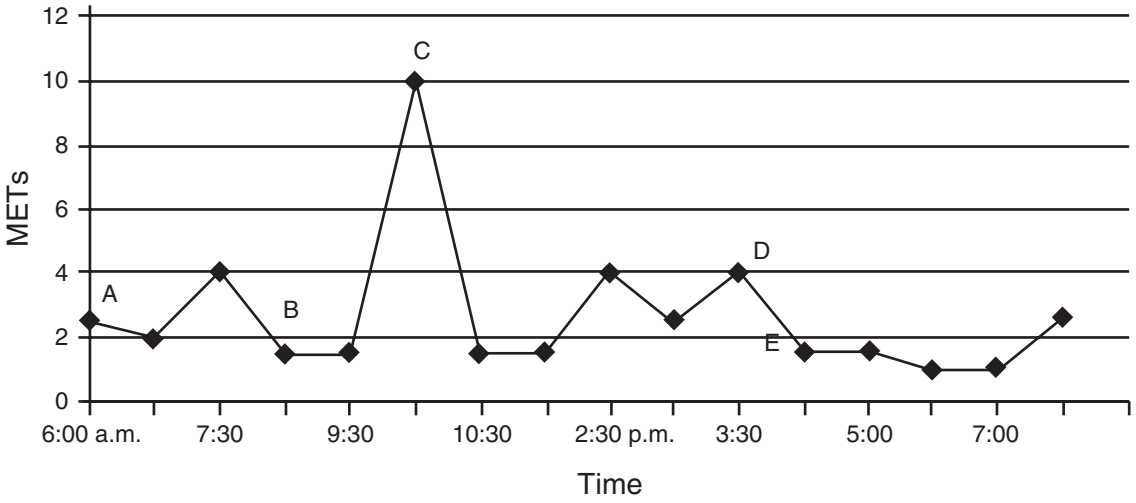
Definition

A MET is a unit used to compare the amount of energy required by different activities to the amount required to sit quietly. Vigorous activities require more energy or METs than less intense activities. Sitting quietly requires 1 MET of energy expenditure. Dancing requires five times as much energy as sitting, or 5 METs of energy expenditure.

Part I: Interpreting Line Graphs

Sometimes a graph is used to describe a series of events. A seventh-grade girl wore an electronic monitor that recorded her activity during a typical school day. Following is a graph illustrating her activity intensity (METs) for the day. When did the events occur? Record the letter that corresponds to each event and the MET value for the activity.

1. The girl listened intently to her teachers.
2. She participated in a soccer game during gym class.
3. She quickly walked to the store for her mother.
4. She got dressed.
5. She watched TV.



Part II: Constructing Coordinate Graphs

What did you do yesterday? In this activity you will make a coordinate graph to illustrate your activity intensity (METs) yesterday. Be as accurate as possible. Complete table 1 as follows:

1. List the event or activity you were engaged in at each of the times listed. If you were involved in more than one activity for a given time interval, list the one activity that took *most* of the interval.
2. Use table 2 to estimate the number of METs you were expending at each time point.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 15.1

What Does Your Day Look Like? *(continued)*

Table 1 What Did You Do Yesterday?

Time	Event	METs	Time	Event	METs
6:00 a.m.			2:00		
6:30			2:30		
7:00			3:00		
7:30			3:30		
8:00			4:00		
8:30			4:30		
9:00			5:00		
9:30			5:30		
10:00			6:00		
10:30			6:30		
11:00			7:00		
11:30			7:30		
12:00 p.m.			8:00		
12:30			8:30		
1:00			9:00		
1:30			9:30		

Table 2 Examples of MET Scores

Inactivity or light activities*		Moderate activities*		Vigorous activities*	
Activity	**METs**	**Activity**	**METs**	**Activity**	**METs**
Sleep	0.9	Walking at a moderate pace (3 mph, or 4.8 km/h)	3.5	Shoveling snow, bicycling (10-12 mph, or 16-19 km/h)	6.0
Watching TV, reading	1.0		4.0		
Sitting in class, eating, doing homework	1.5	Raking, walking at a brisk pace (3.5 mph, or 5.6 km/h), bicycling for pleasure, horseback riding, volleyball (competitive)		Skating, rowing (moderate effort)	7.0
Dressing, grooming, self-care, cooking, washing dishes, straightening up, sweeping, walking at a slow pace (2 mph, or 3.2 km/h)	2.5			Basketball, football, hockey, swimming laps, calisthenics (push-ups, sit-ups), jogging, walking upstairs, tennis, bicycling (12-14 mph, or 19-22 km/h)	8.0
		Dancing, carrying heavy objects, skateboarding, heavy chores, baseball or softball	5.0		
				Soccer	10.0
				Running (8 min mile)	12.5
				Running (6 min mile)	16.0

* MET levels may be higher or lower depending on your effort.

From Ainsworth et al., 2000.

(continued)

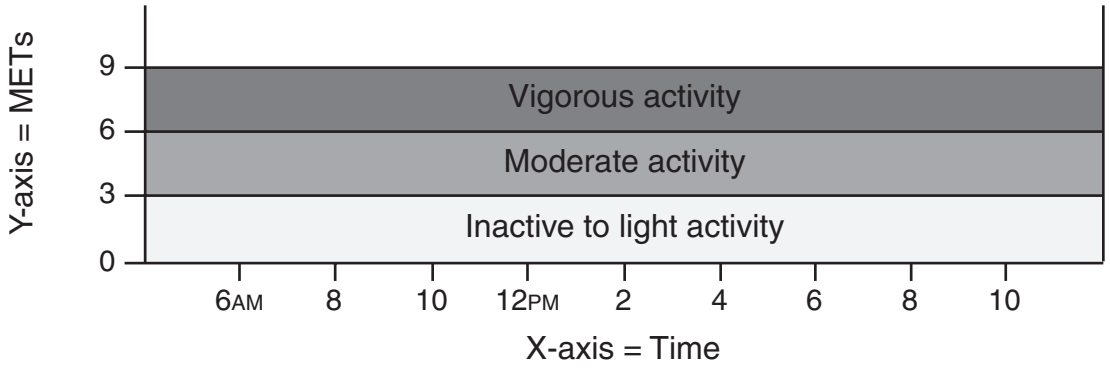
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 15.1

What Does Your Day Look Like? *(continued)*

Use graph paper to make a coordinate graph of your activity.

1. Label the *x*-axis "Time (hours)" and the *y*-axis "MET score."
2. Number both axes as follows: *x*-axis (6 a.m.-10 p.m.); *y*-axis (0-10 or higher).
3. Graph each ordered pair from table 1.
4. Use your ruler to draw a line connecting adjacent data points.
5. Divide the graph into three parts by plotting the lines $y = 3$ and $y = 6$. Label the space above the *y*-axis "Inactive to light activity." Label the space between the lines "Moderate activity." Label the top section "Vigorous activity." See the following figure.



Interpreting Your Activity Patterns

1. During what part of the day were you most active?

2. During what part of the day were you least active?

3. Use the graph to estimate how much time you spent doing the following:

   Moderate activity _____

   Vigorous activity _____

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

What Does Your Day Look Like? *(continued)*

Discussion Questions

1. What fun things could you do to break up the periods of inactivity?

2. What lifestyle changes could you make to increase the amount of energy you expend doing moderate physical activity? (For example: Take the stairs instead of the elevator.)

3. What are the benefits of a very active lifestyle?

4. What are the health risks of a sedentary lifestyle?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 16

Survey the Class

Activity Theme

In this lesson students assess the amount of time they spend being physically active and use this information to practice calculating means, medians, and ranges. They then pool their results to develop statistics for groups of students. This lesson is designed to infuse information about the health benefits of physical activity into a classroom unit on basic statistics.

Behavioral Objective

For students to be physically active every day

Learning Objectives

Students will be able to do the following:

1. Review and characterize the types and frequency of physical activity for individuals and small groups
2. Calculate statistics and apply basic concepts of statistical analysis to survey data

Materials

- Activity 16.1, Personal Data Record
- Activity 16.2, Group Data Record
- Activity 16.3, Analyzing Class Data

Procedure

1. (3-5 minutes) Discuss the importance of physical activity and its benefits. Give examples of physical activity (e.g., walking, basketball, cleaning).
2. (3-5 minutes) Discuss population surveys and how they are used to describe the opinions or behaviors of a total population (e.g., political polls, diet and activity surveys). Review specific math terms, such as *mean, mode,* and *range.*

3. (8-10 minutes) Distribute and review activity 16.1, Personal Data Record. This activity asks students to record (a) physical activities that they have done over the past seven days and (b) the amount of time (in hours) that they have spent doing these activities over the past seven days. Have students complete activity 16.1. While students are working on activity 16.1, pass out activity 16.3, Analyzing Class Data. Have students complete the questions under Personal Data.
4. (10-15 minutes) Distribute and review activity 16.2, Group Data Record, which summarizes data for the group. Divide the class into several groups with approximately four students per group. Using activity 16.2, tally data from the group and answer questions under Group Data on activity 16.3.
5. (5-8 minutes) Select a student representative from each group to describe the group's findings. You may assist by charting the groups' findings (using the chart from activity 16.2) to summarize the findings of the entire class.
6. (5-8 minutes) Compare the class findings with the recommended daily physical activity hours for the appropriate age group (see *Planet Health*'s Activity Message in Teacher Resources). Students may also be interested in comparing individual physical activity hours with recommendations. Are students moderately active every day for *at least* 60 minutes? Do they engage in vigorous activity at least three times per week for 20 minutes or more?

   (Note: If you cannot photocopy worksheets, you can help students set up tables in their notebooks. Provide a sample on the board.)

Extension Activity

Have students review activity 16.1, Personal Data Record, and write a data report. The report should consist of one paragraph that describes their personal activity choices and time spent being active over the past seven days. They should incorporate answers from questions 1 through 4 from activity 16.3 in their reports.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix B)
- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)
- *Planet Health* FitCheck sheets (see pages 466-469)

SPECIFIC BACKGROUND MATERIAL

Planet Health's *Activity Message*

Physical activity promotes health and well-being and offers opportunities to socialize and have fun. Adolescents should strive to be moderately to vigorously active for at least 60 minutes every day or nearly every day as part of play, games, sports, chores, transportation, and planned exercise. Moderate activities are equal in intensity to brisk walking and include bicycling for pleasure, playing volleyball, dancing, or skateboarding. As part of this, students should participate in at least three sessions per week of vigorous physical activity lasting 20 minutes or more. Vigorous activities are greater in intensity to brisk walking, and they make you breathe hard and sweat. Examples of vigorous activity are jogging, soccer, basketball, and shoveling snow.

Planet Health's *FitCheck*

If physical education teachers in your school are teaching *Planet Health,* they are using these sheets to help students track the amount of time they spend in moderately intense physical activities, vigorously intense physical activities, and inactivity. In addition, PE teachers are delivering five-minute *Planet Health* microunits on physical fitness themes, so your students should be familiar with our activity message. FitCheck is the source of the activity list used in the survey in this lesson. It, too, should be familiar to students.

Name _____

Activity 16.1

Personal Data Record

In this table, record the physical activities that you have performed over the past seven days.

1. Under column 1, list the activities you have done over the past seven days. Use the FitScore Activities list to help you remember.
2. Under columns 2-8, note how many hours you have spent doing each activity for each day that week.
3. When you are finished, sum the total time for each activity under column 9 and complete the row labeled "Total activity for the week."
4. Use these data to answer questions on activity 16.3, Analyzing Class Data.

	Hours spent per day							
Physical activity	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day 6**	**Day 7**	**Total time**
Example: swimming	*1/2 hour*			*1/2 hour*				*1 hour*
Total activity time for the week								

FitScore Activities

Shoveling snow
Raking leaves
Cleaning
Vacuuming
Running
Doing sit-ups
Jumping rope
Weightlifting
Playing tag
Skiing
Sledding
Skateboarding
Playing soccer
Swimming
Playing hockey
Playing basketball
Walking
Riding a bike
In-line skating
Climbing stairs

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 16.2

Group Data Record

Use activity 16.1 to complete the following chart.

1. Under column 1, list the activities that each student has done over the past seven days. List each activity once.
2. Under columns 2-5, write the number of hours that students in your group spent doing each physical activity over the past seven days.
3. Sum the "Total time spent by group" for each activity listed.
4. Complete the row at the bottom of the chart labeled "Total time group spent active over the past seven days" by summing the totals in the column "Total time spent by group on each activity."

	Hours spent per week				
Physical activity	**Student 1**	**Student 2**	**Student 3**	**Student 4**	**Total time spent by group**
Example: swimming	*2*	*1*	*1/2*	*0*	*3.5 hours*
Total time the group spent active over the past seven days					

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 16.3

Analyzing Class Data

Personal Data (From Activity 16.1)

Use the back of this sheet for scratch paper.

1. Rank the three physical activities that you spent the most time doing:

   Highest time 1. _____

   Second-highest time 2. _____

   Third-highest time 3. _____

2. What percentage of your total physical activity time did you spend on each one? (Time spent on activity / total activity time $\times$ 100 = % of total activity time.)

   Example: 5 hr walking / 10 hr of total activity = 0.50 $\times$ 100 = 50% of activity time was spent walking.

3. What is the mean number of hours you spent doing physical activity per day? (Mean = total activity time / 7 days per week.) Does this answer surprise you? In what way?

   Example: 10 hr of total activity / 7 = 1.43 hours per day spent on physical activity.

4. Review your physical activity list. Is there one activity that you did on more days than you did any other activity? (Example: If you walked every day for half an hour and you swam four days a week for an hour, the answer would be walking.) The answer to that question is also called the mode (most commonly occurring response).

5. What was the range in hours spent in individual physical activities over the past seven days?

Group Data (From Activity 16.2)

6. What is the total number of hours that the group participated in physical activity?

7. What is the mean number of hours the group spent doing physical activity per day? (See the formula from question 3.)

8. What is the mean number of hours each person spent being active in the last seven days? (Mean = total active time (for group) / total number in group.)

9. Rank the three physical activities the group spent the most time doing:

   Highest time 1. _____

   Second-highest time 2. _____

   Third-highest time 3. _____

10. What percentage of their time did the group spend doing each physical activity? Compute this for the three activities listed in number 9. (See the formula for determining the percentage in question 2.)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 17

Circle Graphs: Where Did the Day Go?

Lifestyle Theme

Students make circle graphs to illustrate the proportion of their day they spend doing vigorous, moderate, and light activities (or inactivity). This lesson is designed to help students become aware of the time they spend being inactive and to encourage them to make lifestyle changes that will increase their activity.

Constructing circle graphs will provide a review of the following math skills: expressing time as fractions of an hour, converting percentages to decimals, and calculating central angles and percentages. An alternative activity for less advanced math students is included. It provides students with a circle graph that has been divided into 24 sections. They must express their activities as fractions of a 24-hour day and shade the circle graph accordingly. This lesson may take one and a half periods, depending on the skill level of the students.

Behavioral Objective

For students to be more aware of the amount of time they spend being inactive (particularly television viewing time) and to be more active

Learning Objectives

Students will be able to do the following:

1. Construct a circle graph
2. Report time as fractions of an hour, calculate percentages, and convert fractions to decimals
3. Calculate central angles (advanced version of the activity only)
4. Draw inferences with tables and graphs that summarize personal activity data

5. Discuss the benefits of a more active lifestyle
6. Describe the physical activity recommendations for adolescents

Materials

- Copies of worksheets for activity 17.1, *or* activity 17.2, Where Did the Day Go?
- Five pieces of large paper or five overhead transparencies
- Calculator recommended
- Compass, protractor, plain paper (activity 17.1 only), colored pencils or crayons
- *Optional:* Overhead transparencies of activities 17.1 and 17.2

Procedure

1. (10 minutes) To introduce the activity, have students complete a carousel brainstorming activity as described here. Write each of the following questions on the top of a different piece of large paper or overhead transparency. Spread the papers or transparencies out around the room.
   - What changes in society have brought about a decrease in daily physical activity? Think about how your life is different from that of your grandparents.
   - How much time do you think kids your age spend watching TV? List some fun activities that you can do in place of watching TV.
   - What are the risks of an inactive lifestyle?
   - What are the benefits of an active lifestyle?
   - How much activity do you think you should do to be healthy and fit?
2. Divide the class into five groups. Assign each group to one of the preceding questions. Give them a minute and a half to write their group's response to the question on the paper; then have the groups move to another question. Continue the process until each group has had the opportunity to respond to all five questions. It is important that you give the signal to move at precisely the allotted amount of time so that students do not waste time chatting. Incomplete answers are OK. The idea is to get them thinking. You also might consider giving each group a different color marker so you can track group responses. Requiring each person in the group to take a turn being the recorder is a good way to ensure that everyone participates. (See Teacher Resources for answers to these questions.)
3. (5 minutes) Display and discuss student answers to each of the questions, filling in gaps in student knowledge where necessary.
4. (1-2 minutes) Point out the goals of the math lesson:
   - To think about how much of their day they spend being inactive and how they might be more active.
   - To make a circle graph to illustrate what portion of the day they spend being active and inactive.
   - To apply and review math skills they have already learned (representing time as fractions of an hour, multiplying and adding fractions, converting fractions to decimals, calculating percentages and central angles). (The skills needed for this activity vary depending on which version of the activity you have students do.)
5. Hand out worksheets for activity 17.1 *or* activity 17.2. (Activity 17.1 is appropriate for students who have learned or are learning how to make circle graphs. Activity 17.2 is appropriate for less advanced math students. It does not require students to construct the circle graph. They will shade in an already prepared graph.) The

activities ask students to estimate the amount of time they spent yesterday doing different things. If you are doing this lesson on a Monday, you may want to replace *yesterday* with *last Friday* or *on a typical school day.*

6. (3 minutes) *Optional:* Use a blank overhead transparency to work through one example of estimating time and the math calculations. You may need to remind students that 1/4 = 0.25, 1/2 = 0.5, and 3/4 = 0.75.
7. (40 minutes for activity 17.1; 30 minutes for activity 17.2) Have students complete activity 17.1 or activity 17.2 and construct or shade in the circle graph, respectively. You may want to display as an overhead transparency the example of a labeled and shaded circle graph included in activity 17.2. (Note: The directions for labeling the circle graph are slightly different on the two versions of the worksheets.) Using calculators will decrease the amount of time needed for this activity.
8. (5 minutes) Have students get into groups of three or four to discuss their conclusions and share their circle graphs.

Extension Activities

Have students interview an adult in their families to determine how he or she spends the day. Have students construct circle graphs to illustrate their findings. Have them write reports that compare and contrast their own activity and inactivity percentages with those of the adults they interviewed.

You may shorten the amount of class time spent on this activity by having students complete their circle graphs and conclusions for homework.

Teacher Resources

GENERAL BACKGROUND MATERIALS

In preparing for this lesson, you may want to refer to the following resources:

- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)
- Gortmaker et al., "Television Viewing as a Cause of Increasing Obesity Among Children in the United States, 1986-1990" (see appendix C)
- Henry J. Kaiser Family Foundation, *Generation M: Media in the Lives of 8- to 18-Year-Olds* (see appendix C)
- Sallis, J.F., and Patrick, K. 1994. Physical activity guidelines for adolescents: Consensus statement. *Pediatric Exercise Science* 6: 302-314.
- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix B)

SPECIFIC BACKGROUND MATERIAL

What changes in society have brought about a decrease in daily physical activity?

In the latter part of the 20th century, there was a dramatic reduction in the amount of physical activity performed in daily life. The growth of the economy resulted in a dramatic increase in the number of sedentary, white-collar jobs and a decrease in blue-collar and farming jobs that required physical work. Modern appliances, machinery, and motorized transportation have decreased the amount of activity required to complete household chores and work-related tasks. The growing contribution of technology to inactivity during leisure time has also been enormous, with computers, video, and TV

being the major factors. The Internet, CD-ROMs, and continued expansion of the TV channel market will help these trends continue.

How much time do adolescents spend watching TV?

According to a recent Henry J. Kaiser Family Foundation study (2005), American children spend more time watching TV than they do engaging in any other activity except sleeping. In 2005 the average adolescent viewed approximately 21 hours per week, but that number jumps to 28 hours when you include videos, DVDs, and prerecorded shows. This is nearly as much time as is spent in school. Add to this one hour a day of computer use (outside of schoolwork), about one hour (50 minutes) a day of video games, and 45 minutes a day of non-school-related reading. Altogether youth pack about eight and a half hours of medium content into about six and a half hours of time by using more than one medium at a time. Essentially, for many children media consumption has become a full-time job! The American Academy of Pediatrics recommends limiting TV viewing to no more than two hours per day.

What are the risks of a sedentary lifestyle?

Activity is required for health. Studies suggest that physically active people enjoy lower risks of developing heart disease, diabetes, colon cancer, osteoporosis, anxiety, and depression relative to sedentary people. Sedentary habits increase the risk of death from these diseases. Television viewing is one of the major causes of overweight among youth. TV watching also has been associated with elevated cholesterol levels, cigarette smoking, and lower cardiorespiratory fitness.

What are the benefits of a more active lifestyle?

Activity helps children develop and retain cardiorespiratory fitness, muscular strength, and confidence in their physical ability. Regular activity helps people maintain a healthy weight, build lean muscle, and reduce fat. It can reduce stress and brighten a person's mood. Regular exercise helps build and maintain dense bones, which helps prevent osteoporosis. Active adults have a lower risk of dying prematurely and developing diabetes, high blood pressure, and colon cancer.

What are the alternatives to TV viewing?

Anything that involves movement! Limiting TV time can ensure that children do other activities that involve more physical activity. Also, you don't have to sit still while you watch TV—you can be dancing, cleaning, cooking, and so on. One easy way to cut down on TV time is to take the TV out of the room where you sleep. If you don't want to physically remove it, just unplug it. Watch TV only when your favorite show is on.

How much activity is needed to obtain health-related benefits?

Moderate amounts of activity are recommended for people of all ages. However, physical activity need not be strenuous to be beneficial. Just a small increase in physical activity can generate genuine health benefits, such as a reduction of body weight and the risk of heart attack, hypertension, and death. Sixty minutes or more of moderately intense activity, such as walking, is beneficial for your health. Regular vigorous activity, however, is the best way to improve cardiorespiratory fitness.

How much activity is needed for fitness?

How long, how hard, and how often you are active will determine how fit you are! To be fit, you must work on your cardiorespiratory (aerobic) endurance, muscular strength

(anaerobic fitness), and flexibility. Do strength training two or three times per week. Stretch and do cardiorespiratory training at least three times per week for at least 20 minutes. You can improve fitness by increasing the frequency (if you are not already exercising regularly), increasing the intensity (doing something faster, doing more repetitions or sets, or using heavier weights), or increasing the time you spend on each exercise. You might choose more types of exercise to do!

What are some examples of things you can do to increase your activity and decrease your inactivity?

Take the stairs; don't park next to the building; walk or ride your bike to school if there is a safe route; walk around the mall or the neighborhood with friends; watch only your favorite TV shows; remove or unplug the TV in your bedroom; play catch with a sibling, a friend, or a parent.

REFERENCE

Henry J. Kaiser Family Foundation. 2005. *Generation M: Media in the lives of 8- to 18-year-olds.* A Kaiser Family Foundation Study, www.kff.org.

Name _____

Activity 17.1

Where Did the Day Go?

Part I: Data Collection

This activity will help you construct a circle graph to illustrate how much time you spent in a variety of activities over one day. A circle graph is used to compare parts of a whole. To begin, complete table 1 as follows:

1. Estimate the time you spend on a typical weekday doing each of the activities listed in column 1. Express your time estimates in hours or fractions of an hour rounded to the nearest quarter hour (example: eating = 1 1/4 hr). In the blank spaces at the bottom of column 1, write in other activities that you are involved in that are not included on the list.
2. Convert your time estimates to decimals and record your answers in column 3 (example: 1 1/4 hr = 1.25 hr).
3. Sum column 3. If the sum is less than 24 hours, calculate the difference and put it in the row labeled "Other activities." If the sum is greater than 24 hours, reconsider the accuracy of your time estimates.
4. Express the time spent in each activity as a ratio of your total day and place this fraction (or decimal) in column 4 (example: eating = 1.25 hr / 24 hr = .05).
5. Calculate the percentage of your day that you spent doing each activity. Multiply the ratio by 100 (example: .05 × 100 = 5%). Enter your answer in column 5.
6. To make a circle graph, you must now figure out the central angle for each activity. Multiply the ratio (decimal) in column 5 by 360° and put the number in column 6 (example: 0.05 × 360° = 18°).

Table 1

1	2	3	4	5	6
Activity	**Time (hr) fraction**	**Time (hr) decimal**	**Ratio (× hr / 24 hr)**	**Percentage (%)**	**Central angle (°)**
Example: eating	*1 1/4 hr*	*1.25 hr*	*1.25 / 24 = .05*	*.05 × 100 = 5%*	*.05 × 360° = 18°*
Sleeping					
Working at a job					
Watching TV					
Eating					
Listening to your teachers					

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Where Did the Day Go? *(continued)*

1	2	3	4	5	6
Activity	**Time (hr) fraction**	**Time (hr) decimal**	**Ratio (× hr / 24 hr)**	**Percentage (%)**	**Central angle (°)**
Talking on the phone					
Playing computer games					
Hanging out with friends					
Doing homework					
Walking					
Playing a sport					
Household chores					
Showering, dressing					
Other activities:					
	Total				

Part II: Classification

Calculate what portion of your day is devoted to inactivity, light activity, moderate activity, and vigorous activity by doing the following:

1. Use table 2 to help you classify your activities as inactivity or light, moderate, or vigorous activity.
2. Write the activities in the appropriate column in table 3. Don't include activities that you spend zero time doing on a typical day (example: If household chores = 0 hr, don't record in table 3). Also, record the percentages and central angles you calculated in table 1.
3. Total the percentages and the central angles for each activity category.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Where Did the Day Go? *(continued)*

Table 2

Inactivity	Lying down, sleeping, sitting, reading, watching TV, eating, listening to music
Light activity	Dressing, grooming, washing dishes, cooking, making beds
Moderate activity	Walking, carrying heavy objects, raking leaves, skating, bicycling, skateboarding, baseball or softball, dancing, climbing stairs
Vigorous activity	Running, swimming, basketball, football, tennis, fast bicycling, hockey, soccer, in-line skating, weightlifting

Table 3

Inactivity/light activity			**Moderate activity**			**Vigorous activity**		
Activity	**%**	**Central angle**	**Activity**	**%**	**Central angle**	**Activity**	**%**	**Central angle**
Example: eating	*5*	*18°*						
Total			**Total**			**Total**		

Part III: Construction

1. Use a compass to draw a circle large enough to write in. Mark the center with a dot.
2. Use a protractor to draw the central angle for each activity. Place all the events from a given activity category next to each other in the circle.
3. Put the name and percentage of each activity on or next to the corresponding section of the circle graph.
4. Choose a different color to represent each of the three activity categories. Make a legend next to the circle graph to indicate which color represents each category. Shade the circle to illustrate what portion of your day is spent being inactive and doing moderate and vigorous activities.
5. During what percentage of your day are you having fun? Draw diagonal lines through the sections of the circle that represent the activities you enjoy.

Part IV: Conclusion

Use the analysis from part III to write a paragraph describing your findings. Include one or two sentences that describe the amount of time you spent being inactive and doing light, moderate, and vigorous activities. Include one to three sentences describing ways to decrease the amount of time you are inactive and increase the amount of fun moderate and vigorous activities you do.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 17.2

Where Did the Day Go?

Part I: Data Collection

How much of your day do you spend being active? Sitting around? Having fun? Watching TV? Talking on the phone? The following activity will help you answer these questions. You will complete a circle graph to illustrate your findings. A circle graph is used to compare parts of a whole. To begin, complete table 1 as follows:

1. Estimate the time you spend on a typical weekday doing each of the activities listed in column 1. Express your time estimates in hours or fractions of an hour rounded to the nearest quarter hour (example: eating = 1 1/4 hour). In the blank spaces at the bottom of column 1, write in other activities that you are involved in that are not included on the list.
2. Convert your time estimates to decimals and record your answers in column 3 (example: 1 1/4 = 1.25).
3. Sum column 3. If the sum is less than 24 hours, calculate the difference and put it in the row labeled "Other activities." If the sum is greater than 24 hours, reconsider the accuracy of your time estimates.
4. Express the time spent in each activity as a ratio of your total day and convert to a decimal. Place this decimal in column 4 (example: 1.25 hr / 24 hr = .05).
5. Calculate the percentage of your day that you spent doing each activity. Multiply the ratio by 100 (example: .05 × 100 = 5%). Enter your answer in column 5.

Table 1

1	2	3	4	5
Activity	**Time (hr) fraction**	**Time (hr) decimal**	**Ratio (× hr / 24 hr)**	**Percentage (%)**
Example: eating	*1 1/4 hr*	*1.25 hr*	*1.25 / 24 = .05*	*.05 × 100 = 5%*
Sleeping				
Working at a job				
Watching TV				
Eating				
Listening to your teachers				
Talking on the phone				
Playing computer games				

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Where Did the Day Go? *(continued)*

1	2	3	4	5
Activity	**Time (hr) fraction**	**Time (hr) decimal**	**Ratio (× hr / 24 hr)**	**Percentage (%)**
Hanging out with friends				
Doing homework				
Walking				
Playing a sport				
Household chores				
Showering, dressing				
Other activities:				
	Total			

Part II: Classification

Calculate what portion of your day is devoted to inactivity, light activity, moderate activity, and vigorous activity by doing the following:

1. Use table 2 to help you classify your activities as inactivity or light, moderate, or vigorous activity.
2. Write the activities in the appropriate column in table 3. Don't include activities that you spend zero time doing on a typical day (example: if household chores = 0 hr, don't record in table 3). Also, record the percentage and time (fraction) you calculated in table 1.
3. Total the time and percentages for each activity category.

Table 2

Inactivity	Lying down, sleeping, sitting, reading, watching TV, eating, listening to music
Light activity	Dressing, grooming, washing dishes, cooking, making beds
Moderate activity	Walking, carrying heavy objects, raking leaves, skating, bicycling, skateboarding, baseball or softball, dancing, climbing stairs
Vigorous activity	Running, swimming, basketball, football, tennis, fast bicycling, hockey, soccer, in-line skating, weightlifting

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 17.2

Where Did the Day Go? *(continued)*

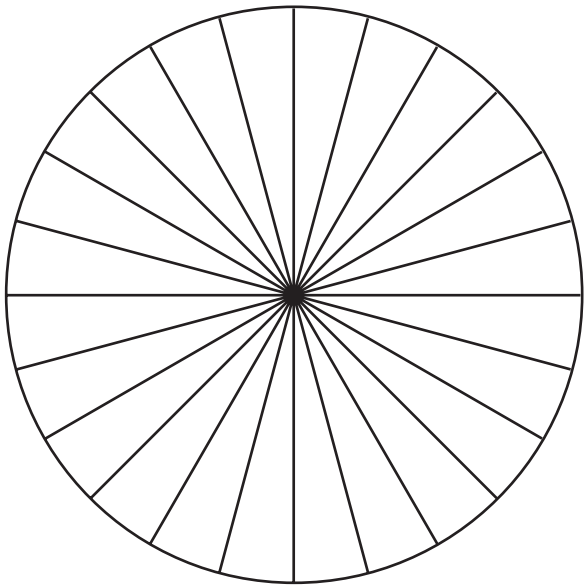
Table 3

Inactivity/light activity		Moderate activity		Vigorous activity	
Activity	**%**	**Activity**	**%**	**Activity**	**%**
Example: eating	5				
Total				**Total**	

Part III: Graphing

Shade in the circle graph as follows:

1. Each section of the circle represents one hour. Assign each activity a color. Shade in the portion of the circle that most accurately represents the amount of time you spent doing each activity. Place all the events from a given activity category (inactivity, light activity, moderate activity, vigorous activity) next to each other in the circle.
2. Put each activity's name and percentage on or next to the corresponding section of the circle graph.
3. Assign each of the activity categories a color. Outline the portion of the circle that represents each category with the assigned color. Make a legend next to the circle graph to indicate which color represents each category. Write the total percentage of time spent doing each activity category in the legend.



4. During what percentage of your day are you having fun? Draw diagonal lines through the sections of the circle that represent the activities you enjoy.

Part IV: Conclusion

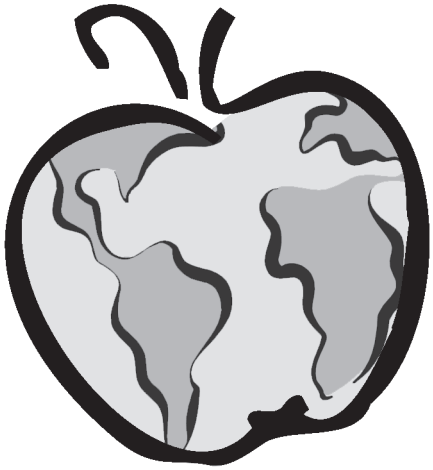
Write a paragraph describing your findings. Include one or two sentences that describe the amount of time you spend being inactive and doing light, moderate, and vigorous activities. Include one to three sentences that describe ways to decrease the amount of time you are inactive and increase the amount of fun moderate and vigorous activities you do.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 18

Energy Equations

Lifestyle Theme



In this lesson, students learn that fat is one of our major sources of calories from food (protein and carbohydrate are the others). They learn that these macronutrients should be present in their diets in certain proportions on average. Students also learn that physical activity increases energy requirements, but the required proportions of fat, protein, and carbohydrate remain unchanged except at very high activity levels.

Through individual work and group discussion, students use addition, multiplication, and division to calculate averages, derive data for graphing, and figure out unknown variables for percentages of fat, protein, and carbohydrate.

This lesson is designed to infuse information about the relationship between physical activity and calorie intake into classroom work using pre-algebra-level skills.

Behavioral Objective

For students to be physically active and to balance their energy needs with their activity demands

Learning Objectives

Students will be able to do the following:

1. State that energy intake needs to increase with increasing activity
2. State the dietary recommendations for protein, carbohydrate, and fat, and recognize that these percentages are the same at any calorie level
3. Derive means and graph data

Materials

- Overhead transparency 15.1 (page 209)
- Overhead transparency 15.2 (page 210)
- Activity 18.1, Calculating Intake

Procedure

1. (5-10 minutes) Explain the following:
   - The human body requires energy for physical activity, growth, digestion, respiration, and many other body functions.
   - A person's energy needs increase with increasing amounts of activity (example: If you play outside all afternoon, your body uses more energy than if you watch TV for the same amount of time). (See Teacher Resources for additional review material on diet and activity.)
2. Use overhead transparency 15.1 (page 209) to explain the concept of energy balance and the role physical activity plays in maintaining a healthy body weight. Elicit student responses to fill in the blanks on the transparency. Test their understanding of your explanation by asking selected students to complete the sentences on overhead transparency 15.2 (page 210).
3. (5 minutes) Once students understand the concept of energy balance, explain the following:
   - Food provides us with energy (or calories) in the form of carbohydrate, fat, and protein. These energy-containing nutrients are referred to as macronutrients, and all foods are made from them in varying amounts.
   - Dietary fat should constitute a range of 25 to 35 percent of daily calories for young people between the ages of 4 and 18.
   - About 10 to 35 percent of calories should come from protein, and the remaining 45 to 65 percent should come from carbohydrate.
4. (5 minutes) Distribute activity 18.1, Calculating Intake, and discuss table 1, Your Average Daily Macronutrient Intake. The activity requires students to review and evaluate their imaginary food intake over four days. They will do the following:
   - Calculate the average percent of total daily calories consumed as carbohydrate, protein, and fat and graph these results
   - Calculate the number of calories consumed daily as carbohydrate, protein, and fat
   - Evaluate their imaginary food choices and make suggestions for improving their diet
5. (30-40 minutes) Be available for individual assistance while students complete the worksheet. To save time, you may want to have students work in teams of two or three.
6. (5-10 minutes) Review the worksheet with the class (see Teacher Resources). As you review the answers to questions 2 and 3 in part I of the activity, discuss with students the importance of paying particular attention to the amount of saturated and trans fat in the foods they eat, because eating too much of this fat increases the risk of developing heart disease. Experts recommend getting no more than 10 percent of daily calories from saturated fat and avoiding trans fat. Replacing saturated fat and trans fat with unsaturated fat can help decrease the risk of developing heart disease and possibly type 2 diabetes. (See Teacher Resources for a discussion of the different types of fat and the foods that contain them.) Also, point out the importance of including plenty of whole grain foods, fruits, and vegetables in their daily meals, because these foods are generally high in fiber as well as other complex carbohydrate, vitamins, and minerals. Eating plenty of fiber decreases the risk of developing heart disease, diabetes, and certain cancers.

Extension Activity

Ask students to use table 2 in activity 18.1 to calculate the number of calories that would come from saturated fat on each of the four days, assuming they consumed the recommended upper limit of 10 percent.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)
- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix B)
- U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans* (see appendix A)

SPECIFIC BACKGROUND MATERIAL

Planet Health*'s Activity Message*

Physical activity promotes health and well-being and offers opportunities to socialize and have fun. Adolescents should strive to be moderately to vigorously active for at least 60 minutes every day as part of play, games, sports, chores, transportation, and planned exercise. This should include at least three sessions per week of vigorous physical activity lasting 20 minutes or more. Adolescents should aim for a total of 60 minutes or more of activity on five to seven days a week.

Calorie Requirements and Dietary Sources of Energy

People have different calorie requirements depending on age, sex, and activity level. The Institute of Medicine's *Dietary Reference Intakes* (2002) notes that girls 11 to 14 years old need 2,000 calories per day, whereas boys this age need 2,400, assuming moderate levels of activity. These are averages that can vary from day to day. They also vary according to a person's activity level and size. Compared to her peers who don't exercise, an athletic adolescent girl may need an additional 300 to 1,000 calories, and an athletic adolescent boy may need an additional 600 to 1,500 calories per day! These active teens are using their energy stores at a faster rate than inactive teens are. Conversely, an adolescent with a very sedentary lifestyle may require about 300 calories less each day to maintain energy balance.

Serving Requirements

The U.S. *Dietary Guidelines* remind us to eat a certain number of servings from each of the five major food groups each day. People with higher energy needs require more servings than do less active people to get all the calories they need. For example, teenage boys on average need about 2,400 calories per day versus 2,000 for girls. To make up this difference, teenage boys are advised to eat a higher number of servings from the five major food groups than teenage girls eat. The extra calories should come from a healthy balance of foods, maintaining the balance of fat, carbohydrate, and protein. An active adolescent girl also needs more calories than her less active peers, so she also should get them by increasing overall consumption, not by filling up on snacks that are high in unhealthy fat and sugar. Extremely active athletes who consistently need lots of extra calories (e.g., those engaged in sports practices or games five to seven days per week) should look to complex carbohydrate in the form of grains, fruits, and vegetables, and lean sources of protein, to take up the slack.

Some daily dietary variation in energy and food intake is normal. Exercise helps regulate appetite. Your body will need more energy and will tell you by feeling hungrier! You should be sure to respond to those cues and try to do so with healthy choices.

Dietary Recommendations for Fat, Protein, and Carbohydrate

Dietary fat provides 9 calories per gram. Fat is important for cell structure, transporting fat-soluble vitamins (A, D, E, and K), storing energy, and insulating our bodies. It's important to note that calories from any source—protein, carbohydrate, fat, or alcohol—are stored as body fat when intake exceeds expenditure.

The fat in foods contains a mixture of saturated and unsaturated (monounsaturated and polyunsaturated) fatty acids, commonly called fat. Many animal products, such as fatty meat, whole milk, butter, and lard, are high in saturated fat. This kind of fat is typically solid at room temperature. Eating too much saturated fat increases your risk for developing heart disease. Therefore, the U.S. *Dietary Guidelines* recommend eating a diet low in saturated fat (less than 10 percent of calories). Most of the fat you eat should be unsaturated, because substituting this type of fat for saturated fat in your diet decreases your risk of developing heart disease. Most plant fat, or oil, is unsaturated fats and is generally liquid at room temperature. Vegetable oils, such as olive, canola, corn, and peanut oils; most nuts; olives; and avocados are good sources of unsaturated fat. Some fish, such as salmon, mackerel, and tuna, are also high in a polyunsaturated fat—omega-3 fatty acid—that may protect you against heart disease. Nutrition experts recommend that you eat fish twice a week to maximize the health benefits.

There are exceptions to the rule. Not all plant fat is healthy. Through a commercial process called hydrogenation, the healthier plant oils can be converted into solids called trans fat (also called partially hydrogenated vegetable oils). This is how some margarines are made. Not surprisingly, foods high in trans fat have been found to also increase the risk of heart disease. To avoid trans fat, check the ingredients list on packaged foods such as cookies and crackers for partially hydrogenated vegetable oil. Also look out for coconut oil and palm oil because these plant oils are naturally high in saturated fat.

Populations with higher saturated fat intakes have higher rates of chronic disease, particularly heart disease, relative to populations with lower intakes. Americans typically get about 11.2 percent of their calories from saturated fat, exceeding recommendations for no more than 10 percent saturated fat.

It is easy to calculate the daily allowance of dietary fat for an adolescent girl who needs a total of 2,000 calories per day. Her total fat allowance is about 30 percent of 2,000 total calories (the midrange of 25 to 35 percent) or

$$0.30 \times 2{,}000 = 600 \text{ calories per day.}$$

Fat contains 9 calories per gram, so to figure her fat allowance in grams,

$$600 / 9 = 67 \text{ grams of fat per day.}$$

Her saturated fat allowance is 10 percent of 2,000 calories, or

$$0.10 \times 2{,}000 = 200 \text{ calories per day.}$$

Note that this is part of her total fat allowance. Fat contains 9 calories per gram, so to figure her saturated fat allowance in grams,

$$200 \text{ calories} / 9 \text{ calories per gram} = 22 \text{ grams.}$$

You can find out the amount of total fat and saturated fat in a product by looking at the food label. Because nutrition labels round numbers to the nearest 5 grams, the recommended total number of fat grams for a 2,000-calorie diet is 65, and the recommended number of saturated fat grams is 20. This is the reference amount for the "daily value" on a product.

Protein provides 4 calories per gram. Protein is essential to growth and to building and repairing cells, making enzymes and hormones, and so on. Protein is produced by cells. Dietary protein needs vary over the life span. Generally expressed in terms of grams needed per kilogram of body weight (g/kg), protein needs are highest during infancy, at about 1.5 g/kg, and decline to 0.8 g/kg in adulthood. Adolescents need about 1 g/kg each day.

Experts recommend that 10 to 35 percent of daily calories should come from protein. During a growth spurt, adolescents may require more calories from protein. However, they should consult with their pediatricians before increasing their protein consumption. Americans rarely have diets deficient in this nutrient.

Lean meats and low-fat dairy products are excellent sources of protein. Dried beans and peas (such as pinto beans, black-eyed peas, and canned baked beans) and nuts are also good sources. Eating the recommended servings of the meat group (two or three servings) and the dairy group (three or four servings) every day will provide you with adequate protein.

An adolescent boy who needs 2,400 total calories per day needs a minimum of 240 calories from protein each day, or 60 grams. Food labels list protein grams per serving.

Carbohydrate provides 4 calories per gram. Carbohydrate is our major source of energy and includes simple carbohydrate (sugar) and complex carbohydrate (starch and fiber). A range of 45 to 65 percent of calories should come from carbohydrate. For an adolescent boy eating 2,400 calories per day, carbohydrate intake would be as much as 390 grams (65 percent of calories at 4 calories per gram). Grams of total carbohydrate per serving are listed on food labels.

Grains (especially whole grains), vegetables, and fruits are excellent sources of complex carbohydrate and naturally occurring sugars and are the foundation of a healthy diet. Eat six or more servings of grain products daily with at least three being whole grain varieties. Eat five or more servings of fruits and vegetables daily. Be sure to choose a variety of foods within these groups. This will help you get the nutrients and fiber you need. Go easy on sweet foods such as soda, cookies, and candy. They provide carbohydrate but are usually low in vitamins and minerals and can be high in saturated and trans fat.

Beverages are often forgotten as a source of calories and nutrients. One of the most dramatic changes in children's dietary habits over the past 20 years is the steady increase in the consumption of sugar-sweetened beverages. More people are drinking beverages sweetened with sugar on a daily basis, at younger ages, and in double the quantity. Sugar-sweetened beverages are the single largest source of added sugar in children's diets, and they account for 50 percent of excess calories consumed by children and adults alike. Adolescents who drink excessive amounts of sugar-sweetened drinks (upward of two or more 8-ounce, or 250 ml, servings per day) are at higher risk for becoming overweight, for getting too little calcium (because they drink less milk), and for developing cavities in their teeth. Sugar-sweetened beverages include soda, sport drinks, flavored milk, yogurt smoothies, or any other punches, ades, or drinks with added sugar. Nutrition experts recommend that adolescents drink water and low-fat or skim milk most of the time as the healthiest beverage options. Drinking 100 percent fruit juice with no added sugar can also be a healthy option so long as intake is not excessive. The American Academy of Pediatrics recommends limiting juice intake to one or two 6-ounce (175 ml) servings per day to allow room in the diet for milk and to help maintain a healthy weight.

Alcohol

Alcohol provides 7 calories per gram. Alcohol should not be consumed by children and youth. There is no dietary requirement for alcohol. Evidence suggests that moderate consumption by healthy men and healthy, nonpregnant, nonlactating women (equivalent to one glass of wine per day for women, two for men) may lower the risk of heart disease in some people. Higher levels of alcohol consumption increase the risk for high blood pressure, stroke, heart disease, certain cancers, accidents, violence, suicide, birth defects, and death. Even moderate consumption may increase the risk of developing certain cancers.

REFERENCE

Institute of Medicine. 2002. *Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids (macronutrients).* Washington, DC: National Academy of Science.

Answer Key

ACTIVITY 18.1

Table 1 Your Average Daily Macronutrient Intake

	Carbohydrate %	Protein %	Fat %
Day 1	60	13	27
Day 2	40	12	48
Day 3	48	10	42
Day 4	50	15	35
Average daily intake (%)	**49.5**	**12.5**	**38**

Table 2 Total Daily Calorie Intake From Your Imaginary Diet

	Carbohydrate		Protein		Fat		Total calories
	%	Calories	%	Calories	%	Calories	
Day 1	60	1,170	13	253.5	27	526.5	1,950
Day 2	40	920	12	276	48	1,104	2,300
Day 3	48	1,056	10	220	42	924	2,200
Day 4	50	1,275	15	382.5	35	892.5	2,550
Average daily intake		**1,105**		**283**		**861.8**	**2,250**

Selected Answers to Questions: Part I

2. My diet contains more fat than is recommended and is on the low end of the recommended range for carbohydrate.
3. I could fix the imbalance by replacing some of the calories from fat with calories from carbohydrate.

Selected Answers to Questions: Part II

1. Day 1
2. Day 2 or day 4
3. Physical activity requires energy (calories). The more active I am, the more energy I need. Because food gives me energy, I need to eat more when I'm physically active.

Name _____

Activity 18.1

Calculating Intake

Part I

The following bar graph shows the percentage of daily calories that experts recommend for protein, carbohydrate, and fat. These proportions help keep you healthy!

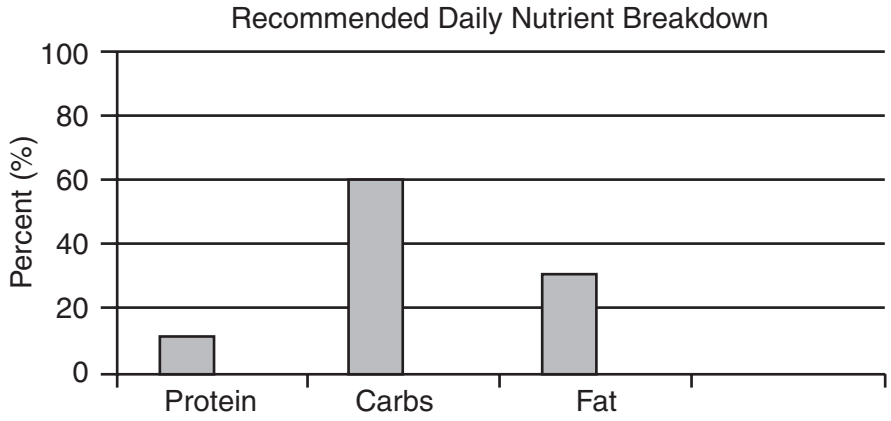


Table 1 breaks down the percentage of calories from carbohydrate, protein, and fat you got from an imaginary diet over four days.

Table 1 Your Average Daily Macronutrient Intake

	Carbohydrate %	Protein %	Fat %
Day 1	60	13	27
Day 2	40	12	48
Day 3	48	10	42
Day 4	50	15	35
Average daily intake (%)			

1. What was your average daily intake for each macronutrient? Fill in the blanks in table 1.
2. Make bars on the bar graph for your average intake. How does your diet compare to the recommendations?
3. Which macronutrient do you need more of? Which do you need less of? How could you fix the imbalance in your diet? (Hint: Replace some of the calories from _____ with calories from _____.)

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Calculating Intake *(continued)*

Part II

Table 2 is the same as table 1, except that it also shows the total number of calories you ate each day of your imaginary diet. Read across each row. For example, on day 1 you ate 1,950 calories. Carbohydrate made up 60 percent of your total daily caloric intake, protein made up 13 percent, and fat made up 27 percent.

Calculate the number of calories from carbohydrate, protein, and fat that you consumed each day.

Table 2 Total Daily Calorie Intake From Your Imaginary Diet

	Carbohydrate		Protein		Fat		Total calories
	%	Calories	%	Calories	%	Calories	
Day 1	60		13		27		1,950
Day 2	40		12		48		2,300
Day 3	48		10		42		2,200
Day 4	50		15		35		2,550
Average daily intake							

1. One day you rested and weren't very hungry. Can you figure out which day? Justify your answer.
2. One day you played soccer for a long time. Can you figure out which day? Justify your answer.
3. What can you conclude about the effect of activity on your daily intake?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Science

This unit contains nine lessons. Use the following At a Glance chart to help you select the lessons that best fit your curriculum objectives. Lessons marked with a ♡ are especially well suited for health and PE classes. Some of the lessons offer a choice of activities. Adapt the lesson procedures to fit your teaching style, students' skills, and time constraints.

Lessons in this unit meet many Massachusetts learning standards that may be similar to standards in your state. Refer to appendix E (page 571) to see which of the 1996-2006 Massachusetts Curriculum Frameworks (MCFW) each lesson incorporates. Please check the CD-ROM for parent information materials that support the lessons you teach.

Science at a Glance

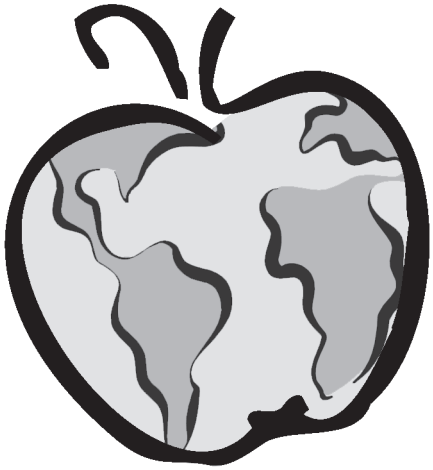
		Level of difficulty by grade*				
Theme	**Lesson**	**6th**	**7th**	**8th**	**Subject-specific skills**	**Materials needed**
Balanced diet	19 Passing the Sugar	M-H	M	M	Weight measurement, digestion, chemical structure of sugar, label reading	Two 5 lb (2.3 kg) bags of sugar, funnels, triple beam balance, small and large beakers, teaspoon measure, empty 20 oz (600 ml) soda bottles
Balanced diet	20 Mighty Minerals: Calcium and Iron	M	M	L	Calcium function, bone development, skeleton	Scissors, paper, markers, chicken bone, 20% hydrochloric acid, beaker, safety goggles, periodic table (optional)
Balanced diet ♡	21 Fat Functions	M	L-M	L	Testing for lipids, scientific process	Food items, brown paper bags or towels, overhead transparencies
Balanced diet ♡	22 Smart Snacks	M	L-M	L	Nutrition, reading food labels	Overhead transparencies, food labels
Fruits and vegetables	23 The Plants We Eat	M	M	L	Plant structure, classification, nutrition	Food items, magnifying glass, knives or scalpels, vitamin C tablet (optional)
Activity	24 Foods for Energy	H	M-H	M	Carbohydrate function	Tennis balls, textbooks, or chairs (optional)
Activity ♡	25 Muscle Mysteries	M-H	M	M	Muscle function	Station cards
Lifestyle	26 The Human Heart	H	M	M	Heart function, measuring heart rate, scientific process	Clock or watch with a second hand, tennis balls (optional)
Lifestyle ♡	27 How Far Can You Jump?	M	M	M	Analyzing movement, scientific process	Tape measure, masking tape

* Level of difficulty: L = low, M = medium, H = high

Lesson 19

Passing the Sugar

Balanced Diet Theme



This lesson integrates chemistry, physiology, math, and health concepts. Students estimate the number of sodas and sport drinks they drink in a week and calculate and measure out the grams and teaspoons of sugar contained in these drinks. Through a reading, they learn that drinking sugar-sweetened beverages provide "empty calories" and that excessive intake has been linked to an increased risk for developing health problems such as type 2 diabetes. Therefore, they need to choose beverages without added sugars. They are also introduced to the chemical structure and function of simple sugars and learn how the digestive, cardiorespiratory, and endocrine systems interact to deliver fuel to muscles. Optional role plays and movement activities offer students opportunities to visualize some of the abstract concepts presented. Finally, students investigate the sugar content of foods found in their homes.

This lesson is best suited for eighth-graders and advanced seventh-graders. However, most sixth- and seventh-graders are able to complete activities 19.1 and 19.3. See the lesson procedure for ideas on modifying activities for sixth- and seventh-graders.

Behavioral Objective

For students to choose beverages without added sugars or artificial sweeteners

Learning Objectives

Students will be able to do the following:

1. Use a triple beam balance to accurately weigh material
2. Use formulas to convert between volume and mass measurement units
3. Recognize that the measurement of volume and mass requires an understanding of the sensitivity of measurement tools and knowledge of which sensitivity is necessary for a particular task
4. Describe the chemical structure and function of simple sugars and give examples of sugars added to foods

5. Describe how the digestive, cardiorespiratory, and endocrine systems interact to deliver fuel to working muscles
6. Recognize that the consumption of excessive amounts of sugar-sweetened beverages can increase a person's risk of developing type 2 diabetes
7. Distinguish between situations in which to drink water and situations in which to drink sport beverages
8. Use food labels to compare and contrast the sugar content of foods

Materials

Activity 19.1

- Activity 19.1, Soda and Sport Drinks: How Many Do You Drink?
- Two 5 lb (2.3 kg) bags of sugar (can be saved and reused)
- Each group of four students will need the following:
  - Four empty 20 oz (600 ml) plastic soda bottles
  - Two small beakers
  - Four large beakers
  - Two teaspoons (measuring spoon if possible)
  - Triple beam balance

Activity 19.2

Activity 19.2, Sugary Sport Drinks?

Optional

- Activity 19.3, Added Sugar Sleuth
- Student resource 19.1, Organ and Cell Name Tags

Procedure

This lesson is best suited for eighth-graders and advanced seventh-graders. However, most sixth- and seventh-graders are able to complete activities 19.1 and 19.3. Teachers working with sixth-graders should do the activity 19.2 reading as a group, stopping to discuss the words students are not familiar or reviewing them prior to beginning the activity. Before doing activity 19.3, sixth-graders may also need a quick review of how to read a nutrition label and a review of the various names for sugar (see step 6 of the procedure).

ENGAGE

1. Ask students to think about and reflect on the following questions:
   - How many sodas and sport drinks did you drink over the past seven days?
   - What's the main ingredient in these drinks?
   - How many teaspoons (ml) of sugar do you think are in a 12-ounce (375 ml) can of coke? A 20-ounce (600 ml) bottle of Gatorade?
   - What happens to the sugar from these drinks once it enters your body? Where does it go? What effect does it have on the chemistry of your body? What effect does it have on your performance in school or sports?

   Listen to their answers, but don't provide them with answers to the questions. Tell that they will explore the answers to these questions during this lesson.

   Optional: In preparation for activity 19.1, Soda and Sport Drinks: How Many Do You Drink?, you may want to have students keep a "beverage diary" because some students have difficulty remembering what they drink.

Day	Beverage type (milk, soda, juice, sport drink, water, etc.)	Serving size (6 oz, 8 oz, 12 oz, 20 oz, etc.)
1	Milk	8 oz
1	Juice	6 oz

2. Hand out activity 19.1, Soda and Sport Drinks: How Many Do You Drink? Have students work individually to complete part I. Explain that this activity will give them the opportunity to reflect on how many high-sugar drinks they consumed last week and calculate how much sugar they ingested. You may need to review how to read a nutrition label with students. (See lesson 22, Smart Snacks, for instructions and an overhead transparency of a food label.)
3. Review students' responses to questions 1 through 6 to make sure they calculated the answers correctly. Discuss question 6, highlighting the fact that 20-ounce (600-milliliter) bottles of sport drinks have about the same amount of sugar as most 12-ounce (375-milliliter) sodas.
4. Assign activity 19.3 for homework. This is especially appropriate if you will not be doing activity 19.2. Explain that you want students to explore their cupboards looking for foods with added sugars. Instruct them to write down the names of foods that have added sugar as one of the first three ingredients. *(Optional:* Begin the lesson with this activity. You will need to review how to read a food label [see lesson 22, Smart Snacks] and the names of common sugars [see step 6 of this lesson procedure].)

EXPLORE

5. Assign partners or groups of four, depending on equipment availability. Review the instructions for activity 19.1, part II. Explain that they will measure out the amount of sugar in 20-ounce (600-milliliter) sodas and the total amount of sugar from sodas and sport drinks they consumed last week. They will use two measurement tools—teaspoons and triple beam balances—allowing them to compare the accuracy and sensitivity of the two and how each tool is suited for different measurement tasks. (Note: Using balances gives students experience with scientific equipment and a better working understanding of grams. On the other hand, students' practical experience with teaspoons may make it easier for them to understand just how much sugar they are consuming in these drinks.) Instruct students to collect their materials and complete the investigation.
6. Have students examine a display of the sugar-filled soda bottles. Invite students to discuss their observations by asking the following:
   - Were you surprised at how much sugar you're consuming?
   - Why don't we see the sugar in soda? Is soda a solution, a mixture, or a suspension of sugar? What's the difference?
   - Why do you suppose doctors and scientists encourage us to limit our consumption of soda and other sugary drinks?
7. Hand out activity 19.2, Sugary Sport Drinks? Preview the reading by explaining the following:
   - There are lots of different kinds of sugars. Sucrose is the scientific name for table sugar. Fructose is found naturally in fruit and is added to sweeten many kinds of manufactured foods. Lactose is found naturally in milk. To identify added sugars in the foods you eat, look for words ending with the suffix *–ose* in the ingredients list found on food labels. List some sugars on the board.

- As you read activity 19.2, Sugary Sport Drinks?, you will learn how sugary drinks such as sport drinks, sodas, and fruit punches affect your body chemistry and can increase your risk of developing type 2 diabetes.

8. Direct students to read and complete the questions in activity 19.2, Sugary Sport Drinks? This can be finished for homework. To improve comprehension, have students locate the names of the digestive organs mentioned in the reading on a diagram in the classroom or their textbook. Arrange the class in small groups to discuss their answers to the questions in activity 19.2. Review the main points as a group. Remind the class of the following:
   - Sugar is a carbohydrate, and some sugar is found naturally in foods. We need to eat carbohydrate because it provides us with energy to move and grow. However, it's important to choose foods such as milk, yogurt, fruits, vegetables, whole grains breads, vitamins, minerals, and other nutrients we need. Sugar-sweetened beverages have only sugar, and this only adds "empty calories." Making healthy choices means choosing drinks and foods without added sugar.
   - Drinking and eating foods with lots of added sugar increases your risk for becoming overweight, developing dental cavities, and developing diabetes. (Review healthy drink options discussed in the Teacher Resources under Specific Background Materials.)
   - It's best to avoid diet soft drinks. They contain artificial sweeteners such as Nutra-Sweet, Splenda, and sucralose, that condition you to expect "sweetness" in drinks and foods. Also, their long-term safety is not fully understood.

EXPAND AND EVALUATE

9. Allow students to clarify their understanding and show you what they have learned by using one or more of the following activities:
   - **Pass the sugar.** Assign students the following roles and distribute student resource 19.1, Organ and Cell Name Tags included in the lesson. Instruct students to act out the movement of sugar from the mouth to various cells in the body. Assign a student "director" to help them work together to pass sugar molecules (tennis balls) through the correct sequence of organs and cells.

     Roles

Mouth	Esophagus	Stomach	Small intestine	Heart
Blood	Muscle cell	Brain cell	Liver cell	Director

     Students need to understand the roles of these organs before they can do the activity. Consider preparing them for the role play by assigning one organ to a group of students (give each group a label), have them look up the functions, and then have groups cooperatively piece together a flow chart on poster board using their labels. This shouldn't take the place of the role play. Some students learn through movement.
   - **Do the wave.** Divide the class into two groups. Direct them to sit in two parallel lines facing each other. Tell line 1 to "do the wave" (i.e., alternate standing up and sitting down). After a very slight delay, instruct line 2 to do the wave. Repeat this several times. Tell students that they just demonstrated what happens to blood glucose and blood insulin after we consume refined starchy food (such as white bread). Ask them if they know which line represents blood glucose? Which line represents blood insulin? Ask them to explain what's happening (see activity 19.2).
   - **Demonstrate insulin's role in the body.** Assign four students to play the role of sugar molecules. Assign one student to play an insulin molecule. Explain that the

classroom represents a cell. The hallway is a blood capillary, or small blood vessel. Instruct the sugar molecule students to go out into the hallway ("blood"), shut the door, and demonstrate how insulin increases the permeability of the cell to sugar. (The insulin student will open the door, allowing the sugar molecules to come in.)

- **Acting out verbs.** Select a group of six to eight students to act out the following:
  a. **Digestion of a starch molecule into sugar molecules.** You may need to give them a reminder (starch molecules are long chains of sugar molecules) and a tip (each student should represent one sugar molecule).
  b. **Dissolving sugar into water.** Divide the class in half. Instruct students to stand on opposite sides of the room. Assign students on one side to be sugar molecules (solute) and those on the other side to be water molecules (solvent). To demonstrate the intermolecular bonds that exist within each substance, have students place their hands on neighboring students' shoulders. On your command, have the sugar "dissolve" into the water and form a solution. Students will need to break their links with neighbors and form new bonds with students from the other group. You may choose to talk about the energy needed to break bonds and how increases in temperature can speed up this reaction.

Extension Activities

1. Instruct students to make a poster, advertisement, or public service announcement that encourages kids to choose water, milk, or 100 percent juice over soda and sport drinks.
2. Have students work together to develop and teach a short lesson that encourages younger kids to choose healthy drinks.
3. Have students use model kits to build the chemical structures of simple sugars and demonstrate how linking sugars together to form chains forms complex carbohydrate. (This is appropriate for eighth-graders who have been introduced to organic chemistry.)

SCHOOLWIDE PROMOTION OR FUNDRAISER

Teach this lesson as a precursor to one of the following schoolwide promotions:

- **Soda Tax Fundraiser.** Raise funds for your school *and* awareness of soda consumption and its connection to health problems. Families are asked to keep track of the number of sodas and other sugary drinks they consume in a week and to donate 10 cents for each one they drink. They can get a "tax credit" of 5 cents for each bottle of water they drink. Include information on the importance of limiting sugar-sweetened beverage consumption (see the Carbohydrate Parent Sheet on the CD-ROM that accompanies this book) and healthy beverage alternatives (see the Quenchers Parent Resource on the CD-ROM) with a description of the promotion.
- **Healthy Beverage Options: Parent Night Promotion.** Offer parents samples and recipes of healthy beverage options. Possibilities could include seltzer and fruit slices, or a seltzer and fruit juice spritzer. Hand out information on the importance of limiting sugar-sweetened beverage consumption (see the Carbohydrate Parent Sheet on the CD-ROM) and healthy beverage alternatives (see the Quenchers Parent Resource on the CD-ROM).

Teacher Resources

GENERAL BACKGROUND MATERIALS

Visit www.hsph.harvard.edu/nutritionsource.

SPECIFIC BACKGROUND MATERIALS

For an overview of the types of carbohydrate, their function in the body, dietary recommendations, and examples of foods high in healthy carbohydrate (whole grains), see Teacher Resources in lesson 4, Carbohydrate: Energy Food (page 92) and the activity 19.2 reading in this lesson. Also see the Quenchers Parent Sheet and the Carbohydrate Parent Sheet on the accompanying CD-ROM.

Why do we need to limit our consumption of sugar-sweetened beverages?

Eating a diet high in added sugar (or refined flour) can raise the risk for heart disease and diabetes over time. During the past 20 years, the amount of sugar-sweetened beverages (soda, fruit drinks, sport drinks, and so on) that people drink has increased dramatically. Youth who drink excessive amounts of sugary beverages (two or more 8-ounce, or 250-milliliter, servings per day) are more at risk for becoming overweight, for getting inadequate calcium and other vitamins and minerals (because they drink less milk and juice), and for developing dental cavities. The following facts illustrate just how many soft drinks teens are consuming:

- Teenagers who drink soft drinks get 15 percent of their calories from carbonated and noncarbonated soft drinks. Teen boys who drink soft drinks consume on average three 12-ounce (375-milliliter) cans per day, and girls drink more than two cans per day.
- One in 10 boys consumes the equivalent of five and a half 12-ounce (375-milliliter) cans per day, or 800 calories per day. One out of every 20 boys consumes the equivalent of seven cans per day, or about 1,000 calories.

Research findings indicate a strong link between sugar-sweetened beverage (SSB) consumption and childhood obesity. A recent study found that middle school students who increased their consumption of soft drinks also increased their chance of becoming obese over the 18-month study. For each additional serving consumed per day over the baseline intake, the odds of obesity increased 60 percent. A school-based randomized controlled trial found that reducing the intake of SSB reduced overweight among youth. SSB consumption has also been linked to weight gain and diabetes incidence in adult women.

What beverage options do nutrition experts recommend?

- Offer water and low-fat or skim milk as the primary beverage choices during meals and snack time. When serving fruit juice, select only 100 percent juice products, and limit them to no more than 12 ounces (375 milliliters) per day (4-6 ounces, or 125-175 milliliters, per day for children ages six and under).
- Do not serve sugar-sweetened beverages (soda, fruit drinks, iced tea, and sport drinks) at school or after-school functions. Encourage parents to limit sugar-sweetened beverages to two 8-ounce (250-milliliter) servings per week at home. Also encourage them to keep no soda in the house, and to discourage children from “super-sizing it” when out at a restaurant.
- Sport drinks are recommended only for highly intense activity that lasts longer than one hour, when the ability to keep going is required for competition. In normal play, stopping for a healthy snack and a cold drink of water is a better way to refuel the body.

- Read nutrition labels to avoid added sugars and artificial sweeteners. Watch out for "punches," "drinks," and "cocktails"—these often contain sugar or artificial sweeteners, with partial or no fruit juice. Choose drinks that do not list sucrose, fructose, high fructose corn syrup, or rice syrup as the first ingredients. Also, look for fruit juice as one of the first ingredients. Artificial sweeteners, such as NutraSweet, Splenda, and sucralose, condition kids to expect "sweetness" in drinks and foods. Because their long-term safety is not fully understood, it is best to avoid them.
- Healthy beverage alternatives include the following:
  - Water (plain, or flavored with fruit slices or frozen fruit juice ice cubes)
  - Sodium-free seltzer water (examples: Zazz, Polar, and Schweppe's seltzer waters)
  - Diluted 100 percent juice (4 ounces of water and 4 ounces of juice, or 12 milliliters of each)
  - Juice spritzers (juice and seltzer water)

What is diabetes? Why is type 2 diabetes on the rise in children?

The Centers for Disease Control (CDC) define diabetes mellitus as a group of diseases characterized by high levels of blood glucose resulting from defects in insulin production, insulin action, or both. Most of the carbohydrate we eat is broken down into glucose, a monosaccharide and major source of energy. After a meal, blood glucose levels rise, and in healthy people this stimulates the beta cells in the pancreas to release insulin, a hormone that facilitates the uptake of glucose into liver, muscle, and fat cells. Diabetics either don't make enough insulin or are resistant to the insulin they make. As a result, blood glucose builds up in their blood. With glucose unavailable to the cells, the body breaks down fat, producing ketones and other metabolites that lower blood pH, which can be fatal. Chronic high blood sugar can cause heart disease, blindness, kidney disease, and lower-extremity amputations.

About 90 to 95 percent of diabetes cases are classified as type 2 diabetes. At the onset of this form of the disease, the pancreas is capable of producing insulin, but the body's cells are insensitive or resistant to the effects of the hormone. Although the causes of the disease are not completely understood, extra fat tissue seems to put an increased demand on the body to make insulin, which in turn diminishes the number or sensitivity of insulin receptor sites on the target cells plasma membranes. Because the cells do not respond properly, glucose levels stay elevated, stimulating the pancreas to release even more insulin, further exacerbating the problem. Eventually, high blood glucose levels destroy the insulin-producing beta cells. Many people with type 2 diabetes can control their blood glucose by following a careful diet and exercise program, losing excess weight, and taking oral medication. More advanced stages may require insulin injection.

Because it was once rare in children, type 2 diabetes was previously called adult-onset diabetes. Between 1988 and 1994, the incidence of type 2 diabetes in children increased tenfold. This type of diabetes is associated with obesity, inactivity, and old age and has a strong genetic component. African Americans, Hispanic/Latino Americans, American Indians, and some Asian Americans and Native Hawaiians or other Pacific Islanders are at particularly high risk for type 2 diabetes. The increase in type 2 diabetes in children seems to be the consequence of an increase in childhood obesity. Unless obesity trends are reversed, the CDC predicts that 40 percent of boys and 30 percent of girls born in 2000 will develop diabetes in their lives. Experts fear that children with type 2 diabetes may face complications at an earlier age, because longer duration seems to increase the complications.

About 5 to 10 percent of all diabetes cases are classified as type 1, or "juvenile," diabetes. This form of diabetes develops when the body's immune system destroys pancreatic beta cells and typically begins in children or young adults, although it can strike at any age. Type 1 diabetics do not produce insulin, so they must receive insulin injections (or pump) to survive, which explains why this form of the disease was previously called insulin-dependent diabetes. The cause of type 1 diabetes is unknown, but it is suspected to be triggered by exposure to environmental factors, possibly an unknown virus, in genetically predisposed people.

The symptoms of diabetes include frequent urination, excessive thirst, unexplained weight loss, extreme hunger, sudden vision changes, tingling or numbness in hands or feet, feeling tired most of the time, very dry skin, sores that are slow to heal, more infections than usual, and halitosis (exhaled ketones that are strong smelling). Elevated blood sugar levels can often go undetected.

For more information, see the CDC's National Diabetes Fact Sheet at www.cdc.gov/diabetes/pubs/factsheet.htm or www.cdc.gov/diabetes/faq/basics.htm.

REFERENCES

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Schulze, M.B., Manson, J.E., Ludwig, D.S., et al. 2004. Sugar-sweetened beverages, weight gain, and incidence of type 2 diabetes in young and middle-aged women. *JAMA* 292: 927-934.

Answer Key

ACTIVITY 19.2, SUGAR SPORTS DRINKS?

1. Water, water, sports drink, water, sports drink, sports drink
2. Blood sugar levels increase, stimulating insulin release from the pancreas, which promotes sugar absorption by cells, thereby bringing blood sugar levels back to normal.
3. Diabetics either do not produce enough insulin, or their cells are resistant to insulin.
4. Limit sugar in the diet, exercise, keep a healthy weight, know your family history.
5. Sugar molecules are small, hexagon-shaped molecules containing carbon, hydrogen, and oxygen. They supply energy to cells.

Activity 19.1

Name _____

Soda and Sport Drinks: How Many Do You Drink?

Part I

1. How many sodas and sport drinks have you consumed in the past seven days? Record your estimates in column 2 of the following table.
2. Examine the food labels on the next page. How many grams of sugar are in each serving? Record your answers in column 3 of the table.
3. How many grams of sugar are in the entire bottle? (Note: Some bottles contain more than one serving.) Total grams = number of servings × grams per serving. Record in column 4.
4. Calculate the total number of grams of sugar you consumed in each beverage category by multiplying the number of drinks (column 2) by the grams per container. (Total grams = number of drinks × grams per bottle.) Record your answers in column 5. Sum the total of all the categories.
5. Calculate the number of teaspoons of sugar you consumed. One teaspoon contains 4 grams of sugar (1 tsp = 4 g).

   Number of teaspoons = number of grams × 1 teaspoon / 4 grams

6. Which container has more sugar, a 12-ounce (375-milliliter) soda or a 20-ounce (600-milliliter) sport drink?
7. What other nutrients (vitamins, minerals, protein, fat, salts) are found in these drinks?

	Number in last seven days	Grams per serving	Grams per container	Total grams	Total teaspoons
Example: 12 oz soda	*3*	*41*	*41*	*123*	*30.75*
12 oz (375 ml) soda					
20 oz (600 ml) soda					
20 oz (600 ml) sport drink					
Bottled water					
Other					
			Total		

(continued)

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Activity 19.1

Soda and Sport Drinks: How Many Do You Drink? *(continued)*

Bottle of water
Nutrition Facts
Serving Size 1 Bottle
Amount Per Serving
Calories 0
% Daily Value
Total Fat 0 g 0%
Sodium 10 mg 0%
Total Carb. 0 g 0%
Sugars 0 g
Protein 0 g
*Percent Daily Values are based on 2,000-calorie diet.

12 oz (375 ml) soda
Nutrition Facts
Serving Size 1 Can
Amount Per Serving
Calories 150
% Daily Value
Total Fat 0 g 0%
Sodium 35 mg 1%
Total Carb. 41 g 14%
Sugars 41 g
Protein 0 g
*Percent Daily Values are based on 2,000-calorie diet.

20 oz (600 ml) soda
Nutrition Facts
Serving Size 8 fl oz (240 ml) Servings Per Container 2.5
Amount Per Serving
Calories 100
% Daily Value
Total Fat 0 g 0%
Sodium 25 mg 1%
Total Carb. 27 g 9%
Sugars 27 g
Protein 0 g
*Percent Daily Values are based on 2,000 calorie diet.

20 oz (600 ml) sport drink
Nutrition Facts
Serving Size 8 fl oz (240 ml) Servings Per Container 2.5
Amount Per Serving
Calories 50
% Daily Value
Total Fat 0 g 0%
Sodium 110 mg 5%
Potassium 30 mg !%
Total Carb. 14 g 5%
Sugars 14 g
Protein 0 g
*Percent Daily Values are based on 2,000 calorie diet.

Part II

Work with your group to collect the following materials:

- Two plastic funnels (you can make these with paper and tape)
- Four empty 20-ounce (600-milliliter) plastic soda bottles
- Two small beakers
- One triple beam balance

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Soda and Sport Drinks: How Many Do You Drink? *(continued)*

Activity 19.1

- Four large beakers
- Two teaspoons
- Sugar

Complete the following measurement activities.

1. Refer to the table on the previous page to determine how much sugar is contained in 20-ounce (600-milliliter) sodas. Record here:

   _____ grams of sugar in 20 oz (600 ml) soda (column 4)

   _____ teaspoons of sugar in 20 oz (600 ml) soda (column 6)

2. Use a triple beam balance to weigh out the grams of sugar in a 20-ounce (600-millliliter) soda. Be precise with your measurements. Set the sugar aside.
3. Use a teaspoon to carefully measure out the teaspoons of sugar in a 20-ounce (600-milliliter) soda. Set the sugar aside.
4. Carefully measure out the total amount of sugar each person consumed in sodas and sport drinks during the last seven days. Half of your group should use a triple beam balance to measure their total sugar, and the others should use a teaspoon. Each person should carefully pour or spoon the sugar into an empty 20-ounce (600-milliliter) soda bottle. Cap the bottle and display it in the front of the room.

   _____ = Total amount of sugar from sodas and sport drinks in seven days

Reflecting on Your Observations

1. Were you surprised by the amount of sugar you consumed? Explain.

2. Why isn't the sugar in drinks visible?

3. Compare the sugar you weighed out in step 2 with the sugar you measured out with the teaspoon in step 3. Do they appear to be about the same? How might you more accurately compare them?

4. Scientists typically use balances to weigh out solid ingredients. Cooks typically use measuring spoons and cups. Explain why each of the measuring tools is best suited for those functions.

5. Which tool—the balance or the teaspoon—do you think was the better tool to use for this activity? Explain your position.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 19.2

Sugary Sport Drinks?

As you read the following essay, circle any words that are new to you and underline at least five key points.

In 1971 water bottles and sport drinks had not been invented yet, so when 14-year-old Lynne Cox and her teammates prepared for their 26-mile (41.6-kilometer) swim across the Catalina Channel in California, they had to figure out how to get the fluids and energy they needed during their 12 1/2 hours in the water. To complicate matters, the water temperature was 55 to 60 °F (13 to 16 °C), so they had to worry about how to maintain their body temperature as well. "We . . . filled plastic ketchup bottles with hot tea with sugar, warm orange juice, beef broth, hot apple cider, hot chocolate, and coffee loaded with sugar. We were trying to figure out what we could use on the Catalina crossing to boost our blood sugar and replace lost heat. With salt water in our mouths from swimming in the sea, the orange juice was absolutely disgusting, beef broth was bad, and hot chocolate was a real mistake because it contained milk solids, which were known to make swimmers nauseated. We narrowed our choices to coffee, tea, and hot cider." A year later, when Lynne broke the world record for crossing the English Channel, she drank hot apple juice and ate oatmeal cookies that were tossed to her.

Today long-distances athletes and others working for long periods in the heat are lucky; they can go to any corner store and purchase sport drinks that are specially formulated to quickly deliver sugar to working muscles and replenish the water lost through sweating. The American College of Sports Medicine recommends drinking sport drinks when you exercise strenuously for more than 60 minutes. They recommend drinking water during shorter bouts of exercise or at times when you are physically active at more moderate intensities, such as playing baseball or riding your bike for fun. Sport drinks do not improve your performance in these situations. You don't need the sugar; your body has enough stored energy. During recreational activities that last several hours, it's best to stop for a healthy snack to refuel your body.

As sport drinks have become more plentiful, many children and adults are drinking when they don't need them. They are also drinking more of other kinds of sugar-sweetened beverages, such as soda and fruit punches. Youth currently drink twice as much soda as milk. The excess sugar in these drinks is creating health problems in children and teens that used to show up only in older adults.

Sugar and Body Chemistry

Glucose, fructose, maltose, and sucrose are examples of sugars commonly found in the foods and drinks we consume. They are added in large quantities to soda, sport drinks, cookies, and candies, but occur naturally in dairy foods, fruits, vegetables, and other foods made from plants. Sugars are simple carbohydrates. They are composed of one or two small molecules that contain carbon, oxygen, and hydrogen.

Because of their small size and shape, sugar molecules are easily transported through the cells lining the small intestines and into the blood. Complex carbohydrate, such as the starch found in grains and vegetables, is made up of long chains of simple sugars linked together. These large molecules must be broken down into simple sugars by digestive enzymes in the small intestines before they can enter the blood. Sugars dissolve in blood and are pumped throughout the body. After a meal, blood sugar levels rise, and this stimulates cells in the pancreas to release a hormone called insulin into the blood. Insulin binds to cells in muscle, liver, and many other tissues, making their membranes more permeable to sugar. It acts like a doorman helping sugar get out

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).
From L. Cox, 2004, *Swimming to Antarctica: Tales of a long-distance swimmer* (New York: Alfred A. Knopf).

of the blood and go inside the cells. Cells break down the sugar molecules and use the energy released to grow, to reproduce, and for many other functions. The brain uses sugar molecules exclusively for energy. During exercise, sugar supplies muscle cells with most of the energy they need for contraction.

Health Risks

Maintaining normal blood sugar is vital to health; eating sugar is not. Scientists have discovered that regularly drinking sugar-sweetened beverages increases the risk of gaining excess weight and developing type 2 diabetes, a chronic disease that used to be called adult-onset diabetes, but is now showing up in youth. This type of diabetes is associated with obesity, lack of exercise, and old age and it tends to run in families. It should not be confused with another form of diabetes called type 1, or juvenile, diabetes. Type 1 diabetes typically shows up in children or young adults and is thought to be triggered by exposure to environmental factors, possibly an unknown virus.

Diabetics have difficulty keeping their blood sugar at a healthy level. After a meal or drink that contains carbohydrate, blood sugar levels rise. In healthy people, this stimulates the pancreas to release insulin into the blood, which in turn helps sugar enter cells and returns blood sugar back to premeal levels. Diabetics either don't make enough insulin or are resistant to the insulin they make. As a result, sugar builds up in their blood. With sugar unavailable to the cells, the body breaks down fat for energy, producing chemicals that make the blood more acidic, which can be fatal. Chronic high blood sugar can cause heart disease, blindness, kidney disease, and lower-extremity amputations.

To help prevent type 2 diabetes, do the following:

- Eat a healthy diet, including plenty of whole grains, vegetables, and fruits. Limit foods that are high in added sugars to small quantities, and don't have them every day.
- Get plenty of exercise.
- Keep a healthy weight. If you're overweight, ask for help from your parents and your doctor to get to a healthier weight.
- Know your family history. If diabetes is in your family, be sure to get your blood checked periodically as you get older to monitor your blood glucose levels.

Sport drinks were plentiful when Lynne Cox swam the first Antarctic mile in 2002, but she didn't need them. The meal she ate before the swim provided her with all the energy she needed during her 25-minute swim in water that was 32 °F (0 °C). Sport drinks are only recommended for strenuous exercise lasting longer than 60 minutes.

Nutrition Tips for Improving Your Fitness and Performance

- Drink plenty of water before, during, and after physical activity.
- Eat foods from each of the five food groups at every meal.
- Choose whole grains over processed grains.
- Choose plant oils over animal fat.
- Time your meals so that you eat 90 minutes or more before a competition.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).
From L. Cox, 2004, *Swimming to Antarctica: Tales of a long-distance swimmer* (New York: Alfred A. Knopf).

Sugary Sport Drinks? *(continued)*

Check What You Learned

1. In which of the following situations should you drink water? In which would a sport drink be a good choice? Write a W (water) or S (sport drink) in the blank to indicate your response.

   _____ Shooting baskets for a few hours after school

   _____ 60-minute soccer or basketball game

   _____ Seven-mile hike

   _____ Riding your bike around town with friends

   _____ Six-hour sports camp held outside in the hot summer sun

   _____ Two-hour bike race

2. Describe what happens to blood sugar and blood insulin levels immediately after drinking a sugary drink. How does insulin help to maintain blood sugar at a healthy level?

3. Why do diabetics have trouble maintaining their blood sugar at a healthy level?

4. List four things you can do to prevent developing type 2 diabetes.

5. List four or more characteristics of sugar molecules. Include information about their size, shape, chemical structure, and function in the body.

Making Connections

Interview your extended family. Does anyone have type 2 diabetes? Why is this important for you to know?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 19.3

Added-Sugar Sleuth

1. Find eight foods in your refrigerator or cupboards that list a sugar as one of the first three ingredients. Remember to look for words ending with the suffix -ose in the ingredients list.
2. Use the information on the nutrition label to complete columns 1 through 3 in the following chart.
3. Four grams of sugar equal 1 teaspoon of sugar. Calculate how many teaspoons of sugar per serving are in each food and write the corresponding number of teaspoons in column 4. (Number of teaspoons = number of grams x 1 teaspoon / 4 grams)

Food	Name of sugars in ingredients	Grams of sugar (g)	Teaspoons of sugar (tsp) per serving

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Student Resource 19.1

Name _____

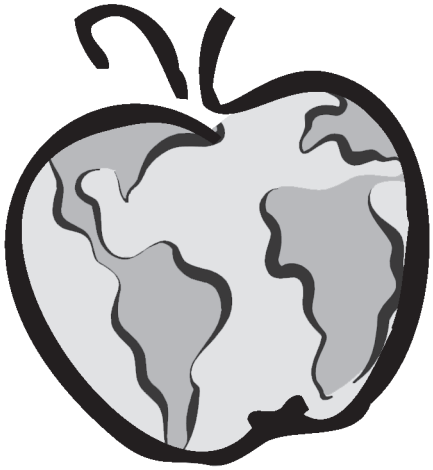
Organ and Cell Name Tags

Mouth	Esophagus
Stomach	Small intestine
Heart	Blood
Muscle cell	Brain cell
Liver cell	Director

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 20

Mighty Minerals: Calcium and Iron



Balanced Diet Theme

This lesson discusses the role of two minerals, calcium and iron, in the development, function, and maintenance of the bones and organs in the human body. Two activities are included; do one or both as time and interest permit. The lesson procedure offers options for integrating the activities into a unit on the human body, the periodic table, or minerals. Both activities describe the health risks for adolescents who do not consume enough calcium and iron.

Activity 20.1 uses a game to teach students that the amount of calcium in bones is in constant flux (a great example of homeostasis), and that to ensure strong, healthy bones, adequate supplies of calcium need to be ingested throughout life. Students learn what types of foods are high in calcium, how many servings they need to eat, and what enhances or inhibits calcium deposits in the bones. They also learn the names of the human bones and how to assemble them into a skeleton.

Activity 20.2 is designed to teach students about the function of iron in the human body. Students learn what types of foods are high in iron and how much iron they need daily. They create a comic strip that depicts the function of iron in the body. This lesson could be included when studying the cardiovascular system.

Behavioral Objective

For students to eat a variety of foods that give the body important minerals and nutrients for health

Learning Objectives

After activity 20.1, students will be able to do the following:

1. Describe the functions of calcium in the body
2. Explain that calcium in the bones is in constant flux, an example of homeostasis
3. Describe the factors that enhance or inhibit the deposition of calcium in the bones

4. Discuss how the needs of other body systems affect the calcium balance
5. List some foods that are excellent sources of calcium
6. Discuss the negative effects of a diet low in calcium
7. Work together with other students to learn new information
8. Recognize some of the bones in the human body and how to assemble them into a skeleton
9. Recognize that calcium is one of the 100 elements found in nature that combine to make up living and nonliving things

After activity 20.2, students will be able to do the following:

1. Describe the functions of iron in the body
2. List some foods that are excellent sources of iron
3. Discuss the negative effects of iron deficiency, and highlight its impact on the systems in the body
4. Create a comic strip that depicts the role of iron in the body
5. Recognize that iron is one of the 100 elements found in nature that combine to make up living and nonliving things

Materials

Activity 20.1:

- Student resource 20.1, Filling Your Calcium Bank
- Activity 20.1, Building a Strong Skeleton: The Rules of the Game
- Copies of bones (two sets per group)
- Scissors (one pair per person if possible)
- Chicken bone (thigh or femur)
- Hydrochloric acid (20 percent)
- Beaker
- Safety goggles
- Periodic table (optional)

Activity 20.2:

- Plain white paper
- Crayons or colored markers
- Activity 20.2, Iron "Toons"
- Periodic table (optional)

Procedure

Decide which activity best suits your curriculum.

ACTIVITY 20.1: BUILDING A STRONG SKELETON

This activity will probably require one and a half to two class periods. (Note: You will need about three or four days to allow the minerals to leach out of the bone.)

Day 1

1. Point out the goals of this lesson:
   - To describe calcium's jobs in the body
   - To discuss factors that help or interfere with building strong bones
   - To become familiar with some foods that are excellent sources of calcium
   - To discuss the negative effects of a diet low in calcium
   - To play a game that helps reinforce an understanding of the importance of calcium
   - To recognize that calcium is one of the 100 elements found in nature that combine to make up living and nonliving things.
2. (2-3 minutes) Ask students the following:
   - Why do we need to eat foods with plenty of calcium? *(Most likely answer: To build strong bones and teeth.)*
   - What happens if we don't get enough calcium? *(Answer: Calcium leaves the bones, and bones weaken.)*
   - What is calcium? *(Answer: One of the 100 naturally occurring elements found in nature that combine to make up living and nonliving things. Calcium is a metal, but it does not exist free in nature; instead it binds to other elements to form minerals.)*

   Help your students make connections with the physical, or earth, science units you have already taught. If your class has studied the periodic table, have students locate calcium on the periodic table and determine its physical and chemical properties based on its location. If your class has studied minerals, use this as an opportunity to review the properties of minerals and give some examples of minerals that contain calcium. See the Teacher Resources for background material to help make these connections.
3. (3-5 minutes) Pass around a fresh, clean chicken leg bone. Have students touch the bone and observe its structure. Place the bone in a beaker of diluted hydrochloric acid. Ask students: What do you think will happen to the bone as it sits in this weak acid? Cover the beaker. Observe the change in the bone after three or four days. Use tongs to remove the bone from the beaker. Rinse the bone in water for one minute before allowing students to twist and bend the bone. (The calcium will leave the bone, and it will become flexible; only the bone cells and bone collagen will be left behind. This shows students that calcium is essential for building strong bones.)
4. (1 minute) Ask students whether they think the following statement is true or false:

   Bones are alive and growing! They completely replace themselves every seven years. *(Answer: True.)* Do not discuss students' opinions about the question until after they have read student resource 20.1, Filling Your Calcium Bank.
5. (5-10 minutes) Have students read student resource 20.1, Filling Your Calcium Bank. Have them put a check mark next to the foods they think are good sources of calcium. *(Answers: Milk, yogurt, cheese, spinach, broccoli, tofu)*
6. (5 minutes) Discuss their answers to the true/false question posed in step 4. Use this as an opportunity to introduce or review the concept of homeostasis—the idea that organisms must maintain the concentrations of certain chemicals within very narrow limits despite changing external conditions. For example, blood concentrations of calcium, oxygen, and sugar may fluctuate, but they always remain within a narrow range in healthy people. For the heart to beat normally, the calcium concentration of

the blood and tissues must be maintained within narrow limits. The body draws on calcium stored in bones to help maintain a relatively constant internal environment when the diet is low in calcium.

7. (5 minutes) Go over which foods are good sources of calcium. Make sure students understand what is meant by weight-bearing exercises. Mention some other lifestyles (habits) that increase or decrease calcium deposits in the bones. (See Teacher Resources.)
8. (5 minutes) Put students into groups of five or more. Tell them that they will play a game to help them learn more about calcium in a fun way. Pass out the necessary supplies to each group: scissors for cutting out the bone models, two copies of the bone models, and copies of activity 20.1, Building a Strong Skeleton: The Rules of the Game.
9. (5-10 minutes) Go over the rules of the game. Make sure everybody understands the rules.
10. (5-10 minutes) Have students cut out the bone models.

Day 2

1. (5 minutes) Ask someone to summarize the game objective and the rules.
2. (1 minute) Display a human skeleton or an overhead transparency of the skeleton on page 274. Let students study the correct arrangement of bones for about one minute.
3. (5 minutes) Have students get into their groups and set up the game. Ask the group to choose one person to be the master of ceremonies for their group.
4. Pass out the answer key and skeleton to the master of ceremonies in each group.
5. (15 minutes) Have students play the game.
6. (2-3 minutes) Have students display their skeleton models for the rest of the class.

ACTIVITY 20.2: IRON "TOONS"

1. Point out the goals of the lesson:
   - To recognize that iron is one of the 100 elements found in nature that combine to make up living things
   - To describe the functions of iron in the body
   - To become familiar with some foods that are excellent sources of iron
   - To discuss the possible negative effects of a lack of iron
   - To create a comic strip that depicts the role of iron in the body
2. (5 minutes) Hand out activity 20.2, Iron "Toons." Have students read the top of the sheet.
3. (5 minutes) If possible, show students an object made of iron. Help your students make connections with the physical, or earth, science units you have already taught. If your class has studied the periodic table, have students locate iron on the periodic table and determine its physical and chemical properties based on its location and their previous knowledge. If your class has studied minerals, use this as an opportunity to review the properties of minerals and give some examples of minerals that contain iron. See the Teacher Resources for background material to help make these connections.
4. (5 minutes) Discuss the reading. Ask students the following:
   - Why do we need to ingest this mineral? What is iron's job in our bodies?
   - What happens if you don't get enough iron?
   - What are some examples of foods that are high in iron?

Use this as an opportunity to illustrate the interactions among organ systems; that is, the cardiovascular, respiratory, and muscular systems are all affected by anemia.

5. (3-5 minutes) Go over the instructions for making the comic strips.
6. (Time will vary) Have students begin their comic strips. They may need to finish them as homework.
7. Display students' comic strips and give students an opportunity to walk around and read them.

Extension Activities

1. Before the next class, have students check the calcium and iron content of some foods they see at home or in stores. Have them bring some labels to class and make a collage of the labels from foods that provide good supplies of these minerals.
2. Ask students to write a rap song, poem, or advertising "jingle" describing the importance of iron or calcium. Have them share it with the class.
3. Give students the following scenario: Your grandmother decides that she wants to retire and build a house on the moon. However, her doctor will not sign the medical release form she needs for space travel. He says the trip will aggravate her osteoporosis. Ask them to explain to their grandmother why she should remain living on earth and to give her advice on how she can strengthen her bones.

Teacher Resources

SPECIFIC BACKGROUND INFORMATION: CALCIUM (ACTIVITY 20.1)

What is a mineral?

A mineral is a solid homogeneous crystalline chemical element or compound that results from the inorganic processes of nature.

What is calcium?

Calcium is a metallic element, one of the 100 naturally occurring elements found in nature that combine to make up living and nonliving things. It is the fifth most abundant element in earth's crust and is the most common metal in many animals. It does not occur free in nature, but instead combines with other elements to form minerals. It is found mostly in soil as limestone, gypsum, and fluorite and in stalagmites and stalactites as calcium carbonate. Plants extract calcium from the soil, and humans and animals consume the plants. Calcium is one of the dietary macrominerals—minerals needed by the human body in high quantities (more than 100 milligrams per day). In animals, calcium combines with phosphate to form hydroxylapatite, the mineral portion of bones and teeth.

On the periodic table, calcium has the following characteristics:

- Symbol: Ca
- Atomic number: 20
- Atomic weight: 40.078
- Group number: 2
- Group name: Alkaline earth metal

Calcium has the following physical and chemical properties:

- Appearance: silvery white
- Standard state: solid; crystalline
- Classification: metal
- Forms inorganic compounds and minerals
- Forms a white coating of nitride in the air
- Reacts with water
- Burns with a yellow-red flame

Information on calcium is available at www.webelements.com.

Functions of Calcium in the Body

Calcium plays an important role in the following:

- Bone and tooth growth, development, and structure
- Muscle contraction and relaxation
- Nerve functioning
- Reduction of blood clotting
- Reduction of blood pressure
- Immunity to disease and infection

Calcium Requirements for Adolescent Boys and Girls

Nutrition experts recommend 1,300 milligrams of calcium daily for 9- to 18-year-olds. To meet this recommendation, they should consume three servings of milk or milk products each day and a combination of foods rich in calcium (see the following table, Food Sources of Calcium).

Vitamin D helps us absorb calcium from the foods we eat. Without enough vitamin D, our bodies take calcium from our bones. The recommended daily intake of vitamin D is 5 micrograms. We can get vitamin D from two sources: (1) the sun and (2) our diet. (Our skin makes vitamin D when we are exposed to direct sunlight.) Fortified dairy products, egg yolks, saltwater fish, and liver are good sources of vitamin D.

Other facts about calcium:

- Dairy foods contribute 70 percent of the calcium intake in the United States.
- Dairy products and tofu are the best source of bio-available calcium in the diet. Plants considered high in calcium often contain oxalates and phylates that inhibit the absorption of calcium in the body. However, calcium is well absorbed from kale and broccoli.
- The following provide the same amount of calcium as 1 cup of milk: 8 cups of spinach, 2 1/4 cups of cooked broccoli, 5 cups of red beans, or 2/3 cup of tofu.
- Calcium-fortified products, such as orange juice and cereal bars, are also good sources of calcium, especially for people who don't like dairy products.
- An 8-ounce (250-milliliter) glass of calcium-fortified orange juice provides 35 percent of the daily recommendation for calcium. An 8-ounce (250-milliliter) glass of milk provides 30 percent of the recommended amount.

Food Sources of Calcium

Food	Serving size	Calcium (mg)	Food	Serving size	Calcium (mg)
Dairy			**Meat**		
Yogurt, plain, low fat	1 cup	400	Tofu, raw, firm	1/2 cup	258
Swiss cheese	1.5 oz (45 g)	408	Sardines, canned with bones	3 oz (90 g)	321
Cheddar cheese	1.5 oz (45 g)	306	Almonds, dry roasted	1 oz (30 g)	80
Skim milk	1 cup	302	**Green vegetables**		
Ice cream, hard, 10% fat	1/2 cup	85	Spinach, fresh, cooked	1/2 cup	122
Grains			Okra, frozen, cooked	1/2 cup	88
Waffle	7 in. (18 cm)	171	**Combination foods**		
Biscuit	1	58	Lasagna	2 1/4" × 2 1/4"	460
Cereal bar, calcium fortified	1	200	Pizza, cheese	2 slices	277
Fruit					
Orange juice, calcium fortified	8 oz (250 ml)	350			

Lactose Intolerance

Some people have difficulty digesting dairy products. These people lack the enzyme lactase, which is needed to break down the milk sugar lactose. When these people consume milk, they experience cramping, bloating, gas, and diarrhea. This condition is called lactose intolerance. Most infants and children are capable of breaking down lactose, but as some people age, they lose the ability to make lactase.

An estimated 30 to 50 million adults in the United States are lactose intolerant. As many as 75 percent of all African Americans, Jews, Hispanics, and Native Americans and 90 percent of Asian Americans are lactose intolerant. However, most Northern Europeans and some African tribes and Mediterraneans and their descendants produce sufficient quantities of lactase.

The severity of lactose intolerance varies from person to person. Most affected people can eat yogurt, hard cheeses, and milk that has been treated with commercially available lactase. Many can even drink small quantities of regular milk. Calcium-fortified foods, tofu, soybeans, broccoli, and kale are also good sources of calcium for lactose-intolerant people.

Are Calcium Supplements Necessary?

Calcium supplements may be necessary for people who are unable to consume milk and milk products. Likewise, they may be used as a part of therapy for osteoporosis. However, physiological risks (e.g., kidney stones and vomiting) are associated with consuming excessive

amounts of calcium (beyond 2,500 milligrams per day). Supplements beyond the suggested daily levels are not recommended.

Calcium Deficiency Signs, Symptoms, and Risk Factors

In adults, osteoporosis or osteomalacia can result from calcium deficiency. Bone loss can occur without symptoms.

Bone Formation

Calcium is continually being deposited in bones and reabsorbed from bones throughout life. In children and adolescents, a larger amount of calcium is deposited than is reabsorbed. However, after the age of 30, more calcium is reabsorbed than is deposited in bone, and bones become progressively less dense.

Almost 50 percent of bone mass is formed during teen years. Even when teenagers stop growing taller, calcium continues to be deposited in their bones, increasing bone density. If inadequate amounts of calcium are deposited, bones will be less dense, and the person will be more likely to develop osteoporosis or to suffer bone fractures later in life.

Vitamin D is also important for growing bones. In children, vitamin D deficiency produces rickets, a disease marked by bone weakness, bone fractures, and bowing of the long bones (commonly referred to as "bowed legs"). In adults, vitamin D deficiency leads to bone softening (a condition known as osteomalacia) that can also lead to fractures and deformities. Vitamin D deficiency is prevalent in otherwise healthy adolescents. One study of teens in Boston found that a quarter of them were vitamin D deficient. More recent studies indicate that low levels of vitamin D are linked to cancer.

- Peak bone mass is reached by age 30.
- An active lifestyle can save your bones! Regular exercise can help slow the rate your bones age. Active people have significantly greater bone mass than sedentary people. Researchers believe that bone behaves like a piezoelectric crystal, converting mechanical stress into electrical energy. When bone is mechanically stressed, the electrical charge created stimulates the activity of bone-forming cells, leading to a buildup of calcium (McArdle, Katch, and Katch, 1991).
- Weight-bearing exercises (activities that force you to work against gravity) such as walking, dancing, and jogging and activities such as weightlifting in which muscular force is generated against the long bones of the body are especially good at enhancing calcium deposits in the bone.
- Prolonged bed rest, as well as the zero-gravity conditions of space travel, weakens bones. The longer an astronaut stays in orbit, the more calcium leaches out of bones. On long missions, astronauts must follow rigorous exercise programs and special diets to help counteract this problem.
- Smokers and alcoholics are at a higher risk of bone fractures than are nonsmokers and those who don't drink or who drink in moderation.
- Underweight women and those with eating disorders are at a higher risk of fractures than women of average weight.
- At birth, humans have 300 bones. By the time adulthood is reached, the bones number 206, because some have fused.
- Half of all of the bones in the human body are in the hands and feet (Allison, 1976).

SPECIFIC BACKGROUND INFORMATION: IRON (ACTIVITY 20.2)

What Is Iron?

Iron is a metallic element, one of the 100 naturally occurring elements found in nature that combine to make up living and nonliving things. It is the most abundant metal on earth and the second most abundant element in the earth's crust. Iron generally exists as iron ore and rarely exists free in its elemental state. Iron is essential to all living

organisms, except for a few bacteria. Plants extract iron from the soil, and humans and animals consume the plants. It is one of the dietary microminerals—minerals needed by the human body in small quantities (less than 200 milligrams per day).

On the periodic table, iron has the following characteristics:

- Symbol: Fe
- Atomic number: 26
- Atomic weight: 55.845
- Group number: 8
- Group name: Transition metal

Iron has the following physical and chemical properties:

- Appearance: lustrous metallic with a grayish tinge
- Standard state: solid; crystalline
- Classification: metal
- Magnetic
- One of the least reactive metals

Information on iron can be found at www.webelements.com

Functions of Iron in the Body

Iron is essential for transporting oxygen around the body. It is part of hemoglobin and myoglobin:

1. Hemoglobin (a protein) is the oxygen carrier in red blood cells. One red blood cell has almost 300 million molecules of hemoglobin.
2. In muscles, myoglobin (a protein) makes oxygen available for cellular respiration (ATP production) in muscle cells.

Iron Requirements for Adolescent Boys and Girls

Under the age of 14, children need 8 milligrams of iron daily. Boys 14 and older require 11 milligrams per day; for girls 14 and older, 15 milligrams daily are recommended.

Food Sources of Iron

- Beef, pork, lamb, fish, poultry (especially dark meat), shellfish, eggs, liver, and other organ meats
- Legumes such as lima beans and green peas, and dry beans and peas such as pinto beans, black-eyed peas, and canned baked beans
- Dark green vegetables such as broccoli and kale
- Yeast-leavened whole wheat bread

Food Sources of Iron

Food	Serving size	Iron (mg)
Hamburger, lean, broiled	3.5 oz (100 g)	2.45
Liver, beef, braised	3.5 oz (100 g)	6.77
Chicken, thigh, roasted	1 thigh	0.83
Broccoli, boiled	1/2 cup	0.65
Baked beans	1 cup	3.60
Lima beans	1 cup	4.50

Are Iron Supplements Necessary?

Iron supplements may be needed by pregnant women or by people not consuming meat. Supplements should be discussed with your doctor. Iron supplements often cause side effects in the digestive system including nausea and constipation. More severe gastrointestinal side effects can occur with very high levels of intake (above 40 to 45 milligrams per day) in adolescents and adults.

Signs and Symptoms of Iron Deficiency

A lack of iron can affect us in many ways:

- The lack of oxygen transportation can reduce energy (ATP) production in cells, causing fatigue and reducing attention span.
- Iron deficiency reduces resistance to cold, lowers the ability to control body temperature, and can cause itchy skin.

Other Important Information

- Consuming small amounts of meat and foods rich in vitamin C in a meal greatly increases iron absorption.
- There is a greater need for iron during rapid growth periods, such as the adolescent growth spurt. However, not all adolescents get enough iron. Studies including children have suggested that a lack of iron may be associated with poor school performance, short attention span, and decreased immune function.

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McArdle, E., Katch, F., and Katch, V. 1991. *Exercise physiology: Energy, nutrition, and human performance,* 3rd ed. Philadelphia: Lea & Febiger.

Name _____

Student Resource 20.1

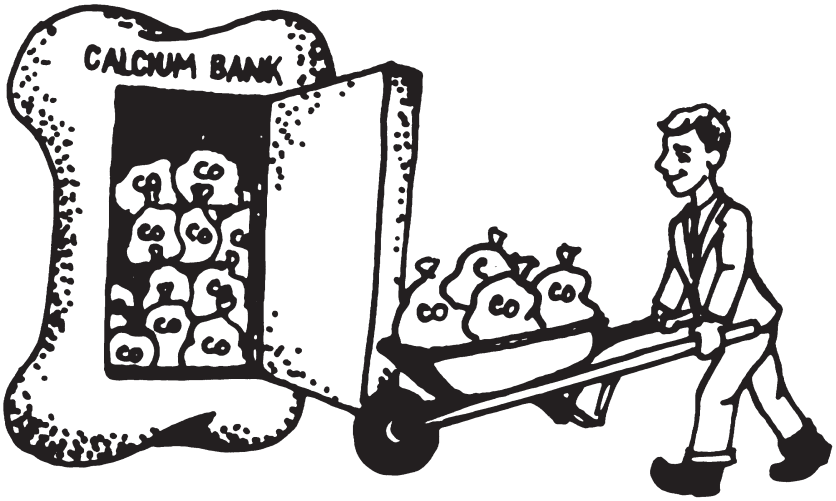
Filling Your Calcium Bank

Calcium's Value

Most people know that calcium is a mineral that helps build strong bones and teeth. But did you know that calcium also does the following:

- Helps your muscles contract and relax
- Helps your heart beat
- Helps your blood clot
- Helps your nerves send messages

So what happens if you don't supply your body with enough calcium to perform these important functions? Your body takes calcium it needs from your bones! Your bones act as a kind of savings account for calcium.



If your diet supplies enough calcium, your body deposits some in your bones.

If your diet is low in calcium, your body makes a withdrawal from your bones.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Filling Your Calcium Bank *(continued)*

Penalties for Not Keeping a Minimum Balance

A diet low in calcium has been linked to several health problems:

Osteoporosis, a crippling bone disease. Bones become so brittle that they break easily.

Bone loss in the jaw. This can lead to difficulty chewing, tooth loss, and poor-fitting dentures.

Hypertension. High blood pressure can lead to strokes and heart attacks in some people.

How to Make a Deposit

If you're like most Americans, you may not be getting all the calcium you need. To provide your body with enough calcium, you (9- to 18-year-olds) need to make daily "deposits" of 1,300 milligrams. Milk and other dairy products (yogurt and cheeses) offer the largest amount of calcium per serving. Three glasses of milk daily, together with other calcium-containing foods, will provide you with all the calcium your body needs. Calcium-fortified orange juice can provide about as much calcium as milk ounce for ounce. Tofu and small fish with bones, such as sardines, are also excellent sources of calcium. Kale, broccoli, and other green leafy vegetables are good sources of calcium, but they provide much fewer grams per serving than most milk products do.

Calcium supplements may be necessary for people who are unable to consume milk and milk products. Talk to your physician before taking a calcium supplement. There are no benefits for taking more than the recommended daily allowance of calcium. In fact, excess doses of calcium can interfere with the absorption of nutrients such as iron.

Weight-bearing exercises such as walking, dancing, and jogging also enhance calcium deposits in the bone and are critical during adolescence to build peak bone mass. During the teen years, people go through a growth spurt—almost 50 percent of bone mass is formed then! Even if you do not appear to be growing, your bones are still getting denser. If you deposit inadequate amounts of calcium, your bones will be less dense, and you will be more likely to develop osteoporosis or to suffer bone fractures later in life.

Problem

Put a check mark next to the foods in the following list that are naturally rich in calcium.

- ❑ Red meat
- ❑ Chicken
- ❑ Cheese
- ❑ Oranges
- ❑ Milk
- ❑ Tofu
- ❑ Broccoli
- ❑ Spinach
- ❑ Yogurt
- ❑ Apples

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 20.1

Building a Strong Skeleton: The Rules of the Game

Objective

To collect 10 human bones and assemble them correctly to form a skeleton.

Materials

- Two sets of the bone models
- One answer key
- Five (or more) people per group
- Scissors
- Tape

Setting Up the Game

1. Cut out the bone models.
2. Place them on a table so that the bone name is face up.
3. Decide who will be the master of ceremonies.
4. Form two teams.

Collecting the Human Bones

To collect a bone, a team must correctly answer the question on the back of the bone. The questions test your understanding of the role calcium and lifestyle play in building strong bones. Some questions ask students to name a food that is high in calcium. Others ask whether a particular lifestyle is likely to help deposit calcium in bones or remove calcium from bones. For example, "Does regular exercise help deposit calcium in bones or weaken bones by removing calcium from bones?" The master of ceremonies checks the answer key to see whether the team's answer is right or wrong. If they are right, they keep the bone. If they are wrong, the bone is left in play.

(Note: For the femur, humerus, fibula and tibia, radius and ulna, hands, and feet, only one question is required to obtain both right and left bones.)

Playing the Game

1. Flip a coin to see which team goes first.
2. Teams take turns choosing a bone to play for. A team is given 30 seconds to answer the question on the back of the bone. If the reply is correct, the team keeps the bone. If it is incorrect, the bone is turned back over, and the other team begins its turn.
3. The first team to collect all 10 bones is given 30 seconds to assemble the bones correctly. After 30 seconds, they must stop manipulating the bones until their next turn. If they are

(continued)

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Building a Strong Skeleton: The Rules of the Game

(continued)

unable to assemble the skeleton, or if they have made some mistakes, the master of ceremonies gives the competing team a chance to win another bone. The first team receives a second chance to assemble the bones correctly on their next turn.

4. The first team to collect all 10 bones *and* correctly assemble them to form a human skeleton wins the game.
5. Teams should tape their skeleton models together.

Master of Ceremonies

The master of ceremonies keeps time, allowing each team 30 seconds to answer the questions. He or she also checks the answer key to determine whether the response is accurate. If the response is incorrect, the master of ceremonies should *not* read the correct answer. The master of ceremonies also determines which team correctly assembles the skeleton first.

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Answer Keys

Building a Strong Skeleton: The Rules of the Game

Bone	Question	Answer
Ribs and vertebrae	Name a food that is high in calcium. (It must be one that has not been mentioned yet in this game.)	Milk, yogurt, cheddar cheese, pizza, lasagna, macaroni and cheese, salmon (canned with bones), dark green vegetables (such as kale and broccoli), some tortillas, and some tofu.
Left and right femur	How many glasses of milk would you need to drink to get a full day's supply of calcium?	Four (for 9- to 18-year-olds)
Left and right humerus	People who do not get an adequate supply of calcium when they are young are likely to develop _____	Osteoporosis or bone fractures
Left and right fibula and tibia	Watching TV is a habit that _____ bones. Explain.	Weakens bones. Sedentary activity increases the amount of calcium that leaves the bones.
Left and right radius and ulna	Living in outer space would _____ your bones. Explain.	Weaken your bones. Putting weight on your bones helps deposit calcium in them. In outer space there is very little gravity; therefore, there is not much stress on your bones, so calcium leaves bones.
Skull and vertebrae	Does bed rest strengthen bones or weaken bones? Explain.	Weakens bones. Weight-bearing exercise is needed to help deposit calcium in bones.
Pelvis, sacrum, and vertebrae	Name a habit that would withdraw calcium from your bones, weakening them. (It must be one that has not been mentioned yet in this game.)	Skipping meals, drinking alcohol, smoking cigarettes, watching TV, starving yourself to lose weight
Left and right hands	Name a habit that would help deposit calcium in your bones.	Eating a well-balanced diet, drinking four glasses of milk a day, regular exercise
Left and right feet	Which food group contains foods that have the most calcium per serving?	Dairy
Clavicle and scapula	Name one job that calcium does in your body besides build strong bones.	Helps muscles contract and relax, helps the heart beat, helps blood clot, and helps nerves send messages.

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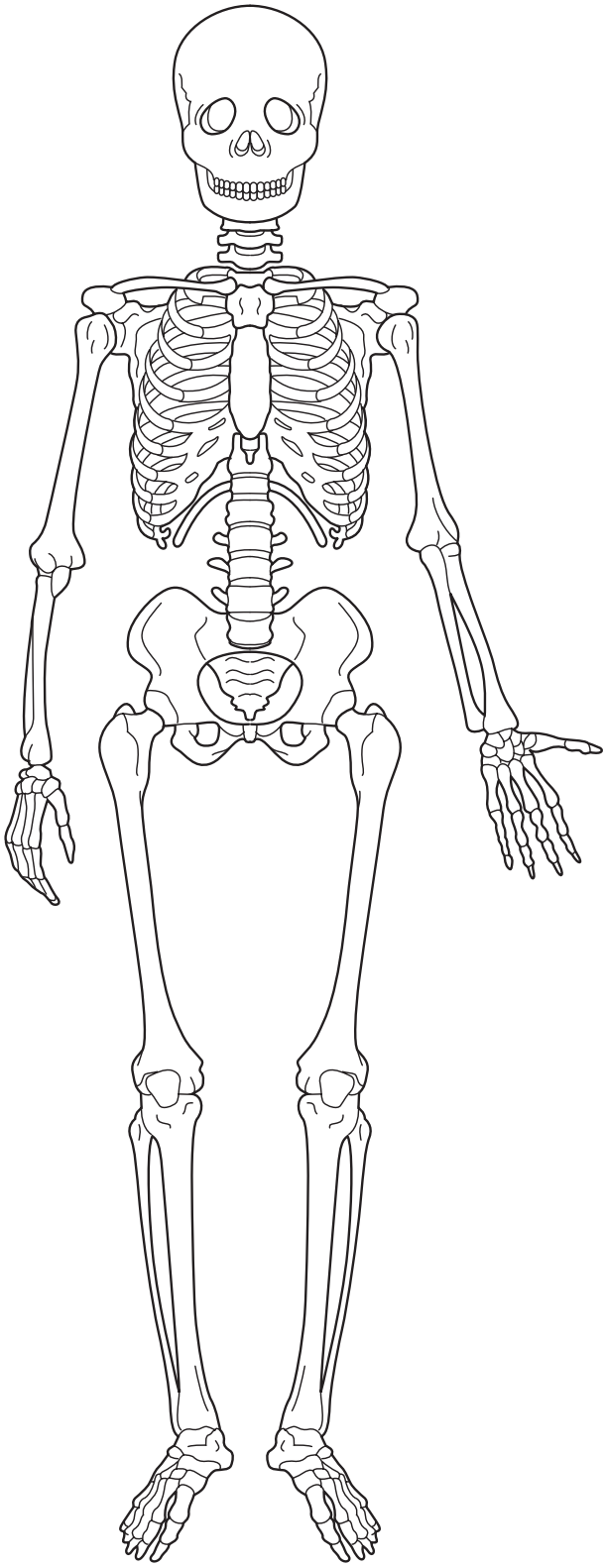
Answer Keys *(continued)*



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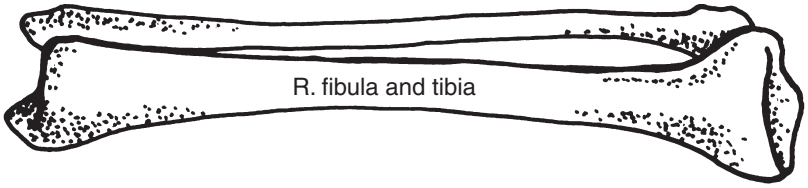
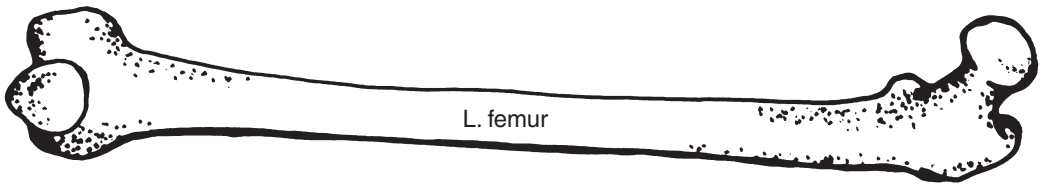
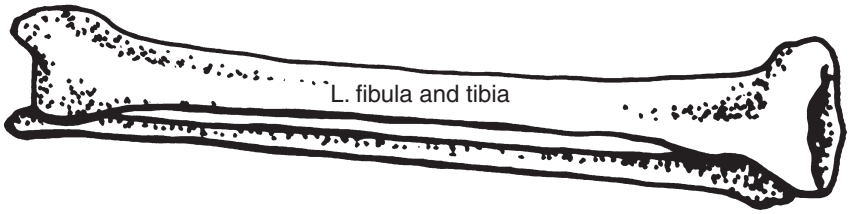
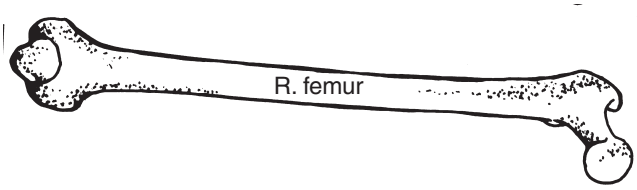
Activity 20.1

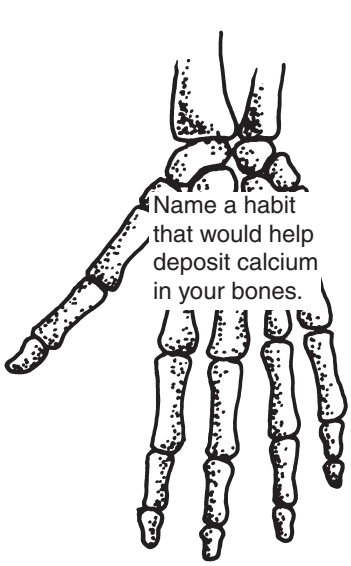
Bone Models

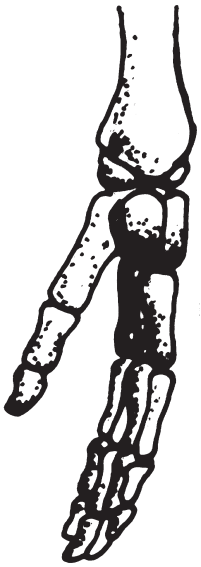












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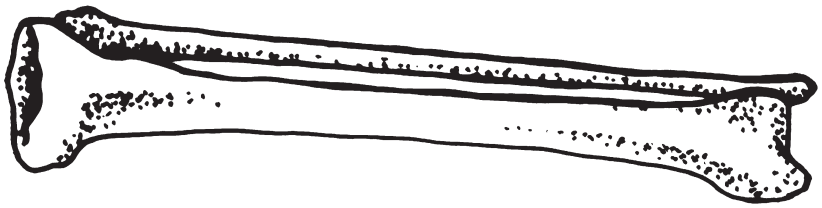
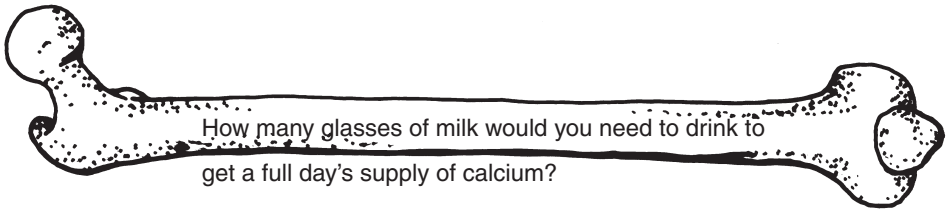
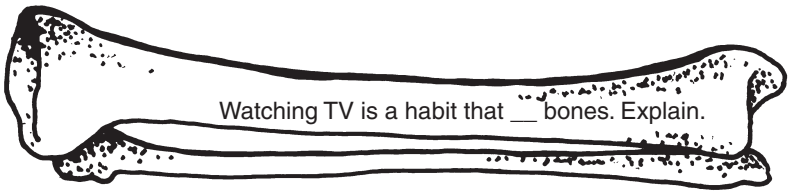
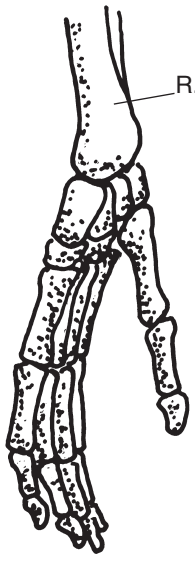
Bone Models *(continued)*

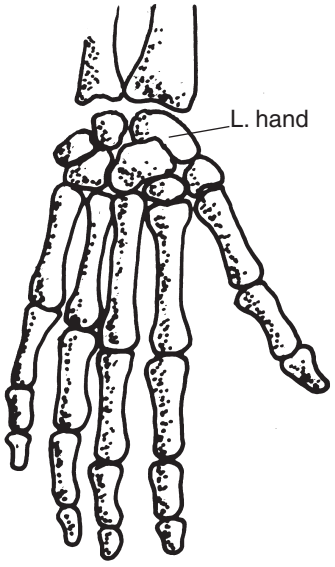
Activity 20.1











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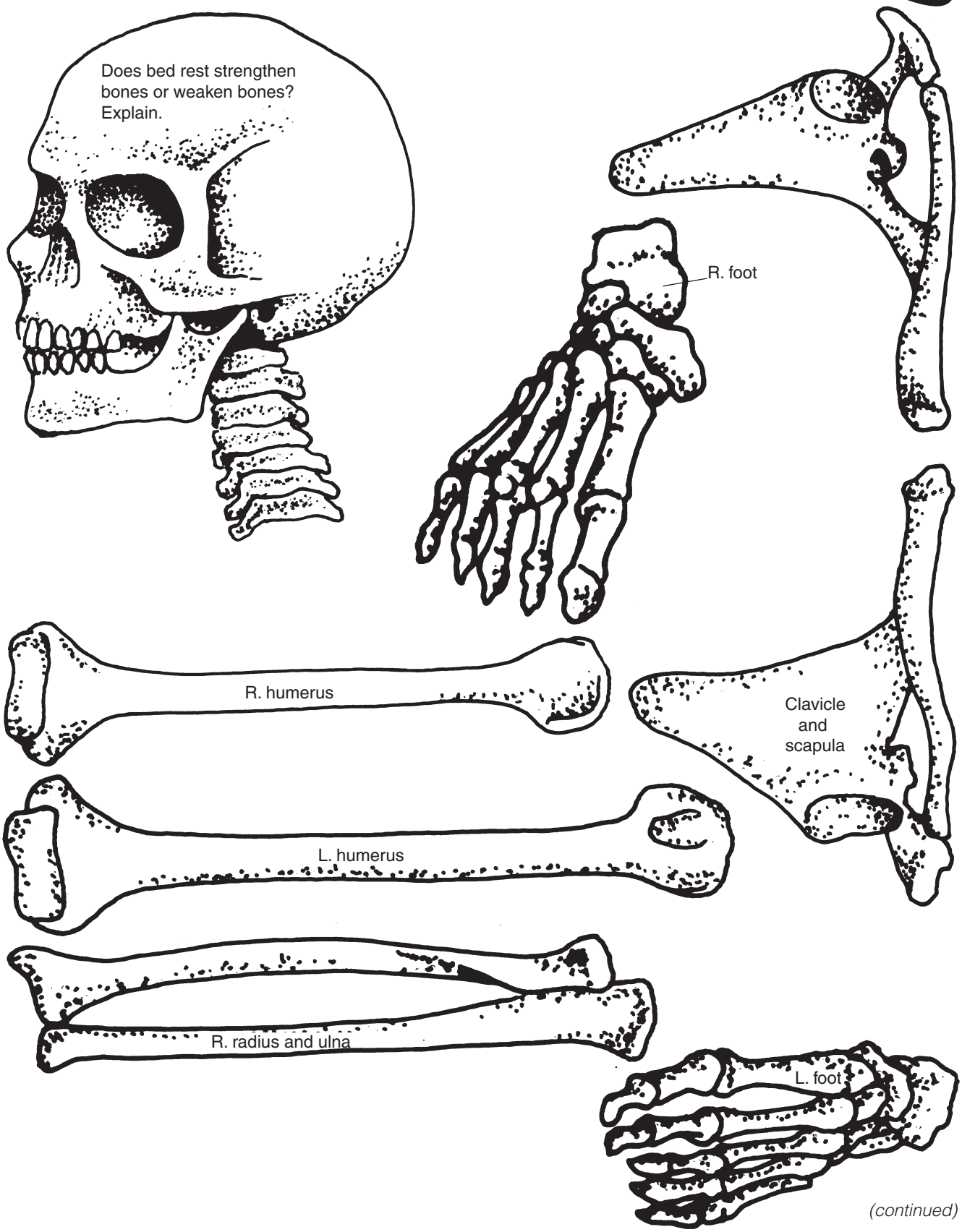
Activity 20.1

Bone Models *(continued)*



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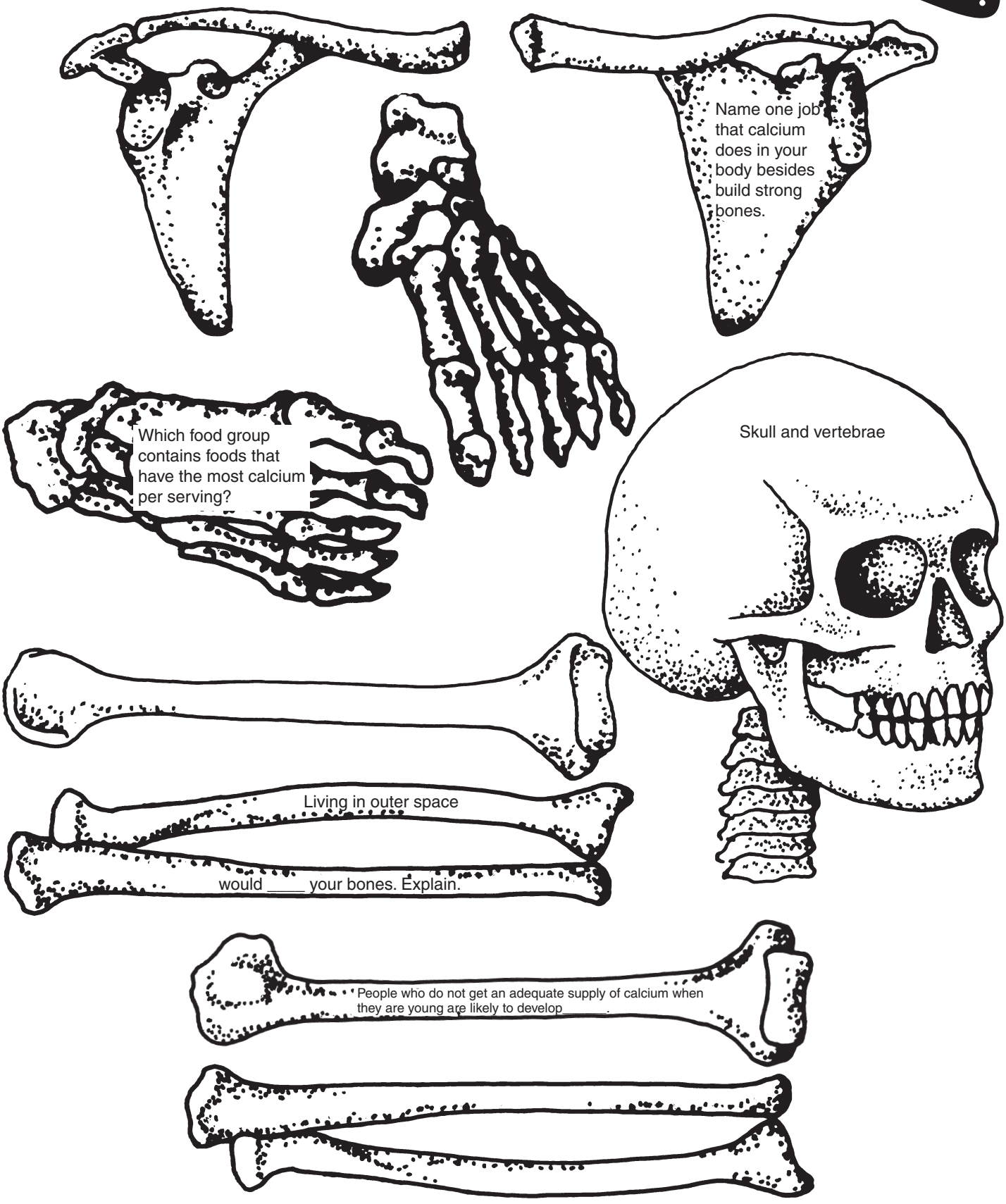
Activity 20.1

Bone Models *(continued)*



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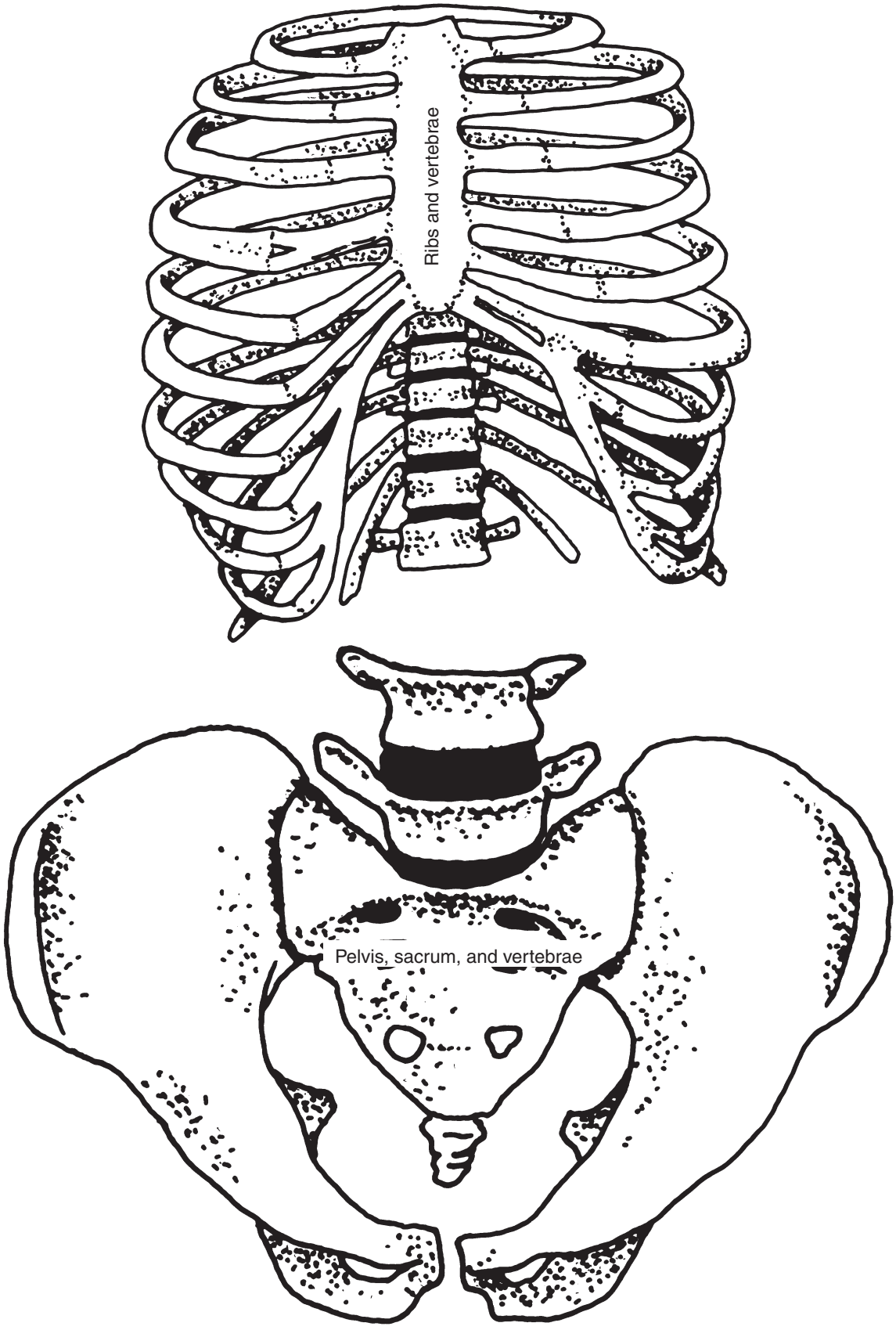
Activity 20.1

Bone Models *(continued)*



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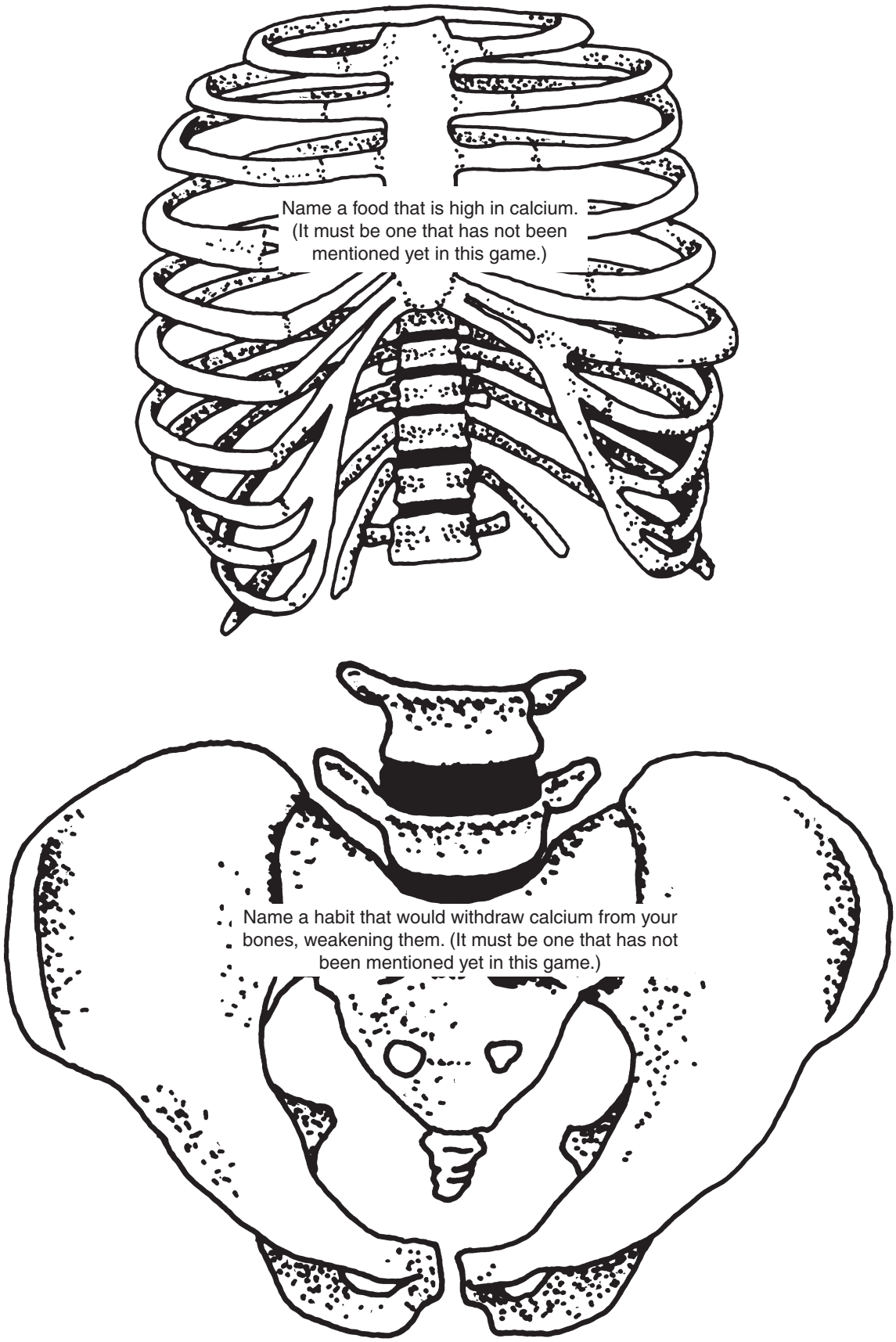
Activity 20.1

Bone Models *(continued)*



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Name _____

Activity 20.2

Iron "Toons"

Do I really need to eat iron? It's a metal.
Yes! Iron is an important part of every red blood cell in your body. Red blood cells are filled with an iron-containing protein called hemoglobin. Oxygen binds to the iron and is carried around the body inside red blood cells. Iron also plays a role in the immune system.

How much iron do I need?
Under the age of 14, children need 8 milligrams of iron daily. Boys 14 and older require 11 milligrams per day; for girls 14 and older, 15 milligrams daily are recommended. There is a greater need for iron during rapid growth periods, such as the adolescent growth spurt.

What foods are good sources of iron?
Lean meat and poultry; fish; leafy green vegetables from the cabbage family (broccoli, kale, and collards); dried beans and peas (pinto beans, black-eyed peas, and canned baked beans); and bread, pasta, rice, and cereals enriched with iron (iron is added during food preparation) are good sources of iron. Eating small amounts of foods rich in vitamin C in a meal greatly increases the amount of iron absorbed from food into the blood.

Are iron supplements necessary?
Pregnant women or people who do not eat meat may need to ingest iron in tablet form. Many vitamin supplements include iron. Supplements should be discussed with your doctor.

What happens if I don't eat enough iron?
A lack of iron makes it difficult for your red blood cells to carry enough oxygen to your cells. The lack of oxygen reduces energy production in your cells, causing you to feel tired and weak. Eventually your body produces too few red blood cells, a condition called anemia. Very low iron intake also reduces your resistance to colds and your ability to control body temperature and can cause itchy skin. Studies with children have suggested that a lack of iron may be associated with short attention span, poor school performance, and short stature.

Directions

Use the preceding information to make a comic strip that illustrates iron's job in the body. Use the following guidelines:

1. The comic strip must be at least four frames long.
2. Your story should include examples of food sources high in iron.
3. You must show what happens when not enough iron is eaten.
4. Helpful tips:
   - Red blood cells are disk shaped with dents in the middle. These cells flow through blood vessels.
   - The chemical symbol for iron is Fe.
   - The chemical symbol for oxygen is O_2.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 21

Fat Functions

Balanced Diet Theme

In this lesson students learn that fat is an essential nutrient needed by the human body, but that eating excess amounts of certain types of fat carries major health risks. Students conduct a scientific investigation on invisible and visible fat to help them understand dietary sources of fat.

This lesson is designed to infuse information about consuming fat in moderation into a classroom unit on the role of fat in the body.

Behavioral Objectives

- For students to understand the role of fat in the diet
- For students to choose foods low in saturated fat and containing no trans fat in foods

Learning Objectives

Students will be able to do the following:

1. Conduct a scientific investigation on invisible and visible fat
2. Use results of an experiment to form conclusions about fat in foods

Materials

- Butter; oil; stick margarine; a piece of cooked meat or poultry; hard-boiled egg; cooked beans; tofu; cheese; yogurt (not low fat); potato chips (regular, not low fat); cereal; cake, donut, or croissant (choose one); and some fruits and vegetables for demonstration. (Note: Be sure to include examples from each of the five food groups [fruits, vegetables, grains, dairy, and meats and beans] so that you have foods with saturated fat, unsaturated fat, trans fat, and no fat.)
- Brown paper bags or brown paper towels
- Activity 21.1, Understanding Visible and Invisible Fat
- Student resource 21.1, What's the Rap on Fat?
- Overhead transparency 21.1, Definitions (or handout or chalkboard)
- Overhead transparency 21.2, Role of Lipids (or handout or chalkboard)
- *Optional:* Extension activity 21.1, Fat Facts Word Scramble

Procedure

PRE-LAB PREPARATIONS

1. Assemble the following food items: butter; oil; stick margarine; cooked meat or poultry; hard-boiled egg (separate the yolk and white); cooked beans; tofu; yogurt (not low fat); cheese; potato chips (regular, not low fat); cereal; cake, donut, or croissant (choose one); and some fruits and vegetables. Be sure to include examples from each of the five food groups—fruits, vegetables, grains, dairy, and meats and beans.
2. Cut or break up the food.

LESSON PROCEDURE

1. (10 minutes) Have students read student resource 21.1, What's the Rap on Fat?
2. (10 minutes) Discuss the different types of fat (see the scientific terms in Teacher Resources) and discuss the importance of fat in the body. (Use overhead transparencies 21.1 and 21.2 or the chalkboard.)
3. (5 minutes) Show students the liquid oil and stick margarine to reinforce how the process of hydrogenation turns liquid oils into solid form. Ask students to tell you which form is more likely to cause problems with blocked arteries (refer them to student resource 21.1). *(Answer: Solid fat tends to raise cholesterol, promotes fatty deposits on the artery walls, and thus increases the risk for heart disease. Liquid oils tend to lower cholesterol and can help to lower the risk for heart disease. Remind students that heart disease is something that begins developing now, during the teen years, so the foods they choose now are important for their lifelong health.)*
4. (5 minutes) Discuss problems associated with consuming excess fat. *(Answer: Consuming too many calories as fat can lead to developing chronic diseases such as heart disease and some cancers. Consistently consuming too much total fat also makes it difficult to maintain a healthy weight because it tends to push up total calorie intake.)*
5. (5 minutes) Put students into groups of four or five. Distribute activity 21.1, Understanding Visible and Invisible Fat. Assign two or three foods to each group.
6. Have students make predictions about whether their assigned foods contain fat. What will happen to the towel or bag and why?
7. Ask students to place food on a brown paper towel or a brown grocery bag.
8. After 10 minutes, remove food and let the paper dry. (You may want to have students work on extension activity 21.2, Fat Facts Word Scramble, during this time.)
9. If the paper has dried and there is enough time before the end of the class period, have students record their observations. Otherwise, save the papers and have them record their observations the following day.
10. (10 minutes) In the next class, have students present the results of their experiment to the class. Record the class results on the chalkboard. Have students record the results and answer the conclusion questions.
11. (10 minutes) Observations and conclusions. Discuss the results of the experiment:

    After the paper is dried up, those that contained the cereal, tofu, beans, egg white, and fruit or vegetable pieces should not have any fat stains on them. The papers that contained the butter or oil, meat, egg yolk, cheese, potato chips, cake, donuts, and croissant should have fat stains on the areas where the foods were kept. The stains may have even extended beyond the areas. These foods contain fat. Fat does not evaporate like the water found in the fruits and vegetables.

    Most fruits and vegetables do not contain any fat and therefore do not leave a stain. (Olives and avocados are examples of fruits that do contain fat.) But cheese, meats,

and bakery goods have invisible fat, and therefore leave a stain that is similar to the stain left by butter, which is visible fat.

Fat is an essential nutrient. Primarily found in meat, dairy, nuts, and seeds, fat also occurs naturally in some fruits, such as coconuts and avocados. Sometimes the brown paper bag test does not show the fat contained within the food. That is why it is necessary to read labels to find fat sources.

Not all fat is created equal! Labels list not only the total fat grams, but the grams of saturated fat and trans fat as well. Be aware that a nutrition label can list 0 grams of trans fat and still contain up to 0.49 grams of trans fat. Read the ingredients list to detect whether partially hydrogenated vegetable oils or shortening are contained in the product. If so, avoid that product. Unsaturated fat is healthier for our bodies than saturated fat or trans fat, which tend to raise blood cholesterol and increase the risk of developing heart disease. The paper bag test does not demonstrate the differences among trans fat, saturated fat, and unsaturated fat. They will appear the same. This is why it is necessary to read labels.

Cholesterol is found only in foods of animal origin. Dietary cholesterol may also raise blood cholesterol, but not nearly as much as saturated fat. That is why coconut oil (mostly saturated fat) is less healthy than other oils, even though it has no cholesterol.

12. (5 minutes) Review key points from the lesson:
    - Fat plays a major role in the body. However, too much, as well as too little, fat in the diet can result in health problems.
    - We should make sure our diets contain mostly healthy unsaturated fat from fish and plant sources, with lower amounts of saturated fat and no trans fat.

Extension Activities

Choose one of the following:

1. Ask students to write six to eight sentences in answer to the following questions: Why does too much saturated or trans fat in our diet result in health problems? Is the total amount of fat important?
2. Use extension activity 21.2, Fat Facts Word Scramble, as a homework assignment or as needed during the lesson.
3. Have students choose three to five foods at home and repeat this experiment. Instruct them to find out from labels or other resources how much fat is in a serving of each of the foods they tried.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans* (see appendix A)
- A Balanced Plate for Health (see appendix A)
- Washington State Dairy Council "Fat: Where It's At" (see appendix A)
- Student resource 13.2, How Much Fat Is OK? (pages 196)

SPECIFIC BACKGROUND MATERIAL

- **Lipid.** The scientific term for fat. Lipids include dietary fat and oils. Whereas fat is solid at room temperature, most oils (excluding coconut) are liquid at room temperature. Fat provides 9 calories per gram.

- **Visible fat.** Fat you can see. This includes the fat we add to food, use for cooking, spread on toast, or use in salad dressings: butter, margarine, oils, lard, drippings, and so on. This category also includes the fat that you can trim from meat.
- **Invisible fat.** Fat that is present in food that may be invisible to the eye. This includes fat in meat, poultry, fish, eggs, dairy products, sweets, and baked goods.
- **Saturated fat.** Fat contained in animal products such as high-fat dairy products (whole milk, butter, cream, ice cream, cheese), fatty fresh and processed meats, and lard, and in palm and coconut oil. This type of fat is generally solid at room temperature. Eating foods high in saturated fat raises blood cholesterol levels. Eating saturated fat in excess over time can increase the risk of developing heart disease. Nutrition experts recommend eating a diet low in saturated fat (10 percent of calories or less).
- **Unsaturated fat (polyunsaturated and monounsaturated).** Fat or oil contained in plant products such as vegetable oils (olive, canola, corn, peanut, soybean), most nuts, olives, and avocados, and in fatty fish such as salmon. This type of fat is generally liquid at room temperature. Eating unsaturated fat does not raise blood cholesterol levels and, therefore, does not contribute to heart disease. In fact, some oils may lower LDL cholesterol (the "bad" cholesterol) and raise HDL cholesterol (the "good" cholesterol), thus decreasing the risk of developing heart disease. Some evidence indicates that omega-3 fatty acids, an unsaturated fat found in salmon, tuna, and mackerel, may protect against heart disease.
- **Trans fatty acids.** Vegetable oils that have been converted from liquids into solids by a commercial process called hydrogenation. Trans fat is commonly called partially hydrogenated vegetable oils on ingredients lists. Solid margarines, shortenings, commercially fried foods, many crackers, and bakery goods are high in this type of fat. To identify this type of fat, check the ingredients lists on packaged foods such as cookies and crackers. Avoid varieties made with partially hydrogenated vegetable oil. Choose margarines with liquid oil as the first ingredient. If eaten in excess over time, foods high in trans fat can increase the risk of developing heart disease.

  One special type of unsaturated fat—omega-3 fat—is actually good for heart health and can be found in fatty fish (e.g., salmon and sardines) as well as some nuts and vegetable oils.
- **Dietary cholesterol.** Lipids (sterols) found only in animal products. Liver and other organ meats, eggs, and high-fat dairy products are high in cholesterol. Eating an excess of these foods increases blood cholesterol levels and can contribute to heart disease. Recent research indicates that people with normal blood cholesterol levels can eat an egg a day without increasing their risk of developing heart disease.

For a discussion of the different types of dietary fat, see student resource 21.1, What's the Rap on Fat?

Role of Lipids in the Diet

- Fat and oils add flavor, aroma, and texture to food.
- Lipids provide a feeling of fullness because they remain in the stomach longer than carbohydrate and protein and take longer to digest than other nutrients.
- Dietary fat is essential for the absorption of fat-soluble vitamins A, D, E, and K. Taking supplements of fat-soluble vitamins without eating any fat will not help prevent deficiencies of these vitamins.
- Fat is a major source of energy. Whereas 1 gram of carbohydrate and 1 gram of protein provide 4 calories each, 1 gram of fat provides 9 calories.

Role of Lipids in the Body

- Lipids include essential fatty acids (EFA). Humans can't synthesize these and therefore need to obtain them through the diet. Essential fatty acids are needed for normal

tissue function throughout the body. Deficiency syndromes can develop if they are missing from the diet.

- Fat helps the body maintain its temperature. About one-half of the fat in the body is deposited just under the skin. This provides a layer of insulation to protect against changes in external temperature.
- Fat serves as a cushion for major organs such as the heart and kidney. These body organs are surrounded by fat, which holds them in place and also protects them from injury. For this reason, the fat stores next to the vital organs are the last to be used for energy in times of need.
- Increases in the percentage of body fat are linked with development changes in females. Girls start menstruating and mature sexually after they have achieved a certain amount of body fat. If they do not have enough body fat, they may start menstruating late. Also, if a woman loses a lot of weight, she may stop menstruating.
- Some lipids are important hormone precursors.
- Phospholipids are the major component of all cell membranes in the body.
- Cholesterol is a lipid that helps transport fatty acids in the blood.

What's the chemical difference between saturated and unsaturated fat?

Food contains many types of lipids (triglycerides, cholesterol, phospholipids). Saturated and unsaturated fat are triglycerides. Triglycerides are composed of a glycerol molecule and three fatty acids. Fatty acids are classified as saturated (lacking double bonds between carbon atoms), monounsaturated (containing a single double bond), or polyunsaturated (containing more than one double bond). Hydrogenation is a commercial process that adds hydrogen to some of the double bonds in poly- and monounsaturated fatty acids, making them more like saturated fat. In addition, some of the remaining double bonds are converted from the *cis* to the *trans* form. Triglycerides are the most concentrated source of energy in the diet (9 calories per gram).

Problems Associated With Excess Unhealthy Fat Intake

- Habitual fat intake in excess of physiological needs increases risk for chronic disease in adulthood. This risk can begin in the teen years or earlier.
- Excess saturated and trans fat consumption can cause blocked arteries and the development of heart disease as well as certain cancers in adult years.
- Atherosclerosis, the process of fatty substances building up in arteries, begins early in life.

What Are the Recommendations for Fat Intake?

The U.S. *Dietary Guidelines* recommend that children and adolescents consume a range of 25 to 35 percent of calories from total fat and no more than 10 percent of calories from saturated fat. The saturated fat allowance is part of the total fat allowance. Individual foods can have higher or lower percentages of calories from fat. It's the balance within the total diet that is important.

Recommended fat intake:

- **Girls 11 to 14 years old.** Active girls can have about 65 grams per day (30 percent of 2,000 calories) with 20 or fewer grams of saturated fat.
- **Boys 11 to 14 years old.** Active boys can have about 80 grams per day (30 percent of 2,400 calories) with 25 or fewer grams of saturated fat.

Answer Key

EXTENSION ACTIVITY 21.1

Why does too much saturated or trans fat in our diet result in health problems? Saturated fat and trans fat raise the amount of cholesterol in the blood, increasing the risk for heart disease. Is the total amount of fat important? Yes—because a diet too high in total fat is also likely to be high in saturated, and possibly trans, fat.

EXTENSION ACTIVITY 21.2

1. FAT is SOLID and OILS are LIQUID at room temperature.
2. Oils, butter, and margarine are examples of VISIBLE fat.
3. Lipids are made up of FATTY ACIDS and GLYCEROL.
4. One gram of fat provides NINE calories.
5. Lipids include ESSENTIAL fatty acids, which prevent FLAKING and DRYING of the SKIN.
6. When in food, fat adds FLAVOR, TEXTURE, and AROMA to the food.
7. Body fat serves as a CUSHION for the major organs such as the heart and the kidneys.
8. Body fat provides a layer of INSULATION to protect the body from changes in the outside temperature.
9. Consuming EXCESS saturated fat can result in HEART problems as an adult.
10. Define visible and invisible fat. (See Teacher Resources.)

Definitions

Lipid. The scientific name for fat, oils, hormones, cholesterol, fat-soluble vitamins, phospholipids, and other chemicals that do not dissolve in water.

Visible fat. Fat you can see; includes fat we add to food, such as butter, margarine, oils, lard, and drippings, and fat that you can trim from meat.

Invisible fat. Fat that is present in food that may not be visible to the eye, including the fat in meat, poultry, fish, eggs, dairy products, sweets, and baked goods.

Saturated fat. Fat contained in animal products such as high-fat dairy products (whole milk, butter, cream, ice cream, cheese), fatty fresh and processed meats, and lard, and in palm and coconut oil. This type of fat is generally solid at room temperature.

Unsaturated fat (polyunsaturated and monounsaturated). Fat (or oil) contained in plant products such as vegetable oils (olive, canola, corn, peanut, soybean), most nuts, olives, and avocados, and in fatty fish such as salmon. This type of fat is generally liquid at room temperature.

Trans fatty acids. Vegetable oils that have been converted into solids by a commercial process called hydrogenation. Trans fat is commonly called partially hydrogenated vegetable oils on ingredients lists. Solid margarines, shortenings, commercially fried foods, many crackers, and bakery goods are high in this type of fat.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Role of Lipids in the Diet

- Add flavor and texture to food.
- Provide a feeling of fullness.
- Essential for the absorption of fat-soluble vitamins, such as A, D, E, and K.
- Provide major source of energy.

Role of Lipids in the Body

- Fatty acids are essential for normal body function.
- Stored body fat helps the body maintain its temperature.
- Stored body fat serves as a cushion for major organs such as the heart and the kidneys.
- Every cell membrane is made up of phospholipids.
- Lipids give the body shape.
- Some lipids are necessary for hormone production.
- Cholesterol is a lipid that helps transport fatty acids in the body.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Student Resource 21.1

What's the Rap on Fat?

Not All Fat Is Created Equal

Your body uses fat for energy, to transport vitamins, to protect your organs, and to make hormones. Every cell in your body is surrounded by a membrane made of fat, or lipid, as scientists call it. Fat gives your body shape and insulates you from the cold. The bottom line is—you need to eat fat! But how much, and what kind?

Foods made from both animals and plants contain fat. This fat falls into two categories: saturated fat and unsaturated fat. Many animal products, such as fatty meat, whole milk, butter, and lard, are high in saturated fat. This kind of fat is typically solid at room temperature. Eating too much saturated fat increases your risk of developing heart disease, so try to build your daily menu around foods that are low in saturated fat (grains, fruits, and vegetables). Choose low-fat dairy products and lean cuts of meat, and go easy on snacks made with butter and eggs (cookies and cake). Think of high-saturated-fat foods as "sometimes foods."

To lower your intake of saturated fat, do the following:

- Cook with vegetable oils instead of butter.
- Trim fat from meat and take the skin off poultry.
- Choose fat-free or low-fat milk, yogurt, and cheese.
- Limit processed meats such as sausage, salami, and hot dogs.
- Limit creamy sauces.
- Check food labels. Choose foods lower in saturated fat.

Most of the fat you eat should be unsaturated, because this type of fat does not contribute to heart disease. Most plant fat, or oil, is unsaturated fat and is generally liquid at room temperature. Unsaturated fat can be further categorized as mono- (meaning "one") and poly- (meaning "many") unsaturated fat based on the number of double bonds in its chemical structure. Fish, vegetable oils (such as olive, canola, corn, and peanut oil), most nuts, olives, and avocados are good sources of unsaturated fat. However, eating too much fat of any type may not be healthy, so try to stay within the recommended range of 25 to 35 percent of calories.

Exceptions to the Rule!

Not all plant fat is healthy! Through a commercial process called hydrogenation, healthier liquid fat can be converted into a solid called trans fat (also called partially hydrogenated vegetable oil). This is how some margarines are made. Not surprisingly, foods high in trans fat also have been found to increase the risk of heart disease. To avoid trans fat, check the ingredients list on packaged foods such as cookies and crackers. Avoid varieties made with partially hydrogenated vegetable oil. Also look out for coconut oil and palm oil because these oils are naturally high in saturated fat.

Not all animal foods are high in saturated fat. Some ocean fish (salmon and tuna) are high in a polyunsaturated fat called omega-3 fatty acid that may protect against heart disease. So try to eat fish at least once a week.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 21.1

Understanding Visible and Invisible Fat

Procedure

1. Place food items on a brown paper bag or paper towels. Write the name of the food on the bag.
2. Let the food sit on the paper for 10 minutes.
3. Record your predictions (what you think will happen) on the following table.
4. Remove the food and let the paper dry. (You may need to leave these to dry overnight.)
5. Record your observations. Describe any stains left on the paper.
6. Exchange your results with other members of the class.

Results

Food item	Description of food item	Prediction of stain on the paper after 30 minutes	Description of stain on the paper after 30 minutes	Observations (quantitative)
Example: orange slice	*Wet pulp, bumpy skins with soft white seeds*	*Small orange juice stain*	*No stain*	*14 cm × 6 cm × 10 cm, 4 seeds*
1.				
2.				
3.				
4.				
5.				
6.				
7.				

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Understanding Visible and Invisible Fat *(continued)*

Conclusions

Use the entire class's data to answer the following questions.

1. Which food items contained fat?

2. Of these foods, which are likely to be high in saturated fat? In trans fat?

3. If you compare the foods tested to the Balanced Plate for Health (see appendix A), which food groups contain fat?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Extension Activity 21.1

Fat Facts Word Scramble

Unscramble the letters to review some terms related to fat.

1. TAF is DOSIL and LIOS are QLIIDU at room temperature.

2. Oils, butter, and margarine are examples of IIBVESL fat.

3. Lipids are made up of TTFAY DISAC and LLGRYECO.

4. One gram of fat provides NNEI calories.

5. Lipids include SSEETNLIA fatty acids, which prevent GNIKALF and GNIDRY of the NISK.

6. When in food, fat adds OVRALF, EETTXUR, and MRAOA to the food.

7. Body fat serves as a CHNSIOU for the major organs such as the heart and the kidneys.

8. Body fat provides a layer of TINALIONSU to protect the body from changes in the outside temperature.

9. Consuming SESCXE saturated fat can result in TRHEA problems as an adult.

10. Define visible and invisible fat.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 22

Smart Snacks

Balanced Diet Theme

This lesson teaches students the importance of healthy snacks in the diet. The fast growth of adolescents makes snacks vital to maintaining a suitable energy balance. However, many snack foods are high in unhealthy fat (such as trans fat), added sugar, and salt, and low in other nutrients needed for health. The lesson makes students aware of food labels and how to read them and offers some options for healthy snack choices. Reading food labels is an effective way to compare the content of fat and other nutrients, sugar, and salt in different snack foods. By replacing some snacks with healthier choices, we are still able to eat "sometimes foods" occasionally.

Behavioral Objective

For students to learn to read food labels so they can choose healthy snack foods

Learning Objectives

Students will be able to do the following:

1. Understand food label components
2. Use food labels to compare and contrast the fat content of foods
3. Explain why it is important to choose healthy snacks
4. Identify healthy snacks

Materials

- Overhead transparency 3.1, A Balanced Plate for Health (see page 78, or use chalkboard)
- Student resource 22.1, Reading Food Labels
- Activity 22.1, Be Fat Wise
- Activity 22.2, Analyzing Food Labels
- *Optional:* Food labels from home
- *Optional*: Student resource 21.1, What's the Rap on Fat? (from lesson 21, page 290)
- *Optional*: Extension Activity 22.1, Graphing Unhealthy Fat in Foods

Procedure

1. Point out the goals of this activity:
   - To discuss healthy snack options and the importance of eating healthy snacks
   - To learn to read and analyze food labels
2. (1-2 minutes) Have students make a list of their five favorite snack foods or beverages.
3. (2-3 minutes) Display overhead transparency 3.1, A Balanced Plate for Health. Have students identify the group to which each of their snack foods belongs. Write selected student snack examples in the appropriate food groups on the transparency.
4. (2-3 minutes) Ask and discuss the following questions:
   - Into which group were most of your snacks placed?
   - Were any of your snack choices low in saturated or trans fat, or sugar? (Circle these examples and praise students for selecting healthy snacks.)
   - Were any of your snack choices high in saturated or trans fat, or sugar?

   Place an X through these examples and explain that these can fit into a healthy diet when they are eaten infrequently. We call these "sometimes foods." Draw an arrow to the "sometimes foods" area on the transparency.
5. (2-3 minutes) Discuss the importance of selecting foods low in saturated fat and containing no trans fat. Remind students that healthy eating guidelines tell us to choose fat wisely to keep our bodies healthy. (See the Teacher Resources for a discussion of the different types of fat, or student resource 21.1 in lesson 21, What's the Rap on Fat?, on page 290.)
6. (2-3 minutes) To help students identify some healthy snack choices, have them complete activity 22.1, Be Fat Wise. This activity can be done as a class, individually, or in pairs. Review the answers by displaying a transparency of the answer key to activity 22.1. Remind students that healthy snacks do not need to be fat free and can contain heart healthy fat, such as fat found naturally in nuts, whole grains, and vegetables. See the Teacher Resources for more examples of healthy snacks.
7. (5-10 minutes) Hand out student resource 22.1, Reading Food Labels, or display it on the overhead projector. Explain the label information (refer to Teacher Resources). If applicable, encourage students to examine the information on one of their food labels brought from home.
8. (15 minutes) Divide the class into groups of three or four. Give each group four to six food labels. These can include the ones they brought from home or the sample food labels included with this lesson. Have students complete activity 22.2, Analyzing Food Labels. They should locate and record the serving size, amount of fat grams per serving (total, saturated, and trans), and % daily value recommended for total and saturated fat contained per serving. Have groups exchange food labels so they review at least 10 labels.
9. (5 minutes) Discuss students' findings based on their analysis of the data. See the Teacher Resources to help you discuss the questions on saturated and trans fat content.
10. (3 minutes) Create a list of heart healthy snacks based on the students' responses to question 4 in activity 22.2. What type of snacks do they need to limit to "sometimes foods"?

Extension Activities

1. In extension activity 22.1, students evaluate food groups using the scientific method. Have each group of students look at the types of foods available for assessment and

make a hypothesis as to which food groups are highest and lowest in total fat and saturated fat and which contain unhealthy trans fat. (Note: Each group will have a different selection of labels.) Then instruct the groups to gather their data using the available table from activity 22.2 and graph the total amount of saturated and trans fat in the various products, using extension activity 22.1. Groups draw conclusions based on the data collected and make a report of their findings, along with an explanation of how they came to their results.

2. Food label matching game: Collect food labels. Separate the names of the products from the nutrient information on the labels. Divide the class into groups of four. Give each group five to eight labels along with the product names. Have students try to match the nutrient information with the appropriate product name.
3. Bring in nutritious snacks from home to sample. Include snacks from each food group and those with heart healthy unsaturated fat.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans* (see appendix A)
- Student resource 13.2, How Much Fat Is OK? (page 196)

SPECIFIC BACKGROUND MATERIAL

Why do adolescents need snacks?

Adolescents are at a very important stage in their physical development, with each individual entering a rapid growth spurt according to his or her own internal timetable. During growth, the body has higher nutrient needs. The prevalence of dietary inadequacies is higher during adolescence than at any other stage of the life cycle. Smaller, more frequent meals have been shown to have physiological and nutritional advantages for adolescents. Snacks provide an energy boost and have a place in most people's daily diets. For teenagers, snacking is a way of life! Our goal is to focus on improving the quality of those snacks.

What are some healthy foods adolescents can snack on?

Snacks can make an important contribution to the diet if they are monitored in terms of quality and amount. They can provide up to 25 percent of an adolescent's energy intake and many nutrients. Each food group offers healthy snack choices. Here are some examples of healthy snacks:

- Whole grain breads, plain bread sticks, whole grain crackers, rice cakes, cereal, whole grain bagels (read labels to avoid products with trans fat)
- Fresh fruit or fruit canned in its own juice
- Raisins or other dried fruits
- 100 percent fruit juices
- Vegetables (plain or dipped in hummus or low-fat dressing)
- Cheese (low fat is preferred)
- Low-fat or fat-free yogurt and milk

- Peanut butter or whole nuts (dry roasted and unsalted is preferred)
- Chicken or turkey (skinless)
- Hard-boiled egg
- Sandwiches or half sandwiches made with lean meats or tuna (prepared with limited added fat, such as mayonnaise or salad dressing)

Are there any foods that adolescents should avoid?

Although most foods can fit into an overall healthy eating pattern, recognize that some foods—namely, those high in added sugar, salt, or saturated and trans fat—should be limited. Many Americans tend to eat too many foods high in saturated fat, trans fat, and added salt and sugars. Although this lesson focuses on fat, it should be noted that many teenagers consume increasing amounts of soda and other beverages sweetened with sugar. Sugar-sweetened beverages are the single largest source of added sugar in children's diets, and they account for 50 percent of excess calories consumed by children and adults alike. These drinks have no nutritional value, and they often replace healthy beverages such as low-fat milk or 100 percent fruit juice. For details on healthy eating guidelines, see lesson 3, Food Power.

How much fat is OK for adolescents?

The U.S. *Dietary Guidelines* recommend that adolescents consume between 25 and 35 percent of calories from total fat, with no more than 10 percent of calories coming from saturated fat. The guidelines recommend limiting trans fat to the lowest amount possible because new scientific evidence points to the harmful effects of trans fat. Therefore, it is particularly important to focus on the healthy polyunsaturated and monounsaturated fat that comes from plant sources and fish.

The midrange limits (30 percent) for daily fat intake for adolescents are as follows:

- **For active girls 11 to 14 years old:** About 65 grams per day of total fat with 20 or fewer grams of saturated fat (based on a 2,000-calorie diet)
- **For active boys 11 to 14 years old:** About 80 grams per day of total fat with 25 or fewer grams of saturated fat (based on a 2,400-calorie diet)

Not All Fat Is Created Equal

The fat in foods constitutes a mixture of saturated and unsaturated (monounsaturated and polyunsaturated) fatty acids, commonly called fat. Recent nutrition science has revealed that the type of fat you eat matters more to health than the total quantity. Most of the fat you eat should be unsaturated because substituting unsaturated fat for saturated fat in the diet appears to lower the risk for heart disease and type 2 diabetes.

Most plant oils are high in unsaturated fat and generally are liquid at room temperature. Fish, vegetable oils (olive, canola, corn, peanut), most nuts, olives, and avocados are good sources of unsaturated fat. Some ocean fish, such as salmon, mackerel, and tuna, are high in a polyunsaturated fat—called omega-3 fatty acid—that may protect against heart disease. Nutrition experts recommend eating fish twice a week.

Many animal products, such as fatty meat, whole milk, butter, and lard, are high in saturated fat. This kind of fat is typically solid at room temperature. Eating too much saturated fat increases the risk of developing heart disease because it raises LDL cholesterol in the blood. Therefore, the U.S. *Dietary Guidelines* recommend eating a diet low in saturated fat (10 percent of total calories).

There are exceptions to the rule. Not all plant fat is healthy. For example, coconut and palm oils are naturally high in saturated fat. And unhealthy trans fat is made from plant oils through a commercial process called hydrogenation (also called partially hydrogenated

vegetable oil). This is how some margarines and shortening are made. Trans fat raises unhealthy LDL cholesterol *and* lowers protective HDL cholesterol, thereby increasing the risk of heart disease. To avoid this kind of fat, check the ingredients lists on packaged foods such as cookies and crackers for partially hydrogenated vegetable oil. Trans fat is more stable than regular vegetable oil so it is also used in fast-food restaurants for frying.

Using the Nutrition Facts Label

With so many nutritional claims on the front of food packages, the nutrition facts label can be used to make informed food choices. The label provides details on serving size; calories and macronutrient content (fat, carbohydrate, and protein); and the contribution of other nutrients such as cholesterol, fiber, vitamins, and minerals.

Reading a food label will tell you the following:

- **Serving size and how many servings are in the package.** Serving sizes are standardized to make it easy to compare similar products. When looking at the serving size, consider whether that is the amount you would actually consume. For instance, many "individual-sized" bottles of juice provide up to 2.5 eight-ounce (250-milliliter) servings, which means that if you consume the entire bottle, you would need to multiply the total calories and sugar content (along with any vitamins or minerals) by 2.5.
- **Total calories in one serving, and calories from fat.** Most foods provide energy, but consuming too much energy from any source (fat, sugar, or protein) can make it difficult to maintain a healthy weight. Notice the percentage of calories that come from fat; this can give you a quick sense of whether the product is a high-fat food (in the student resource example, half of the calories in macaroni and cheese come from fat).
- **Nutrients to limit.** Saturated fat and trans fat, as well as cholesterol and sodium, should be limited because high amounts of these substances over time can increase the risk of heart disease and other chronic diseases. Added sugars, listed under carbohydrate, are also something to take note of. Eating many foods and beverages with added sugars can contribute to weight gain.
- **Nutrients to include in a healthy diet.** Dietary fiber (found in whole grains, fruits, and vegetables), protein, vitamins A and C, and the minerals calcium and iron are necessary components for health.
- **% daily value.** The daily values (DV) for nutrients listed on food labels are based on a 2,000-calorie diet. This value helps you determine whether the product contributes significant amounts of a nutrient to your overall diet. A product containing 5 percent or less of a nutrient is low in that nutrient, whereas 20 percent or more is considered high. This can be especially useful when looking at saturated fat. In the macaroni and cheese example, just 1 cup provides 3 grams, or 15 percent of the DV for saturated fat. Alone this is not considered high, but if you consume 2 cups, you would take in 30 percent of your daily limit for saturated fat.
- **Footnote on daily values.** The lower part of the nutrition facts label provides more information about daily values and includes the suggested nutrient intakes for both a 2,000- and 2,500-calorie diet. (The grams for carbohydrate are the amount recommended in a balanced diet, whereas the grams listed for fiber represent the least amount that you should consume. These are standard values based on the U.S. *Dietary Guidelines* and do not change by product [though products with limited packaging space may omit this footnote.])

Answer Key

ACTIVITY 22.1

In each of the boxes in the following table, put an X next to the food that is the healthier snack choice. (Hint: Consider saturated and trans fat content.) Note how the presence of trans fat can help identify the better choice (example: string cheese has 1 more gram of saturated fat than the cheese cracker sandwiches, but it makes the better choice because it has no trans fat).

❑ Ice cream ☒ Low-fat frozen yogurt	☒ Apple cereal bar ❑ Apple pie
☒ Bagel with peanut butter ❑ Doughnut	☒ Salsa ❑ Guacamole
❑ Potato chips ☒ Pretzels	❑ Bologna ☒ Roast turkey
☒ Low-fat chocolate milk ❑ Chocolate milkshake	☒ Oatmeal cookie ❑ Croissant
❑ Cheese and cracker sandwiches ☒ String cheese	☒ Peanuts ❑ "Cheese" popcorn

Examine the following list of healthy snack foods. The foods listed contain little to no fat, or they contain heart-healthy fat. In the space provided, name the food group to which each food belongs. Based on that information, which food groups offer a variety of healthy snack choices? *(Answer: Each of the five food groups offers snack choices with little to no unhealthy fat.)*

Food	Food group
Whole wheat bagel	Grain
Grapes	Fruit
Carrot sticks	Vegetable
Hummus dip	Meat (made with chickpeas)
Low-fat yogurt with fruit	Dairy (and fruit if fresh fruit used)
Turkey breast	Meat
Pretzels	Grain
Banana	Fruit
Low-fat milk	Dairy
Mixed nuts	Meat (nuts)
Whole wheat crackers	Grain
Sweet red pepper slices	Vegetable
Apple	Fruit
Vegetable juice	Vegetable
Low-fat cheese	Dairy

Name _____

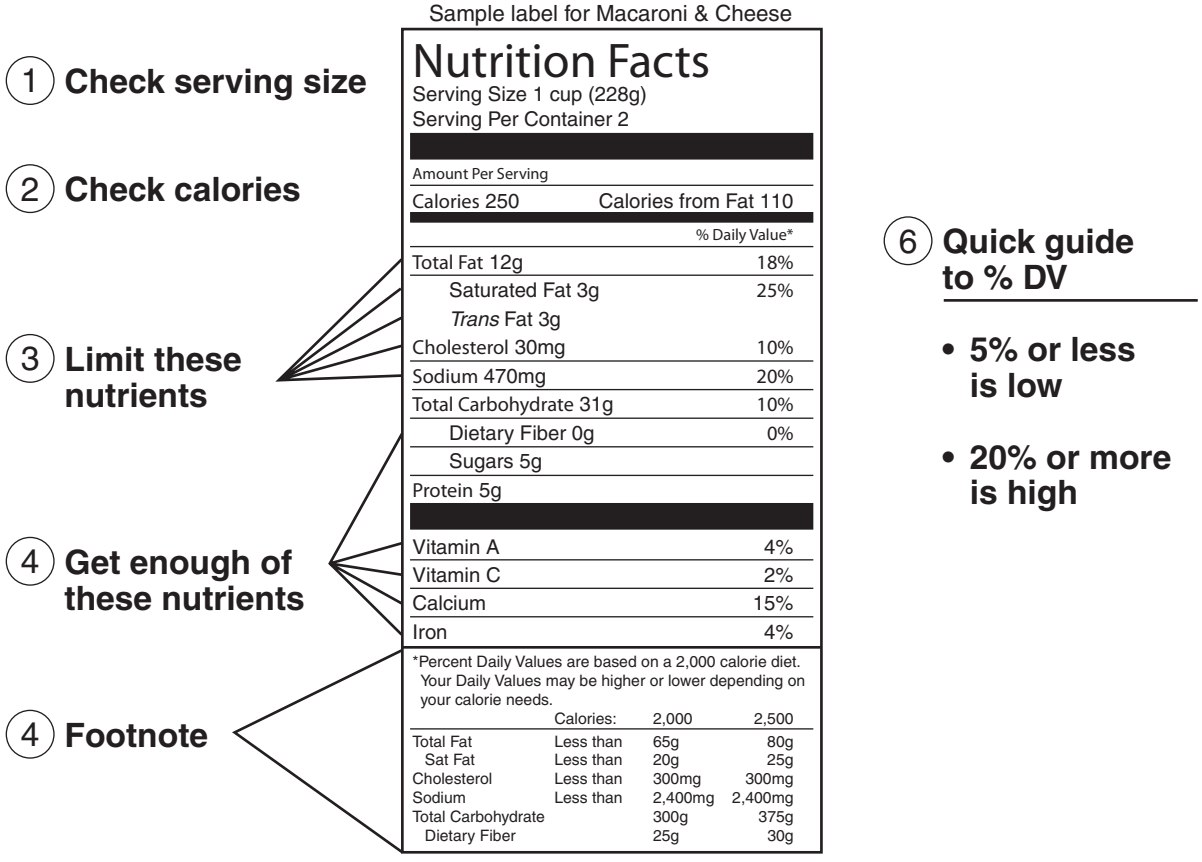
Student Resource 22.1

Reading Food Labels

Guidelines for Reading Food Labels

Food labels are a useful way to learn about the fat and other nutrients contained in the foods you eat.

1. Be cautious when reading claims on the front of the package. Labels often make claims such as “bursting with energy,” “high fiber,” “lite,” “lower in fat,” or “oozing goodness.” These statements can be misleading.
2. Get the nutrition facts:
   a. Check out how much of the product equals one **serving size** and how many servings the package contains.
   b. Check **calories** and calories from fat.
   c. Examine the nutrient list to determine what percentage of the recommended **daily value** for fat, carbohydrate, protein, and vitamins is provided by one serving of the food. For example, the following product provides 3 grams of saturated fat, which may not sound like much, but it is about 15 percent of your daily saturated fat limit.
   d. Examine the list of **ingredients** located near the label. Ingredients highest in weight are listed first. If you see partially hydrogenated vegetable oil listed, then the product contains trans fat. Some foods with partially hydrogenated vegetable oil on the label will have 0 grams of trans fat listed on the label. This is because foods with less than 0.5 gram of trans fat can list 0 grams of trans fat on the nutrition facts label.



From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics). Food label adapted from www.cfsan.fda.gov/~dmsfoodlab.html.

Name _____

Activity 22.1

Be Fat Wise

In each box in the following table, put an X next to food that has the greater amount of fat per serving.

Food pairs	Serving size	Fat content (average grams total, saturated, trans)
❑ Ice cream (regular vanilla) ❑ Low-fat frozen yogurt (vanilla soft serve)	1/2 cup for both	8 total; 5 saturated; 0 trans 4 total; 2 saturated; 0 trans
❑ Bagel with peanut butter ❑ Doughnut	1/2 bagel, 1 Tbsp (15 ml) peanut butter 1 medium	9 total; 1.5 saturated; 0 trans 12 total; 3 saturated; 4 trans
❑ Potato chips ❑ Pretzels	1 oz (30 g) for both	9 total; 3 saturated; 0 trans 1 total; 0 saturated; 0 trans
❑ Low-fat chocolate milk ❑ Chocolate milkshake	8 oz (250 ml) 12 oz (375 ml) (small)	2 total; 2.5 saturated; 0 trans 10 total; 6 saturated; 0.5 trans
❑ Cheese and cracker sandwiches ❑ String cheese	1 package of 6 sandwiches 1 stick	10 total; 2.5 saturated; 3.5 trans 6 total; 3.5 saturated; 0 trans
❑ Apple cereal bar ❑ Apple pie	1 bar 1 snack package	3 total; 0.5 saturated; 0 trans 27 total; 7 saturated; 8 trans
❑ Salsa ❑ Guacamole	1 oz (30 g) each	0 fat 6 total; 1 saturated; 0 trans
❑ Bologna ❑ Roast turkey	1 oz (30 g) slice each	7 total; 2 saturated; 0 trans 1 total; 0 saturated; 0 trans
❑ Oatmeal cookie ❑ Croissant	1 cookie 1 butter croissant	3 total; 1 saturated; 0 trans 12 total; 6 saturated; 7 trans
❑ Peanuts ❑ “Cheese” popcorn	1 oz (30 g) each	14 total; 1 saturated; 0 trans 10 total; 2 saturated; 0 trans

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics). Adapted from C. Cheung, 2001, *Eat Well & Keep MovingI* (Champaign, IL: Human Kinetics), 346.

Be Fat Wise *(continued)*

Activity 22.1

Examine the following list of healthy snack foods. The foods listed contain little to no fat, or they contain heart-healthy fat. In the space provided, name the food group to which each food belongs. Based on that information, which food groups offer a variety of healthy snack choices?

Food	Food group
Whole wheat bagel	
Grapes	
Carrot sticks	
Hummus dip	
Low-fat yogurt with fruit	
Turkey breast	
Pretzels	
Banana	
Low-fat milk	
Mixed nuts	
Whole wheat crackers	
Sweet red pepper slices	
Apple	
Vegetable juice	
Low-fat cheese	

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 22.2

Analyzing Food Labels

Examine the food labels brought from home or provided by your teacher. Use the nutrient information provided on the label to complete the following table.

Product name	Serving size	Total fat (grams)	Total fat (% daily value)	Saturated fat (grams)	Saturated fat (% daily value)	Trans fat (grams)

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 22.2

Analyzing Food Labels *(continued)*

Analyzing the Data

1. Which three products have the most grams of saturated fat per serving? Do you usually eat more or less than a serving size of each of these snacks in one sitting?

Product name	Saturated fat (grams)	Typical amount eaten (more or less than one serving)

2. Which three products have the most grams of trans fat per serving?

Product name	Trans fat (grams)	Typical amount eaten (more or less than one serving)

3. Which three products have the fewest grams of total fat per serving?

Product name	Total fat (grams)	Typical amount eaten (more or less than one serving)

4. Name three foods that are low in saturated fat and that contain no trans fat that you would like to eat for a healthy snack. Name three foods that are high in heart-unhealthy fat that you should limit to "sometimes foods."

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 22.2

Analyzing Food Labels *(continued)*

Frozen pizza

Nutrition Facts

Serving Size 1 pizza (234g)
Servings Per Container 1

Amount Per Serving	
Calories 540	Calories from Fat 260
	% Daily Value*
Total Fat 29g	**45%**
Saturated Fat 10g	**50%**
Trans Fat 3g	
Cholesterol 25mg	**8%**
Sodium 1.320mg	**55%**
Potassium 530mg	**15%**
Total Carbohydrate 53g	**18%**
Dietary Fiber 6g	**24%**
Sugars 7g	
Protein 21g	
Vitamin A 50% •	Vitamin C 0%
Calcium 35% •	Iron 10%

*Percent Daily Values are based on a 2,000 calorie diet.

Chicken nuggets

Nutrition Facts

Serving Size 4 Nuggets (76g)
Servings Per Container about 4

Amount Per Serving	
Calories 210	Calories from Fat 130
	% Daily Value*
Total Fat 15g	**23%**
Saturated Fat 3.5g	**18%**
Trans Fat 3g	
Cholesterol 35mg	**12%**
Sodium 300mg	**13%**
Total Carbohydrate 9g	**3%**
Dietary Fiber 1g	**4%**
Sugars 0g	
Protein 11g	**22%**

Not a significant source of dietary fiber, sugars, vitamin A, vitamin C, calcium and iron.

*Percent Daily Values are based on a 2,000 calorie diet.

Spinach

Nutrition Facts

Serving Size 1/3 cup (83g)
Servings Per Container about 3.5

Amount Per Serving	
Calories 20	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 115mg	**5%**
Total Carbohydrate 2g	**1%**
Dietary Fiber 2g	**7%**
Sugars 1g	
Protein 2g	
Vitamin A 120% •	Vitamin C 10%
Calcium 6% •	Iron 2%

*Percent Daily Values are based on a 2,000 calorie diet.

Whole milk

Nutrition Facts

Serving Size 1 Cup (236mL)
Servings Per Container 4

Amount Per Serving	
Calories 150	Calories from Fat 70
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 5g	**25%**
Trans Fat 0g	
Cholesterol 35mg	**11%**
Sodium 125mg	**5%**
Total Carbohydrate 12g	**4%**
Dietary Fiber 0g	**0%**
Sugars 12g	
Protein 8g	**16%**
Vitamin A 6% •	Vitamin C 4%
Calcium 30% •	Iron 0%
Vitamin D 25%	

*Percent Daily Values are based on a 2,000 calorie diet.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Analyzing Food Labels *(continued)*

Activity 22.2

Skim milk

Nutrition Facts

Serving Size 1 Cup (236mL)
Servings Per Container 8

Amount Per Serving	
Calories 90	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 5mg	**1%**
Sodium 125mg	**5%**
Total Carbohydrate 13g	**4%**
Dietary Fiber 0g	**0%**
Sugars 12g	
Protein 8g	

Vitamin A 10% • Vitamin C 4%
Calcium 30% • Iron 0% • Vitamin D 25%

*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Fried chicken

Nutrition Facts

Serving Size 3oz. (84g)
Servings Per Container about 7

Amount Per Serving	
Calories 270	Calories from Fat 160
	% Daily Value*
Total Fat 18g	**27%**
Saturated Fat 5g	**23%**
Trans Fat 3g	
Cholesterol 65mg	**22%**
Sodium 620mg	**26%**
Total Carbohydrate 13g	**4%**
Dietary Fiber 1g	**5%**
Sugars 1g	
Protein 14g	

Vitamin A 0% • Vitamin C 6%
Calcium 8% • Iron 4%

*Percent Daily Values are based on a 2,000 calorie diet.

Cheddar cheese

Nutrition Facts

Serving Size 1 oz. (30g)
Servings Per Container 4

Amount Per Serving	
Calories 120	Calories from Fat 90
	% Daily Value*
Total Fat 10g	**15%**
Saturated Fat 5.5g	**27%**
Trans Fat 1.5g	
Cholesterol 30mg	**10%**
Sodium 190mg	**8%**
Total Carbohydrate 1g	**0%**
Dietary Fiber 0g	**0%**
Sugars 0g	
Protein 7g	

Vitamin A 8% • Vitamin C 0%
Calcium 25% • Iron 0%

*Percent Daily Values are based on a 2,000 calorie diet.

Orange juice

Nutrition Facts

Serving Size 8 fl oz. (237mL)
Servings Per Container 2

Amount Per Serving	
Calories 100	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Trans Fat 0g	
Sodium 0mg	**0%**
Potassium 290mg	**8%**
Total Carbohydrate 24g	**8%**
Sugars 23g	
Protein 1g	

Vitamin C 90% • Thiamin 6% • Folate 2%
Phosphorus 2% • Magnesium 6%

Not a significant source of saturated fat, cholesterol, dietary fiber, vitamin A, calcium and iron.
*Percent Daily Values are based on a 2,000 calorie diet.

Reduced fat processed cheese

Nutrition Facts
Serv Size 1 slice (21g)
Servings 16
Calories 50
Fat Cal 30
*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Amount/serving	%DV*	Amount/serving	%DV*
Total Fat 3g	**5%**	**Total Carb** 2g	**1%**
Sat Fat 2g	**10%**	Fiber 0g	**0%**
Trans Fat 0g			
Cholest 10mg	**3%**	Sugars 1g	
Sodium 330mg	**14%**	**Protein** 5g	

Vitamin A 4% • Vitamin C 0% • Calcium 15% • Iron 0%

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Analyzing Food Labels *(continued)*

Activity 22.2

Chocolate candy bar with almonds

Nutrition Facts
Serv Size 1 Bar
Calories 230
Fat Cal 140
*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Amount/serving	%DV*	Amount/serving	%DV*
Total Fat 14g	**22%**	**Total Carb** 20g	**7%**
Sat Fat 7g	**35%**	Fiber 1g	**5%**
Trans Fat 3g			
Cholest 5mg	**2%**	Sugars 18g	
Sodium 35mg	**2%**	**Protein** 5g	

Vitamin A 0% • Vitamin C 0% • Calcium 8% • Iron 4%

Chocolate chip cookies

Nutrition Facts
Serving Size 1 Cookie (about 39g)
Servings Per Container 2

Amount Per Serving	
Calories 190	Calories from Fat 80
	% Daily Value*
Total Fat 9g	**14%**
Saturated Fat 2.5g	**13%**
Trans Fat 2g	
Cholesterol less than 5mg	**1%**
Sodium 130mg	**5%**
Total Carbohydrate 25g	**8%**
Dietary Fiber 1g	**4%**
Sugars 11g	
Protein 2g	

Vitamin A 0% • Vitamin C 0%
Calcium 2% • Iron 6%

*Percent Daily Values are based on a 2,000 calorie diet.

Cheese flavored popcorn

Nutrition Facts
Serving Size 1 package
Servings Per Container 1

Amount Per Serving	
Calories 160	Calories from Fat 90
	% Daily Value*
Total Fat 10g	**15%**
Saturated Fat 2g	**11%**
Trans Fat 3g	
Cholesterol 5mg	**2%**
Sodium 320mg	**14%**
Total Carbohydrate 14g	**5%**
Dietary Fiber 1g	**5%**
Sugars 2g	
Protein 3g	

Vitamin A 0% • Vitamin C 0%
Calcium 2% • Iron 0%

*Percent Daily Values are based on a 2,000 calorie diet.

Potato chips

Nutrition Facts
Serving Size 1 package
Servings Per Container 1

Amount Per Serving	
Calories 150	Calories from Fat 90
	% Daily Value*
Total Fat 10g	**16%**
Saturated Fat 3g	**14%**
Trans Fat 3g	
Cholesterol 0mg	**0%**
Sodium 180mg	**8%**
Total Carbohydrate 15g	**5%**
Dietary Fiber 1g	**4%**
Sugars 0g	
Protein 2g	

Vitamin A 0% • Vitamin C 10%
Calcium 0% • Iron 0%

*Percent Daily Values are based on a 2,000 calorie diet.

Pretzels

Nutrition Facts
Serving Size 1 pkg. (45g/about 5 pretzels)
Servings Per Container 1

Amount Per Serving	
Calories 180	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	**2%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 500mg	**21%**
Total Carbohydrate 36g	**12%**
Dietary Fiber less than 1g	**1%**
Sugars 1g	
Protein 5g	

Vitamin A 0% • Vitamin C 0%
Calcium 0% • Iron 3%

*Percent Daily Values are based on a 2,000 calorie diet.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Analyzing Food Labels *(continued)*

Activity 22.2

Chocolate covered mints

Nutrition Facts
Serv Size 1 box (45g)
Calories 190
Fat Cal 35

*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Amount/serving	%DV*	Amount/serving	%DV*
Total Fat 4g	**6%**	**Total Carb** 38g	**13%**
Sat Fat 2.5g	**12%**	Fiber less than 1g	**3%**
Trans Fat 0g			
Cholest 0mg	**0%**	Sugars 37g	
Sodium 10mg	**1%**	**Protein** less than 1g	

Vitamin A 0% • Vitamin C 0% • Calcium 0% • Iron 4%

Frosted doughnuts

Nutrition Facts
Serv Size 6 Donuts (85g)
Serv Per Container 1
Calories 390
Fat Cal 210

*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Amount/serving	%DV*	Amount/serving	%DV*
Total Fat 23g	**35%**	**Total Carb** 42g	**14%**
Sat Fat 15g	**75%**	Fiber 2g	**8%**
Trans Fat 3g			
Cholest 10mg	**3%**	Sugars 21g	
Sodium 360mg	**15%**	**Protein** 5g	

Vitamin A 1% • Vitamin C 0% • Calcium 2% • Iron 15%
Thiamin 15% • Riboflavin 10% • Niacin 8%

Raisin bran cereal

Nutrition Facts
Serving Size 1 cup
Servings Per Container About 12

Amount Per Serving	
Calories 190	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	**3%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 350mg	**8%**
Total Carbohydrate 45g	**6%**
Dietary Fiber 7g	**12%**
Sugars 19g	
Protein 5g	

Vitamin A 10% • Vitamin C 0%
Calcium 2% • Iron 25%

*Percent Daily Values are based on a 2,000 calorie diet.

Whole-wheat bread

Nutrition Facts
Serving Size 1 slice
Servings Per Container 18

Amount Per Serving	
Calories 90	Calories from Fat 10
	% Daily Value*
Total Fat 1g	**2%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 180mg	**8%**
Total Carbohydrate 18g	**6%**
Dietary Fiber 3g	**12%**
Sugars 3g	
Protein 4g	

Vitamin A 0% • Vitamin C 0%
Calcium 2% • Iron 6%

*Percent Daily Values are based on a 2,000 calorie diet.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Analyzing Food Labels *(continued)*

Activity 22.2

Carrot sticks

Nutrition Facts

Serving Size 6 sticks
Servings Per Container About 3

Amount Per Serving	
Calories 35	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 40mg	**2%**
Total Carbohydrate 8g	**3%**
Dietary Fiber 2g	**8%**
Sugars 5g	
Protein 1g	

Vitamin A 270%	•	Vitamin C 10%
Calcium 2%	•	Iron 0%

*Percent Daily Values are based on a 2,000 calorie diet.

Green beans

Nutrition Facts

Serving Size 1 cup
Servings Per Container 5

Amount Per Serving	
Calories 25	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 10mg	**0%**
Total Carbohydrate 4g	**1%**
Dietary Fiber 2g	**8%**
Sugars 2g	
Protein 1g	

Vitamin A 4%	•	Vitamin C 2%
Calcium 2%	•	Iron 2%

*Percent Daily Values are based on a 2,000 calorie diet.

Mandarin oranges

Nutrition Facts

Serving Size ½ cup
Servings Per Container 3.5

Amount Per Serving	
Calories 80	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 10mg	**0%**
Total Carbohydrate 19g	**6%**
Dietary Fiber 1g	**4%**
Sugars 18g	
Protein 0g	

Vitamin A 10%	•	Vitamin C 35%
Calcium 2%	•	Iron 2%

*Percent Daily Values are based on a 2,000 calorie diet.

Raisins

Nutrition Facts

Serving Size 1 box
Servings Per Container 1

Amount Per Serving	
Calories 130	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 10mg	**0%**
Total Carbohydrate 33g	**11%**
Dietary Fiber 2g	**8%**
Sugars 30g	
Protein 1g	

Vitamin A 0%	•	Vitamin C %
Calcium 2%	•	Iron 6%

*Percent Daily Values are based on a 2,000 calorie diet.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Extension Activity 22.1

Graphing Unhealthy Fat in Foods

Instructions: Use the chart below to shade in the grams of saturated fat and trans fat (combined) for various foods in each food group, using the labels provided at the bottom.

Grams	Saturated + trans fat	Saturated + trans fat	Saturated + trans fat	Saturated + trans fat	Saturated + trans fat
25					
24					
23					
22					
21					
20					
19					
18					
17					
16					
15					
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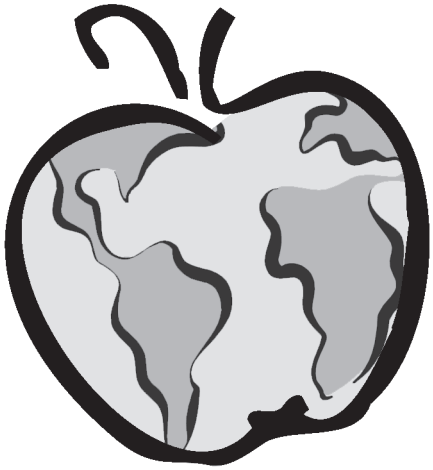
1					
	Grain	Fruit	Vegetable	Dairy	Meat, beans, and alternatives

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 23

The Plants We Eat

Fruits and Vegetables Theme



This lesson is designed to be incorporated into a unit on nutrition, plant structure, or plant classification. The goal of this lesson is for students to appreciate the importance of eating a variety of fruits and vegetables daily. Students classify foods as plant or animal products. They then examine the nutrient content of various plant products and classify them as roots, stems, leaves, or fruits.

The lesson also includes three extension activity options. Extension activity 23.1 provides students with the opportunity to examine the structural diversity of edible plant parts. Extension activity 23.2 familiarizes students with the functions of some vitamins. Extension activity 23.3 demonstrates the antioxidant role of vitamin C and provides the framework for discussing the rationale for increasing fruit and vegetable intake as a way of preventing cancer.

Behavioral Objective

For students to eat five or more servings of fruits and vegetables (combined) daily

Learning Objectives

Students will be able to do the following:

1. Identify the parts of a plant—roots, stems, leaves, and fruits—and define their function
2. Classify foods as animal or plant products
3. Classify plant products as roots, stems, leaves, or fruits
4. Explain the importance of eating a variety of fruits and vegetables
5. Accurately sketch and describe plant structures
6. Use their observations to identify similarities and differences in plant structure and appreciate the diversity of plant forms

7. State examples of vitamin functions
8. Discuss the role of antioxidants in the body

Materials

- Student resource 23.1, Plant Parts
- Activity 23.1, The Plants We Eat
- Extension activity 23.1, Examining Plant Diversity
- Extension activity 23.2, Vitamin Function
- Extension activity 23.3, Vitamin C at Work
- Optional supplies for activity 23.1: Small quantities of broccoli, romaine lettuce, celery, corn, tomatoes, spinach, carrots, peas, cauliflower, rhubarb, radishes, potatoes, and peaches
- Supplies for extension activity 23.1: At least three types of edible roots, stems, leaves, and fruits; knives or scalpels; magnifying glass
- Supplies for extension activity 23.3: Apple, vitamin C tablet, knife

Procedure

1. Point out the goals of this lesson:
   - To identify the parts of a plant (roots, stems, leaves, and fruits) and define their function
   - To classify foods as animal or plant products
   - To classify plant products as roots, stems, leaves, or fruits
   - To explain the importance of eating a variety of fruits and vegetables
2. Ask students whether humans are herbivores, carnivores, or omnivores. *(Answer: Except for strict vegetarians, humans are omnivores.)*
3. (5 minutes) Hand out activity 23.1, The Plants We Eat. Have students complete part I and then go over the answers as a class. Although this activity seems very basic, students do not generally think of food in these terms (unless they live on a farm) and may have difficulty classifying some of the food items. (The Answer Key follows the Teacher Resources.)
4. (5-10 minutes) Hand out and discuss student resource 23.1, Plant Parts. Use diagrams, overhead transparencies, or actual plants to give examples of each of the plant parts.
5. (20-30 minutes) Have students complete parts II and III of activity 23.1. If possible, have some or all of the plant parts (fresh, frozen, or canned) listed in part II available for students to observe and handle. This will make it much easier for them to classify the edible plant parts.
6. (5-10 minutes) Go over parts II and III of activity 23.1. Finish by asking students how many fruits and vegetables experts recommend they eat. *(Answer: Five or more servings each day.)* Explain that to meet this goal, they should eat fruits and vegetables at every meal and snack.

Extension Activities

EXTENSION ACTIVITY 23.1: EXAMINING PLANT DIVERSITY

Have students compare and contrast the structure of three roots, stems, leaves, or fruits.

EXTENSION ACTIVITY 23.2: VITAMIN FUNCTION

Completing this activity will introduce students to some of the functions of vitamins in the body.

EXTENSION ACTIVITY 23.3: VITAMIN C AT WORK

Use the browning apple demonstration to illustrate the antioxidant role of vitamin C. This demonstration provides the framework for discussing the rationale for increasing fruit and vegetable intake to help prevent some types of cancer. See Teacher Resources for a detailed description of the functions of vitamin C and the role of antioxidants.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- National Institutes of Health and National Cancer Institute, "Time to Take Five" (see appendix A)
- The National Cancer Institute's 5-A-Day program Web site offers resources for teachers and families as well as research information: www.5aday.gov.

SPECIFIC BACKGROUND MATERIAL

Definitions of the Plant Structures

Root: The underground part of the plant that stores food produced in the leaves, collects water and minerals, and anchors the plant to the soil. Examples of edible roots are carrots, radishes, turnips, parsnips, and sweet potatoes.

Stem: The stalk or trunk of the plant that supports the leaves and transports food, water, and minerals between the roots and the leaves. Examples of edible stems are asparagus and white potatoes (swollen end of stolon—underground stems).

Leaf: The green organ of a plant that produces food through photosynthesis. Leaves are made up of two parts: a leaf blade and a stalk (also called the petiole). The leaf blade is the flat, broad part. The stalk connects the blade to the stem. Examples of edible leaves are lettuce, spinach, cabbage, brussels sprouts, celery, and rhubarb. (The edible parts of these last two plants are leaf stalks, not stems as many people think.)

Flowers: The reproductive part of a seed plant. Examples of edible flowers are cauliflower, broccoli, and artichokes. (The edible part of cauliflower and broccoli is composed of the fleshy flower stalks and clusters of flower buds.)

Fruit: A structure that covers and protects the seeds of flowering plants. It develops from the maturing flower and is the plant's ripened ovary. Examples are apples, green beans, coconuts, avocados, pea pods, peanuts, acorns, cucumbers, rice, wheat, and corn. We don't usually think of grains such as corn, wheat, and rice as fruits. However, each grain is a developed ovary. As the single seed inside the ovary grows, the wall of the seed becomes part of the ripening ovary wall and forms the grain or fruit.

Seed: A plant embryo, surrounded by a food supply and a protective seed coat. Examples of edible seeds are sunflower seeds and peas.

Benefits of Fruits and Vegetables

Fruits and vegetables help protect against chronic diseases such as heart disease, stroke, high blood pressure, diabetes, and possibly some types of cancers. Select fruits and vegetables of different colors (especially deep green vegetables and orange or red ones) to maximize nutrient intake, and select those without a lot of fat or sugar added to them most of the time.

Functions of Vitamin C (Ascorbic Acid)

- This water-soluble vitamin has multiple functions in the body as either a coenzyme or cofactor to facilitate metabolic processes within cells.
- It has the ability to take on or lose hydrogen ions, giving it an important role in the metabolism of nutrients.
- It enhances the absorption of iron by changing it from the ferric form to the reduced, or ferrous, form, which is more readily absorbed.
- It is involved in the synthesis of collagen, a component of all fibrous tissue in the body, including cartilage, bone matrix, tooth dentin, skin, and tendons.
- It is involved in healing wounds, fractures, bruises, hemorrhages, and bleeding gums.
- It reduces the susceptibility of the body to infections.
- The value of vitamin C in preventing and curing the common cold has also been touted, but these findings remain controversial.
- It is believed to have a role as an antioxidant (discussed later).

Good Sources of Vitamin C

- Broccoli
- Cantaloupes
- Grapefruit
- Oranges
- Limes
- Lemons
- Mangoes
- Bell peppers
- Tomatoes

Preventing Food Browning (Oxidation)

Vitamin C prevents various food constituents from reacting with oxygen. This antioxidant property prevents the food from discoloring or spoiling.

Functions of Folate

- This B-vitamin is involved in cell production and metabolism.
- It makes DNA and RNA, the building blocks of all cells.
- It is used to make red blood cells and thus prevent anemia.
- It is used in the metabolism of the amino acid homocysteine.
- It has been linked to lower rates of heart disease.
- It has been linked to preventing birth defects of the brain and spine called neural tube defects.

Good Sources of Folate

- Spinach
- Black-eyed peas
- Green peas
- Broccoli
- Orange juice
- Avocados

- Wheat germ
- Papayas
- Cereals, breads, and other foods fortified with folic acid, the synthetic version of folate

Functions of Vitamin A

- This fat-soluble vitamin has many functions related to growth and immune function.
- It maintains vision by protecting the surface lining of the eyes.
- It maintains healthy skin and mucous membranes (including those in the lungs and gastrointestinal tract), which adds to the body's protection from bacteria infections.
- It plays a role in cell division, growth, and reproduction.
- It helps make white blood cells, which fight off infection.

Sources of Vitamin A

Vitamin A is converted in the body from carotenoids (such as beta-carotene in plants) and retinol (from animals).

- Carrots
- Spinach
- Kale
- Cantaloupes
- Apricots
- Papayas
- Mangoes
- Tomato juice
- Peaches
- Eggs
- Milk
- Liver

Antioxidants

Nutrients such as beta-carotene (a precursor to vitamin A), vitamin C, and vitamin E are believed to protect the body with their antioxidant effects. Certain minerals such as iron, zinc, and selenium also are hypothesized to have important antioxidant roles.

In the aging process, free radicals (the by-products of normal oxidative chemical reactions) are thought to cause degeneration of the immune function by damaging DNA, perhaps leading to the formation of certain forms of cancer, as well as atherosclerotic damage and degenerative disease such as arthritis and Parkinson's disease. Free radicals are believed to damage chromosomes and thus cause mutations. Therefore, protection from DNA damage is believed to enhance the body's self-defense mechanisms. Vegetables and fruits and their relationship to good health and enhanced immunity have been studied extensively in recent years, because they are believed to help stop the damage to DNA caused by free radicals. The hope is that by increasing our consumption of fruits and vegetables that contain antioxidants, we will be able to reduce our risk of developing several serious diseases, including cancer.

The National Cancer Institute, in partnership with the Produce for Better Health Foundation, has joined with other agencies to promote the consumption of adequate fruits and vegetables in campaigns such as "5-A-Day for Better Health." Eating five or more servings

of fruits and vegetables (combined) daily is recommended. A serving size equals a medium-size piece of fruit, a small glass of 100 percent fruit juice, 1 cup of raw salad greens, 1/2 cup of cut-up fruit or vegetables, 1/2 cup of cooked vegetables or beans, or 1/4 cup of dried fruit. Many foods are typically eaten in portion sizes larger than one serving, so getting the recommended amount is easier than you may think. Reaching your goal of five or more servings can be as simple as including a fruit or vegetable at every meal and snack.

Answer Key

ACTIVITY 23.1

Part I

Name one commonly eaten food that does not come from a plant or an animal. *(Answer: Mushrooms; they are fungi.)*

Part II

1. Are any of the foods good sources of *all* the nutrients listed? *(Answer: No.)*
2. Why is it important to eat a variety of fruits and vegetables? Explain. *(Answer: No one food can provide all of the vitamins and minerals our bodies need to be healthy.)*

Note: vitamin B_{12} is found only in animal products including fish (clams, salmon, trout, tuna), beef (including liver), milk, yogurt, and eggs; some cereals are fortified with vitamin B_{12}.

Part III

2. Which of the plant products in the table are classified as fruits (based on food groups)? *(Answer: Strawberries, peaches, oranges, cantaloupes)*
3. What characteristics do these fruits have in common? *(Answer: They are fleshy or pulpy, often juicy, and because they contain fructose [fruit sugar], they are usually sweet, with fragrant flavors. In addition, they all are ripened ovaries, so they generally contain seeds.)*
4. What characteristics do the vegetables have in common? *(Answer: Vegetables include edible leaves, stems, roots, bulbs, fruits, and flowers. Vegetables are usually not as sweet as fruits because they do not contain much fructose, but they do contain some protein.)*
5. You may have noticed that some plant products, such as the tomato, are classified as vegetables in the food groups and as fruits by plant scientists. What characteristics of the tomato, and other foods like it, enable them to be classified as vegetables? What characteristics make them fruits? *(Answer: Tomatoes, squash, and cucumbers are examples of plant products that are fruits because they developed from flowers and contain seeds, but are typically called vegetables because they come from herbaceous plants—the technical source of a vegetable. From a common food perspective, they are not sweet and are usually eaten with the main portion of a meal.)*
6. Which are more nutritious: vegetables or the foods we commonly refer to as fruits? *(Answer: Foods from both groups are excellent sources of vitamin A, vitamin C, folate, and fiber.)*

Extension Activity 23.2

Patient A: vitamin C deficiency

Patient B: vitamin A deficiency

Patient C: vitamin D deficiency

Patient D: vitamin K deficiency

Name _____

Student Resource 23.1

Plant Parts

Roots: The underground part of the plant that stores food produced in the leaves. Roots collect water and minerals, and they anchor the plant to the soil.

Stem: The stalk or trunk of the plant that supports the leaves and transports food, water, and minerals between the roots and the leaves.

Leaves: The green organs of plants that grow out of the stem and produce food through photosynthesis. They are made up of two parts: a leaf blade and a stalk (also called the petiole). The leaf blade is the flat, broad part. The stalk connects the blade to the stem.

Flowers: The reproductive parts of seed plants. They are composed of petals, sepals, stamen, and pistils.

Fruit: A structure that covers and protects the seeds of flowering plants. It develops from the maturing flower and is actually the plant's ripened ovary.

Seed: A plant embryo surrounded by a food supply and a protective seed coat.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 23.1

The Plants We Eat

Part I

Most of the foods you eat come from plants or animals. Classify each of the following foods as a plant or animal product by recording it in the appropriate column of the table that follows.

Bread	Cereal
Cheese	Butter
Broccoli	Yogurt
Hamburger	Apples
Tomatoes	Peanut butter
Pasta	Milk
Margarine	Fish
Eggs	Chicken

Plant products	Animal products

Name one commonly eaten food that does not come from a plant or an animal.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 23.1

The Plants We Eat *(continued)*

Part II

Use the following table to compare the vitamin content of a typical serving of the various plant products listed. Indicate which three foods contain the largest quantity of each nutrient by circling the three largest values in each column.

Food	Vitamin A (retinol equivalents)	Vitamin B_{12}	Vitamin C (mg)	Folate (μg)
Broccoli	68	0	41	31
Romaine lettuce	73	0	7	38
Celery	5	0	3	11
Strawberry	4	0	85	26
Tomato	77	0	24	18
Spinach	188	0	8	54
Carrot	2,025	0	7	10
Green beans	41	0	6	21
Cauliflower	1	0	36	33
Asparagus	48	0	15	132
Sweet potato	2,488	0	28	26
Orange	26	0	80	47
Squash	714	0	15	20
Peach	47	0	6	3
Cantaloupe	516	0	68	27

1. Are any of the foods good sources of *all* the nutrients listed?
2. Why is it important to eat a variety of fruits and vegetables? Explain.

Part III

We eat many parts of plants. Leaves, stems, roots, fruits, seeds, and even some flowers are edible. Classify the plant products listed in part II as roots, stems, leaves, or fruits by recording them in the following table. Be sure to classify the part of the plant that is most commonly eaten.

Foods are considered to be a good source of a nutrient if they provide at least 10 percent of the recommended daily allowance.

- Good sources of vitamin A provide greater than 80 retinol equivalents (RE) per serving.
- Good sources of vitamin B_{12} provide greater than 0.2 μg per serving.
- Good sources of vitamin C provide greater than 5 mg per serving.
- Good sources of folate provide greater than 15 μg per serving.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 23.1

The Plants We Eat *(continued)*

Next to the foods you classified in the following table indicate the vitamins they are good sources of.

Roots		Stems		Leaves	
Food	**Good source of vitamin(s)**	**Food**	**Good source of vitamin(s)**	**Food**	**Good source of vitamin(s)**

Fruits		Flowers	
Food	**Good source of vitamin(s)**	**Food**	**Good source of vitamin(s)**

1. It is recommended that teenagers eat five or more servings of fruits and vegetables (combined) daily. Circle the foods in the preceding table that are classified as vegetables (based on the food groups, not the part of the plant).

2. Which of the plant products in the table are classified as fruits (based on food groups)?

3. What characteristics do these fruits have in common?

4. What characteristics do the vegetables have in common?

5. You may have noticed that some plant products, such as the tomato, are classified as vegetables in the food groups and as fruits by plant scientists. What characteristics of the tomato, and other foods like it, enable them to be classified as vegetables? What characteristics make them fruits?

6. Which are more nutritious: vegetables or the foods we commonly refer to as fruits?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

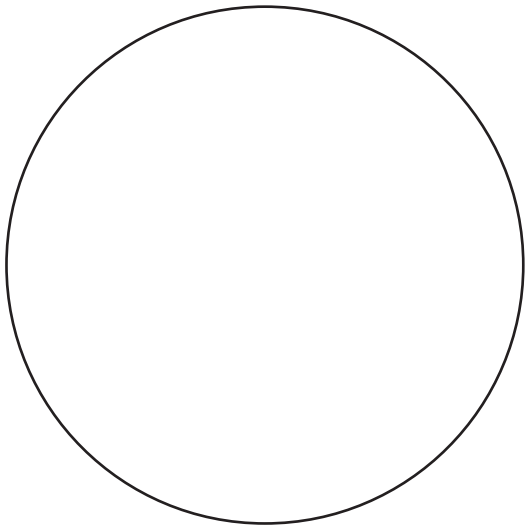
Name _____

Extension Activity 23.1

Examining Plant Diversity

In this activity you will compare and contrast the structure of three commonly eaten roots, stems, leaves, or fruits.

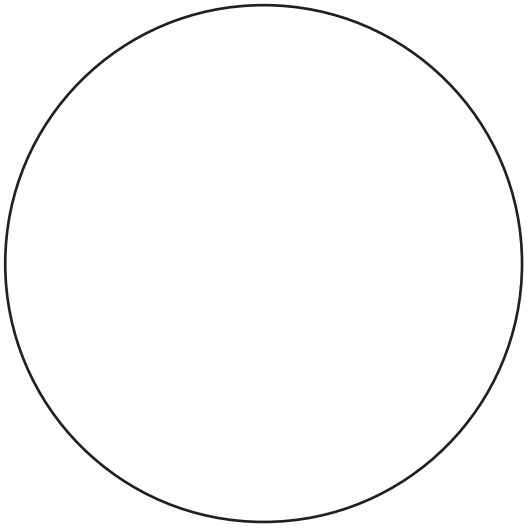
1. Decide which plant structure you will study: roots, stems, leaves, or fruits.
2. Examine the structure in three different types of plants and sketch them below. Describe their color, texture, size, shape, and any defining characteristics below the drawing. Cut each food in half and sketch and describe what you see. (If possible, examine them with a magnifying glass or dissecting microscope.)
3. How were the structures of the three foods you observed similar?
4. How were the structures of the three foods you observed different?
5. How might the differences you observed affect the plant's function (how it works)?



Whole food

Food name:

Description:



Cross section

Food name:

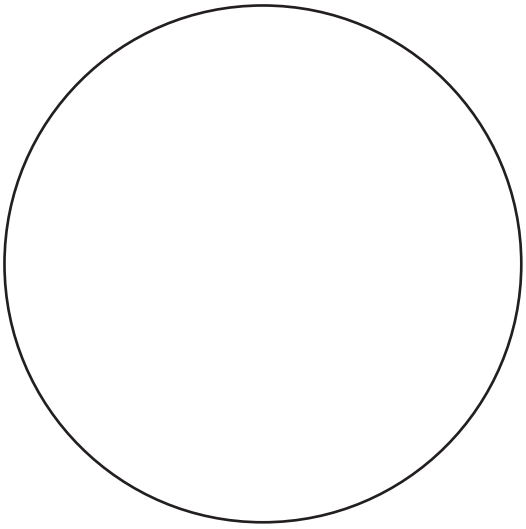
Description:

(continued)

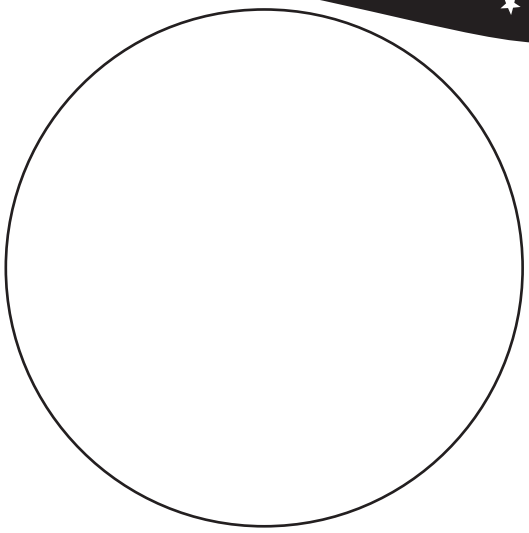
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Examining Plant Diversity *(continued)*

Extension Activity 23.1



Whole food



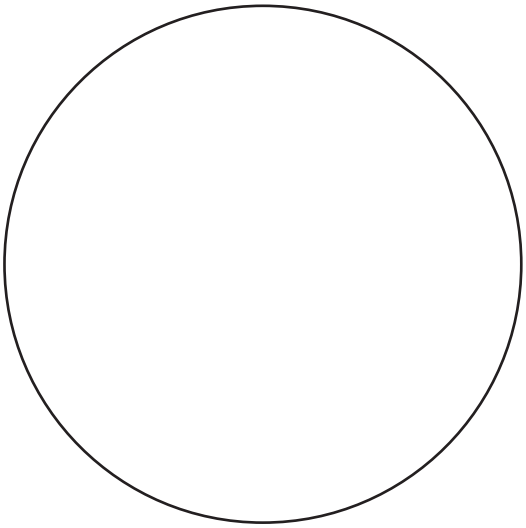
Cross section

Food name:

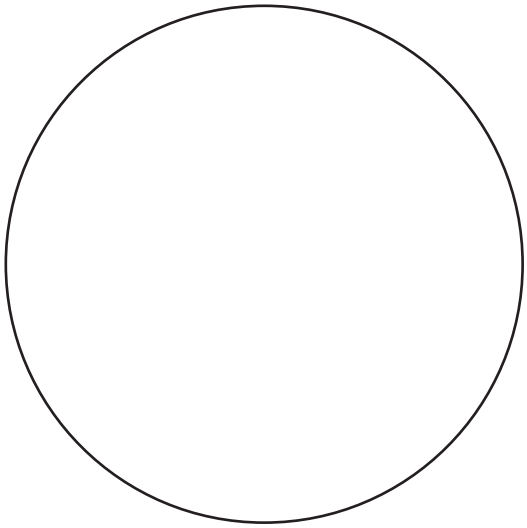
Description:

Food name:

Description:



Whole food



Cross section

Food name:

Description:

Food name:

Description:

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Extension Activity 23.2

Vitamin Function

Vitamins are nutrients that assist with many chemical reactions in the body. The following table outlines some of the important functions of a few vitamins.

Vitamin	Function	Food source
A	Helps make eye pigments needed for sight; maintains healthy skin	Green vegetables, liver, milk, butter, cheese, fruits
C	Maintains healthy gums, teeth, blood vessels, and immune system*	Citrus fruits, tomatoes, green peppers, berries, melons, potatoes, green leafy vegetables
D	Helps build strong teeth and bones	Fortified milk products, cod liver oil, eggs**
E	Protects cell membranes*	Seeds, green leafy vegetables, margarine, whole wheat
K	Aids blood clotting	Green leafy vegetables, whole wheat cereals, meat

* Vitamins C and E act as antioxidants. Antioxidants are substances that prevent cell damage that can lead to cancer.

** Sunlight stimulates the skin to produce vitamin D.

Imagine you are a doctor who specializes in nutrition disorders. You examined four patients and recorded their symptoms of illness. You drew a blood sample from each patient and sent it to the lab for analysis. Unfortunately, the lab technician mixed up the samples. Based on your knowledge of vitamin function, match the patients' symptoms to the vitamin deficiencies detected in the blood samples.

Draw a line to the vitamin that is deficient next to the patient's symptoms.

Patient symptoms	Lab results
Patient A: Bleeding gums, degenerating teeth, bruises easily	Vitamin A deficiency
Patient B: Night blindness	Vitamin C deficiency
Patient C: Bowed legs	Vitamin D deficiency
Patient D: Frequent nosebleeds, difficult to stop cuts from bleeding	Vitamin K deficiency

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Extension Activity 23.3

Vitamin C at Work

Materials: Apple, vitamin C tablet, knife

Procedure

1. Cut the unpeeled apple in half.

2. Give a complete description of the apple before the experiment.

3. Predict how the color will change in both apple halves during the experiment.

4. Crush the vitamin C tablet and sprinkle the powder over the surface of one of the apple halves.

5. Allow both apple sections to set uncovered for at least 30 minutes.

6. Observe the color of each section.

7. At the end of the experiment, describe how the color actually changed in both apple halves.

8. What do you think caused the apple halves to change color?

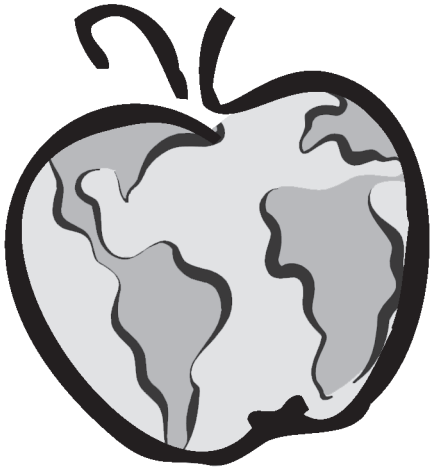
9. How might eating fruits and vegetables high in vitamin C help us? (Hint: It doesn't keep us from changing color.)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 24

Foods for Energy

Activity Theme



This lesson introduces the concept of physical endurance and the role carbohydrate plays in fueling muscular activity. In activity 24.1, students work in groups to design a food menu for a class hiking trip. This activity reinforces concepts introduced in lesson 4. Activity 24.2 is designed to introduce students to cellular respiration. Consider activity 24.2 if your students have studied animal cell organelles and have been introduced to atoms, molecules, and simple chemical formulas.

Behavioral Objectives

- For students to be physically active every day
- For students to eat a variety of grains (especially whole grains), fruits, and vegetables

Learning Objectives

Students will be able to do the following:

1. Define the term *endurance*
2. State the primary function of carbohydrate in the body
3. Work with others to solve a problem
4. Plan food requirements for a situation requiring moderately intense to vigorous activity and understand why certain foods would be appropriate
5. Discuss how physical fitness, carbohydrate, and fluids affect endurance for physical activity
6. Recognize that the mitochondria are the powerhouses of cells, the site of energy production
7. Recognize the raw materials and products of cellular respiration
8. Recognize the chemical symbols for carbon, oxygen, and hydrogen
9. Count the atoms and molecules in a chemical formula
10. Explain how changes in the availability of oxygen affect cellular energy production and our ability to do physical activity
11. Explain why animals are dependent on producers for energy production

Materials

- Activity 24.1, Let's Take a Hike
- Student resource 24.1, Foods for Energy
- *Optional:* Tennis balls, textbooks, or chairs (see optional activity in Procedure)
- Activity 24.2, Cellular Respiration: Unlocking the Energy Stored in Food

Procedure

ACTIVITY 24.1: LET'S TAKE A HIKE

1. Point out the goals of the activity:
   - To discuss how physical fitness, carbohydrate, and fluids affect endurance for physical activity
   - To plan menus that will provide the optimum nutrition needed on a 3.5-mile (5.6-kilometer) hike
2. (5-10 minutes) *Optional activity:* If time allows, start this lesson by having students determine how much endurance they have for one of the following activities:
   - Squeeze a tennis ball firmly, then relax; repeat this as fast and as long as you can.
   - Perform biceps curls while grasping two textbooks.
   - Step up and down on a chair.
   - Perform push-ups.
   - Perform sit-ups.

   The experience of doing one of these activities for as long as they can will give students firsthand experience with endurance and fatigue and lots to say about the following questions. The first two activities are likely to be the least disruptive to your classroom. Have each student record her or his results. Ask students to list some factors that affect endurance.
3. (5 minutes) Ask students the following: What is endurance? What can you do to improve your endurance? Discuss student responses. Emphasize that endurance is dependent not only on physical fitness but also on adequate intake of carbohydrate and fluids. (See Teacher Resources for answers to these questions.)
4. (3-5 minutes) Ask students the following and record their responses on the board:
   - What foods have you eaten today that are rich in carbohydrate?
   - What is the primary job of carbohydrate in our body?
5. (10 minutes) Hand out and have students read student resource 24.1, Foods for Energy. Review
   - what carbohydrates are,
   - where they come from,
   - what they provide, and
   - why we should choose whole grain over processed grain foods.
6. (15 minutes) Hand out activity 24.1, Let's Take a Hike. This activity requires students to plan what they should eat the day before and the day of a hike. Have students work in groups of two to four to complete this activity. Be sure students understand the directions before they begin.
7. (10-15 minutes) Have each group exchange its menu plan with another group. Ask students to model constructive criticism by pointing out the pros and cons of their classmates' menu plans. Have each group share its critique.

ACTIVITY 24.2: CELLULAR RESPIRATION: UNLOCKING THE ENERGY STORED IN FOOD

This activity is designed to introduce students to cellular respiration. Choose this activity if your students have studied animal cell organelles and have been introduced to atoms, molecules, and simple chemical formulas.

1. Remind students that when they studied animal cells they learned about important organelles called mitochondria. Ask whether they remember what they look like and what their function is. You may want to show them an illustration of a cell to refresh their memory.
2. Explain that in this activity they will learn more about how we get energy from food and how the mitochondria are involved in this process.
3. (5 minutes) Distribute activity 24.2, Cellular Respiration: Unlocking the Energy Stored in Food. Have students take turns reading aloud. Ask students to underline or highlight words they don't know.
4. (10 minutes) Review cellular respiration before students answer the questions in part I and part II. See Teacher Resources for specific background on cellular respiration.
5. (25 minutes) Have students work in pairs to answer the questions in parts I and II. The questions in part I reinforce what students have already read and discussed. The questions in part II require students to apply what they have learned.
6. (10 minutes) Lead a discussion with students based on their responses to the questions in part II. Refer to the activity 24.2 answer key.

Extension Activities

1. Have students record their day hike menus on poster board and display them in the room.
2. Have the class decide which group's menu is the "best." Take a hiking field trip and have everyone bring the food on the "best" menu.
3. Have students present what they've learned about carbohydrate and how it affects physical performance to school athletic teams.
4. Have students make a list of everyone in their homes and list each person's weekly physical activities. Have them explain why the people in their homes have endurance in different activities. Does anyone do moderately intense or vigorous physical activity on a regular basis? How are their activity patterns different from each other?

Teacher Resources

GENERAL BACKGROUND INFORMATION

In preparing for this lesson, you may want to refer to U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans*. See appendix A for information on how to obtain this resource.

To look up the carbohydrate content of foods, visit www.nal.usda.gov/fnic/foodcomp/search/ or http://calorieking.com/.

SPECIFIC BACKGROUND INFORMATION

Following are some definitions that may be useful for this lesson.

Nutrient: A substance that must be consumed as part of the diet to provide a source of energy, to provide material for growth, and to regulate growth or energy production. Nutrients include carbohydrate, fat, protein, minerals, and vitamins.

Endurance: The time limit of a person's ability to maintain a specific muscular activity at a specific level of intensity. Endurance is a measure of how long a person can repeat an activity without getting tired. How many miles can a person run? How many laps can a person swim? How many push-ups can she or he do?

Carbohydrate: A macronutrient that contains carbon, hydrogen, and oxygen. It is the primary fuel for muscle contraction. There are two types of carbohydrate: simple and complex. Simple carbohydrate is composed of one or two small molecules and is also called sugar (glucose, fructose, sucrose). Sweet foods such as cookies and candy tend to be high in simple sugars and low in vitamins and minerals; often they are high in fat as well. Sugars are easily absorbed into the blood from the digestive system and provide short bursts of energy. Unfortunately, this burst of energy sometimes is followed by a feeling of drowsiness or low energy. Sugars also are found naturally in fruits and other foods made from plants.

Complex carbohydrate, such as starches and glycogen, is made up of long chains of glucose molecules linked together. These large molecules provide longer-lasting energy than simple sugars. Breads, cereals, pasta, rice, and other grain products are high in complex carbohydrate, as are many fruits and vegetables. Foods high in complex carbohydrate usually are low in fat and provide protein, some vitamins, and some minerals.

The starches in whole grains, found in foods such as whole wheat bread, raisin bran, popcorn, and brown rice, are surrounded by intact kernels of grain. They are broken down more slowly than starches found in foods made from refined grains such as white bread and white rice. Whole grain foods and some fruits and vegetables are high in fiber, a complex carbohydrate that helps the digestive system function properly. Fiber can't be broken down by the digestive juices, so it passes through the intestine, soaking up water and making it easier for waste to pass from the body. Eating plenty of fiber helps prevent heart disease and diabetes.

Carbohydrate (primarily complex carbohydrate) should make up the largest part of each day's total calorie intake (45 to 65 percent). About 10 to 35 percent of daily calories should come from protein, and no more than 35 percent should come from fat (only 10 percent from saturated fat). (For more information on dietary sources of carbohydrate, see student resource 24.1 in this lesson and overhead transparency 4.3 in lesson 4).

What factors affect endurance?

- Physical fitness: aerobic fitness (the ability of the heart, lungs, and circulatory system to deliver oxygen and nutrients to all areas of the body), muscular strength, flexibility
- Nutrition
- Fluid balance

What activities help to improve endurance?

Endurance is improved progressively by doing activities that extend what you are normally used to doing. This can be done by increasing the frequency, intensity, or duration of exercise. Athletes have training programs that get progressively more demanding as time goes on. This slowly brings their bodies to higher capability levels. If you were to walk a half a mile farther each day, walking long distances would become easier and more routine. How long, how hard, and how often you exercise determine how fit you are.

How does nutrition affect endurance?

Only a small amount of carbohydrate is stored in the liver and muscles as glycogen (long chains of glucose molecules). Therefore, the best sport nutrition regime is one in which a carbohydrate-rich diet is eaten *daily.* In most cases, this means following the same diet recommended for nonathletes. A daily calorie balance of 45 to 65 percent

carbohydrate, 10 to 35 percent protein, and no more than 35 percent fat (10 percent saturated fat) will ensure that muscles remain loaded with glycogen and that energy and endurance levels remain high. Adolescent athletes who regularly compete in endurance events lasting longer than 90 minutes may benefit from increasing their carbohydrate intake to 60 to 65 percent (protein 10 to 15 percent and fat 20 to 30 percent). This pattern of intake can also be helpful in strenuous, long-lasting activities such as lengthy hiking or biking trips.

Research has not yet shown a definitive difference between complex and simple carbohydrate and optimal sport performance. However, complex carbohydrate is preferable overall for good health, because it contains essential vitamins and minerals as well as fiber, and these contribute to a healthy diet. With the exception of fruits, foods rich in simple carbohydrate tend to be deficient in essential nutrients and fiber. Whole grains are a better source of carbohydrate than processed grains, because whole grains provide fiber, plant oils, and other micronutrients that are not present in refined grains.

Carbohydrate is the primary fuel for muscle contraction and is stored only in limited amounts by the body. "After two to three hours of exercise, blood glucose concentration normally declines to relatively low levels" (Coyle, 1988). Because an insufficient amount of blood glucose is available to compensate for depleted muscle glycogen stores, fatigue may result. Most athletes experience local muscular fatigue, not hypoglycemia (low blood glucose that causes symptoms such as light-headedness and nausea). Athletes in this state may have difficulty exercising intensely. "Sports such as soccer, while not played for more than two hours, can result in significant muscle glycogen depletion and fatigue" (Coyle, 1988).

High-carbohydrate meals eaten within six hours of competition "top off" the glycogen stores in liver and muscle. "Consuming carbohydrate foods or beverages during exercise has been shown to delay fatigue (i.e., improve endurance and performance) for athletes involved in vigorous continuous or intermittent exercise lasting more than two hours. However, carbohydrate supplements are not necessary for non-fatiguing exercise" (Coyle, 1988).

How important are drinks to endurance?

When you're active, you sweat. Sweat is largely made up of water and just a small amount of minerals and electrolytes (sodium, potassium, and magnesium). Not drinking enough water during exercise may lead to dehydration, which can result in cramps, exhaustion, and heat stroke. Prevention is easy: Drink water when you exercise.

Water is the best and most economical drink for activities lasting less than an hour. Sport drinks are recommended for exercise that lasts longer than one hour or that is performed in high temperature and humidity. They provide water and a carbohydrate supplement (20 grams per 8 ounces, or 250 milliliters). Sport drinks offer no performance advantage for adolescents participating in typical sport events and activities (baseball, basketball, soccer, and so on) in which intermittent, short-term activity is the norm. Water and a small snack are recommended as a better way to ensure proper hydration and energy for active adolescents.

To avoid dehydration, drink 1 to 2 cups of cool water before exercising. When you work out, start drinking early and at regular intervals (4 to 8 ounces, or 125 to 250 milliliters, every 10 to 15 minutes). Water is the preferred fluid because large amounts of sugar (from soda or juice) slow down stomach emptying and increase the time it takes for the fluid to reach the blood. Soda and other caffeinated drinks should also be avoided because caffeine increases water loss through urine. Although water is best, flavored drinks or diluted fruit juices (half juice, half water) are sometimes suggested to adolescents who have difficulty drinking enough water to stay hydrated.

A common misconception that sweating depletes salt in the body leads some people to take salt tablets. However, they can make you sick to your stomach and can worsen dehydration because one salt tablet increases the amount of water you need by 1 pint (600 milliliters). Never use salt tablets.

ACTIVITY 24.2

What is cellular respiration, and why is it important?

Activities of all living things require energy. Food molecules (carbohydrate, protein, and fat) contain stored energy in their chemical bonds. Carbohydrate, our primary supply of energy, is made up of sugar molecules (glucose). Cells can't directly use the energy stored in sugar. Cellular respiration is the process (a series of chemical reactions) that transfers the energy stored in glucose to ATP, a molecule that cells can use to fuel energy-requiring processes such as muscle contraction.

In which organelle does cellular respiration take place?

Mitochondria

What are the reactants and products of cellular respiration?

The reactants are glucose and oxygen. The products are energy (ATP), carbon dioxide, and water.

How do you think exercise affects cellular respiration?

During exercise, more oxygen is transported to the muscle cells and muscle cells need more energy for contraction. There is also an increase in body temperature. These all result in an increase in cellular respiration, producing more energy and carbon dioxide. The carbon dioxide is delivered to the lungs, where it's exhaled, and the ATP energy is used to fuel muscle contraction, so you can run, cycle, or swim.

Mitochondrial Myopathy

A myopathy is any disease of the muscles and generally results in muscular weakness. There are many causes of myopathies. According to the Muscular Dystrophy Association, mitochondrial myopathy is actually a group of diseases that affect the functioning of mitochondria, the site of cellular energy production, and interfere with muscle function. Mitochondrial myopathies are caused by defects in the genes that code for the enzymes involved in cellular respiration. The type of enzyme affected determines which of the mitochondrial diseases is present and the specific symptoms.

This activity does not distinguish which type of mitochondrial myopathy Greg LeMond inherited (question 4 in part II). The primary goal of the activity is for students to reason that a disorder of the mitochondria would reduce the capacity of the muscle cells to produce the energy (ATP) needed for muscle contraction, thus making it difficult for Greg to compete.

REFERENCE

Coyle, E.F. 1988. Carbohydrates and athletic performance. *Sports Science Exchange* 1 (7).

Answer Key

ACTIVITY 24.2

PART I: UNDERSTANDING THE EQUATION

1. Where does cellular respiration take place? *(Answer: The mitochondria)*

   Circle the raw materials (reactants) of the chemical reaction. *(Answer: Circle glucose and oxygen.)*

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{energy(ATP)}$$

glucose oxygen carbon dioxide water

3. Put a box around the products of the chemical reaction. *(Answer: Put a box around carbon dioxide, water, and energy.)*
4. List the names of the elements that make up the glucose molecule. *(Answer: Carbon, oxygen, and hydrogen)*
5. How many atoms of carbon are in

   a glucose molecule? *(Answer: 6)*

   a carbon dioxide molecule? *(Answer: 1)*
6. How many molecules of oxygen are needed to break down one glucose molecule? *(Answer: 6)*
7. How many molecules of carbon dioxide are produced when one molecule of glucose is broken down? *(Answer: 6)*

PART II: MAKING CONNECTIONS

1. What group of living things produces the oxygen we need for cellular respiration?

   (Answer: Plants produce oxygen through photosynthesis. This process requires the sun.)
2. If we continue to cut down rainforests, what effect might this have on our ability to release the energy stored in glucose? *(Answer: When rainforests are cut down, fewer trees are available to make oxygen. With less oxygen in the air, humans and other animals would have difficulty breaking glucose down through cellular respiration. As a result, we would have less energy to move and grow and would feel fatigued.)*
3. At high altitudes the air is less dense and so less oxygen is available to breathe. In 1968 the summer Olympic Games were held in Mexico City, at an altitude of 7,500 feet (2,286 meters) above sea level. Many athletes were concerned that the high altitude would affect their performance. Explain why exercise at high altitudes would be more difficult than exercise at lower altitudes. How does it affect cellular respiration? *(Answer: Exercise at high altitudes is more difficult than exercise at lower altitudes because there's less oxygen available for cellular respiration. Therefore less energy can be generated to fuel the intense muscle contractions needed for exercise.)*
4. Greg LeMond, the three-time winner of the Tour de France, a bicycle road race through France, retired from professional cycling after being diagnosed with mitochondrial myopathy. This rare muscle disorder occurs when cell mitochondria don't function properly. Explain what effect this disease would have on Greg's ability to compete. *(Answer: Mitochondria are located in the cytoplasm in every cell in the body. They are often referred to as the powerhouses of the cell, because they convert the energy stored in glucose into ATP energy, the energy used to power most cell functions. Greg would have difficulty competing because his mitochondria wouldn't be able to generate enough energy for the intense muscle contractions required for competitive cycling.)*

BONUS

Explain why we are dependent on the sun and plants for the energy we need to exercise. *(Answer: We get our energy from food. The energy stored in food originally came from the sun. Plants capture the sun's energy and make sugar and oxygen. The sugar is stored in fruits, vegetables, and grains. When we eat these foods and breathe in oxygen, we can make energy for exercise. Pigs, chickens, fish, and cows eat plants and grains too. When we eat them, we are getting energy that originally came from plants and the sun.)*

Name _____

Student Resource 24.1

Foods for Energy

Carbohydrate

Carbohydrate is a nutrient found in food and is our major source of energy. It is found in many foods and in all of the food groups. However, the grain, fruit, and vegetable groups contain the greatest amount of carbohydrate. Whole grain foods, fruits, and vegetables generally are low in saturated and trans fat and provide protein, healthy plant oils, fiber, minerals, and vitamins as well. These nutrients are removed during milling and are not present in foods made from processed grain foods, such as white bread, white rice, and pasta. Eating a variety of grains, especially whole grains (at least three servings daily), fruits, and vegetables is the basis of healthy eating.

Sweet foods such as soda, cookies, and candy that contain sugar also provide carbohydrate. Unfortunately, these foods usually contain very few vitamins and minerals, and some can be high in saturated and trans fat; therefore, these foods should be eaten only in small amounts.

Carbohydrate should make up the largest part (45 to 65 percent) of each day's total calorie intake. On a typical day, you should consume 275 to 330 grams of carbohydrate. However, your calorie and carbohydrate needs will vary depending on how much and how hard you are exercising and your weight. Carbohydrate is the primary fuel for muscle contraction and is stored in only limited amounts by the body; when depleted, athletes may feel fatigue and have difficulty exercising intensely. Carbohydrate-rich meals eaten within six hours of physical activity "top off" the carbohydrate stores in liver and muscle.

Riding your bike with friends, playing baseball all afternoon, hanging out at the pool, or hiking 3.5 miles (5.6 kilometers), as described in activity 24.1, can be fueled by the carbohydrate in a typical healthy diet. However, if you participate in a moderate to vigorous activity lasting *more than two hours,* you should eat additional amounts of carbohydrate during and after the activity. An all-day hike or a six-hour soccer clinic would require a lot more energy and more carbohydrate than a normal day at school. Consuming sport drinks is a growing trend among youth and adults alike for "fueling the body" during physical activity. However, sport drinks provide little nutritional benefit over standard foods and beverages during normal recreational activities. Water is the best choice except in cases of extremely intense activity lasting longer than one hour, or in the presence of high heat and humidity. Sport drinks offer no performance advantage for adolescents participating in typical sports events and activities (e.g., baseball, basketball, soccer) in which intermittent, short-term activity is the norm. Water and a small snack are recommended as a better way to ensure proper hydration and energy for active adolescents.

Here's a list of foods to help you understand sources of carbohydrate. Mark the ones that are rich in carbohydrate (12 grams or more per serving). You may use this list to help you work on activity 24.1.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Student Resource 24.1

Foods for Energy *(continued)*

Food item	Serving size	Carbohydrate (grams)	Fiber (grams)	Saturated fat (grams)	Food item	Serving size	Carbohydrate (grams)	Fiber (grams)	Saturated fat (grams)
Grain					**Meat/Protein**				
Bagel	1 (4-in., or 10 cm, diameter)	45	2	0	Bacon	3 slices	0	0	3
Brown rice	1 cup	46	4	0	Beans	1/2 cup	20	8	0
Raisin bran	1 cup				Chicken breast	1 piece	0	0	0
Pasta	1 cup	47	7	0	Egg	1	1	0	2
White bread	1 slice	15	1	0	Ham	1 slice	1	0	1
Whole wheat bread	1 slice	13	2	0	Peanut butter	2 Tbsp (30 ml)	6	2	3
Whole wheat crackers	7	22	4	1	**Vegetables**				
Dairy Foods					Broccoli	1 cup	6	2	0
Cheddar cheese	1 oz (30 g) slice	0	0	6	Carrots	1 cup	12	4	0
Cottage cheese, 2% milkfat	1 cup	8	0	3	Corn	1/2 cup	15	2	0
Milk, whole	1 cup	11	0	5	Peas	1/2 cup	11	4	0
Milk, 1%	1 cup	12	0	2	Tomato	1	5	2	0
Yogurt, low fat, fruit flavored	1 cup	47	0	2	**Fat and Oils**				
Fruits					Butter	1 Tbsp (15 ml)	0	0	7
Apple	1	19	3	0	Olive oil	1 Tbsp (15 ml)	0	0	1
Banana	1	27	3	0	**Beverages**				
Grapes	1 cup	29	1	0	Gatorade	1 cup	15	0	0
Orange	1	16	3	0	Orange juice	1 cup	26	0	0
Raisins	1 small box (1.5 oz, or 45 g)	34	2	0	Water	1 cup	0	0	0

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 24.1

Let's Take a Hike

Your science class is planning to explore a nearby nature preserve. The 3.5-mile (5.6-kilometer) trail will range in difficulty from an easy walk in the woods to a heart-pumping hike. The trip should take one and a half to two hours, allowing time for observations and a snack.

Most of the energy you will need for the hike will come from carbohydrate stored in your muscle and liver cells. If you've been eating a balanced diet that includes plenty of grains, fruits, vegetables, and dairy products, your body is well fueled for this challenge. However, eating a small carbohydrate-rich snack and drinking plenty of water during the hike will prevent you from feeling hungry and ensure proper hydration.

Your teacher wants to make sure everyone in the class has the energy needed to do the hike and will have fun. She asked students to plan what they will eat for lunch and dinner on the day before the trip and for breakfast and snack on the day of the trip. Experts recommend that people your age eat between 275 and 330 grams of carbohydrate (45 to 65 percent of total calories), because carbohydrate is the primary source of energy for muscle contraction and brain function. This amount of carbohydrate, along with some stored body fat, will provide the energy you need to fuel your hike. However, for optimum nutrition and physical performance, you need to consider more than just the total amount of energy. Eating whole grains, fruits, and vegetables will provide you with energy, as well as fiber, healthy plant fat, vitamins, and minerals. These other ingredients are essential for you to perform at your best.

Use student resource 24.1, Foods for Energy, to help you plan your lunch, dinner, breakfast, and snack. You may include foods that are not on the student resource sheet in your menu. However, you will need to look at food labels at home or in a store to determine the amount of carbohydrate these foods contain. Remember to include some whole grain foods and foods from each food group. Include beverages in each menu.

Food	Quantity	Carbohydrate (grams)	Food	Quantity	Carbohydrate (grams)
Lunch			Dinner		
Breakfast			Snack		

What is the total number of carbohydrate supplied by your menu? How many servings of whole grain did you include? How many fruits and vegetables?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 24.2

Cellular Respiration: Unlocking the Energy Stored in Food

Everything we do requires energy: running, breathing, building new bone and muscle, even moving things in and out of our cells. Where do we get this energy? We get our energy from food.

Our digestive system breaks food down into nutrients. The macronutrients—carbohydrate, fat, and protein—contain energy we can use to exercise, grow, and carry out all life processes. Carbohydrate is our primary source of energy. It is made up of sugar molecules; the most common sugar is glucose. To be able to use the energy stored in glucose, the body must break it down through a series of chemical reactions.

Deep inside our muscles, in every muscle cell, there are organelles called mitochondria, the powerhouses of our cells. It's here that glucose combines with oxygen, releasing the energy stored in its chemical bonds. This process is called cellular respiration. The following chemical equation summarizes the breakdown of glucose:

Cellular Respiration

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{energy(ATP)}$$

glucose oxygen carbon dioxide water

As glucose is broken down, the energy stored in its chemical bonds is transferred to ATP, a molecule that cells can use to fuel energy-requiring activities, such as muscle contraction. Carbon dioxide and water are given off as waste products. The blood delivers the carbon dioxide to our lungs, from which we exhale it. This is how we get the energy to do all the things we need to do.

Part I: Understanding the Equation

1. Where does cellular respiration take place? _____
2. Circle the raw materials (reactants) of the chemical reaction.
3. Put a box around the products of the chemical reaction.
4. List the names of the elements that make up the glucose molecule.

   _____

   _____

   _____

5. How many atoms of carbon are in

   a glucose molecule? _____

   a carbon dioxide molecule? _____
6. How many molecules of oxygen are needed to break down one glucose molecule?_____
7. How many molecules of carbon dioxide are produced when one molecule of glucose is broken down?_____

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 24.2

Cellular Respiration *(continued)*

Part II: Making Connections

1. What group of living things produces the oxygen we need for cellular respiration?

2. If we continue to cut down the rainforests, what effect might this have on our ability to release the energy stored in glucose?

3. At high altitudes the air is less dense and so less oxygen is available to breathe. In 1968 the summer Olympic Games were held in Mexico City, at an altitude of 7,500 feet (2,286 meters) above sea level. Many athletes were concerned that the high altitude would affect their performance. Explain why exercise at high altitudes would be more difficult than exercise at lower altitudes. How does it affect cellular respiration?

4. Greg LeMond, the three-time winner of the Tour de France, a bicycle road race through France, retired from professional cycling after being diagnosed with mitochondrial myopathy. This rare muscle disorder occurs when cell mitochondria don't function properly. Explain what effect this disease would have on Greg's ability to compete.

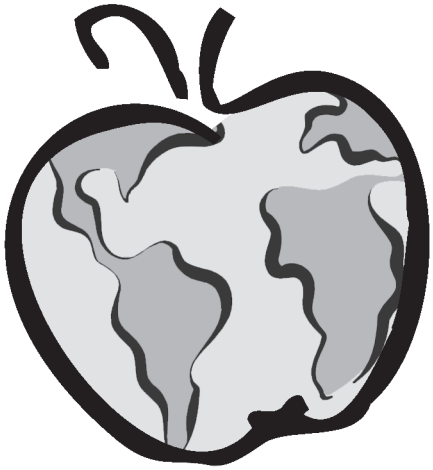
BONUS

Explain why we are dependent on the sun and plants for the energy we need to exercise.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 25

Muscle Mysteries



Activity Theme

This lesson is designed to be infused into a classroom unit on the muscular system. In activity 25.1, students perform prescribed motions, observe which muscles are involved, and make conclusions as to the type of fitness that the motions contribute to when done as exercise. The activity reinforces the "three components of physical fitness" concept while giving students an opportunity to hone their anatomy skills and their powers of observation. In activity 25.2, students discuss ways that the muscular, cardiovascular, and respiratory systems interact during exercise and how exercise training changes these systems, thus improving fitness. Students should be familiar with the functions of the human body systems prior to doing this activity.

Behavioral Objectives

- For students to be physically active every day
- For students to learn exercises they can practice regularly

Learning Objectives

Students will be able to do the following:

1. Identify the major muscles of the body and the motions they produce when they contract
2. Describe the three types of fitness: muscular strength (anaerobic fitness), cardiorespiratory (aerobic) fitness, and flexibility
3. Describe ways that the muscular, cardiovascular, and respiratory systems interact with each other
4. Explain how exercise training affects these systems—improving fitness

Materials

- Student resource 25.1, Muscles
- Station cards
- Activity 25.1, Solving the Muscle Mysteries
- Activity 25.2, The Mystery of Training

Procedure

ACTIVITY 25.1

(Note: This is not a workout—it is a series of activities to show students how muscles are used in various ways.) Arrange your classroom into 10 workstations to accommodate the activities listed on the station cards. Some stations require a wall; others need some floor space. Post the activity description and illustration (station card) at each station. Ideally, divide the class into pairs of students. Adjust group sizes as necessary. This activity may require more than one 45-minute period. Because moving through the workstations takes approximately 25 minutes, you may want to split the procedures between two periods.

1. (5 minutes) Distribute student resource 25.1, Muscles, to the class. Discuss the function of the major muscle groups by generating discussion with students and writing answers on the board. Tell students that they do not need to memorize the muscle groups.
2. (3-5 minutes) Discuss the three types of fitness—muscular strength (anaerobic fitness), cardiorespiratory (aerobic) fitness, and flexibility—each of which uses muscles in a different way (see Teacher Resources).
3. (2-3 minutes) Distribute activity 25.1, Solving the Muscle Mysteries, to students. On the worksheets, students are asked to identify the following:
   - Which type of fitness the activity would improve if done regularly
   - Which muscles were used in the activity (using student resource 25.1 as a reference)
4. (10 minutes) Divide the class into pairs or small groups and move them to assigned areas. Review each activity with the class by having students at each station demonstrate the activity.
5. (25 minutes) Move students through the stations until each pair or group has completed all 10 activities. One student in each group will perform the activity at each station. Members of the group should take turns in this role. Have the students spend 45 seconds doing each activity. They have another minute to complete the worksheet. One student can act as a timer and can read the station card to assist the student doing the activity.

   (Note: Keep track of the time and move groups around the room in a clockwise fashion. The stations can be completed in any order. With 10 stations, the activity should be completed in approximately 25 minutes.)
6. (5-7 minutes) Ask students return to their seats. Help students review their experiences by drawing a chart similar to the worksheet on the board and filling in and discussing answers.

ACTIVITY 25.2: THE MYSTERY OF TRAINING

In this activity students learn that training changes the anatomy and physiology of the cardiovascular, respiratory, and muscular systems. They apply their understanding of these systems and how they're integrated to explain the benefits of theses changes.

1. (5-10 minutes) Use the following discussion questions to review the functions of the cardiovascular, respiratory, and muscular systems.
   - What are the primary functions of each of the systems?
   - How do they work together?
   - What happens to each system during a bout of exercise (not long-term training)? *(Answer: The heart beats faster and harder. You breathe deeper and faster. Your skeletal muscles repeatedly contract and relax.)*

- How do these changes help a person meet the demands of exercise? *(Answer: The cardiovascular and respiratory system adjustments result in more oxygen being transported to the skeletal muscle cells.)*
- Why do working muscles need more oxygen? *(Answer: To make energy through aerobic cellular respiration)*

2. (15 minutes) Distribute activity 25.2, The Mystery of Training. Explain that students will learn how training changes some of the major organ systems and that they will need to apply what they know about the organ systems to explain the benefits of these changes. Have students work in pairs to read and complete the diagram and question.
3. (10 minutes) Ask several groups to present and explain their diagrams. Ask other groups to share their responses to the question. Help students understand how regular training affects the major organ systems and how this benefits the body during exercise and at rest. (See the Teacher Resources and the Answer Key to help with this discussion.)

Extension Activity

Have students come up with their own stretches and movements. Ask them to determine which muscles these movements work.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- U.S. Department of Health and Human Services *Healthy People 2010* (see appendix B)
- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)
- *Planet Health* microunits 13, 14, 15, and 16

SPECIFIC BACKGROUND MATERIAL

Planet Health*'s Activity Message*

Physical activity promotes health and well-being and offers opportunities to socialize and have fun. Adolescents should strive to accumulate at least 60 minutes of moderate to vigorous activity every day as part of play, games, sports, chores, transportation, and planned exercise. To help achieve this, they should participate in at least three sessions per week of vigorous physical activity lasting 20 minutes or more. These guidelines are recommended minimum levels of activity for health.

Three Components of Fitness

There are many ways to look at fitness. *Planet Health* focuses on three: cardiorespiratory (aerobic) endurance, muscular strength (anaerobic fitness), and flexibility. If your students are receiving *Planet Health*'s physical education lessons, this lesson offers them another opportunity to learn these concepts:

1. Cardiorespiratory (aerobic) endurance is defined as follows:
   - The heart's ability to get enough oxygen to the muscles to let the body maintain a certain level of activity for a long period of time
   - The ability to perform activities such as running, cycling, and swimming for long periods of time
   - The ability of the heart, lungs, and muscles to carry and use oxygen to perform continuous and rhythmic exercises

Long-term aerobic exercise increases the size and strength of the heart—a muscle. As a result, a trained heart can pump more blood per beat and beat more slowly at rest and during exercise. Regular aerobic exercise also increases blood volume and breathing volume. All these adaptations enable trained people to transport more oxygen to working muscles.

Aerobic exercise also changes skeletal muscles. It increases the number of muscle capillaries, which facilitates oxygen diffusion into the cell. It also increases the number and size of muscle cell mitochondria, resulting in an increase in the number of aerobic enzymes. These changes increase the capacity of the muscle to generate ATP through aerobic cellular respiration, improving muscle endurance.

2. Muscular strength (anaerobic fitness) is defined as follows:
   - The ability to lift or move the body or objects
   - The ability of muscles to produce force at high intensities over short intervals of time
   - The ability to perform high-force exercises such as sit-ups for short periods of time (10 to 20 repetitions). Repetition means performing a movement without rest. Doing 10 to 20 "reps" means doing an activity such as sit-ups 10 to 20 times.

   Muscles get bigger with strength training mainly because they make more muscle filaments, the proteins that slide together, contracting the muscle and thus generating movement. With more muscle filaments available, trained muscles can generate larger forces and therefore lift heavier objects.
3. Flexibility is defined as follows:
   - The ability to bend, stretch, and twist with ease
   - The ability to move muscles and joints through their range of motion

Flexibility exercises are muscle specific and can be done for all the major muscles. Instruct students to stretch to the point where muscles are taut, but not beyond that point. They should hold the stretch for at least 10 seconds to obtain any benefit from the stretch. Students also have an opportunity to learn this concept in their physical education lessons. (This instruction is relevant to the flexibility stations in this lesson: stations 1, 2, 3, and 10.)

Improving Fitness

You can improve fitness by doing the following:

- Increasing frequency (if you are not already exercising regularly)
- Increasing intensity (doing something faster, doing more repetitions or sets, or using heavier weights)
- Increasing the time you spend on exercise
- Choosing new types of exercise to try. Different types of exercise involve different muscle groups and can work on different components of fitness.

Training Recommendations

- Flexibility and cardiorespiratory (aerobic) exercises should be done at least three times per week.
- Strength training should be done two or three times per week. Gradually build up to three sets of 15 repetitions; if you can do this, increase the weight and build up to three sets of 15 reps at the new weight.

Answer Key

ACTIVITY 25.1: SOLVING THE MUSCLE MYSTERIES

Station name	Type of fitness (flexibility, aerobic, or strength)	Muscles used
1. Up and down swings	Flexibility	Upper arm, shoulder, and upper back (deltoid group), and chest (pectoralis group)
2. Thigh stretch	Flexibility	Quadriceps in thigh
3. Calf stretch	Flexibility	Calf (gastrocnemius) and Achilles tendon
4. Wall push	Strength	Upper arms, shoulders, and upper back (deltoid group, brachialis, trapezius), and chest (pectoralis group)
5. Side hops	Aerobic	Calf (gastrocnemius and soleus), Achilles tendon, thigh (quadriceps and hamstrings), and heart
6. Jogging in place	Aerobic	Thigh (quadriceps and hamstrings), calf (gastrocnemius and soleus), and heart
7. Half knee bends	Strength	Thigh (quadriceps), calf (gastrocnemius and soleus), hips and buttocks (gluteus maximus), lower back (latissimus dorsi), and shoulders (pectoralis group, deltoids, and trapezius)
8. Toe raises	Strength	Calf (gastrocnemius and soleus)
9. Arm curls	Strength	Upper arm (biceps)
10. Head rotation	Flexibility	Neck and upper back (sternocleidomastoid and trapezius)

ACTIVITY 25.2: THE MYSTERY OF TRAINING

1. How training affects organs:

   Heart: Can pump more blood per beat, and pump fewer beats per minute

   Skeletal muscles:

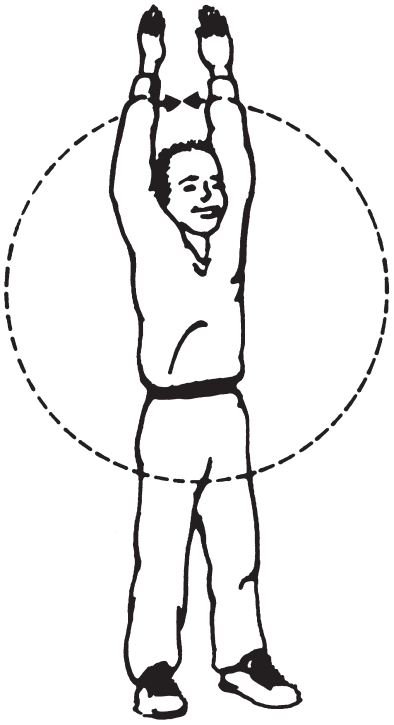
   - Get bigger from more muscle filaments (fibers), so can work harder
   - Get more capillaries to deliver blood to and from the muscles
   - Get more mitochondria to generate more energy during exercise. This results in greater strength and endurance.

2. Training made Lance's heart larger and stronger, which allowed him to pump more blood to his working muscles. Training also enhanced energy production from the mitochondria in Lance's muscles so that he was able to cycle faster and for a longer period of time than his competitors. This carried him up mountains faster and over thousands of miles of roads with more endurance, thus leading to victory.

Stations

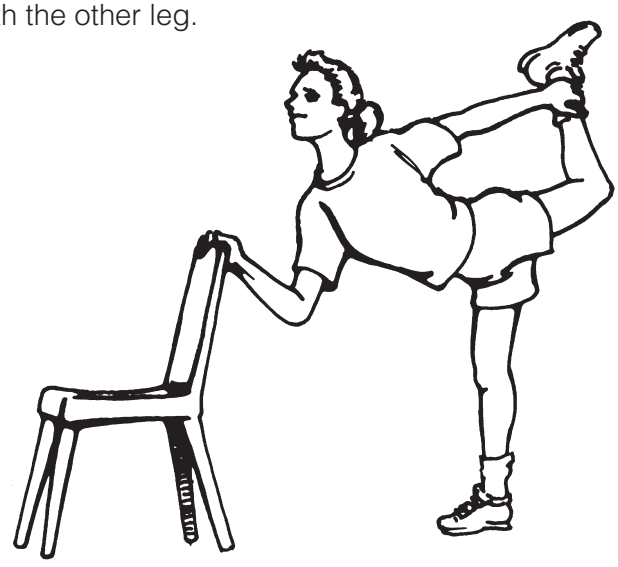
Station 1: Up and Down Swings

Stand erect with feet shoulder-width apart and arms hanging loosely at your sides. Raise and stretch your arms over your head until your wrists touch. Move your arms in a circle downward until your wrists touch in front of your abdomen. Repeat for 45 seconds.



Station 2: Thigh Stretch

Lean against the back of a chair for balance. Bend forward and raise one foot up and back. Bend your knee and grasp your ankle with your hand. Pull gently until you feel tension. Hold for 20 seconds. Repeat with the other leg.



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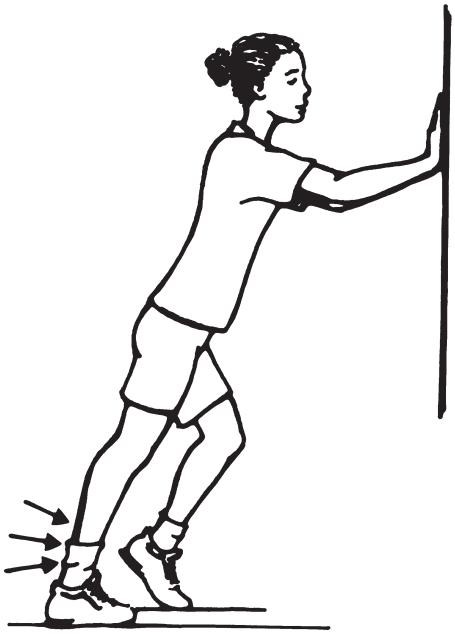
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Stations *(continued)*

Station 3: Calf Stretch

Stand about 2 feet (61 centimeters) from a wall with both hands pressed flat on the wall at shoulder level. Press your heels to the ground. Keeping your knees and hips straight, lean into the wall until you feel a pull behind your knee or leg. Increase the tension gradually. Hold for 30 seconds. Repeat with the other leg.



Station 4: Wall Push

Place your palms flat against the wall. Make sure your arms are straight with your elbows locked and your back and legs straight. Slowly bend your elbows until your nose and chest touch the surface. Slowly push back up and lock your elbows again, making sure to keep your back and legs straight. Repeat continuously for 45 seconds.

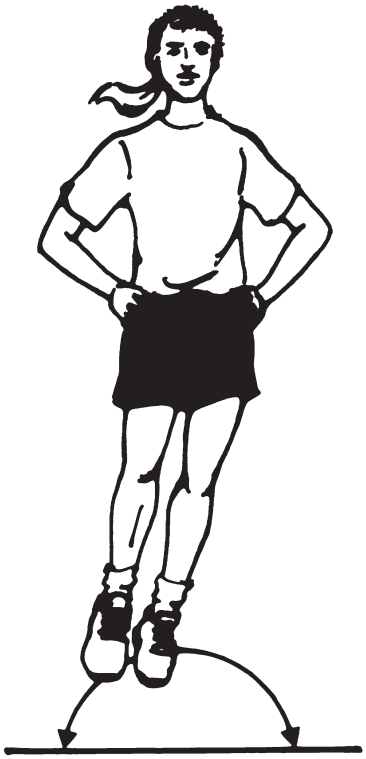
(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Stations *(continued)*

Station 5: Side Hops

Stand erect with your feet together and your hands on your hips. Hop about 12 inches (30.5 centimeters) to the left. Hop back to your starting position. Repeat, hopping from side to side for 45 seconds.



Station 6: Jogging in Place

Stand erect with your feet about 2 inches (5 centimeters) apart. Jog in place, lifting your feet 4 to 6 inches (10 to 15 centimeters) off the floor. Hold your arms at your sides at a 90° angle. Continue for 45 seconds.

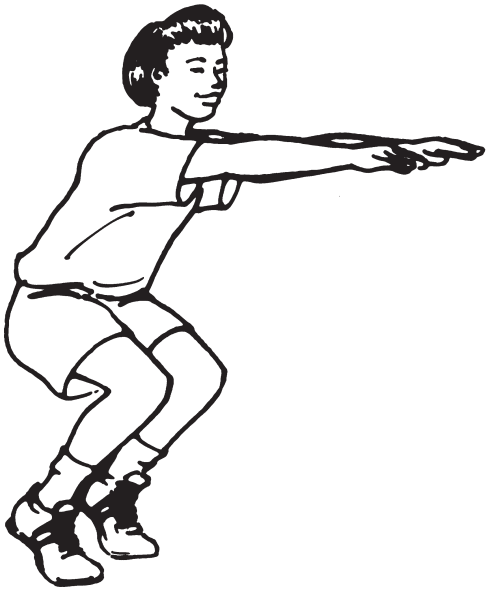
(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Stations *(continued)*

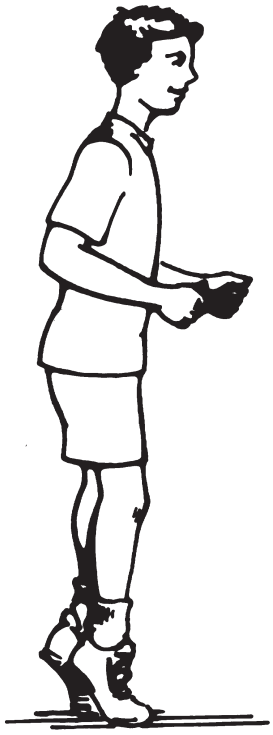
Station 7: Half Knee Bends

Stand erect with feet shoulder-width apart. Place your hands on your hips. Bend your knees halfway, bringing your heels off the ground, while extending your arms forward at shoulder level with your palms down. Return to your standing position. Repeat for 45 seconds.



Station 8: Toe Raises

Stand straight with your weight on the balls of your feet. Lift your heels and push your body toward the ceiling repeatedly, each time lowering your heels back to the ground. Continue for 45 seconds.



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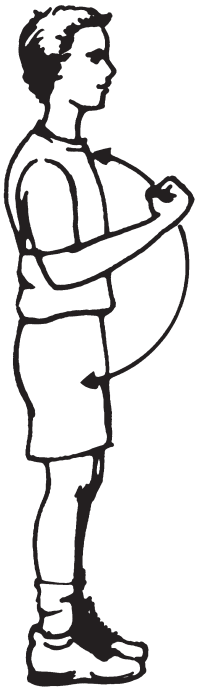
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Stations *(continued)*

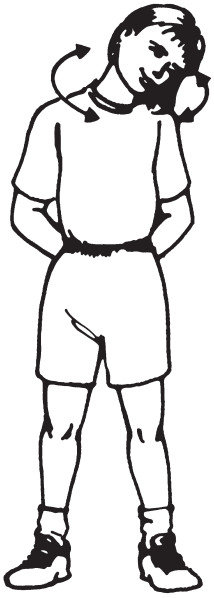
Station 9: Arm Curls

Stand straight with your arms hanging by your sides. Make a fist with your fingers facing forward. Bending your arms at the elbow, lift your fists to nearly touch your upper arm; lower slowly to your starting position. Repeat for 45 seconds.



Station 10: Head Rotation

Stand erect but relaxed, with your feet shoulder-width apart and your arms behind your back. Look straight ahead. Let your head fall forward and then far to the right in one smooth motion until you can look at the floor behind your right shoulder. Reverse the motion and return to the starting position. Let your head fall forward and to the left in one smooth motion until you can look at the floor behind your left shoulder. Reverse the motion and return to the starting position. Continue moving from right to left for 45 seconds.

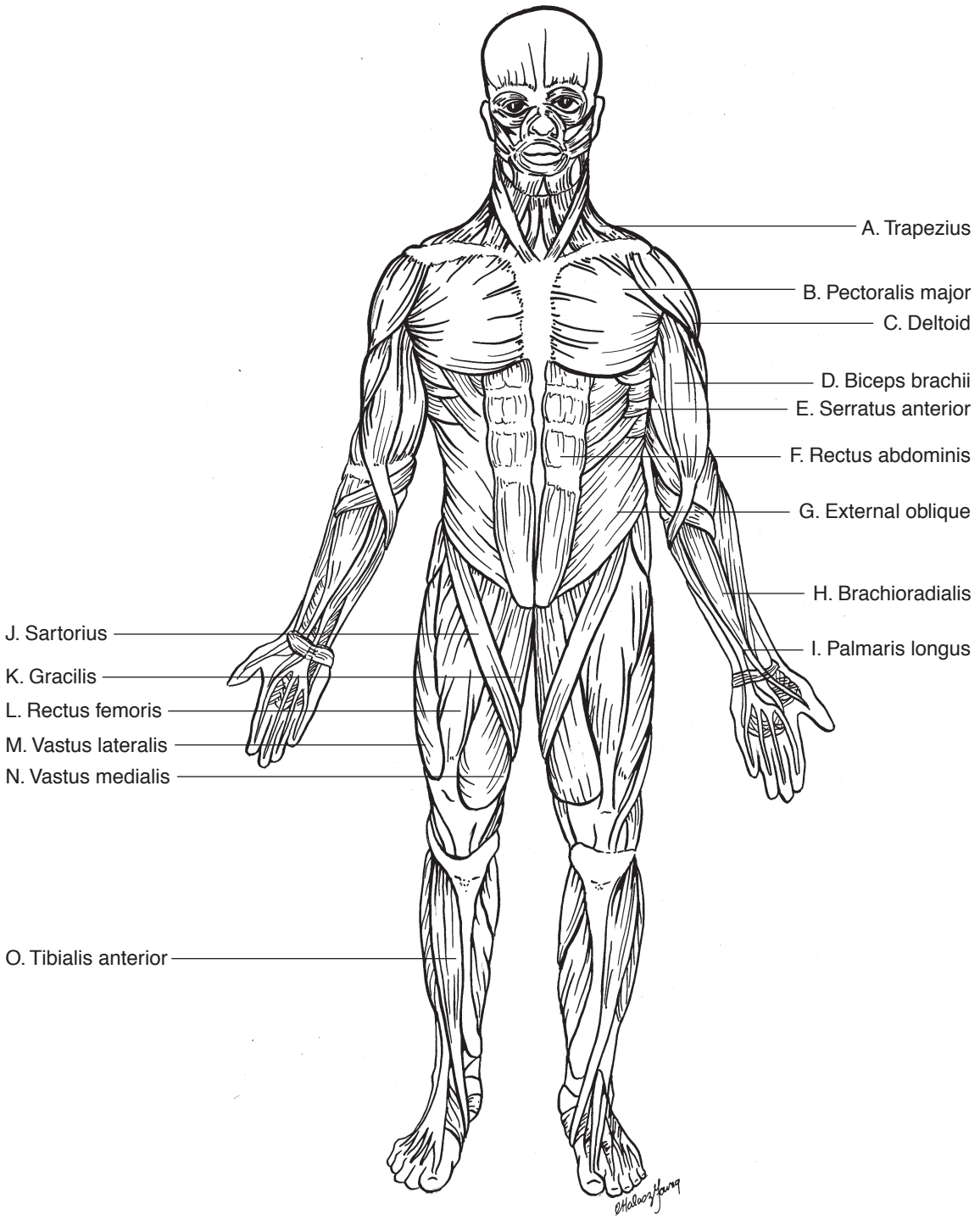


From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Student Resource 25.1

Muscles



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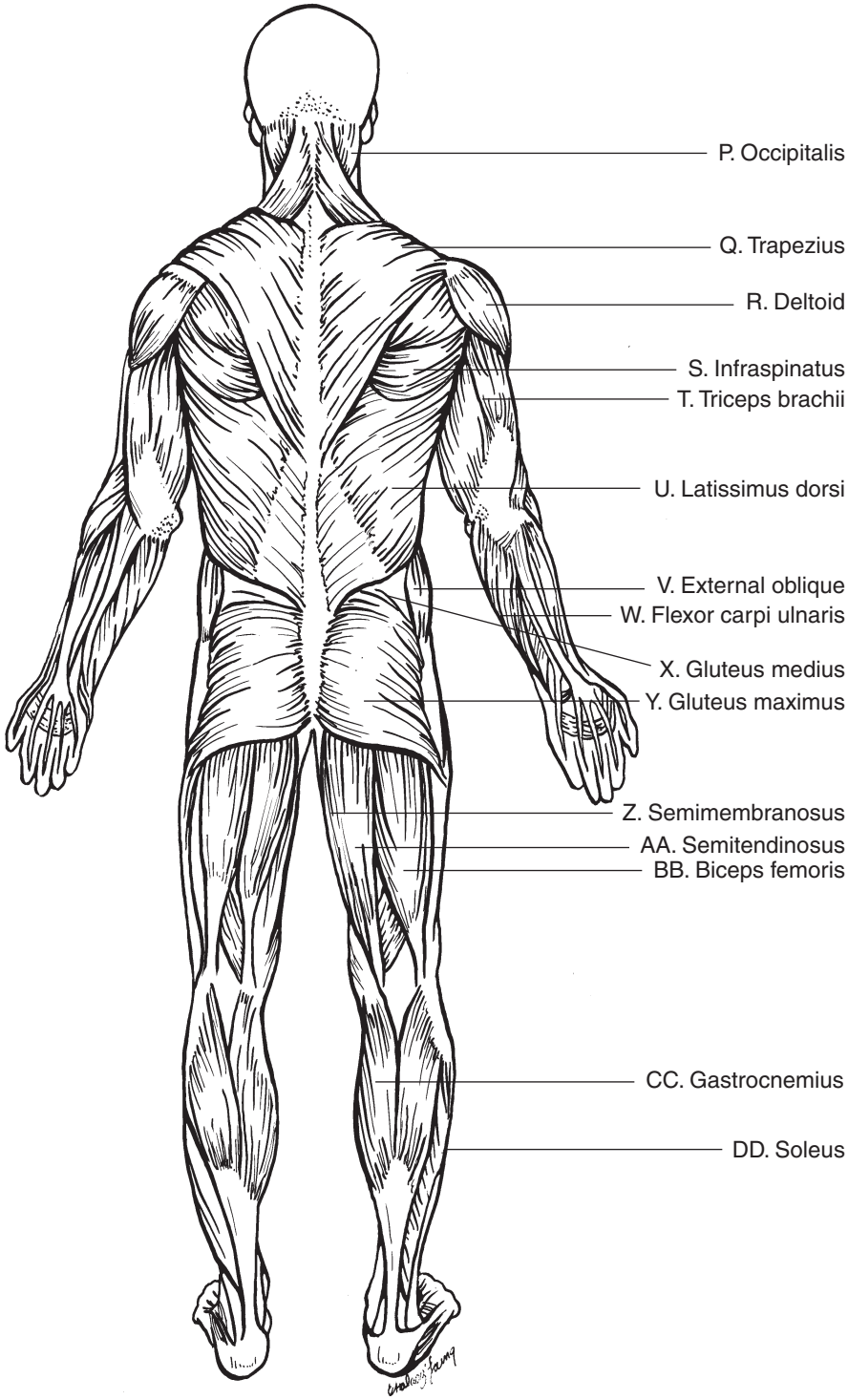
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Muscles *(continued)*

Student Resource 25.1



From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 25.1

Solving the Muscle Mysteries

Station name	Type of fitness (flexibility, aerobic, or strength)	Muscles used
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 25.2

The Mystery of Training

Have you ever wondered how exercise training works? What changes take place in your body to improve your endurance and make you stronger and faster? Regular exercise affects many of the body's organ systems, especially the cardiovascular, respiratory, and musculoskeletal systems.

Long-term aerobic exercise increases the size and strength of the **heart**—a muscle. As a result, a trained heart can pump more blood per beat and beat more slowly at rest and during exercise. Regular aerobic exercise also increases **blood volume** and **breathing volume.** All these adaptations enable trained people to transport more oxygen to working muscles.

Exercise also changes **skeletal muscles.** Muscles get bigger with strength training mainly because they make more **muscle filaments,** the proteins that slide together, contracting the muscle and thus generating movement. Aerobic training, such as running and cycling, also increases the number of **muscle capillaries** (small blood vessels) and the number and size of muscle cell **mitochondria** (cell powerhouses).

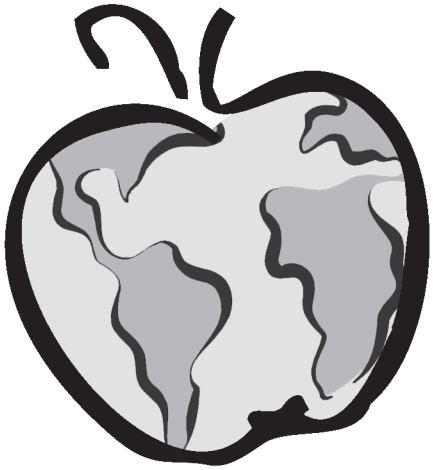
Seven-time Tour de France champion Lance Armstrong had a competitive edge, something that gave him an advantage over his competitors. Much of his competitive edge had to do with his training schedule, which included months of grueling workouts on the actual 2,000+ mile (3,200+ kilometer) race course. Knowing how training can change the anatomy and physiology of the heart, lungs, and muscles, explain what changes in Lance's body allowed him to outperform his competitors to achieve victory in the Tour de France.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 26

The Human Heart

Lifestyle Theme



This lesson teaches students about the effect of exercise on the heart and the importance of exercise to general health. Students design and conduct an experiment to examine the effect of exercise, or another variable, on heart rate. This activity will probably require one and a half to two periods of class time.

Behavioral Objective

For students to be physically active every day

Learning Objectives

Students will be able to do the following:

1. Describe the importance of activity to the health and strength of the heart
2. Measure their resting pulse rate
3. Make a hypothesis about the impact of exercise (or another variable of their choosing) on heart rate
4. Design and conduct an experiment to determine the impact of exercise (or another variable) on resting pulse rate
5. Draw conclusions from their experimental findings

Materials

- Clock or watch with a second hand
- Activity 26.1, How Much Do You Know About Your Heart? (handout or overhead transparency, or use chalkboard)
- Activity 26.2, The Double-Barreled Pumper
- Activity 26.3, Designing an Experiment
- *Optional:* Tennis balls, overhead transparencies

Procedure

1. Point out the goals of the lesson:
   - Describe the importance of activity to the health and strength of the heart.
   - Measure resting pulse rate.
   - Design and conduct an experiment to determine the impact of exercise (or another variable) on resting pulse rate.
2. (10 minutes) Hand out activity 26.1 to students (or display it as an overhead transparency, or use the chalkboard). Use this short introductory activity to spark students' interest and to point out that the heart is an amazing organ. Ask students to record the answers to the fill-in-the-blank questions. Then call on students to share their responses. Review the answers (see the Answer Key). Next, discuss the critical thinking portion of the transparency. Give students time to formulate their own theories. Ask for their ideas before you discuss the conclusions.
3. (5-minute *optional* activity) To give students an idea of how hard the heart must work, even at rest, have them try to squeeze a tennis ball 70 times per minute. The force needed to squeeze a tennis ball is similar to the force needed to squeeze blood out of the heart. Can anyone do it?
4. (10 minutes) Have students read activity 26.2, The Double-Barreled Pumper, and determine their resting pulse rate. Check for understanding by asking students: How does exercise strengthen the heart and lower a person's resting pulse rate?
5. (2-3 minutes) Ask students to brainstorm a list of conditions or variables that might increase or decrease a person's resting heart rate. Examples can include exercise, body position (lying down versus standing up), coffee, temperature, and stress.
6. (5-10 minutes) Discuss activity 26.3, Designing an Experiment, with students. In this activity, students choose one variable and test its impact on resting heart rate. They work in pairs to make a hypothesis, write the procedure, record their heart rate under different conditions, record their results, and draw conclusions based on their findings. Ask them for some examples of experiments they might conduct or describe one of the following examples. Try not to provide too many ideas. *Encourage them to be creative and curious.* This is an opportunity to do what scientists do. Be prepared: This type of open-ended experiment will excite some students but frustrate others. You may want to give students who seem frustrated questions to choose from, but let them design the experiment. Emphasize that they need to have you check their procedures before they begin the actual experiment.

Possible experimental questions and designs:

1. What effect does physical activity have on heart rate? There are many possible strategies for answering this question, but encourage students to try more than one intensity exercise. For example:
   - Measure resting pulse rate.
   - Jog in place for two minutes.
   - Measure pulse rate.
   - Run in place more energetically than before, raising your knees to your chest for two minutes.
   - Measure pulse rate.
2. Do different types of physical activity affect heart rate differently?
   - Measure resting pulse rate.
   - Do 25 sit-ups.

- Measure pulse rate.
- Rest.
- Do 25 jumping jacks.
- Measure pulse rate.
- Rest.
- Run in place for two minutes (or about the same time it took you to do the other activities).
- Measure pulse rate.

3. How does exercise duration affect heart rate? What happens to your heartbeat as you do more work?
   - Measure resting pulse rate.
   - Step up and down on a chair for one minute.
   - Measure pulse rate.
   - Continue stepping up and down at the same rate for three more minutes.
   - Measure pulse rate.
4. How does body position affect heart rate? Which requires more work: sitting, lying down, or standing?
   - Sit in a chair for two minutes, then measure pulse rate.
   - Lie down for two minutes, then measure pulse rate.
   - Stand up, then measure pulse rate.
5. How does stress affect heart rate?
   - Measure another person's resting pulse rate.
   - Give the person a small amount of time to finish a written task or puzzle.
   - Measure the person's pulse rate immediately after the person finishes racing through the task.
6. How does cold and pain affect heart rate?
   - Measure resting pulse rate.
   - Stick hand in ice water for one minute.
   - Measure pulse rate at the end of the minute.
7. (30 minutes) Have students complete activity 26.3, Designing an Experiment.
8. (5-10 minutes) Ask several groups to share their results. Students are likely to have difficulty drawing conclusions and explaining why the observed results occurred. You may want to have students record their results on the board and have the whole class interpret and discuss the results. Encourage all students to brainstorm possible explanations for why the results occurred. Place less emphasis on the "right" explanation. Emphasize the process of thinking like a scientist. (See Teacher Resources for results you might expect.)

Extension Activities

1. Determine the average resting heart rate for the students in your classes. What differences could explain variations in resting heart rate? *(Answer: Age, stress, caffeine, medication, active or sedentary lifestyle)*
2. Ask students to take the resting pulse rates of each member of their families. What differences could explain variations in resting heart rate? *(Answers: Fitness level, stress, caffeine intake, age)*

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)
- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix B)

SPECIFIC BACKGROUND MATERIAL

See activity 26.2, The Double-Barreled Pumper.

How Strong Is the Heart?

The force needed to squeeze a tennis ball is similar to the force needed to squeeze blood out of the heart. "Although this four-chambered muscular organ weighs less than a pound (about half a kilogram), it beats so steadily and powerfully that the force generated during its 40 million beats per year could lift its owner 100 miles above the earth. Even for a person of average fitness, the maximum output of blood from this remarkable organ is greater than the fluid output from a household faucet turned wide open" (McArdle, Katch, and Katch, 1991).

Disorders of the Circulatory System

Heart attack: The artery carrying blood to the heart becomes blocked by fatty deposits or blood clots. An area of the heart muscle is deprived of oxygen and dies.

Stroke: The artery carrying blood to the brain becomes blocked. Brain cells do not get enough oxygen and die.

Artherosclerosis: Arteries become narrower as a result of a buildup of fatty deposits on artery walls.

Hypertension: Constant high blood pressure that can lead to a heart attack or stroke.

Varicose veins: Valves in the veins do not work properly. Veins become swollen from the accumulation of blood. Varicose veins are most common in leg veins.

What Effect Does _____ Have on Heart Rate?

(variable)

The following are possible experimental results for activity 26.3, Designing an Experiment.

Physical activity: Increases heart rate. The more intense the exercise, the higher the heart rate. Exercise that uses large muscle groups and works against gravity results in the greatest increase in heart rate. Heart rate increases rapidly at the onset of exercise and levels off after three to five minutes of exercise at a steady rate. Through training (regular exercise), the heart increases in efficiency and pumps more blood per beat, so resting heart rate declines.

Stress: May increase heart rate. Stressful situations increase nerve impulses from the brain that stimulate the heart to beat faster.

Caffeine: May increase heart rate in some people. However, sensitivity to caffeine varies greatly. People who consume caffeine regularly will likely notice less effect on heart rate.

Pain: Generally increases heart rate.

Temperature: Long-term exposure to the cold lowers heart rate.

Posture: Lying down lowers heart rate. Upright posture raises heart rate. The heart must work harder to pump blood against gravity from the lower extremities back to the heart and up to the brain. Standing perfectly still for an extended period of time results in blood pooling in the veins and can cause fainting as a result of insufficient cerebral blood supply.

REFERENCE

McArdle, W.D., Katch, F., and Katch, V. 1991. *Exercise physiology: Energy, nutrition, and human performance,* 3rd ed. Philadelphia: Lea & Febiger.

Answer Key

ACTIVITY 26.1: HOW MUCH DO YOU KNOW ABOUT YOUR HEART?

1. At rest your heart beats about **60 to 80** beats per minute.
2. Your heart weighs about **1** pound(s) and is the size of a **clenched fist.**
3. Heart disease is the leading cause of death in the United States (true or false). **True**
4. The maximum output of blood from your heart is greater than the water output from a household faucet turned wide open (true or false). **True**
5. An athlete's resting heart rate is higher than the resting heart rate of a person who does little exercise (true or false). **False (it's lower)**

CRITICAL THINKING

Conclusion: Animals with **slower** heart rates live **longer.**

So, what is one way that physical activity can help you live longer? (*Answer: Through regular physical activity the heart increases in efficiency and pumps more blood per beat [contraction], so resting heart rate declines.*)

Name _____

Activity 26.1

How Much Do You Know About Your Heart?

1. At rest your heart beats about _____ beats per minute.
2. Your heart weighs about _____ pound(s) and is the size of a _____.
3. Heart disease is the leading cause of death in the United States (true or false). _____
4. The maximum output of blood from your heart is greater than the water output from a household faucet turned wide open (true or false). _____
5. An athlete's resting heart rate is higher than the resting heart rate of a person who does little exercise (true or false). _____

Critical Thinking

What conclusions can you draw from the following data?

Animal	Heart rate (beats/minute)	Average life span
Shrew	1,000	Up to 1 1/2 years
Mouse	500	1 to 2 years
Rabbit	200	6 years
Elephant	25	60 years
Human	70	70 years

Conclusion: Animals with _____ heart rates live _____.

- These mammals' hearts are good for about 1 billion beats, except for humans.
- Humans have a high-performance heart that averages about 2.5 billion beats per lifetime.
- If you could slow down your heart rate, you would have a good chance of spreading those 2.5 billion beats over more years.

So, what is one way that physical activity can help you live longer?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 26.2

The Double-Barreled Pumper

What Is the Role of the Heart?

The heart is a muscular organ that controls the flow of the body's blood. It is the equivalent of an engine room, because it pumps blood through the body continuously, transporting **oxygen** to all the muscles of the body. The heart therefore controls the body's **circulatory system,** which includes arteries and veins, the tubes that carry the blood away from and back to the heart.

How Does Your Diet Affect the Heart?

In the United States, circulatory system disorders are the leading cause of death. There is good evidence to suggest that high saturated and trans fat consumption increases the risk of heart diseases. An excessive intake of unhealthy fat can lead to the buildup of fatty deposits in arteries—**atherosclerosis.** As arteries narrow and harden, blood flow may be blocked to surrounding cells. If an artery supplying blood to the heart is blocked, some heart muscles may die from lack of oxygen; this is called a **heart attack.** For this reason, experts recommend that no more than 10 percent of our total calories come from saturated fat and that we avoid foods that contain trans fat (partially hydrogenated vegetable oil). One special type of unsaturated fat—omega-3 fat—is actually good for heart health and can be found in fatty fish (e.g., salmon and sardines) as well as some nuts and vegetable oils.

How Does Physical Activity Improve Your Heart?

With physical fitness and aerobic training, the heart will function more efficiently, beating at a slower rate and pumping more blood with each beat. It is only over time that good aerobic fitness can be developed, and training the body to function at more active levels makes it stronger and more productive during vigorous activity.

How Much Physical Activity Do I Need to Do to Make My Heart Stronger?

Do some moderate to vigorous physical activity for at least 60 minutes every day, or nearly every day, as part of play, games, sports, chores, transportation, and planned exercise. Any activity that raises the heart rate above the resting heart rate can be beneficial to your overall health and can reduce the risk of heart disease. Strive to include at least three sessions per week of vigorous physical activity lasting 20 minutes or more. This type of continuous exercise is best for strengthening your heart. Moderate physical activity includes walking, baseball, softball, dancing, heavy chores, skateboarding, bicycling, shooting baskets, and other activities of a similar level. Vigorous physical activity includes tennis, fast bicycling, jogging or running, lap swimming, hockey, roller skating or in-line skating, and other activities that make you breathe hard. How long, how hard, and how often you are active will determine how fit you are! Aim for a total of 60 minutes or more of activity nearly every day.

How Do You Measure Your Resting Pulse?

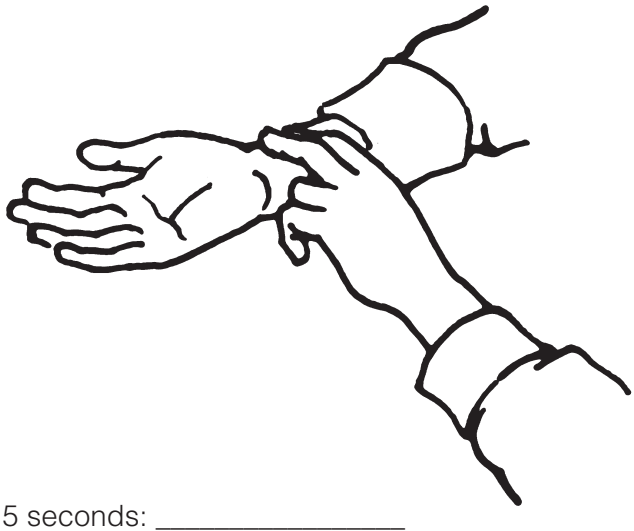
Each time the left side of the heart contracts (or beats), it forces blood into your arteries. Your pulse is caused by blood stopping and starting as it rushes through your arteries. Your pulse rate equals your heart rate. An average resting pulse is around 60 to 80 beats per minute. However,

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

The Double-Barreled Pumper *(continued)*

trained athletes can have resting pulse rates as low as 35 beats per minute. You can take a resting pulse at any time of the day, but the most accurate time to record it is when you first wake in the morning. The easiest way to find your pulse is either in your neck, to the left of the Adam's apple, or on your wrist below your thumb. Sit still for at least 1 minute, find your pulse, and record the number of times your heart beats in 15 seconds.



Number of beats in 15 seconds: _____

Multiply by 4 (× 4): _____

Resting heart rate beats per minute: _____

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 26.3

Designing an Experiment

What effect does _____ (variable) have on heart rate?

Research Question

Come up with a research question that you hope to answer with this experiment.

Hypothesis

What effect do you think this variable will have on heart rate?

Procedure

Design an experiment to test your hypothesis. List and number the steps in your experiment. Have your teacher look over your procedure and sign this sheet before you do the experiment.

_____

(Teacher's signature)

Results

Record your results in the following table.

Condition	Heart rate: Student 1 (beats/minute)	Heart rate: Student 2 (beats/minute)
Example: Resting for 1 minute	*65*	*70*

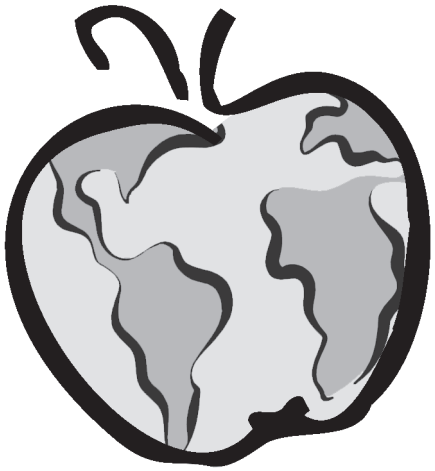
Conclusions

What do your results tell you about heart rate? Do your conclusions support your hypothesis? Explain why you think these results occurred.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics). Development of this activity was influenced by laboratory activities created by Weston Public School Faculty (Weston, MA): Jill Carter, Patricia Corey, Janet Kresl Moffitt, and Joyce Schwartz.

Lesson 27

How Far Can You Jump?



Lifestyle Theme

In this lesson students are introduced to the classification of motor skills. They perform a hands-on laboratory activity that focuses on the improvement of a specific gross motor skill—the standing broad jump. Students form hypotheses and attempt to increase their jumping distances by analyzing performances. This lesson is designed to infuse information about the benefits of physical activity and the risks of inactivity into a classroom unit on growth and development or biomechanics.

Behavioral Objectives

- For students to be physically active every day
- For students to strive to evaluate and improve gross and fine motor physical skills

Learning Objectives

Students will be able to do the following:

1. Classify skills—gross motor versus fine motor
2. Develop hypotheses, take measurements, and make detailed observations
3. Complete an observation assessment of the standing broad jump
4. Make effective group recommendations to promote individual skill improvement

Materials

- Activity 27.1, How Far Can You Jump?
- Six 6- to 7-foot (2-meter) tape measures and masking tape
- *Optional:* Mats for students to land on

Procedure

PLANNING

- Because students will be jumping and possibly falling, you might advise them to wear casual pants and sneakers or other shock-absorbing shoes. To save time, you may want to write the list in step 5 of the procedure on the board before class.
- Tape measures should be taped on the floor ahead of time. You can improvise with masking tape by laying it down and marking 6-inch (15.2-centimeter) increments.

1. (1 minute) Begin class by making a prediction: "By the end of this class, many of you will be able to jump farther than you can right now." Write this on the board.
2. (5-7 minutes) Using the Teacher Resources, present the following background material about motor development (you may have done this in another class):
   - Define fundamental motor skills.
   - List terms for the study of movement on the board (biomechanics and kinesiology).
   - What do science and mathematics have to do with sports? *(Answer: Principles of physics govern the motions of bodies [and balls] through space. We measure and observe sport outcomes. Trainers base their suggestions for improvement on hypotheses about what will change the outcome; then they test their hypotheses.)*
   - Write *fine motor skill* and *gross motor skill* on the board and define these terms with examples.
   - Explain that fine motor activities are generally sedentary activities and gross motor activities are fitness and activity skills.
3. (5 minutes) Explain to students that if they were really interested in a sport or activity, they'd want to get better at it. Tell them that they are going to look closely at the process of improving gross motor skills using a kinesiology approach. Using the following questions, conduct a discussion of the value of physical skill assessment:
   - How do physical fitness trainers (e.g., coaches) assess the skills of their athletes? *(Answer: Through observation and measurement)*
   - How do people improve their performances? *(Answer: Through practice [the right kind and type of practice]. This involves breaking down the motions, observing them objectively, forming a mental hypothesis [e.g., if I stretch out more, I will be able to run farther], and testing the hypothesis.)*
4. (3-5 minutes) Have the class participate in formulating a hypothesis to the effect that "athletes can increase their standing broad jumps by X inches when coaches advise them of the skill components they need to improve." To do this, begin with the statement you wrote on the board in step 1. Tell the students you are going to recreate the prediction as a *scientific hypothesis.*

A scientific hypothesis

- is predictive or explanatory,
- is based on a rational theory,
- can be tested, and
- yields measurable results.

5. (5-10 minutes) Write the following list on the board. Explain to the class that they are about to become athletes and coaches who will attempt to improve gross motor skills through the standing broad jump (a simple gross motor skill). While using a student to demonstrate this jump, generate a group discussion on the steps involved:
   - Start in a crouch (with knees bent and feet together).
   - Reach your arms backward.
   - Swing your arms forward.
   - Extend your arms overhead at takeoff.
   - Flex or bend your knees to propel your body through space.
   - Push off with both feet (two-foot takeoff).
   - Tip your body forward during flight (head in front of hips).
   - Land on both feet (two-foot landing).
   - Extend your arms forward on landing (at shoulder level).
6. (3 minutes) Divide the class into small groups with approximately five students per group. Pass out one copy of the activity to each group. Each group will pick one student to be the athlete; all the other students will be coaches. One of the coaches will hold onto the worksheets and be responsible for recording data.
7. (15 minutes) Group activity: Students have 15 minutes to complete the activity.
   - The recorder notes the measurement goal and the actual measurement for each jump. The measurement goal is the athlete's estimate of how far he or she will jump. The athlete guesses at the first jump goal and works to improve the actual jump in the following two jumps using the observations and hypotheses of the coaches.
   - The student chosen as the athlete will perform three standing long jumps while the coaches observe and evaluate the jump using the Coaches' Checklist (in activity 27.1) as a guide, noting each action that happened or did not happen.
   - Between jumps, the group discusses what parts of the jump did or did not happen and then makes recommendations for how to improve the jump. The recorder notes the recommendations in the results section of the activity sheet.
   - During this time the teacher circulates among the groups to answer questions as they come up. In addition, the teacher gathers data from each group; records the data on the Class Data Sheet; and calculates averages for the first, second, and third jumps for presentation to the class during the discussion.
8. (5-10 minutes) Students return to their seats. Use the following questions to generate a class discussion of the evaluation and assessment process:
   - Evaluate the class's starting hypothesis using the averages you calculated:
     a. Did the athletes' jumps improve with observation and coaching?
     b. How far was the average starting jump? Average second jump? Average third jump?
   - Was any single component of the standing broad jump more important to do right than others?
   - Was this a gross motor skill or a fine motor skill?
   - Have you ever worked hard to get better at a skill or sport? How did it make you feel?

Extension Activity

Have students select a skill from any sport or physical activity that they do and break it down into different parts or components as they did with the standing broad jump. They can select anything that involves motion, including walking, kicking, running, catching,

throwing (gross motor skills), or playing an instrument, painting, drawing, pottery making, gardening, carpentry (fine motor skills).

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix B)
- Gortmaker et al., "Television Viewing as a Cause of Increasing Obesity Among Children in the United States, 1986-1990" (see appendix C)

SPECIFIC BACKGROUND MATERIAL

Fundamental Motor Skills, or Basic Motor Skills

Fundamental, or basic, motor skills are common motor activities with specific movement patterns. Walking, running, jumping, and throwing are fundamental motor skills. These basic skills form the basis for more advanced and specific movement activities.

Proficiency in movements or motor skills are described in terms of immature (initial) form or mature form to sport skill form. Generally, children two to three years of age show immature forms of motor skills. By the sixth year, most children acquire some features of mature movement patterns. Mature movement patterns are then adapted to special requirements for a particular movement activity, such as pitching in baseball (from a basic throw) or running hurdles (from a basic leap). These skills can be refined for stronger and better performance.

Analysis of Movement

Definition of terms for the study of movement:

- **Biomechanics:** The physics of human motion or the study of forces produced by and acting on the body.
- **Kinesiology:** Often used synonymously with *biomechanics,* but means "the science of motion."

Classification of Motor Skills

A motor skill is an action or task that requires voluntary body movement to achieve the goal. Playing the piano and kicking a soccer ball are motor skills, but they can be further classified into fine motor skills and gross motor skills (see the following table).

- **Fine motor skill:** A skill performed by the smaller muscles of the body, particularly the hands and fingers.
- **Gross motor skill:** A motor skill requiring the large musculature of the body, or the larger muscles.

Examples of fine motor skills	Examples of gross motor skills
Playing the piano	Kicking a soccer ball
Keyboarding on the computer	Throwing a baseball
Writing with a pen	Walking to school
Sewing a button on a shirt	Playing basketball
Opening a combination lock	Climbing stairs
Using video game controls	Ballet dancing

Fine and gross motor skills are performance-based movements. People can improve their performances through the right practice. Experts, teachers, and coaches assist people in refining their fine and gross motor skills. A piano teacher helps students with finger placement and touch of the piano keys, whereas a coach breaks down a gross motor skill into parts to help athletes improve performance.

Both fine and gross motor skills can be important components in a person's life. Activities involving gross motor skills, when performed regularly, improve physical fitness, reduce stress, and appear to contribute to good health throughout the life span. From a health standpoint, finding a gross motor skill that one enjoys and can keep doing for many years is important. Sedentary activities that involve fine motor skills can be relaxing and satisfying and can form the basis of a lifelong career or vocation. These are wonderful alternatives to TV viewing. In contrast, TV viewing is a sedentary activity that requires no skill, offers no room for improvement, and provides none of the benefits of fine and gross motor skills.

Name _____

Activity 27.1

How Far Can You Jump?

Purpose

To improve _____'s ability to do the standing long jump.

Hypothesis

Procedure (time limit: 15 minutes):

1. Choose one student to be the athlete. The other students will act as coaches.
2. Choose one coach to record everyone's observations.
3. The athlete warms up by stretching his or her legs and rotating his or her ankles.
4. The athlete sets a distance goal and records it below.
5. Coaches observe the athlete's jump, measure and record the length of the actual jump, and then use the Coaches' Checklist to analyze the jump. They put an X in the box next to the action(s) the athlete did and a Ø in the box if an action did not happen.
6. The coaches and athlete work together to think about how to improve the performance of the jump. They write their hypothesis (recommendation) below.
7. The athlete completes three jumps. (Repeat steps 4 through 6 three times.)

Results

Name of recording coach: _____

Names of coaches: _____

Name of athlete: _____

First Jump

Goal: I will jump _____ (measurement in feet and inches, or centimeters).

Actual jump: _____

Coaches' hypothesis (recommendation) for next jump: If you_____, you will improve your jump by going farther.

Second Jump

Goal: I will jump _____ (measurement in feet and inches, or centimeters).

Actual jump: _____

Coaches' hypothesis (recommendation) for next jump: If you_____ _____, you will improve your jump by going farther.

Third Jump

Goal: I will jump_____ (measurement in feet and inches, or centimeters).

Actual jump: _____

Coaches' hypothesis (recommendation) for next jump: If you_____, you will improve your jump by going farther.

(continued)

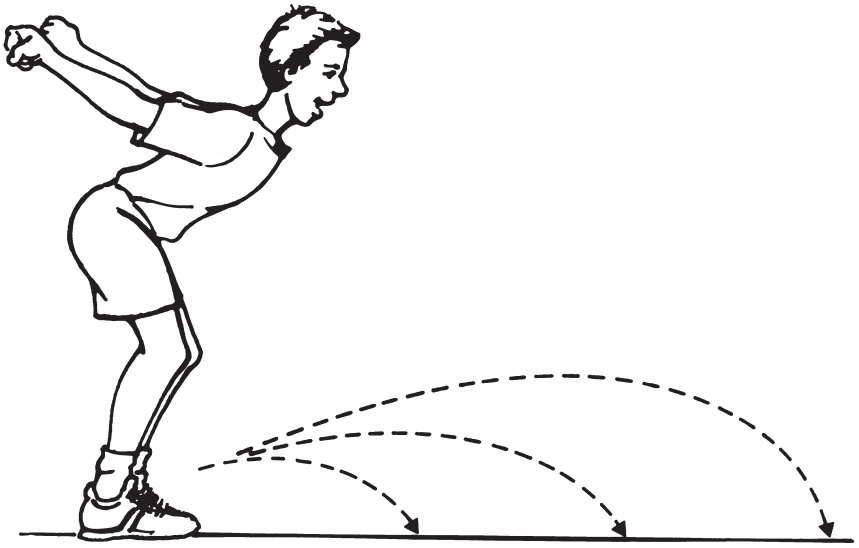
From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 27.1

How Far Can You Jump? *(continued)*

Coaches' Checklist

Put an X in the box if an action happened. Put a Ø in the box if an action did not happen.



List of skills	Jump 1	Jump 2	Jump 3
Starts in a crouch			
Two-foot takeoff			
Arms start backward			
Legs straighten after takeoff			
Arms extend overhead during jump			
Body tips forward during flight (head in front of hips)			
Arms extend forward at landing			
Landing is in control			
Two-foot landing			

Conclusions

1. Did the athlete use your recommendations to improve his or her technique? Explain.

2. Did the athlete improve his or her jump?

3. What skills should the athlete continue to work on?

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

How Far Can You Jump? *(continued)*

Class Data Sheet

Group	Jump 1	Jump 2	Jump 3
Class average			

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

PART V

Social Studies

This unit contains eight lessons. Use the following At a Glance chart to help you select the lessons that best fit your curriculum objectives. Lessons marked with a ♡ are especially well suited for health and PE classes. Some of the lessons offer a choice of activities. Adapt the lesson procedures to fit your teaching style, students' skills, and time constraints.

Lessons in this unit meet many Massachusetts learning standards that may be similar to standards in your state. Refer to appendix E (page 571) to see which of the 1996-1999 Massachusetts Curriculum Frameworks (MCFW) each lesson incorporates. Please check the CD-ROM for parent information materials that support the lessons you teach.

Social Studies at a Glance

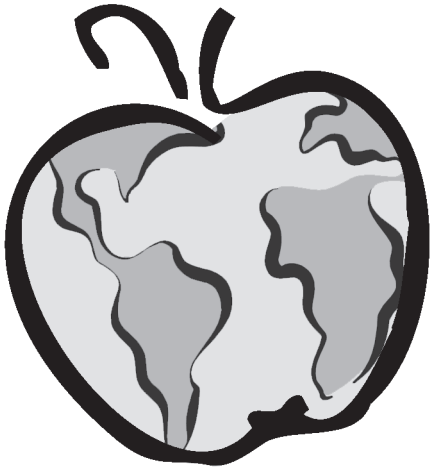
		Level of difficulty (grade)*				
Theme	**Lesson**	**6th**	**7th**	**8th**	**Subject-specific skills**	**Materials needed**
Balanced diet	28 Food Through the Ages	M	M	L	Eating patterns of ancient people	Overhead transparency
Balanced diet	29 Democracy and Diet	H	M-H	M	Government decision making	None
Fruits and vegetables	30 Global Foods	M	M	L	Cultural comparison, geography	World map, overhead transparencies
Fruits and vegetables	31 Around the World With Five a Day	M	M	L	Agriculture, geography, group research and presentation	Overhead transparency or handout of world climates
Activity 	32 Map Maker	M	L	L	Map skills	Large town map, colored thumbtacks or markers, overhead transparency
Activity	33 Free to Be Fit	H	M-H	M	Constitutional rights, lawmaking	None
Lifestyle	34 Impact of Technology	H	M	M	Industrial Revolution, 19th- and 20th-century technology	Social studies textbook
Lifestyle	35 Food Rituals and Society	M	M	L	Religious and ethnic tradition	None

* Level of difficulty: L = low, M = medium, H = high

Lesson 28

Food Through the Ages

Balanced Diet Theme



This lesson reinforces the importance of eating a balanced diet based on the U.S. *Dietary Guidelines* and the *Planet Health* Guide to Healthy Eating. Students focus on the recommendations to eat a variety of foods from each food group, with particular emphasis on fruits and vegetables. The lesson also describes how food recommendations are developed and modified over time as our knowledge of nutrition and diseases associated with poor nutrition grows. Students are asked to compare and contrast the foods eaten by ancient and historical populations (early hominids, Benedictine monks [AD 530], English peasants and knights [1200s], and English mill workers [1800s]) with current dietary guidelines, which promote a balanced and varied diet of foods from all food groups. Students also determine whether these people were likely to have suffered from certain diseases as a result of deficiencies in their diets. Students are encouraged to discuss the economic, trade, food production, and knowledge changes that have decreased undernutrition in industrialized countries and that might help solve the problem of undernutrition in developing countries.

Behavioral Objective

For students to eat a balanced diet that includes a variety of foods from each food group

Learning Objectives

Students will be able to do the following:

1. Compare and contrast the foods eaten by ancient people with the principles of healthy eating that call for a balanced and varied diet
2. Classify food items into the five food groups
3. Discuss some of the nutritional disorders associated with vitamin and mineral deficiencies

4. Discuss the economic, trade, food production, and knowledge changes that have led to a decrease in disorders associated with undernutrition in industrialized countries and that might help solve the problem of undernutrition in developing countries
5. Conduct oral surveys of adults to determine changes in eating patterns during the past 50 years (extension activity)

Materials

- Activity 28.1, Food Through the Ages
- Student resource 28.1, Vitamins and Minerals (one copy for each pair of students)
- Overhead transparency 28.1, *Planet Health* Guide to Healthy Eating
- *Optional:* Extension activity 28.1, Food Survey

Procedure

1. Point out the goals of this lesson:
   - To review the five food groups and key components of a healthy diet
   - To compare and contrast the foods eaten by ancient people with the dietary guidelines that call for us to eat a balanced and varied diet (eating foods from all food groups and different foods within each group)
   - To discuss the economic, trade, food production, and knowledge changes that have decreased undernutrition in industrialized countries and that might decrease undernutrition in developing countries
2. (2 minutes) Have students recall the names of the food groups and write these on the board.
3. (3-5 minutes) Ask some of the students to name foods they ate yesterday. Ask other students to classify these foods into the appropriate food groups.
4. (5 minutes) Briefly review the key components of a healthy diet (show overhead transparency 28.1, *Planet Health* Guide to Healthy Eating).
5. (5 minutes) Introduce the student activity by explaining the following:
   - As scientists have become more knowledgeable about nutrition and diseases associated with poor nutrition, diet recommendations have changed. Your parents probably learned about the four basic food groups when they were your age. The U.S. government introduced the Food Guide Pyramid recommendations in 1992, and later modified them in 2005 as MyPyramid. In addition to the dietary recommendations based on food groups, the U.S. Department of Agriculture along with the U.S. Department of Health and Human Services also publishes *Dietary Guidelines for Americans* every five years. These guidelines reflect the latest nutrition science and provide details on how to eat a healthy diet.
   - Undernutrition and nutrient deficiencies have always been more common among the least wealthy people in society. The original dietary recommendations were designed to decrease the number of people with vitamin, mineral, and protein deficiencies. Current guidelines promote diets as a way to prevent both undernutrition and chronic diseases, especially those conditions associated with excessive intake of calories and specific food components such as saturated fat and cholesterol (a risk factor for heart disease).
   - In this activity we will compare the diets of ancient people with current dietary guidelines that call for balance and variety among and within food groups.
6. (30 minutes) Hand out activity 28.1 and student resource 28.1. Have students work in pairs to complete activity 28.1. (See the Answer Key for answers to selected questions.)

7. (5 minutes) Discuss the following questions:
   - Why did many of these ancient people eat diets that do not meet the current recommendations for healthy eating? (*Answer: They did not have access to the variety and quantity of food needed for a balanced diet on a year-round basis. They also lacked knowledge of what foods were needed for good health. Food availability fluctuated with seasons, weather, and income, and in some cases, myths or religious beliefs determined their diet.*)
   - Why are most people in industrialized countries today better fed than these ancient people? (*Answer: Improved transportation, refrigeration, and industrial-scale agriculture and food production ensure that more food is available. Improvements have also occurred in international trade and economy, as have advances in knowledge of what makes up a healthy diet.*)
   - Why are many people in developing countries still undernourished? (You may want to use a specific country as an example.) (*Answer: It depends on the country. Government instability and war can disrupt transportation, food production, trade, education, and public health.*)
   - Currently, many people in the United States eat too much food. Therefore, there has been a rise in the diseases associated with obesity. What is responsible for this new nutritional problem? (*Answer: A few things have happened at the same time. A lot more food is available, in a lot more places, and much of it is pretty cheap and tasty. Also, people in industrial societies live more sedentary lifestyles than did people in other times in history. At the same time they eat high-calorie diets rich in fat and sugar. So people eat more than they need for the amount of activity they do. For example, beverages sweetened with sugar contribute half of the excess calories consumed by children and adults alike.*)

Extension Activity 28.1: Food Survey

How are your eating habits different from those of children living 50 years ago? Interview an older relative, neighbor, teacher, or friend of the family who was 11 to 14 years old during the 1940s, 1950s, or 1960s. Use the questions on the Food Survey worksheet and record the answers for you and your relative. How do they compare? How do you explain the major differences?

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans* (see appendix A)
- Overhead transparency 28.1, *Planet Health* Guide to Healthy Eating

SPECIFIC BACKGROUND MATERIAL

What Are the Dietary Guidelines*?*

The *Dietary Guidelines for Americans* are published by the U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services every five years. The guidelines are updated and revised to reflect the latest nutrition research, especially in the areas of disease prevention and health promotion. The guidelines apply to all people over the age of two years, though some specific recommendations exist for specific populations, including teenagers, pregnant women, and seniors. The *Dietary Guidelines for Americans*

include the principles of balance, variety, and moderation, suggesting a diet that contains foods from each food group and various foods within each group.

The current *Dietary Guidelines* (6th edition, 2005) emphasize increasing your intake of whole grain foods, because evidence continues to show that eating a diet high in fiber reduces the risk of heart disease and diabetes. These guidelines also place a greater emphasis than previous guidelines on eating a diet low in saturated fat (10 percent of total calories from saturated fat) and cholesterol and avoiding the consumption of trans fat (partially hydrogenated vegetable oil). This reflects a new understanding that because not all fat has the same health effects, we need to focus on limiting our intake of saturated and trans fat (as opposed to simply lowering the consumption of total fat as was recommended by the guidelines during the 1990s). Nutrition experts recommend replacing saturated fat (found primarily in animal products such as meat, butter, and whole milk) with unsaturated fat (safflower, sunflower, corn, canola, soybean, and olive oils). Because unsaturated fat lowers blood cholesterol, substituting this type of fat for saturated and trans fat can reduce the risk of heart disease. Experts suggest avoiding trans fat (found in some margarines, many convenience snack foods such as crackers and cookies, and fast-food products) as much as possible because it has the most harmful effects on blood cholesterol levels, thus increasing one's risk for heart disease. The guidelines also recommend making healthy food choices and including physical activity as a way to achieve or maintain a healthy weight.

How Have Dietary Recommendations Changed? A Look at Food Groups

In 1943 the USDA released the "Basic Seven Food Guide," which specified a foundation diet that was designed to help people consume adequate diets to optimize health. It was meant to address issues of undernutrition rather than overnutrition. This plan was developed in 1943 because one-third of the men who applied to join the armed services for World War II were rejected because their growth had been affected by a poor diet. The seven groups (along with the recommended number of servings per day) were as follows:

- Milk and dairy (at least 2 cups per day)
- Meats, poultry, fish, eggs, dried beans, peas, nuts (one or two servings per day)
- Leafy green or yellow vegetables (at least one serving per day)
- Citrus fruits (at least one serving per day)
- Potatoes and other fruits or vegetables (at least two servings per day)
- Bread, flour, cereal—enriched or whole grain (every day)
- Butter-fortified margarine (some daily)

The "Basic Four" (1956) was a simplified version of the "Basic Seven." It also specified serving size and frequency of daily consumption from each food group. Again, it was intended to address issues of dietary deficiency rather than overconsumption of foods from specific food groups. The four groups were as follows:

- Milk group (at least 2 cups per day)
- Fruits and vegetables (at least four servings of dark-green leafy or yellow vegetables or citrus daily)
- Meat group (at least two servings, with one serving equal to 2 to 3 ounces, or 60 to 90 grams)
- Breads and cereals (at least four servings, with one serving equal to 1 ounce, or 30 grams, of dry cereal, one slice of bread, or 1/2 to 3/4 cup of cooked cereal)

By the 1970s research was suggesting that the overconsumption of certain nutrients in food—such as fat, saturated fat, cholesterol, sodium, and sugar—was related to an increased risk of heart disease, some cancers, and diabetes. Research also showed that a higher intake of fruits and vegetables rich in vitamins A, C, and E decreased the risk for heart disease

and some cancers. Taking these findings into consideration, the USDA revised its nutrition recommendations in 1980. The basic educational message changed from "variety" to "variety and moderation." Recommended serving size in each of the four groups was reduced, and a fifth group (fat, sweets, and alcohol; no serving size recommended but moderation encouraged) was added.

To promote the need for moderation and variety in the diet, the USDA designed the Food Guide Pyramid (1992). The pyramid translates the Food and Drug Administration's recommended daily allowances (RDA) and the USDA's dietary guidelines into the kinds and amounts of foods to eat every day. This well-recognized graphic highlighted grains, fruits, and vegetables as the foundation of healthy eating.

The USDA updated the pyramid in 2005 as MyPyramid, and it can be accessed online at www.mypyramid.gov. MyPyramid retains the familiar shape, but reinforces the need for making careful food selections within each food group. It also adds a visual reminder of the importance of daily physical activity. Specifically, MyPyramid is designed to help you make smart choices within each food group, find balance between food and physical activity, and get the most nutrition out of your calories. It continues to recognize that no single food supplies all the nutrients you need, and different foods within the same food group have different amounts of nutrients. Eating many different foods will ensure that you meet the nutritional recommendations.

Follow the *Planet Health* Guidelines for Healthy Eating on page 376, and you will be a Food Star! These recommendations are compatible with the MyPyramid.

Answer Key

SELECTED ANSWERS TO ACTIVITY 28.1

Ancient people	Grains	Fruits	Vegetables	Meats	Dairy	Other things*
Monks	1 lb (about 1/2 kg) bread		2 cooked veggie dishes, salad	Fish or chicken only occasionally		1/2 pint (300 ml) wine
Peasants	5.25 lb (2.4 kg) rye bread, 2.75 oz (78 g) oats		Beans, peas	Beans; occasionally eggs, herrings, eel, cod, meat (bacon, chicken, pigeon, sheep, beef)	Cheese; occasionally sour or sweet milk	Butter
Knights	Grains, white and wheat bread	Preserved fruit	Legumes, onions, leeks, garlic, cabbage, smallage	Pork, veal, swan, crane, heron, peacock, eel, trout, salmon, haddock, nuts		Fennel, parsley, salt, saffron, lard, suet, tallow, beer, ale, wine
English mill workers	Oatmeal porridge, bread		Potatoes	Rarely meat	Rancid milk	

Planet Health Guide to Healthy Eating

Be a Food Star by following these healthy eating guidelines:

★ **Eat for variety.**
Foods from all food groups are important. Eat foods from all of the food groups every day, and choose a variety of foods within each food group.

★ **Eat fruits and vegetables at every meal and snack.**
Eat five or more servings of fruits and vegetables combined each day; the more, the better.

★ **Go for whole grains.**
Eat six to eight servings of grains each day, with at least three servings being whole grain foods. Look for foods with 3 grams of fiber per serving and that are low in sugar (5 to 10 grams per serving).

★ **Choose foods with healthy fat.**
Quality matters. Limit saturated fat by choosing low-fat or fat-free dairy products and lean meats. Steer clear of foods with trans fat by reading food labels and eating "fast food" only once in a while. Fast foods are often high in unhealthy fat.

★ **Limit foods and beverages with added sugar.**
Choose drinks with no added sugars (such as water and low-fat milk) most of the time. Save high-sugar foods and drinks for a "sometimes" treat.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Student Resource 28.1

Vitamins and Minerals

Throughout history poor nutrition (diet) has been the cause of poor health in a large number of people. Examine the following list of vitamins and minerals and the types of foods they are found in. Compare the diet of the ancient people you are examining to this list and determine whether they were susceptible to these disorders.

Vitamins and minerals	Good dietary sources	Function in the body	Disorder associated with deficiency
Vitamin A	Liver, fish liver oil, carrots, eggs, dark green leafy veggies, fortified milk*	Essential for vision, growth, reproduction, a properly working immune system	Night blindness: partial or total loss of vision, weakened immune system
Vitamin D	Exposure of the skin to the sunlight, eggs, butter, fortified milk*	Essential for proper bone development	Rickets: deformed skeleton (e.g., bowed legs)
Vitamin B_1 (thiamin)	Unrefined cereal grains, brewer's yeast, organ meats (liver, heart, kidney), legumes, seeds and nuts, fortified grains and cereals*	Essential for breaking down carbohydrate for energy	Beri beri: mental confusion, loss of appetite, muscle wasting and weakness, inability to move arms or legs, irregular heartbeat
Vitamin C	Oranges, lemons, limes, and other citrus fruits; green and red peppers; broccoli; spinach; tomatoes; potatoes; strawberries	Essential component of collagen, a connective tissue; important for wound healing and a properly functioning immune system	Scurvy: bleeding gums, bleeding in the skin, sore muscles and joints, fatigue
Iron	Beef, poultry, fish, eggs, vegetables, fortified cereal*	Essential component of hemoglobin, the oxygen-carrying pigment in red blood cells	Anemia: loss of red blood cells results in fatigue
Calcium	Milk, yogurt, cheese, broccoli, kale, collard greens, lime-processed tortillas, fortified* orange juice and cereals, soy milk, tofu, almonds	Essential for making bones	Osteoporosis: loss of calcium from the bones makes them weak and more likely to break; develops over time and appears in elderly

* Fortified means that the vitamins or minerals are added to the food during processing. Fortified products did not exist during the time periods of the people being discussed in this lesson.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 28.1

Food Through the Ages

Part I

1. Read the accounts of diets eaten by people living at different time periods.
2. Complete the table following each paragraph by writing the foods eaten by the people in the boxes under the appropriate food group.

Example

Australopithecus afarensis (early hominids, 1.75 to 3 million years ago): Most scientists now agree that australopithecines, human ancestors, gathered and scavenged for food rather than hunting. Some evidence of meat-eating extends as far back as 1.75 million years. Early humans probably scavenged the kills of large carnivores and fed on birds, reptiles, fruits, grasses, seeds, grubs, and roots.

Grains	Fruits	Vegetables	Meats	Dairy	Other things*
Grasses, seeds	Fruits (no details)	Roots	Birds, reptiles, grubs		

Benedictine Monks (AD 530)

The one winter meal, served at 2:00 p.m., consisted of two cooked vegetable dishes, eggs, salad, bread, wine, and possibly fish or chicken. Beef was strictly prohibited. They were allowed a pound (about half a kilogram) of bread and a half pint (300 ml) of wine daily. In the summer, they had two meals.

Grains	Fruits	Vegetables	Meats	Dairy	Other things*

English Peasants (13th Century)

At Peterborough Abbey, the average servant daily consumed about 5.25 pounds (2.4 kilograms) of rye bread; 2.75 ounces (78 grams) of oats; and small portions of beans, peas, cheese, and butter. At harvest time, these protein-deficient diets were enhanced by additional amounts of cheese, butter, sour and sweet milk, eggs, herring, eel, cod, and a bit of fresh or salted meat. Only on special occasions might they get bacon, chicken, pigeon, sheep, or a piece of beef.

Grains	Fruits	Vegetables	Meats	Dairy	Other things*

Knights (13th Century)

The daily diet of most knights was probably quite simple, but tournaments and other celebrations were occasions for eating and drinking large quantities. The wealthy ate large quantities of meat: pork, veal, swan, crane, heron, peacock, eel, trout, salmon, haddock, shark, dried fish, and more.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Activity 28.1

Food Through the Ages *(continued)*

They also ate grains, legumes, onions, garlic, leeks, and cabbage. Fennel, parsley, smallage (wild celery), and herbs were used to flavor dishes. Soup and broth contained vegetables, marrow bones, saffron, salt, and boiled bacon. When fruit was eaten, it was usually cooked or preserved because fresh fruit was thought to be unhealthy or poisonous. Bread was eaten at all meals. Ground white bread (manchet) was preferred by those who could afford it; cheat (wheat bread) was second quality. They flavored their foods with lard, beef suet, and mutton tallow. Nuts were popular. Barley was used to make ale. Beer, cider, and wine were also available for drinking.

Grains	Fruits	Vegetables	Meats	Dairy	Other things*

English Mill Workers (Early 19th Century)

The year-long diet of English mill workers of the 19th century consisted of potatoes, oatmeal porridge, bread, and, rarely, a bit of meat. Meat and milk were often rancid.

Grains	Fruits	Vegetables	Meats	Dairy	Other things*

Part II

Choose *one* of the diets described in part I and compare it with the *Planet Health* Guide to Healthy Eating, which calls for eating a balanced diet (including all food groups) and a varied diet (different foods within each group). Answer the following questions:

Diet of the _____

1. Did they eat foods from each of the food groups? _____ If not, which food groups were missing?
2. Did their diets contain a variety of foods in each of the food groups? _____ If not, which food groups lacked variety?
3. Use student resource 28.1 to determine whether these people were likely to have suffered from certain diseases as a result of deficiencies in their diet. Remember, if they ate a food only on rare occasions, they probably were not getting enough of the nutrients they needed.

Type of food missing	Vitamin or mineral deficiency	Diseases
Example: Fruit	*Vitamin C*	*Scurvy*

4. Why do you suppose these people did not eat a well-balanced diet? There are probably several contributing factors.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Extension Activity 28.1

Food Survey

Interview an older relative, neighbor, or friend of your family who was 11 to 14 years old during the 1940s, 1950s, or 1960s. Ask him or her the questions in the following table. Record his or her answers and your answers to the same questions in the table.

Question: When you were 11 to 14 years old . . .	Adult response	Your response
Did you eat all three meals with your family? If no, explain.		
If you ate lunch at school, did you bring or buy your lunch?		
Did your family produce any of its own food?		
Describe the size of the store (corner store, supermarket) where your family did most of its shopping.		
How often did you eat at a restaurant?		
What kind of bread did you eat (white, wheat, rye)?		
What kind of milk did you drink (whole, skim)?		
Did you use butter, margarine, oleo, or something else to flavor your foods?		
How often did you eat dessert or what might be considered "junk foods" (twice a day, weekly, monthly)?		

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Extension Activity 28.1

Question: When you were 11 to 14 years old . . .	Adult response	Your response
How often did you drink soda?		
Which of these fruits were commonly available to you: bananas, oranges, plums, kiwi, mangoes, apples, melons, pineapples, pears, strawberries, plantains, tangerines?		
How often did you usually eat fruit (once a day, twice a day, three times a day, once a week, once a month, never)?		
How often did you eat meat?		
What kind of meat did you eat?		
How often did you eat vegetables?		
What vegetables were your favorites?		

Compare your responses to those of the adult you interviewed. How do you explain the major differences?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 29

Democracy and Diet

Balanced Diet Theme

In this lesson students use nutrition survey data to learn about how decisions that affect public health policy can be made. A group activity in which students role play key groups in a legislative public hearing enables students to practice skills of participation and persuasion. The individual activity is homework that requires students to articulate their own responses to the arguments they hear in class and to think about their personal nutrition actions.

This lesson is designed to infuse information about choosing healthy snacks into a classroom unit on the democratic process. It is best taught after you have spent a class learning about how laws are made and how citizens can get involved in that process.

Behavioral Objective

For students to learn how to replace snacks high in saturated and trans fat with healthy alternatives, including fruits and vegetables

Learning Objectives

Students will be able to do the following:

1. Use information (data) to guide their actions and decisions
2. Describe the roles public participation and legislative debate play in making health policy decisions
3. Explain how legislatures, public health agencies, and special interest groups interact

Materials

- Student resource 29.1, Making a Public Health Decision (handout or chalkboard)
- Findings from a nutrition study (handout, overhead, or chalkboard)

- Activity 29.1, Group A: Students for Healthy Snacks
- Activity 29.1, Group B: CHIP (Choice Is Personal)
- Activity 29.1, Group C: State Legislature
- *Optional:* Student resource 21.1, What's the Rap on Fat?, from lesson 21 (page 290)

Procedure

1. (5 minutes) Review lawmaking in a democratic system (time estimate assumes students are already familiar with this topic). Legislators make laws following specific procedures. Ask students, Where do ideas for laws come from? List students' ideas on the chalkboard.

   Many times ideas come from citizens. If interested citizens can get a legislator (representative or senator elected to represent a district comprising one or more cities or towns) to sponsor their idea (introduce it to the legislature), the idea can be written up as a bill that is voted on by the legislature (all the legislators). If the bill passes the vote, it becomes legislation, or law. List students' examples of laws they know on the chalkboard.

   Once a bill becomes law, the appropriate government agency (such as a public health agency) needs to carry out or enforce the legislation. Organized citizens have been successful in getting laws passed concerning many issues such as the environment and child care as well as public health.
2. (5 minutes) Read the following situation: Nutrition scientists are very interested in what students eat. In a recent study, scientists asked, "What kinds of snacks do middle school students eat? Do their snacks fit into a healthy diet?" After doing a survey of almost 2,000 middle school students, they found out the following:
   - Middle school students eat an average of 3.5 fruits and vegetables per day.
   - Only about 25 percent of middle school students eat five or more fruits and vegetables per day.
   - On average, middle school students get about 34 percent of their daily calories from fat and about 12 percent from saturated fat.

   Nutrition experts recommend that people eat five or more servings of fruits and vegetables combined each day and eat high-fat foods in moderation (occasionally), so that they get between 25 and 35 percent of their total calories from fat and no more than 10 percent of their calories from saturated fat. There is no recommended safe level of trans fat in the diet, and it is best to eliminate it (at least what's commercially produced) completely.

   When the results of this survey came out in newspapers and on TV, students banded together to form Students for Healthy Snacks. They realized there are plenty of healthy snacks around (see Teacher Resources). These include fruits, vegetables, low-fat yogurt, low-fat milk, and pretzels. Other healthy choices include small portions of other, higher-fat foods, especially foods high in unsaturated fat (a healthier fat), such as peanut butter and nuts. But when students want snacks, the easiest and cheapest things they can buy are candy, cookies, and fast food from vending machines and local restaurants, foods that often are not very nutritious and may be very high in saturated fat, trans fat, or sugar. The group Students for Healthy Snacks wants the state government to help make healthy snack foods more available to them by passing legislation (a law) to fund a healthy snack campaign. The idea for this new law is contained in a bill that legislators (elected representatives or senators from towns and cities) need to vote on.

   Another student group tried to block the action. They call themselves CHIP, or *CH*oice *I*s *P*ersonal, because they felt that government should not get involved in telling people what to eat.

During a public hearing, the legislature listened to testimony (oral presentations) from both sides before deciding whether to fund the campaign.

3. (30 minutes) Have a public hearing. Assign or recruit students into three groups of equal size. (Group C, the state legislature, has to have an odd number of students in it. This will avoid a tie vote.) Distribute student resource 29.1, Making a Public Health Decision, to all students so they understand how the legislature votes. (This student resource is intended to supplement, not replace, other materials and textbooks on lawmaking that you may already be using.) *Optional:* You also may want to distribute student resource 21.1, What's the Rap on Fat?, from lesson 21 (page 290). This resource describes the different kinds of fat and may help students form their arguments.
   - Group A receives activity 29.1, Group A: Students for Healthy Snacks.
   - Group B receives activity 29.1, Group B: CHIP (CHoice Is Personal).
   - Group C receives activity 29.1, Group C: State Legislature.
   - Review the worksheet procedures with students.
   - Give the groups 10 to 15 minutes to prepare 5 minutes of testimony (oral presentations in support of or against a particular action).
   - Listen to the testimony. You should cut off testimony at five minutes. Likewise, you should give a two-minute and one-minute warning. (You may want to schedule presentations for another day.)
   - After listening to the testimony, allow the legislature to ask a few questions and vote on what they have heard.
   - Discuss the outcome. Why do you think the vote came out the way it did? What could each side do differently to improve its position next time? If the bill passed, what would happen now?

Extension Activities

Have students choose one of the following and write a paragraph addressing the issue.

1. In this debate you heard arguments for and against a proposal. Members of the legislature had to decide whether to vote yea or nay. Pretend the vote was a tie. You are a legislator and you offer to negotiate a compromise to break the tie. Write a paragraph describing the compromise. Try to think of a compromise that addresses elements of each side's arguments.
2. CHIP argued that if the campaign worked, people would stop eating the "less healthy" snack foods completely, causing the businesses that made or sold them to close and forcing people out of work. Critique this argument. Was it supported by facts? Did it appeal to emotions, to reason, or to both? Also, is it necessary to stop eating "less healthy" foods completely to have a balanced diet?
3. CHIP also argued that an advantage of typical snack foods over fruits and vegetables is that they have more of the calories that growing, active teens need. Critique this argument. What's missing from most snacks that are high in saturated fat? Why is it unhealthy to eat foods that are high in saturated and trans fat? To make your point, read some labels! Find a snack that provides more than 20 percent of the daily value of saturated fat and compare it to a snack with the same number of calories but less saturated fat. Check the ingredients list for partially hydrogenated vegetable oil (trans fat). Can you find a variety or brand of the high-saturated-fat food made with healthier unsaturated fat?

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- Student resource 13.2, How Much Fat Is OK? (page 196)
- U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans* (see appendix A)
- Commonwealth of Massachusetts, *Lawmaking in Massachusetts* (see appendix D)
- William Frances Galvin, Secretary of the Commonwealth, "The Ladybug Story: A Story About Lawmaking" (see appendix D)

SPECIFIC BACKGROUND MATERIAL

How Laws Are Made

The resources listed in appendix D will assist you with teaching about citizen participation in developing legislation. *Lawmaking in Massachusetts* describes the legislative process in Massachusetts. You might want to send for a resource that describes the legislative process in your state. However, this is not necessary if you are already aware of the process and can discuss it with your students.

Healthy Snacking

The health message in this lesson is that healthy snacks are part of a balanced diet. Snacking is an important component of adolescent nutrient intake, constituting a quarter or more of daily calorie intake. Because of adolescents' increasing independence in making food choices, as well as their growing ability to earn money on their own, it is important for them to learn how to select snacks that are enjoyable and healthy. They need tools to help them be responsible for their own nutritional well-being. Unfortunately, many of the snacks they choose (such as ice cream, cookies, chips, and candy) are high in saturated fat and trans fat. Eating too much unhealthy fat increases the risk of developing heart disease. Unsaturated fat found in vegetable oils, nuts, olives, and avocados does not contribute to heart disease. It is important for adolescents to understand that the type of fat they eat is more important to their health than the total amount of fat in the diet. Encourage students to include sources of healthy unsaturated fat every day such as nuts, seeds, fish, whole grains, and vegetable oils (for cooking). Reinforce the importance of limiting saturated fat by replacing butter and lard with liquid vegetable oil when cooking, and by choosing lean meats and low-fat or fat-free dairy products. They should avoid foods containing trans fat by purchasing foods with no partially hydrogenated vegetable oils in the ingredients list. For more information on fat see the following section, More on Fat.

Snack Choices

Quick, simple-to-prepare, or easy-to-buy foods that are low in saturated and trans fat and high in nutrients make good snacks. These include the following:

- Many breakfast cereals, especially unsweetened or lightly sweetened
- Savory baked goods such as bagels, pretzels, and breads
- Unbuttered popcorn
- Fruits (fresh, dried, or juice) and vegetables
- Low-fat yogurt or milk
- Sandwiches made with lean meats

Other foods that are good snacks when consumed in moderation are those that are not low fat but pack lots of other nutrients, too, such as peanut butter, nuts, and cheese. Peanut butter and nuts are high in unsaturated fat, a healthier type of fat; substituting this type of fat for saturated and trans fat in the diet lowers the risk of developing heart disease. Finally, students should know that it is all right to eat an occasional serving of potato chips, French fries, or ice cream; they should look for varieties that substitute healthier fat for saturated and trans fat. Student resource 13.2, How Much Fat Is OK? (page 196), can help students identify snack choices without unhealthy fat (see also lesson 13, Looking for Patterns, page 179).

More on Fat

Foods made from both animals and plants contain fat. Fat falls into two categories: saturated fat and unsaturated fat. The type of fat eaten is more important to health than the total fat in the diet. Quality matters when it comes to preventing chronic diseases. Unsaturated fat comes from plant and fish oils and includes both mono- and polyunsaturated forms. Unsaturated fat is liquid at room temperature (think of cooking oils). Research shows a strong association between these healthy oils and lower rates of heart disease and type 2 diabetes. For this reason most of the fat you consume should be unsaturated. Sources include fish, vegetable cooking oils, nuts, seeds, and whole grains.

Saturated fat mostly comes from animal sources such as meat and dairy foods, and is solid at room temperature (think of butter and lard). Eating too much saturated fat raises blood cholesterol and increases the risk for heart disease. Nutrition experts recommend limiting saturated fat to no more than 10 percent of calories in the diet to reduce the risk of heart disease. Because saturated fat is contained in many foods that we need (meats and dairy products), it's not practical to eliminate these foods altogether. However, you can limit saturated fat to a healthy level by consuming low-fat or fat-free dairy foods and lean meats, and substituting vegetable oils for butter when cooking.

Trans fat is another type of unhealthy saturated fat. Most trans fat in the diet comes from vegetable oils that have been chemically modified through a process called hydrogenation to improve the shelf life of foods such as baked goods, snack foods, and fast foods (think fried sandwiches and French fries). A much smaller amount comes from naturally occurring tran fats in certain types of meats. Trans fat is more heart unhealthy than saturated fat because it raises unhealthy LDL cholesterol and lowers protective HDL cholesterol. There is no recommended safe level of trans fat in the diet, and it is best to eliminate it (at least what's commercially produced) completely. In January 2006 all nutrition labels began declaring trans fat by law. However, products can still list 0 grams of trans fat on the nutrition label if the food contains 0.49 gram or less of trans fat per serving. Avoid trans fat by consuming only foods listing no partially hydrogenated vegetable oils in the ingredients, cooking with liquid vegetable oils instead of stick margarine or shortening, and choosing trans-fat-free foods when eating out.

Recommended fat intake for active youth:

Girls 11-14	Total fat	65 grams (30% of 2,000 calories)
	Saturated fat	20 grams (10% of 2,000 calories)
Boys 11-14	Total fat	80 grams (30% of 2,400 calories)
	Saturated fat	25 grams (10% of 2,400 calories)

Name_____

Student Resource 29.1

Making a Public Health Decision

There are many paths to the creation of public health legislation, or laws. One such path is shown below.

Research	Media	Citizen advocacy	Legislation	Action
A nutrition study shows that on average middle school students eat fewer vegetables and fruits and more fat than experts recommend.	Local newspapers and TV newscasters make a fuss about the results.	Students campaign to get the state to carry out a Healthy Snacks campaign. They ask Representative Smith to sponsor their legislation. A second group of students disagrees with the legislation.	1. Representative Smith agrees to sponsor a bill funding a Healthy Snacks campaign to be run by the state public health agency. 2. The legislature listens to testimony for and against the bill. 3. The legislature votes on the bill. 4. Will the bill pass?	If the bill passes, the state public health agency now has to run the campaign. The agency may work with local community groups to do this.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 29.1

Group A: Students for Healthy Snacks

Why the State Legislature Should Fund a Healthy Snacks Campaign

Instructions

You have 10 minutes to plan and 5 minutes to present. Use the following resources to develop your testimony. Work as a group to build on the statements, adding to them to make solid arguments. Select one or more speakers to present each of the arguments. Feel free to be creative.

1. Speaker(s)

Read this at the beginning of your testimony: Students for Healthy Snacks believes the state legislature should fund the State Public Health Agency to run a Healthy Snacks Campaign because _____.

(*Fill in using results from the nutrition study that your teacher presented.)*

2. Speaker(s)

Many snack foods currently available to students are high in saturated fat, trans fat, or both, which can increase the risk of developing heart disease. There are two parts of the campaign. The first part is to encourage students to eat more fruits and vegetables and fewer high-fat or nonnutritious foods by making fruits and vegetables available where students buy food. For example, _____.

(Think of two places where students your age buy food. Think of two healthy foods these places could [or already do] offer that students your age like to eat.)

3. Speaker(s)

The second part of the campaign is to run an ad campaign that teaches healthy snack alternatives. For example, _____.

(Think of two foods that are high in saturated or trans fat and alternatives to them.)

4. Speaker(s)

This legislation makes sense for several health reasons. Experts think everyone should eat at least _____ *(how many?)* fruits and vegetables a day to keep them healthy now and throughout their lives. Examples of fruits and vegetables students our age like are _____.

(Name five.)

5. Speaker(s)

Diets high in saturated fat, in which more fat is eaten than is needed, can include foods that are high only in calories, not in vitamins, and can make you feel full so you don't feel like eating foods that are better for you. Examples of foods high in saturated fat that students our age like to buy are _____.

(Name three.)

6. Speaker(s)

Active, growing teens need lots of calories, but it is best to get calories from eating nutritious foods instead of foods high in unhealthy fat that have calories but few nutrients. For example, instead of eating a chocolate-caramel-cookie bar, a student could eat an apple or a bag of _____ *(pretzels or potato chips—which has less saturated and trans fat?)* and drink a small carton of _____ *(whole milk or 2 percent milk—which has less saturated fat?).*

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 29.1

Group B: CHIP (CHoice Is Personal)

Why the State Legislature Should Not Fund a Healthy Snacks Campaign

Instructions

You have 10 minutes to plan and 5 minutes to present. Use the following resources to develop your testimony. Work as a group to build on the statements, adding to them to make solid arguments. Select one or more speakers to present each of the arguments. Feel free to be creative.

1. Speaker(s)

Read this at the beginning of your testimony: CHIP believes the state legislature should not fund the State Public Health Agency to run a Healthy Snacks Campaign for several reasons. First, active, growing teenagers need lots of calories. Fruits and vegetables are typically very low in calories. Fat, however, has plenty of calories, and students love high-fat foods. Three examples of high-fat foods we love are_____ _____ .

(Identify three high-fat foods.)

2. Speaker(s)

The main danger from sugar in sweet snacks is cavities, which occur when people do not brush their teeth regularly. If you brush your teeth _____ *(at least how many times?)* per day and floss your teeth _____ *(how many times?)* per day and brush your teeth every time you have cookies, candy, or other sticky snacks, there's no problem!

3. Speaker(s)

Students like fast foods, cookies, candy, and other similar foods because they are _____ _____ .

(Name two or three reasons; for example, think about price, whether it is easy to find them, flavor, and so on.)

4. Speaker(s)

Food choices are personal! If people want to eat diets that are _____ *(high or low?)* in fat, even though it might harm their health in the long run, that's their choice. Besides, how can teens learn to make healthy choices if the range of foods available to them is limited?

5. Speaker(s)

A Healthy Snacks Campaign could prove bad for local businesses that make or sell high-fat snack foods, such as _____ *(name three kinds of businesses).* If such a campaign worked, people would stop buying the foods made or sold at these places. Businesses would shut down, and people would be out of work.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 29.1

Group C: State Legislature

How Should I Vote?

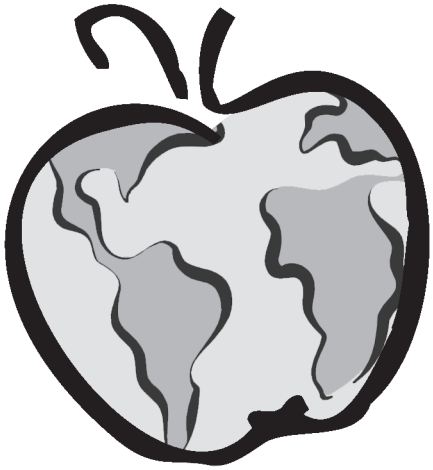
1. Listen to the testimony of the two groups.
2. Ask questions of each group. You can ask the groups to clarify points or to respond to one another's points.
3. When you are finished asking questions, vote on the proposal to fund the State Public Health Agency to run a Healthy Snacks Campaign. Base your vote on your beliefs and on the arguments you heard. Your teacher will conduct the voting by asking all those in favor of funding the Healthy Snacks Campaign to raise their hands. After counting the "yeas," your teacher will then ask all of those opposed to (against) funding the Healthy Snacks Campaign to raise their hands. After counting the "nays," your teacher will determine which side has convinced legislators.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 30

Global Foods

Fruits and Vegetables Theme



This lesson asks students to discover the differences in foods regularly consumed in different countries and cultures. The student resource provides general information about different countries and their current and traditional diets. The comparison of any two countries will make the student aware of the differences in food patterns across countries and the variety of fruits and vegetables available worldwide. The goal of the lesson is to encourage students to eat a variety of fruits and vegetables. Some previous knowledge or discussion of world climates may be helpful in preparing students for this lesson.

Behavioral Objective

For students to eat five or more servings of fruits and vegetables (combined) daily

Learning Objectives

Students will be able to do the following:

1. Explain why it is important to eat a variety of fruits and vegetables
2. Compare and contrast the types of foods and methods of food preparation used by different countries and cultural groups
3. List some of the factors that determine which foods are commonly produced by a country
4. Locate Haiti, Puerto Rico, Cambodia, Brazil, and the United States on a map

Materials

- Activity 30.1, Discover Foods of the World
- Student resource 30.1, Fruits and Vegetables of the World (one copy per group of two)
- Map of the world
- Overhead transparencies 30.1 and 30.2 (or handout, or use chalkboard)
- Extension activity 30.1, Hidden Foods

Procedure

Some previous knowledge or discussion of world climates would be helpful in preparing students for this lesson.

1. Point out the goals of the lesson:
   - To discuss why it is important to eat a variety of fruits or vegetables
   - To compare and contrast the types of fruits and vegetables consumed and cooking methods used in different countries around the world
2. Ask students, What vegetables does your family eat most often?
3. (5 minutes) Display overhead transparency 30.1. Have students study the vitamin and mineral content of the fruits and vegetables listed. What do they notice? How are the foods different? Based on the information, why do they think it's important to eat a variety of fruits and vegetables? Remind them that they should eat five or more servings of fruits and vegetables. (See Teacher Resources for help with this discussion.)
4. (5 minutes) Have students locate Haiti, Cambodia, Brazil, Puerto Rico, and the United States on a map of the world.
5. (5-10 minutes) Discuss the climates and the size of these countries. How are they different? How are they the same? How would this affect the variety and quantity of fruits and vegetables grown in each country? (You also might want to discuss the fact that many fruits and vegetables grown in the other countries are imported to the United States and are available at some local supermarkets, ethnic markets, and specialty stores.)
6. (20 minutes) Hand out activity 30.1 and student resource 30.1. Have students work in pairs to complete the activity. You may want to display overhead transparency 30.2, Methods of Food Preparation, as a reference to students while they work on the activity.
7. (5-10 minutes) To wrap up the lesson, ask students to share their answers to the last two questions of activity 30.1.

Extension Activities

1. Have students complete extension activity 30.1, Hidden Foods.
2. Teach this lesson on Friday and have students prepare a traditional dish over the weekend to be brought to school and shared on Monday.
3. Ask students to identify the international restaurants in the area. What types of foods are available in each of the restaurants? Which cuisines include dishes that are high in vegetables, fruits, or both? Which include dishes that are high in saturated fat or partially hydrogenated vegetable oils (trans fat)? Have students who don't eat out pick up take-out menus to do the assignment.
4. Have students choose a country, maybe one that their ancestors emigrated from, and make a collage of the foods eaten in that country.

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- National Institutes of Health and National Cancer Institute, "Time to Take Five" (see appendix A)
- The Web site Food in Every Country, published by Thompson Gale, provides a country-by-country summary of foods, meal customs, geographic settings, religious and holiday customs, and recipes: www.foodbycounry.com/index.html.
- The three-part PBS series *The Meaning of Food* explores and celebrates American food and a wide variety of cultures across America: www.pbs.org/opb/meaningoffood/.

SPECIFIC BACKGROUND MATERIAL

What can we learn from studying the commonly consumed foods of a country?

The study of food can enhance understanding about cultural and climatic differences. People in different countries eat different foods, prepare foods differently, and maintain different traditions related to food. Foods from many countries exist in some form in the United States. Restaurants now serve the foods of many ethnic groups. For example, Chinese, Italian, and Mexican cuisines have become an integral part of the American diet, although dishes are often prepared differently in this country than they are in the countries of origin.

What determines the commonly produced foods of a country?

Climate is a major determinant of a nation's ability to grow and harvest foods. Natural resources, the amount of arable land, landscape, economics, and political factors also affect food production.

How many fruits and vegetables should we eat daily?

The five-a-day campaign promotes eating five or more servings of fruits and vegetables (combined) every day. Students should eat fruits and vegetables at every meal and snack for a total of at least five servings each day.

What are the benefits of fruits and vegetables?

- Many are good sources of vitamin C: oranges, lemons, grapefruit, cantaloupes, raspberries, strawberries, tomatoes, cabbage, potatoes, spinach, cauliflower, peppers, radishes, and green leafy vegetables such as kale and spinach.
- Many are good sources of vitamin A: bright orange vegetables such as carrots, sweet potatoes, and pumpkin; bright orange fruits such as mangoes, cantaloupes, and apricots; dark green leafy vegetables such as spinach, collards, and turnip greens.

- Many are important sources of B vitamins: green leafy vegetables, legumes (beans and peas), nuts, and oranges.
- They are an important source of potassium and fiber.
- They are low in fat.
- They reduce the risk of certain types of cancer.
- They provide nutrients important for healthy skin and eyes and aid in boosting immunity, healing, and other functions.

Why is it important to eat a variety of fruits and vegetables?

No single food supplies all the nutrients one needs to grow, repair, and maintain a healthy body. Eating a variety of fruits and vegetables as part of an overall healthy diet helps ensure that a person will meet the daily recommended allowances of vitamins and minerals.

How should vegetables be prepared?

Because chopping, dicing, grating, mincing, or mashing vegetables can destroy some of the vitamins in the food, whenever possible, chop or slice vegetables just prior to serving or cooking.

Does cooking vegetables also affect their nutritional value?

Yes. Overboiling or overcooking vegetables can greatly reduce the amount of vitamins; therefore, steaming vegetables is preferable. The less water involved in the cooking process, the better.

Are frozen vegetables nutritious?

Yes. In fact, frozen vegetables can be just as nutritious as fresh. However, don't buy frozen vegetable packets that have ice crystals on the outside; this usually means they have been thawed and refrozen. Use thawed vegetables as soon as possible.

Are all vegetables the same nutritionally?

All vegetables are good for you, but some are "better" because some have a lot more nutrients that can help you stay healthy. Dark green leafy vegetables (spinach, kale, collard greens), as well as yellow or orange vegetables (pumpkin, carrots, tomato, butternut squash) have many more nutrients than corn, peas, or potatoes, which are very popular vegetables in the United States. In general, bright-colored vegetables contain more vitamins and minerals than dull-colored ones.

What about canned vegetables?

Canned vegetables can still provide many important nutrients even though they may have lost a lot of their nutrients in the high-heat process involved in canning foods. Canned tomatoes, beets, and spinach still have a lot of vitamin A and carotenoids.

Avoid canned vegetables that have a lot of added salt or sodium and sugar. Vegetables canned in water or their own juices are best.

How can we include plenty of different fruits and vegetables in meals and snacks?

The *Dietary Guidelines for Americans* (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2005) recommend the following:

- Keep ready-to-eat vegetables handy in a clear container in the front of your refrigerator for snacks or on-the-go meals.
- Keep a day's supply of fresh or dried fruit handy on the table or counter.
- Enjoy fruit as a naturally sweet end to a meal.
- When eating out, choose a variety of vegetables at a salad bar.
- Serve raw vegetables with dip.
- Mix fruit or vegetables with other foods in salads, casseroles, soups, and sauces. For example, add shredded vegetables to pasta sauces.

Are ketchup, French fries, and potato chips considered vegetables?

Technically, yes, but we say no! They are all derived from vegetable sources, but because of the way they have been prepared, the beneficial nutritional content of those foods is masked by excessive amounts of added fat, salt, or sugar. For example, when you deep-fry vegetables in oil, such as French fries and potato chips, they become foods high in saturated and trans fat that should be consumed infrequently and in small quantities. You should use these foods sparingly!

What about spaghetti sauce?

Tomato sauce is a great source of vitamins A and C. Eating tomatoes and tomato products may help men reduce the risk of prostate cancer. Lycopene, the red pigment in tomatoes, seems to be responsible for this effect. Interestingly, lycopene is more available to the body when tomatoes have been cooked and are in the presence of small amounts of fat. (Lycopene is a fat-soluble nutrient and therefore needs a small amount of fat to be better absorbed.) Add spaghetti sauce liberally to pasta, skinless chicken, pizza, and anything else you want to. When choosing a store-bought sauce, select one with a low to moderate amount of sodium and sugar. Sauce made with olive oil is preferred. For homemade sauce, add a small amount of olive oil to the sauce to help with lycopene absorption, and throw in some grated carrots or peppers for extra nutrition. It's a great way to add vegetables to your diet.

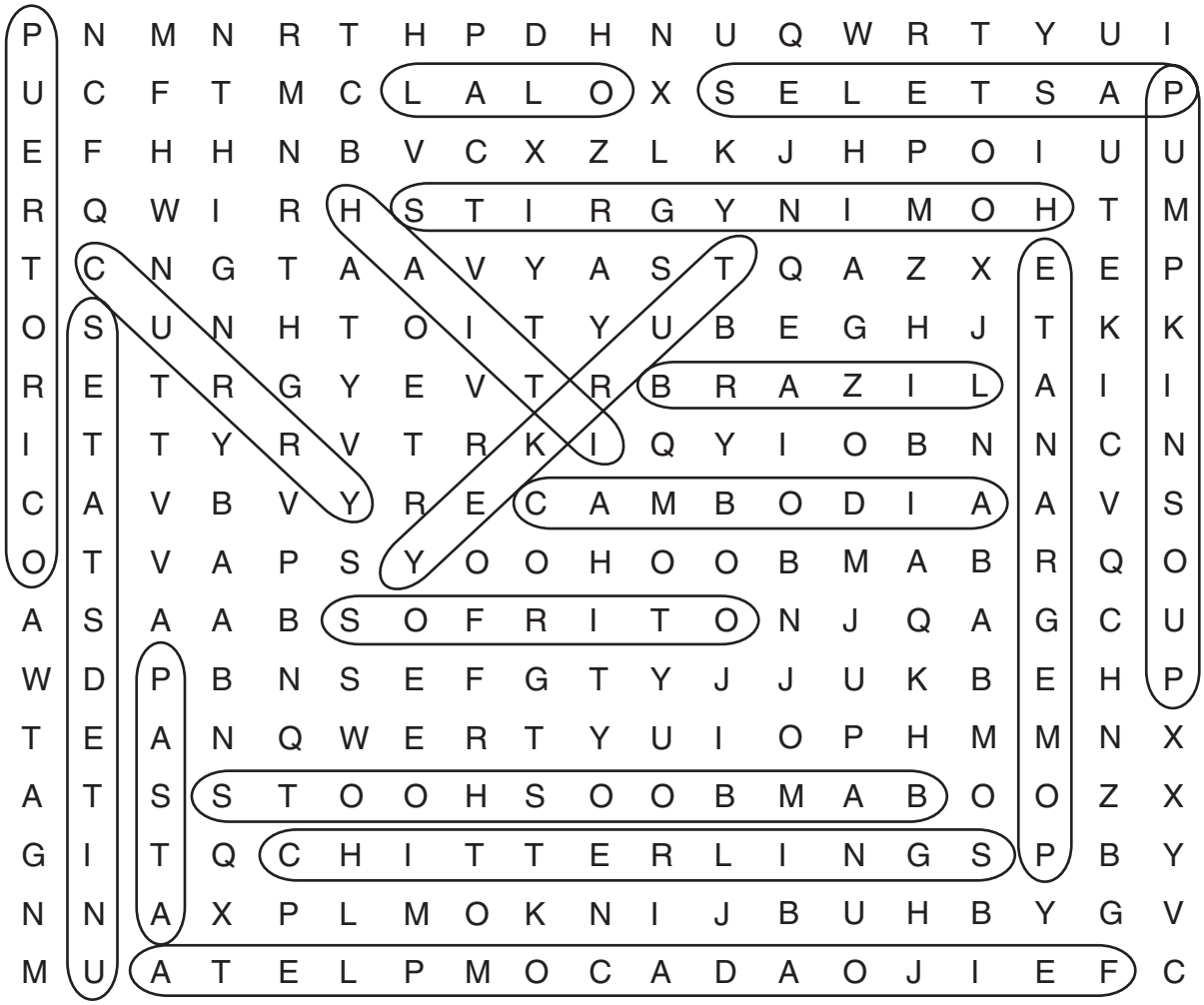
REFERENCE

U.S. Department of Agriculture and U.S. Department of Health and Human Services. 2005. *Dietary Guidelines for Americans,* 6th ed., www.healthierus.gov/dietaryguidelines.

Answer Key

EXTENSION ACTIVITY 30.1: HIDDEN FOODS

Find the Hidden Foods



Find and circle the four countries and the one U.S. commonwealth and some foods specific to each place. Some words are written top to bottom. Other words are written bottom to top. Finally, there are even words written left to right, right to left, and diagonally. The words are listed below.

Haiti: Pumpkin soup, Lalo
United States: Pasta, Turkey, Hominy grits, Chitterlings
Cambodia: Bamboo shoots, Curry
Puerto Rico: Sofrito, Pasteles
Brazil: Feijoada completa, Pomegranate

Examine the list of foods in the following table. Which two foods offer the most vitamin A? Vitamin C? Folate? Calcium?

Food	Vitamin A (RE)	Vitamin C (mg)	Folate (μg)	Calcium (mg)
Banana	9	10	22	7
Orange	26	80	47	56
Apple	7	8	4	10
Corn	18	5	38	2
Tomato	139	22	12	8
Carrot	2,025	7	10	19
Cantaloupe	516	68	27	17

*Units: RE = retinol equivalents; mg = milligrams; μg = micrograms

Why is it important to eat a variety of fruits and vegetables?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Methods of Food Preparation

Stove-top cooking	Boil	To cook in water at 220 °F (104.4 °C) until bubbles rise continuously and break on the surface.
	Stew	To simmer food in a small quantity of liquid.
	Simmer	To cook in liquid that is maintained just below the boiling point, with bubbles forming slowly.
	Blanch	To preheat in boiling water or steam. Done to inactivate enzymes and to shrink food for canning, freezing, or drying; also to aid the removal of skins from nuts, fruits, and some vegetables.
	Steam	To cook in steam, with or without pressure.
	Fry	To cook in fat.
	Pan-broil	To cook uncovered on a hot surface, usually a frying pan. Fat is poured off as it accumulates.
Oven cooking	Bake	To cook by dry heat in an oven or oven-type appliance. Covered or uncovered containers may be used, although uncovered baking can be considered roasting.
	Roast	To cook uncovered by dry heat. Usually done in an oven, cooking meats and vegetables.
	Broil	To cook by direct heat.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Fruits and Vegetables of the World

Country	Fruits	Vegetables	General preparation of vegetables	Traditional diet	National dish
Cambodia Capital: Phnom Penh Location: Indochina Population: 6.6 million Population density: 121/ sq. mi. Land area: 70,238 sq. mi Arable land: 16% Native language: Khmer	Grapes, pears, melons, pineapples, fruit juices, coconuts, apples, and varieties of mangoes and bananas	Green leafy vegetables prepared in soups and sautéed with tofu; bamboo shoots, bean sprouts, celery, eggplant, leeks, spinach, watercress, squash, broccoli, carrots, and celery	Often sautéed with tofu and served with rice or noodles or prepared in soups. For example, in a chicken noodle salad, vinegar, sugar, and garlic are added to shredded cabbage, carrots, and cucumbers.	Rice is the primary source of energy, and diets usually contain adequate vegetables and fruits, with small amounts of meat (fish is plentiful) and dairy products.	A curry that includes coconut milk, potatoes, and onions. It can be made with a variety of meats including chicken, duck, pork, beef, or quail.
Haiti Capital: Port-au-Prince Location: West Indies Population: 5.8 million Population density: 544/ sq. mi. Land area: 10,579 sq. mi. Arable land: 20% Native languages: French, Creole	Mangoes (most popular fruit, with 15 varieties), bananas, oranges, tangerines, grapefruits, and pineapple	Green vegetables are plentiful in Haiti, including lalo, which is a small leafy vegetable high in iron. Green peppers, garlic, and tomatoes are widely used. Starchy vegetables include yuca, yams, and taro. Other types include green peas, watercress, spinach, carrots, and okra.	Beans are prepared similarly throughout the Caribbean with salt and lard. Haitians enjoy spicing their food with celery, garlic, hot pepper, black pepper, scallions, and parsley. Vegetables are prepared in soups and stews and sautéed as side dishes.	The Haitian diet is high in carbohydrate such as rice, tubers, millet, and corn. Corn is incorporated into many dishes such as breakfast porridge, bread, and dessert. The traditional diet includes lots of soups and stews made with vegetables, meat, and/or beans. Meats such as pork and fish are often salted and dried.	A pumpkin soup called joumou with cabbage, carrots, celery, pasta, and oxtail. It is traditionally eaten on New Year's Day or for Sunday dinner.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

(continued)

Fruits and Vegetables of the World *(continued)*

Country	Fruits	Vegetables	General preparation of vegetables	Traditional diet	National dish
Puerto Rico Capital: San Juan Location: Eastern West Indies Population: 3.4 million Population density: 944.1/sq. mi. Land area: 3,421 sq. mi. Arable land: 20% Native languages: English, Spanish	Oranges, grapefruits, papayas, pineapples, mangoes, and guavas	Corn, okra, eggplant, green beans, onion, green peppers, garlic, tomatoes, sweet potatoes, and beets are popular. Starchy vegetables such as yuccas dominate.	Often combined into a dish known as sofrito, a mixture of vegetables and pork. Lard and olive oil are commonly used in cooking. Starchy vegetables are often boiled and served with boiled, dry codfish.	Beans and rice are emphasized in the traditional diet. Few green leafy vegetables are consumed. Fish, such as codfish, is usually dried and salted.	A snack or side dish called pasteles is prepared with meat that is mixed with cornmeal and mashed plantains, and then wrapped in plantain leaves and steamed. Pasteles are traditionally eaten at Christmas.
Brazil Capital: Brasilia Location: South America Population: 154 million Population density: 47/sq. mi. Land area: 3,286,470 sq. mi. Arable land: 8% Native language: Portuguese	Mangoes, acerola, oranges, pineapples, passion fruit, guavas, papayas, grapes, bananas, and strawberries	Green collards, pumpkin, cabbage, green beans, tomatoes, lettuce, mustard greens, butternut squash, zucchini, carrots, sweet potatoes, yucca, and tubers, such as mandioca. The type of beans consumed varies by region. For example, in Rio de Janeiro, black beans are most common, whereas in the southeastern region, red and brown beans are preferred.	Frying and stewing are common methods of preparation. Chilies, garlic, parsley, and onions are often added to vegetable dishes.	Coconuts, bananas, and hot peppers are prevalent in the spicy delicacies of Brazil. Brazilians add a lot of salt to their food as well as a lot of white sugar to their coffee. Beans are emphasized in the traditional diet. A popular traditional dish is farofa, which is mandioca flour, fried with a little oil.	Feijoada completa is prepared with black beans, bacon, pork, beef, dried beef, smoked tongue, and sausage. It is accompanied by sliced oranges, seasoned rice, toasted cassava meal, and vegetables such as kale.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Student Resource 30.1

United States Capital: Washington, D.C. Location: North America Population: 300 million Population density: 68/sq. mi. Land area: 3,618,770 sq. mi. Arable land: 21% Native language: English	Apples, bananas, cantaloupes, cherries, grapes, honeydew melons, plums, strawberries, blueberries, blackberries, pears, peaches, pineapples, tangerines, oranges, nectarines, raspberries, watermelon, dried fruits, and fruit juices	Asparagus, artichokes, broccoli, cauliflower, green cabbage, red cabbage, beets, peas, string beans, carrots, tomatoes, cucumbers, lettuce, mustard greens, turnip greens, kale, collards, spinach, scallions, pumpkin, summer and winter squash, corn, snap beans, bell peppers (green, red, and yellow), eggplant, mushrooms, celery, radish, and zucchini	Steaming, boiling, sautéeing, frying, broiling, grilling, and roasting	Greatly influenced by northern European cooking. Traditionally, meals have been centered around a meat dish. As a consequence, meals have a lot of saturated fat. A variety of vegetables including potatoes, cabbage, and carrots are common in most American diets, as well as a wide variety of yellow and dark green leafy vegetables. Common meats are beef, pork, and poultry.	Thanksgiving dinner: roast turkey, pumpkin pie, mashed potatoes, and cranberry sauce

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health*, 2nd ed. (Champaign, IL: Human Kinetics).

Activity 30.1

Discover Foods of the World

Choose two countries to compare. Use student resource 30.1 to help you complete the following table.

Country		
Climate		
Commonly consumed fruits You have tried You have not tried		
Commonly consumed vegetables You have tried You have not tried		
Methods of cooking vegetables *Example: Boiling*		
National dish: Which of the five food groups are represented in this dish?		

1. What effect does the climate and size of these countries have on the foods commonly grown in the region?

2. How do the economy and politics of the region affect the food consumed in the region?

3. If you had the opportunity to go to a restaurant that served food from one of these countries, which restaurant would you go to and why?

4. What would you order? Be sure to include some fruits and vegetables and a description of how the food would be prepared.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Extension Activity 30.1

Hidden Foods

Find the Hidden Foods

P N M N R T H P D H N U Q W R T Y U I
U C F T M C L A L O X S E L E T S A P
E F H H N B V C X Z L K J H P O I U U
R Q W I R H S T I R G Y N I M O H T M
T C N G T A A V Y A S T Q A Z X E E P
O S U N H T O I T Y U B E G H J T K K
R E T R G Y E V T R B R A Z I L A I I
I T T Y R V T R K I Q Y I O B N N C N
C A V B V Y R E C A M B O D I A A V S
O T V A P S Y O O H O O B M A B R Q O
A S A A B S O F R I T O N J Q A G C U
W D P B N S E F G T Y J J U K B E H P
T E A N Q W E R T Y U I O P H M M N X
A T S S T O O H S O O B M A B O O Z X
G I T Q C H I T T E R L I N G S P B Y
N N A X P L M O K N I J B U H B Y G V
M U A T E L P M O C A D A O J I E F C

Find and circle the four countries and the one U.S. commonwealth and some foods specific to each place. Some words are written top to bottom. Other words are written bottom to top. Finally, there are even words written left to right, right to left, and diagonally. The words are listed below.

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From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 31

Around the World With Five a Day

Fruits and Vegetables Theme

In this lesson students learn about growing conditions for some fruits and vegetables in different parts of the world, as well as where they were first cultivated. Working in groups, students do library research, design a poster, and use the poster to present their assigned fruit or vegetable to the class.

Behavioral Objective

For students to eat five or more servings of fruits and vegetables (combined) per day

Learning Objectives

Students will be able to do the following:

1. State the growing conditions for some fruits and vegetables
2. State where some fruits and vegetables were first cultivated
3. Work in groups to investigate fruits and vegetables from different countries
4. Design a poster that clearly presents information
5. Make an oral presentation of a group research project

Materials

- Activity 31.1, Around the World With Fruits and Vegetables
- Overhead transparency of world climates (or handout; see Teacher Resources)
- Student resource 31.1, Foods and Their Origins
- Student resource 31.2, Sample Recipes (optional: find recipes to match selected fruits or vegetables)
- *Optional:* Samples of cole (*Brassica*) crops (cabbage, cauliflower, turnips, and so on), beets, apples, and citrus fruit

Procedure

DAY 1

1. (10 minutes) Using an overhead transparency or handout, discuss climates as they relate to certain latitudes.
2. (2-3 minutes) Review the five-a-day recommendation for fruit and vegetable consumption (five or more a day), making sure students understand that eating at least five a day refers to the total number of fruit and vegetable servings combined, not five servings of fruits and five servings of vegetables. Students don't have to count servings, but they should try to eat a fruit or vegetable with every meal or snack to get the recommended amount.
3. (5 minutes) Explain that students will conduct research on a particular fruit or vegetable and then create an informative poster and class presentation (presentations should be two to three minutes long). Hand out student resource 31.1, Foods and Their Origins, and activity 31.1, Around the World With Fruits and Vegetables. Explain that the purpose of the student resource is to provide background information about a sample of foods as examples of the type of information they will gather.

   Note: To better connect this lesson to your curriculum, you may choose to assign fruits and vegetables specific to the region of the world your class is currently studying. This would allow them to find the climate, map, and countries that produce the food in their textbooks. However, they would still need to do library research to determine the family name, nutrient value, and location of first cultivation of these foods. Students can find this information online or in encyclopedias.

   Optional: Alternatively, you may assign groups to study the produce grown during a particular period of time and compare and contrast that to what is available either now or in a different time period (for instance, compare ancient Greece to Greek food culture in the 18th century or to current food production in the region). If your class is studying ancient or historical times, discuss the impact of transportation, politics, and economic trade on fruit and vegetable availability, and how this might differ by socioeconomic class.
4. (15-20 minutes) Divide the class into groups of five to begin designing their posters and dividing up the research tasks. If possible, have students use class time to begin their library research at the school library.

DAY 2

1. (15-20 minutes) Give students time to complete their posters, design their quiz questions (see activity 31.1, question 2), and plan their presentations.
2. Collect the quiz questions prepared by each group.
3. (20 minutes) Have students give their two- to three-minute presentations. Prior to the presentations, remind students that they will be quizzed on the material presented. This will encourage students to pay attention to the presentations.
4. (10 minutes) Give students the quizzes on another day.

EXTENSION ACTIVITIES

1. Have students make note of the fresh fruits and vegetables served in the cafeteria. Ask them to research where these foods are currently grown. Are any items produced locally? Which foods are imported from other countries? If the school were to serve locally grown fruits and vegetables, what would be available at this time of the year?

2. Have the students research the food culture from ancient or historic civilizations (refer to Teacher Resources for Internet resources). Did the people from ancient cultures consume a variety of fruits and vegetables? Were there differences among societal classes? How did issues such as class, season, transportation, economics, and marketing practices affect food choices?
3. Have students bring in food dishes that include the fruits or vegetables they researched, or make one of the sample recipes (student resource 31.2).

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the National Institutes of Health and National Cancer Institute's publication, "Time to Take Five" (see appendix A).

www.foodtimeline.org

The Food Timeline Web site provides historical information about foods and tips for how to research food history. The site was developed by Lynn Olver, a reference librarian who contributed to the *Oxford Encyclopedia of Food and Drink in America*, Andrew F. Smith, editor in chief (2004), and gives food history presentations. The site was recognized by the American Library Association as a great Web site for kids.

www.ers.usda.gov

The Web site of the Economic Research Service of the U.S. Department of Agriculture provides information about food, farming, natural resources, and rural America. Agricultural land use, including changes over the past 60 years, can be found here, along with information about food consumption and markets.

www.Mrdonn.org

Two social studies teachers, Lin and Don Donn, created this extensive Web site with resources on historic and ancient civilizations. It includes information about daily life and diet, free lesson plans, and test questions for teachers and students.

www.fao.org/farmingsystems/index_en.htm

The Food and Agricultural Organization (FAO) of the United Nations, in partnership with the World Bank, produced a report titled "Farming Systems and Poverty," which is available online and provides additional links to area maps and descriptions of different farming systems, with a focus on the small farmer.

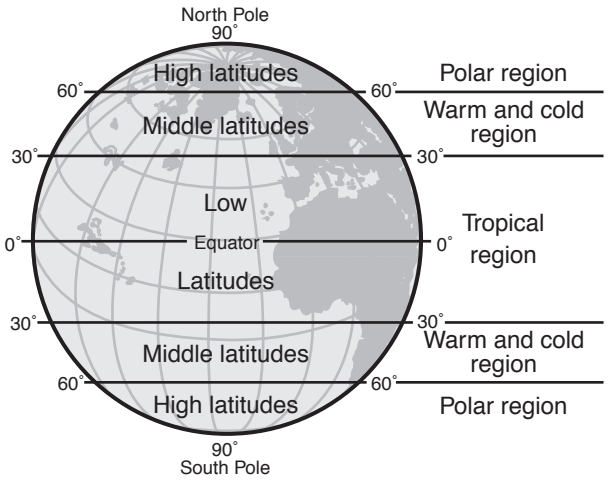
SPECIFIC BACKGROUND MATERIAL

About 11 billion acres of land—almost one-third of the earth's total land area—is used for farming. Crops are grown on about one-third of this land, and the rest is used for raising livestock. The focus of this unit is root crops (e.g., beets and cassava) and fruits and vegetables.

Climate determines the ability of a nation to grow and harvest foods. Most crops need a frost-free period, a growing season of at least 90 days, to develop from seeds into mature plants. Most parts of the world, except the far north and Antarctica, have growing seasons

of at least 90 days. However, many regions receive fewer than 10 inches (25.4 centimeters) of rain per year. Few crops can grow under these conditions without irrigation. Bananas and potatoes require a lot of moisture, whereas wheat grows best in a fairly dry climate.

Examples of climates include tropical, temperate with mild and rainy winters, temperate with cold and snowy winters, dry, and polar (see figure).



Name _____

Student Resource 31.1

Foods and Their Origins

Cabbage and Cole Crops

- Family: Belongs to the Cruciferae family (examples include cabbage, cauliflower, broccoli, turnips, and radishes).
- Nutritional value: High in fiber and vitamin C.
- Origin: Along the Mediterranean coast, but now the widest production of cole crops is in California.
- Other facts: Modern names for cabbage, *cabus* (French) and *cabbage* (English), come from the Celtic word for head (cole). The cabbage is the most treasured vegetable in the Korean diet. Pickled cabbage (Kimchi) is Korea's national dish and is consumed at every meal.

Beets

- Family: Belongs to the *Beta vulgaris* family, which includes sugar beets and Swiss chard.
- Nutritional value: High in folate and potassium, plus the greens (if using fresh beets) are a good source of calcium, beta carotene, and iron.
- Origin: Mediterranean regions of Europe and North Africa, but now grown in Russia, France, Poland, Italy, and the United States (New York, Wisconsin, Oregon, and Texas are the major producing states, although beets are grown in 30 states across the country).
- Other facts: Wild beets were originally used for medicinal purposes; when cultivating it for human consumption, the Greeks and Romans considered the beet to be "epicurean" fare.

Apple

- Family: Belongs to the Rose family, which includes peaches, plums, pears, cherries, and strawberries.
- Nutritional value: Provides small amounts of vitamins and minerals and is a good source of fiber.
- Origin: Southwestern Asia (between the Caspian and Black Seas); is more than 4,000 years old.
- Other facts: Appears in ancient Greek myths and legends. For example, Hercules was sent to pick golden apples that grew in a tree guarded by a hundred-headed dragon. The giant Atlas protected Hercules from the dragon so that he could pick the apples. In Germany, apples are often cooked and blended with vegetables such as cabbage and potatoes.

Citrus Fruits

- Family: Citrus is from the Rutaceae family.
- Nutritional value: High in vitamin C and potassium.
- Origin: Most species have their origins in warm, moist, tropical regions, Southeast Asia, and the Pacific, particularly China and India. Grapefruit comes from the West Indies. Some records indicate citrus cultivation in Asia dating back 4,000 years.
- Other facts: Mainly eaten fresh, but also processed into jams, juices, and sweets.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Student Resource 31.2

Sample Recipes

Kimchi (Korea) (pickled cabbage)

Yield

About 4 cups
Kimchi can be varied by adding different vegetables. The longer kimchi ferments, the stronger and spicier it gets. Serve as a relish with other dishes or add to meat, soups, or stews.

Ingredients

2 cups chopped Chinese cabbage (also called Napa cabbage), washed and drained
1/2 cup coarse (kosher) salt
4 green onions (including tops), finely chopped
1 cup finely shredded carrots
1 Tbsp peeled, grated fresh ginger or 1/2 tsp ground ginger
3 cloves garlic, finely chopped, or 1 tsp garlic granules
1 tsp sugar
4 Tbsp dried red pepper flakes

Equipment and Instructions

Large mixing bowl, colander or strainer, two-quart crock or glass jar with cover

1. Toss cabbage with salt in large mixing bowl to coat evenly. Set aside for 30 minutes; toss frequently.
2. Transfer cabbage to colander or strainer, rinse under cold water, and drain well. Return to large bowl and add green onions, carrots, ginger, garlic, sugar, and red pepper flakes, and mix well to blend.
3. Pack mixture in crock or jar, cover, and keep at room temperature for about two days, then refrigerate.

Bata Ne Tameta (Bangladesh) (potatoes with gravy)

Yield

Serves four to six
This gravy is simply seasoned potato water. Serve as a condiment with rice and curried fish or meat.

Ingredients

2-4 Tbsp vegetable oil
4 potatoes, peeled and cubed
4 cups water
1 Tbsp vinegar
1 tomato, cubed
1/2 tsp each dry ground mustard, ground coriander, crushed red pepper flakes, ground ginger, and ground turmeric
Touch of salt and pepper
1 tsp sugar

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Student Resource 31.2

Sample Recipes *(continued)*

Equipment and Instructions

Large skillet with cover, mixing spoon

1. Heat oil in skillet over medium heat, add potatoes, and fry for three minutes stirring continually to coat potatoes with oil. Add water and vinegar, cover, and cook for about 15 minutes.
2. Add tomato, mustard, coriander, red pepper, ginger, turmeric, sugar, and salt and pepper to taste, mix well, and cook until potatoes are tender (about five more minutes).

Himmel und Erde (Germany) ("Heaven and Earth"; cooked potatoes and apple)

Yield

Serves six to eight

This recipe, blending fruit and vegetables, is typical of German country cooking. Perhaps it is named *himmel und erde* ("heaven and earth") because apples grow on trees toward the heavens and potatoes grow in the earth.

Ingredients

2 lb (0.9 kg) new potatoes, washed and quartered

6 cups water

1 Tbsp vinegar

2 lb (0.9 kg) cooking apples, peeled and cut into chunks

6 slices bacon, finely diced

1/2 cup bread crumbs

Salt and pepper to taste

Equipment and Instructions

Medium-size saucepan with cover, medium-size skillet, mixing spoon

1. Put potatoes in saucepan and cover with water. Add vinegar and bring to a boil over high heat. Reduce heat to simmer, cover, and cook for 10 minutes. Add apple chunks, mix well, and continue cooking until potatoes are tender but not mushy (about 10 more minutes). Drain well.
2. While the potatoes and apples are cooking, fry bacon in the skillet over medium-high heat until crisp. Reduce heat to medium, add bread crumbs, and mix well to coat crumbs. Fry for about two more minutes to heat through.
3. Add bacon mixture and salt and pepper to taste to potatoes and apples, toss gently, and transfer to serving bowl. Serve *himmel und erde* hot as a side dish with meat, poultry, or fish.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Student Resource 31.2

Sample Recipes *(continued)*

Laranjas (Brazil) (orange salad)

Yield

Serves six

Ingredients

6 oranges, peeled, with pips removed, cut in slices

1 tsp ground ginger

Salt and pepper to taste

Equipment and Instructions

Serrated-edge knife, medium-size platter

1. Arrange orange slices, slightly overlapping, on a platter.
2. Sprinkle with ginger and salt and pepper to taste.
3. Refrigerate until ready to serve. Serve as a side dish with feijoada.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 31.1

Around the World With Fruits and Vegetables

Student names _____

_____

Food _____

1. Make a poster that includes the following information about the fruit or vegetable your group has been assigned. Items d, e, and f require library research.
   a. The scientific name of the food.
   b. A map with the part of the world where the fruit or vegetable was first cultivated. (Draw or find a map and point to the region when you make your presentation.) Draw an arrow pointing to the region.
   c. A listing of the nutrient value of the food.
   d. A recipe that includes your food as an ingredient. Put the recipe on the poster.
   e. A listing of several countries that currently grow this food.
   f. The characteristics of the climate best suited for growing this food.
   g. Pictures of the food. Use drawings or pictures from magazines.
2. Write five multiple-choice quiz questions that your teacher can use to test the class's knowledge of your food.

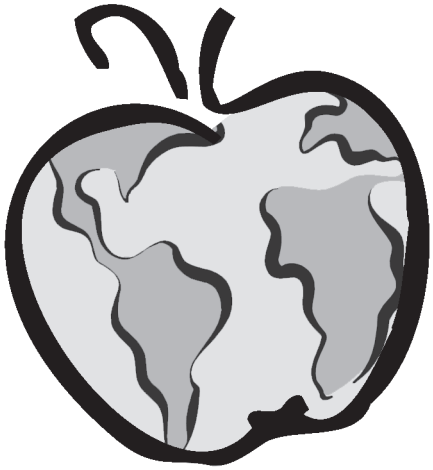
3. You are the experts! Use your poster to make a clear, concise, and creative oral presentation to the class about your food. Each member of your group should have a role in explaining some aspect of the poster.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 32

Map Maker

Activity Theme



This lesson is a mapping exercise that encourages students to be aware of the facilities and opportunities for recreation in their school and community. Often adolescents are not familiar with the areas in which they live, and this can restrict the amount of physical activity they get. As adolescents develop into adults, they will realize that being physically fit and healthy requires more of a commitment of time and effort.

Behavioral Objective

For students to be physically active every day

Learning Objectives

Students will be able to do the following:

1. Locate places on city or town maps
2. Give directions to recreation facilities in their neighborhoods
3. Discuss the distribution of recreation facilities in their town
4. State the physical activity recommendations for adolescents
5. Discuss the importance of physical activity to people and the community

Materials

- Large map of the town or city in which the school is located (one for each of your classes). These can be obtained for free from your city government, tourism board, or many real estate agencies.
- Colored thumbtacks or markers
- Activity 32.1, Exploring Your Neighborhood
- Activity 32.2, Designing a Fitness Program
- Overhead transparency 32.1 (or use chalkboard)

Procedure

Activity 32.1 should be introduced on day 1; students must complete a homework assignment before completing the activity on day 2.

DAY 1

1. (5 minutes) Display overhead transparency 32.1. Point out the goals of the lesson and the physical activity recommendations for adolescents. Discuss the benefits of physical activity.
2. (5 minutes) Have students brainstorm answers to the following questions:
   - What are some reasons people your age give for not doing enough physical activity?
   - What are some reasons adults give for not doing enough physical activity?
   - What suggestions would you make to someone who gave these reasons for not doing enough physical activity? Why should they try to be fit?

   Record their responses on the board or overhead transparency.
3. (2 minutes) Make the following points:
   - Physical activity doesn't necessarily have to be done at the gym. Going for walks, riding bikes, swimming, and visiting the park all benefit health.
   - Accessibility to recreational facilities can affect the amount of physical activity a person participates in.
4. (1-2 minutes) Hand out activity 32.1 and provide this overview: In this activity each of you will determine the location of recreational facilities in your neighborhood. In class we will plot the location of the recreational facilities on a map of the city or town and discuss the distribution of facilities in your neighborhood or community. We'll also identify safe places to be physically active and discuss improvements that could be made to the local exercise facilities. What facilities are needed, or could be improved?
5. (5 minutes) Put students into groups of three or four and ask them to discuss the following questions:
   - Are there a number of recreational facilities within walking or biking distance from your house?
   - Do you think recreational facilities are evenly distributed (spread out) in your community? (You may want to discuss the school neighborhood or the whole town or city). Make an assumption.
6. Students should record their assumptions on the sheet for activity 32.1.
7. Have students complete activity 32.1 for homework.

DAY 2

1. Hang a copy of your town or city map on the wall.
2. (5 minutes) Explain how to find locations on the town map using the lettered and numbered grid system. (You might prefer to do this step on day 1.)
3. (5 minutes) Ask students to name different types of recreational facilities they found in their neighborhood and town. Make a list of these categories on the chalkboard and assign a color to each category. This legend should be listed next to the map. *(Examples: basketball courts, tennis courts, tracks, parks, playgrounds, swimming pools, health clubs, bike paths, ponds)*
4. (10-15 minutes) Have students take turns (two at a time) locating on the map the recreational facilities they identified in activity 32.1. They should use the appropri-

ate colored marker or thumbtack to plot the location of the facility on the map. Each facility should be identified by only *one* thumbtack. Tell students that if someone else has already identified one of the facilities on their list, they should not put a second identifying mark on the map.

5. (25 minutes) While students are taking turns completing step 4, the rest of the class should be working individually or in pairs to complete activity 32.2.
6. (10 minutes) Discuss the distribution of recreational facilities on the map. Ask students the following questions:
   - Are the recreational facilities evenly distributed throughout the town (or city), or are they clustered in certain neighborhoods?
   - Is there a good variety of facilities to choose from?
   - What are some improvements that could increase access to the exercise facilities for youth in your community? What facilities are needed, or could be improved?
7. Ask students to implement the fitness programs they designed in activity 32.2 this week.
8. Ask students to share their experiences. Did they meet their goals? What were the barriers to success?

Extension Activities

1. Have students write a letter to the local newspaper or mayor suggesting ideas to improve the opportunities for recreation in the area, and why that would improve everyone's health.
2. Have students write a paper describing the experience of implementing the fitness program students created in activity 32.2.

Teacher Resources

GENERAL BACKGROUND MATERIALS

In preparing for this lesson, you may want to refer to the following resources:

- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)
- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix B)
- The Web site Gmaps Pedometer lets you plot walking routes and distances: www.gmap-pedometer.com/. Click on "Usage Instructions" to get started.

SPECIFIC BACKGROUND MATERIALS

How much physical activity is recommended for adolescents?

Experts recommend that children and adolescents be moderately to vigorously active for 60 minutes or more on most, preferably all, days of the week. For adolescents, this should include 20 or more minutes of intense activity (that makes you sweat) at least three days a week. How long, how hard, and how often you are active will determine how fit you are! You can improve fitness by increasing the frequency (if you are not exercising regularly), increasing the intensity (doing something faster, doing more repetitions), or increasing the time you spend on each exercise.

Why do people become less active as they get older?

People explaining why they're not physically active give some of the following reasons:

- "I don't have time for fitness. All I do is work and sleep."
- "There's always something else to do. My family is a full-time job."
- "It's too expensive to do sports once you leave school."
- "I'd rather spend time with my friends."
- "I don't enjoy hard fitness work."

Some of these statements have some truth. As you get older, life is more demanding in many ways, you have more responsibilities, and it takes a lot more discipline to remain active and fit once you are studying at a high school or college, working, or raising a family. It can be expensive to play sports or join a gym, but there are always inexpensive ways to be active. Lastly, fitness programs can seem difficult initially for people who are not used to consistent physical activity.

However, many of these obstacles can be avoided by establishing an active lifestyle from the time you are very young. For example, children and adolescents who engage in physical activities that they enjoy will be more motivated to continue an active lifestyle as adults. Regular physical activity each day can keep you physically fit and feeling good. It's also important to keep in mind that there are costs to your health for *not* making space for physical activity and good nutrition. The message here is simple: Fitness and health takes some effort, time, and organization—but you don't need to be a "fitness freak" to be fit.

What is a fitness program?

A fitness program doesn't have to mean going to the gym to work out. Some people like to do team sports or run. However, that's not what everyone enjoys doing. You don't need to do strenuous exercise to achieve a minimum level of fitness. You can stay fit by simply being active in everyday activities—for instance, walking briskly to school each day or cycling to a friend's house. Baby-sitting can be a fitness program in itself! *All* active time helps fitness and health.

What are some ways to stay active and healthy?

Here are several steps toward achieving a more active and healthy lifestyle:

- Understand the importance of fitness, activity, and nutrition. Many people don't realize how important good eating and activity are in their lives. Being fit and eating right will make you feel good about yourself and will give you energy to be active. Also, getting into the habit of fitness as an adolescent will make life easier in years to come and will lower the risk of developing some diseases. In adult life and old age, the benefits of fitness can be dramatic, including decreasing the risk of injury, increasing the ease of daily tasks, reducing stress, and preventing chronic disease.
- Identify your needs and make some goals. Some people would just like to be able to walk to the local store; others want to run marathons. You need to decide what you want to achieve or how you would like to feel, and then build up your health progressively toward that goal. Different goals may be appropriate at different stages in life. To increase fitness, create your goals around increasing the following:
    - Endurance
    - Strength
    - Flexibility

Keeping muscles moving is important for growth, development, and overall health. This doesn't mean that you have to do bodybuilding at a gym. Participating in a variety of sports, dance, or recreational activities keeps the muscles of the body active and moving.

- Decide what is realistic given your daily schedule. Everyone has different schedules, and some have more free time than others. Some may have to prioritize activities to be fit, depending on their goals. For many people, better organization of their time will be enough to create space to do regular exercise. People with many responsibilities may have a hard time believing that taking time out for fitness is valid. Keep in mind that your health and well-being are important to you, your family, and your friends. Start by making just a small space for fitness in your life.
- Try to do a variety of activities. Variety is important to keeping up your interest in any part of your life, and fitness is no exception. A variety of activities also works a wide range of muscles and joints.
- Design a schedule that keeps you challenged and motivated. A schedule should keep you active on a regular basis and possibly become more demanding over time. This keeps it challenging and often motivates you to keep going.
- Encourage friends to join you. Doing active things with friends is an excellent way to stay motivated and involved. People often need the help of others to keep their interest and enjoyment up. Many people prefer team sports for this reason.

Lesson goals:

- To discuss the importance of physical activity
- To research the location of recreational facilities in your neighborhood and plot them on a classroom map
- To discuss the distribution of recreation facilities in town

Planet Health physical activity recommendations:

- Be moderately active for at least 60 minutes every day as part of play, games, chores, work, transportation, and planned exercise.
- Include at least three sessions per week of vigorous physical activity lasting 20 minutes or more.

What are the benefits of an active lifestyle?

- Develops cardiorespiratory fitness, muscular strength, and confidence in physical ability
- Maintains a healthy body weight and reduces fat
- Reduces stress and brightens a person's mood
- Lowers the risk of developing heart disease, diabetes, high blood pressure, and colon cancer, which can lead to premature death

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 32.1

Exploring Your Neighborhood

Make a Prediction

Do you think recreational facilities are evenly distributed in your community (yes or no)? What is there to do in your neighborhood that would increase your level of fitness?

1. In the following table, make a list of three to five recreational facilities that are within walking or biking distance of your home. *(Examples: basketball courts, tennis courts, tracks, parks, playgrounds, swimming pools, health clubs, bike paths, ponds)*
2. List the street address for each facility and the nearest cross streets. *(Example: Skyline Park is located at 100 Eastern Avenue between Park Street and Highland Avenue. Park Street and Highland Avenue are the cross streets and will help you locate the park on a map.)*
3. Give directions to each location from your home.

Facility name	Types of activities	Address and cross streets	Directions from your home
Example: Skyline Park	*Basketball, tennis, playground, soccer, baseball*	*Eastern Ave. between Park St. and Highland Ave.*	*Walk west on Gray St. to Highland Ave., turn right on Highland, walk three blocks and take left on Eastern Ave.*

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 32.2

Designing a Fitness Program

Here are several suggestions that will help you design a fitness program:

1. Set a fitness goal. Why do you want to be more fit?
2. Decide what activities will realistically fit into your daily schedule.
3. Try to do a variety of activities.
4. Design a program that keeps you challenged.
5. Encourage friends to join you.

List some fitness goals that will help you stay healthy:

1.
2.
3.
4.

Design an activity schedule for one week. Of course, you have school Monday to Friday, but after school and the weekends are good times to be active. You can include sports and other activities that you already do.

Make sure the schedule

- includes a variety of activities that you like to do and
- keeps you challenged.

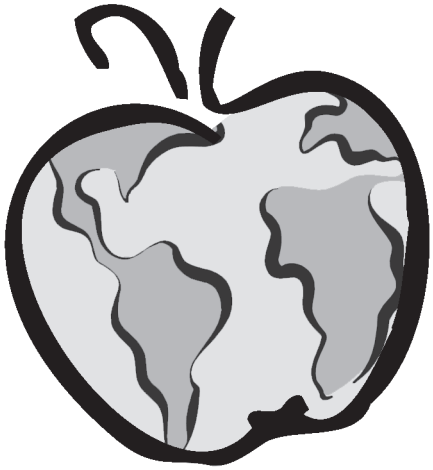
Day of week	Activity	Location	Duration	Time of day
Sunday				
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 33

Free to Be Fit

Activity Theme



In this lesson students think about the rights and freedoms guaranteed by the Constitution of the United States. They discuss the possible actions (recommendations, laws, education) that the federal or state governments might take to encourage an increase in physical activity and a decrease in inactivity. In small groups students consider several laws and discuss whether the laws would be effective at increasing physical activity and whether they would interfere with individual rights protected by the Constitution. They try to reach a consensus to support or oppose the laws and defend their positions.

Behavioral Objective

For students to be physically active every day

Learning Objectives

Students will be able to do the following:

1. Define the term *freedom*
2. Give examples of freedoms and rights guaranteed by the U.S. Constitution
3. Discuss whether federal or state governments have the power to pass laws that deprive us of personal choice to promote physical activity and healthier lifestyles
4. Listen carefully to the thinking of others
5. Explain the difference between a government recommendation and a mandate or law
6. State the physical activity and inactivity recommendations for adolescents

Materials

Activity, 33.1 Free to Be Fit

Procedure

1. Point out the goals of the activity:
   - To discuss the concept of freedom
   - To discuss the freedoms and rights guaranteed by the U.S. Constitution

- To discuss whether federal or state governments have the power to pass laws that deprive us of personal choice to promote physical activity and healthier lifestyles
- To brainstorm actions the government might take (other than passing laws) to promote physical activity and decrease inactivity

2. Distribute activity 33.1, Free to Be Fit.
3. Have the class brainstorm answers to the first two questions on the worksheet. *(Possible answers to question 2 concerning freedoms and rights guaranteed by the Constitution: Free speech, right to assemble, religious freedom, right to bear arms, right to vote, right to privacy, trial by jury, no unwarranted searches, right to an appeal, due process, equal protection under the law)*
4. Divide the class into groups of three or four students. Have each group complete questions 3, 4, and 5 as follows: Discuss question 3 and try to develop a group consensus (opinion) that the group can defend; assign each group *one or two* of the laws listed in question 4 to discuss; brainstorm answers to question 5. One person should record the group responses to each question. Emphasize the importance of taking turns speaking and listening carefully to other people's ideas. You may want to walk around the room and point out incidences in which students are not following these recommendations.
5. Conduct a class discussion of questions 3, 4, and 5. Ask one person (not the recorder) from each group to report his or her group's answers. During this discussion, make sure students understand the difference between government recommendations and a mandate or law. Encourage students to be creative in their response to question 5 and to really think about possible actions the government might take to encourage an increase in physical activity. *(Possible answers to question 5: Fund education programs; offer grants of money to schools, towns, or cities interested in improving their physical activity facilities or sport programs; develop a media campaign to advertise the recommendations; encourage health insurance companies to provide cash credits to people who join health clubs or other physical activity programs)*
6. Conclude by asking a volunteer to state the physical activity and inactivity recommendations.

Extension Activities

1. Have students analyze community resources and examine sports in their society to determine why certain sports are played in their neighborhood. Do unsafe parks or recreation facilities limit the kinds of activities that are available? Do they have a right to a safe place to play? How can a community overcome a lack of resources to offer different sports to its residents?
2. Ask students to think about sports and democracy for different ages. Are there opportunities for younger children to play on soccer or basketball teams? Have them interview 10 children of different ages and ask them what sports they participate in and what sports they would like to learn. Have them analyze the results and write a letter to the local newspaper, the mayor, or a local town official.
3. Have students write an essay about why sports and physical activity are important to them and to their society. They should focus on the positive benefits and the different reasons people have for participating in different sports or activities.
4. Have students establish a pen pal, by e-mail or letter, in a country of their choice. What type of government does this country have? Is it a democracy? If so, what type of democracy? They should find out about the opportunities to participate in sports in this country. In what sports does the pen pal participate? How much physical

activity does the pen pal get? Does the pen pal walk to school? How many hours per day does the pen pal watch TV or sit in front of a computer?

5. Have students pick a sport to research. Is everyone in our democratic society "free" to participate in this sport? Why or why not? Is everyone "free" to compete in this sport at both the amateur and professional levels? Why or why not? Is the sport they picked an Olympic sport? If so, are there limitations in terms of age, sex, ability, or politics that affect who competes in this sport at the Olympic level, not only in this country but in other countries as well?
6. Have students choose a country and find a newspaper from this country at the library or on the Internet. Is there a sports section in this newspaper? What sports are represented in the reports? Do any of the sports make the front page of the paper? What type of government does the country have? Is the country a democracy? If so, what type of democracy? Does the type of government seem to affect the newspaper reporting of the sport? Why or why not?

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing this lesson, you may want to refer to the following resources:

- Gortmaker et al., "Television Viewing as a Cause of Increasing Obesity Among Children in the United States, 1986-1990" (see appendix C)
- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix B)
- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)

SPECIFIC BACKGROUND MATERIAL

Planet Health's activity message: Physical activity promotes health and well-being and offers opportunities to socialize and have fun. Adolescents should strive to be moderately to vigorously active for at least 60 minutes every day as part of play, games, sports, chores, transportation, and planned exercise. To help achieve this, they should participate in at least three sessions per week of vigorous physical activity lasting 20 minutes or more.

Adult recommendations are for a minimum of 30 minutes of moderately intense activity per day, not necessarily continuous, with more time and intensity required to achieve higher fitness levels.

Planet Health's inactivity message: We endorse the American Academy of Pediatrics' recommendation that leisure time spent watching TV (or at a computer) should total no more than two hours per day of quality programming.

Recommendations versus mandates or laws: In this lesson students are asked to debate the pros and cons of a statement that ties the abstract concepts of freedom and democracy to the concrete notion of requiring people to be physically active because it is good for their health. Students should be made aware that in the United States, governments at all levels address many behaviors associated with health through recommendations to the public (e.g., quit smoking, drink more milk, eat less salt). They do not mandate or require people to behave in a certain way. In our culture, mandates or laws of that type would be considered intrusive and a violation of our freedom.

Sport is mentioned in the extension activities. This term denotes competitive organized team or individual physical activities such as basketball, soccer, and competitive figure skating. *Physical activity* refers more broadly to a wide variety of gross motor activities carried out for recreation or with a purpose, including bicycling, raking leaves, walking, dancing, and cleaning.

Name _____

Activity 33.1

Free to Be Fit

1. Define the word *freedom.*

2. The Declaration of Independence states the following:

   "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their creator with certain unalienable rights, that among these are life, liberty [the state of being free; the power to do as one pleases], and the pursuit of happiness."

   The Constitution of the United States protects certain individual rights and prohibits state governments from "depriving any person of life, liberty, or property without due process of law; nor deny to any person . . . equal protection under the law . . . ."

   What individual freedoms and rights are Americans guaranteed by the Constitution of the United States?

3. Research has shown that physical activity helps children develop and retain cardiorespiratory fitness, muscular strength, and confidence in their physical ability. Regular activity helps people maintain a healthy weight, build muscle, and reduce fat. It can reduce stress and brighten a person's mood. Active adults have a lower risk of developing heart disease, diabetes, high blood pressure, and colon cancer and of dying prematurely. Scientists recommend that adolescents be moderately active for at least 60 minutes every day or nearly every day, *and* that they include at least three sessions per week of vigorous physical activity lasting for 20 minutes or more. They encourage them to aim for a total of 60 minutes or more of activity nearly every day. They also recommend that youth spend no more than two hours per day watching TV (or on computer games).

   Based on these findings and recommendations, do you think the federal or state government could pass laws that would *require* people to follow these physical activity and TV guidelines? Would these laws interfere with individual rights protected by the Constitution? (Consider other health-related laws that have been passed: laws requiring seat belts, car seats, helmets.)

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Free to Be Fit *(continued)*

Activity 33.1

4. Following is a list of some laws that the federal (or state) government might consider passing to increase physical activity and improve the health of people in the United States. Read the law assigned to your group, and discuss the following questions:
   - Would the proposed law increase physical activity (or decrease TV watching) in a large number of people?
   - Would the law interfere with individual rights protected by the Constitution?
   - Would your group recommend that this law be passed? Why?

   Summarize and justify your opinions below about the law assigned to your group. Possible federal (or state) laws aimed at increasing physical activity and improving the health of people in the United States:

   a. School districts are required to offer physical education daily.

   b. To get health insurance, people must meet physical activity recommendations.

   c. People under the age of 18 are prohibited from logging onto the Internet for more than two hours each day.

   d. All towns and cities must spend 10 percent of their budgets on recreation facilities (pools, parks, bike paths) and physical activity programs.

   e. Girls must be allowed to participate on male sport teams if comparable female sport teams are not available at the school.

   f. All students must pass a physical fitness test to graduate from high school.

5. What might the government do (besides passing laws) to encourage people to follow the activity and TV viewing recommendations?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 34

Impact of Technology

Lifestyle Theme

This lesson is designed to be used while teaching a unit on the Industrial Revolution. It asks students to examine the impact of technological advances on the lifestyles of people living in the 19th century and the present. For much of the world, everyday existence now requires far less physical energy because modes of transportation and food gathering have generally improved. Similarly, new technologies, such as TV, computers, and video games, encourage inactive leisure-time interests. Physical fitness now requires people to set aside time for physical pursuits. An understanding of the historical developments in technology generates an awareness of this phenomenon.

Behavioral Objectives

- For students to limit screen time to no more than two hours per day
- For students to be physically active every day

Learning Objectives

Students will be able to do the following:

1. List several important inventions (and the inventor) that led to the Industrial Revolution and describe why they were important
2. Discuss the influence of technology and inventions on society (the economy, geography, transportation, education, communication, medicine, politics, food production, social changes) and daily life in the United States during the Industrial Revolution and the present
3. Discuss the effects of technology on the availability and uses of free time
4. Give examples of inventions that have brought world advances, but resulted in unintended health consequences
5. Discuss the importance of making time for physical activity

Materials

- Activity 34.1, Inventions and Discoveries
- Extension activity 34.1, Relating the Past to the Present
- Social studies textbook

Procedure

1. Point out the goals of the activity:
   - To discuss the influence of technology and inventions on society and daily life in the United States during the Industrial Revolution and the present
   - To discuss the effects of technology on the availability and uses of free time, and its unintended health consequences
   - To discuss the importance of making time for physical activity
2. (5 minutes) To introduce the activity, discuss with students how their lifestyles compare to those of children living on farms in the early 1800s. Why do they need to make time for physical activity, whereas children in the 1800s did not have to think about this? *(Possible answer: Lack of machines for food and clothing production and transportation required the children in the 1800s to be more active.)*
3. Put students into groups of three.
4. Hand out activity 34.1 to all students.
5. (5 minutes) Assign each group *one* of the seven inventions in part I of the activity. Make sure students understand that they are to discuss the invention—what it does, why it is or was important, and its impact—on *only one* of the many factors in society. Encourage them to refer to their textbooks and any other available classroom resources.
6. (10 minutes) Ask one person in each group to report the group's findings orally or by writing them on the chalkboard. The other students in the group should record the information in their tables. (See Teacher Resources for possible answers.)
7. (10 minutes) Have students work in their groups to complete the rest of part I.
8. (20 minutes) Assign each group *one* of the inventions in part II and have the groups exchange information, or have each student complete part II for homework.
9. (5-10 minutes) Conduct a summary discussion with the class. This activity will likely generate a lot of discussion and various responses. You will want to direct the discussion to emphasize the impact of technology on our decreased physical activity during work and leisure time and its unintended health consequences. End by reminding students of *Planet Health*'s activity message and encouraging them to limit their TV viewing and other recreational screen time to two hours or less per day. (See Teacher Resources.)

Extension Activities

1. Have students complete extension activity 34.1. How is their lifestyle different from that of their grandparents when they were their age? Have them interview a grandparent, great aunt or uncle, neighbor, or friend of the family who was 11 to 14 years old during the 1930s, 1940s, or 1950s. What were their lives like as children? How did they spend their free time? Did they spend more of it on self-improvement or amusement? What kind of jobs did they do? (Another option would be to have students prepare their own interview questions.)
2. Ask students to describe how their lives would be different if they had no TV.

3. Ask students to identify areas of the world that have the least and the most technology. Which countries often have insufficient money for education, health care, and food? Are the people in these countries less or more active than people in industrialized nations? Which countries have health problems related to eating too much and being too sedentary?
4. Ask students how much technology there is in their school and community. Have them make a list of the inventions that have helped their city, school, or home.
5. Have students write a story or essay explaining why technology has brought the world many advances, but has not necessarily been good for health. They should give examples.

Teacher Resources

GENERAL BACKGROUND MATERIALS

In preparing for this lesson, you may want to refer to the following resources:

- Centers for Disease Control and Prevention, fact sheets on physical activity (see appendix B)
- U.S. Department of Health and Human Services, *Healthy People 2010* (see appendix B)

SPECIFIC BACKGROUND MATERIALS

Planet Health's activity message: Physical activity promotes health and well-being and offers opportunities to socialize and have fun. Children and adolescents should strive to be moderately active for 60 minutes every day. For adolescents, this should include 20 or more minutes of intense activity (that makes you sweat) at least three days a week. How long, how hard, and how often you are active will determine how fit you are! You can improve fitness by increasing the frequency (if you are not exercising regularly), increasing the intensity (doing something faster, doing more repetitions), or increasing the time you spend on each exercise.

How much activity is needed to obtain health-related benefits?

Moderate amounts of daily activity are recommended for people of all ages. However, physical activity need not be strenuous to be beneficial. Just a small increase in physical activity can generate genuine health benefits, such as a reduction of body weight and the risk of heart attack, hypertension, and death. For adults, 30 minutes or more of moderately intense activity, such as walking, on most days of the week is beneficial for health. Some kind of regular vigorous activity, however, is the best way to improve cardiorespiratory fitness. Children and adolescents should aim for 60 minutes of moderate to vigorous activity every day. This is beneficial for physical development, maintaining proper energy balance, and enjoying the feelings of fun and well-being that physical activity provides. For adolescents, this active time should include 20 minutes or more of vigorous activity (greater in intensity than brisk walking) at least three times a week to improve cardiorespiratory fitness.

Planet Health's inactivity message: Limit TV viewing and other recreational screen time to two hours or less per day. The American Academy of Pediatrics makes a similar recommendation for limiting TV viewing time.

Why is it important for adolescents to understand the changing lifestyles of the world?

Technology is greatly affecting the play and leisure interests of youth. According to Dietz and Strasburger (1991), American children spend more time watching TV than they do engaging in any other activity except sleeping. In 2005 the average adolescent viewed approximately

21 hours per week, but that number jumps to 28 hours when you include videos, DVDs, and prerecorded shows. This is nearly as much time as is spent in school. Add to this computer, video games, and other media that might be in use simultaneously and altogether youth pack about eight and a half hours of media content into about six and a half hours of time every day. Essentially, for many children media consumption has become a full-time job! Despite the trend for using multiple media formats, television still remains the primary media format consumed by adolescents. However, as television content expands to other formats (iPods, computers, cell phones), so too will youth's vulnerability to the harmful effects of advertising. The American Academy of Pediatrics recommends limiting TV viewing to two hours or less per day of quality programming.

Television viewing is one of the major causes of overweight (obese) youth. Excessive TV viewing contributes to a sedentary lifestyle and promotes poor nutrition by exposing children to food advertising for high-calorie, low-nutrient foods. Food marketing on television directly influences what children eat and what they ask their parents to buy. TV watching is associated with increased calorie intake as a result of the intake of foods advertised on television, overweight, elevated cholesterol levels, cigarette smoking, poor cardiorespiratory fitness. TV watching also leads to less time spent reading. Lack of parental control over TV time, having a television in the bedroom, and an absence of family dinners are all associated with increased viewing (Wiecha et al., 2001).

Adolescents who are aware that their parents' and grandparents' lives were very different in their youth may better appreciate the need for activity. Inactivity is dangerous to health. It increases the risk of developing heart disease, diabetes, colon cancer, obesity, and osteoporosis.

In what way have leisure pursuits changed in recent years?

Today, TV and computers hold great fascination and interest for most children. These technologies, along with a rise in crime, a dramatic decline in the number of park keepers, parents' changing work patterns, more single-parent families, and an erosion of the sense of community have all been cited as reasons for a decline in outdoor play. This is unfortunate because outdoor play is something that has been a part of growing up since the beginning of time. Children are less active now than were children in the past. Those who are active spend more of their activity time in supervised, structured school and community programs.

In what way have occupations and lifestyles changed?

When hunting, gathering, and farming were required for food, activity was a central part of life. Adults and even children were required to work 12 to 16 hours a day during certain times of the year. Before motorized transportation, people also expended more energy walking and running from place to place. Even early factory, mill, and mining jobs required long hours of moderately intense to vigorous activity. Working 12 to 13+ hours a day, six days a week (72 hours per week or more), was common for even women and children in New England mills in the early 1800s. At that time, there was a movement in England and the United States to reduce the length of the workday. However, many of the workers were not in favor of these early legislative efforts because they reduced wages. In 1840, a 10-hour workday was approved for government employees (Davidson and Batchelor, 1986). "In 1903, Macmillan and Company published a revised edition of Volume 9 of Charles Booth's *Life and Labour of the People in London* (1897). Investigators reported that, of the 206 occupations surveyed, 6% required 48 (or fewer) hr/week, 25% required 48-54 hr, 41% required 54-60 hr, and 14% required over 72 hr/wk" (Park, 1992). Use the Impact of Technology table to compare the intensity, type, and hours per day of the activities of various groups.

Impact of Technology

Workers	Intensity	Type	Hours/day
Benedictine Monks ca. AD 600	Light to moderate	Cerebral, light muscular	5.25 (winter), 6.5 (Lent), 9 (summer)
Medieval knights ca. 1100-1400	Moderate to heavy	Muscular and endurance	2-6
Medieval peasants	Moderate to very heavy	Muscular and endurance	15-16 (harvest), 10-14 (winter)
Lincolnshire farm laborers mid-1800s	Heavy to very heavy Moderate to heavy	Muscular and endurance	15-16 (harvest), 10-14 (winter)
Cotton mill workers 1830s (men and women)	Moderate	More endurance than muscular	12-16
Females in coal mining 1840s	Heavy to very heavy	Muscular and endurance	11-18
Victorian middle-class females	None to light	Sewing, needle-work, walking at slow pace	NA
American college women (1985 survey)	Light to moderate	Very limited muscular or endurance	>0.5-1
1960-1975 survey of 16- to 29-year-olds	Light to moderate	Cerebral, moderate to moderately heavy	8-10 (professional, clerical, skilled/semi-skilled, service labor) 12 (managerial)

Reprinted, by permission, from R. Park, 1992, "Human energy expenditure from Australopithecus afarensis to 4-minute mile: Exemplars and case studies," *Exercise Science and Sports Medicine Review* 20: 185-220.

As we developed machinery and technology, occupational work, housework, and transportation have required less overall physical activity. Jobs that used to require moving around now can be accomplished by sitting in front of a computer. Even many construction and farming jobs have become less active because machinery is available that achieves higher rates of production and efficiency than manual labor. Children likewise spend less time in physical activity, particularly in urban areas where facilities for recreation are often limited.

"Even when the average number of [hours per] week spent in voluntary participation in sports, exercise, and other active leisure pursuits is added to those consumed in an 'average' work week of 40 hours, very few individuals in the United States or other industrialized countries today can approach the daily energy expenditure levels of medieval or 19th century farmers, 'pit brow lasses,' or the men, women, and children who toiled up to 16 hours per day in the cotton mills or the Caribbean sugar industry. In many non-industrialized societies, however, daily work patterns differ little from those of labor intensive occupations in past eras" (Park, 1992).

How have these changes affected lifestyle and health in the United States?

Jobs and leisure-time activities have both become less active. Inactivity in adolescents and adults has increased, and as a result, obesity is on the rise in both groups. For many people being physically fit means making an effort each day to be active and

moving. The gymnasium and fitness boom has led many adolescents to misunderstand the requirements of fitness and health. Many have been discouraged from exercising because they think they need to be athletes to be fit. Excessive exercise is not required to maintain good health—merely regular movement and muscular use is sufficient. Of course, higher levels of fitness will result only from more rigorous training.

What are the recreational opportunities for adolescents in urban settings?

Seemingly, there are never enough recreational opportunities for adolescents in urban settings. Funding for recreation both in schools and towns may be inadequate. The expense of joining or using many facilities is also a hindrance to participation for many. Youth clubs, sport clubs, and gyms, however, are great ways for children to get regular activity. Local parks are underused for recreation, as are swimming pools and the seaside.

How do we encourage adolescents to be active?

Organized sport teams and recreation help some adolescents become involved in physical activity. Moderating TV viewing to two hours or less per day of quality programming, as recommended by the American Academy of Pediatrics, will encourage other more physically active uses of their free time. Moving TVs out of the main activity areas or bedrooms helps children forget about the TV. If students are surrounded by educators and families who are active themselves, they will also develop an understanding of the benefits of movement and fitness and seek ways to be active. Role modeling at school and home are both important to students.

"Providing opportunity and encouragement for unstructured play outside, where possible, is also important. Psychologists and others say unstructured outdoor play fosters a deep appreciation for nature and a sense of independence, creativity, and serenity. According to Robin C. Moore—professor of landscape architecture and president of the International Association for Children's Right to Play—neighborhoods, schools, and governments must also take a role in providing adequate outdoor play space for children. She has examined how improving the physical diversity of schoolyards can encourage a broader range of activities among children. In England, it has become popular to break up portions of blacktop with planted areas, streams or other types of water, creating areas appropriate for small groups" (van Dam, 1997).

ADDITIONAL FACTS ABOUT TECHNOLOGY DEVELOPMENT IN THE 20TH CENTURY

Computers

- 1890: First punch card tabulator developed by Hollerith (his company became IBM)
- 1941: First programmable computer designed to solve complex engineering equations
- 1946: First high-speed electronics digital computer (ENIAC)
- 1950s: Mainframes first available commercially
- 1975: First minicomputer retailed for $397. It had to be assembled by the owner and manually programmed.
- 1983: First machine with a mouse and a graphical user interface

Internet

- 1965: First computers linked for military defense reasons
- 1969: Four host computers connected (university and military)

- 1976: First e-mail sent
- 1992: Term "surfing the Internet" coined by Jean Armour Polly
- 1997: 19,540,000 host computers linked

Portable Music

- 1980: Walkman (portable cassette player) introduced by Sony
- 1985: Portable CD player introduced by Sony
- 2001: Portable digital MP3 player introduced by Apple

Portable TV

- 2005: Apple introduces the video iPod with color screen

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Answer Key

SELECTED ANSWERS TO ACTIVITY 34.1

Part I

The answers for table 1 will vary, but should be available in most social studies textbooks. Choose two types of people from the following list and explain how one of the inventions or industries listed in table 1 affected the lives of these people. Answers will vary.

Imagine what life was like for one of the two people you chose. Describe a typical day's physical activity for the person. What did he or she do? How many hours a day did this person work? Did this person's life change as a result of the invention or advance in the industry? How much free time did the person have, and what did he or she do with it?

Influence of the cotton gin on Southern planters: They were able to supply more cotton to Northern factories, which resulted in great economic success. They bought more land and slaves to meet the increasing Northern factory demands. As a result, Southern plantations stretched as far west as Texas, the number of slaves in the United States increased sharply in the 1800s, and the planters depended on Europe and the North for finished goods. Many plantation owners felt they were enslaved to the products of Northern industry.

Influence of the cotton gin on Southern slaves: It reduced the number of slaves that were needed to clean the cotton (one person could now do the work of 1,000 people). However, most slaves continued to do back-breaking labor in the fields.

Influence of the steam-powered engine, sewing machine, cotton gin, and new transportation vehicles on mill owners: All of these inventions resulted in an expansion of industry in the North. Mill owners built bigger factories, hired more workers, and grew wealthy.

Influence of advances in textile finishing machinery and transportation on homemakers: Finished textile products became more readily available to the homemaker.

Growth of the mills and factories: Increased the number of jobs available to young women, children, the urban poor, and recent immigrants. Entire families worked in factories. They needed all their earnings to pay for food and housing. Young women did most of the work in textile mills. Children cleaned debris out of machines and changed spindles. The hours were long, the wages were poor, and the working conditions were unsafe.

Influence of the steel plow on farmers: The steel plow made farming the prairie practical. Its sharp blades easily cut through prairie grass roots. Before this technology, farmers depended on huge, unwieldy iron and wooden plows that had to be pulled by six oxen and guided by three men. One man and two horses could operate the steel plow. In 1833 there were no farms in Iowa. By 1860, the steel plow had made it possible for farmers to produce 42,411,000 bushels of corn in Iowa.

Factory workers of all ages: Work began at 4 a.m. and ended at 7:30 p.m. Workers took a break for breakfast at 7:30 a.m. and again at noon for lunch. The work was tedious and dangerous (poor ventilation and lighting, unsafe machinery). Any free time they had would have been spent maintaining their homes and resting.

Slaves: Most did hard labor in the fields. "Teenagers worked alongside adults in the field. Children pulled weeds, picked insects from crops and carried water to other workers" (Davidson and Batchelor, 1986). Some worked as many as 16 hours a day. Older slaves worked in the planter's house cooking, cleaning, and doing other chores. They did not have much free time.

Small Northern and Southern farmers: All members of their families would have spent 10- to 12-hour days planting and doing household and farm chores. The little free time that they had may have been spent going to church, relaxing, or, for children, in unstructured play.

Planters: "They entertained lavishly, dressing and behaving like the nobility of Europe . . . . They had to make decisions about when to plant and harvest their crops . . . . They devoted many hours to local and state politics [and] . . . hired overseers to run the plantation . . . . Women were involved in overseeing the house slaves, raising the children, and entertaining" (Davidson and Batchelor, 1986). Children in this group had time for education and much more time for socializing and unstructured play.

Part II

The answers for table 2 will vary.

How do computers, TV, the Internet, and DVDs affect the daily physical activity of children your age?

See Teacher Resources.

Compare your physical activity (amount and type) to the physical activity of children (11 to 14 years old) living in the early 1800s. How do you account for the difference?

In the 1800s most children were required to spend a large portion of their day doing chores or working in factories. They also had to walk long distances to school or work. Wealthy children had more time for leisure activities and therefore engaged in less physical activity. Children today are required to do fewer chores and are frequently transported by car or bus. Most of their day is spent doing schoolwork. They also engage in a lot of inactive leisure activities. Advances in technology and the passing of child labor laws, as well as interest in TV, have done much to decrease the physical activity of children.

Compare your free time (amount and uses of it) to the free time of children (11 to 14 years old) living in the early 1800s. How do you account for the difference?

Children have more free time now. (See the previous answer for a discussion of why.)

Name _____

Activity 34.1

Inventions and Discoveries

Part I: 1780 to 1890

The 1800s brought the Industrial Revolution to the United States. Inventions sparked the growth of new industries. Complete the following table by explaining why the new technologies were important, and how they affected two of the following: the economy, geography, politics, travel, the environment, or the everyday life of people living during that time.

Table 1

Invention or industry	Inventor	Importance or impact on society
Cotton gin (1793)	Eli Whitney	
Steel plow (1837)	John Deere	
Mechanical reaper (1848)	Cyrus McCormick	
Steam-powered engine (1782) boat (1803) train engine (1829)	 James Watt Robert Fulton G. Stephenson	
Sewing machine (1846)	Elias Howe	
Telegraph (1840)	Samuel F.B. Morse	
Mills and factories (U.S. 1790)	Moses Brown	
Clipper ships (1845)	John Griffith	

Choose two types of people from the following list and explain how one of the inventions or industries listed in table 1 affected the lives of these people (use separate paper).

Southern planter	Southern slave	20-year-old female city dweller
Northern farmer	Northern mill owner	12-year-old northern city dweller
Urban poor	Recent immigrant	Homemaker

Imagine what life was like for one of the two people you chose. Describe a typical day's physical activity for the person. What did he or she do? How many hours a day did this person work? Did this person's life change as a result of an invention or advance in the industry? How much free time did the person have, and what did he or she do with it? Use separate paper if you need more room.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Inventions and Discoveries *(continued)*

Part II: 1925 to 2005

Advances in technology, especially in computers, communication, and biotechnology, are currently taking place at a rapid pace. Complete the following table by explaining why the technologies are important and how they are influencing *one* of the following: the economy, politics, medicine, the justice system, the environment, education, communication, or everyday life.

Table 2

Invention or industry	Inventor	Importance or impact on society
Personal computers available to the general public (1977)	Apple Radio Shack	
Television (1925)	John Logie Baird	
VCRs available to the general public (1975)	Sony*	
Internet access available to the general public (1995)	Compuserve* America Online Prodigy	
Compact discs (1983)	Sony* Phillips	
Cell phone (1973)	Dr. Martin Cooper	
Game Boy (1989)	Gunpei Yokoi/ Nintendo*	
iPod (2001)	Apple	
Video iPod (2005)	Apple	

*These inventions were the work of groups of scientists who built on the ideas and inventions of earlier work in the field. They were marketed by the company listed.

The rapid advances in technology at the beginning of the 1800s sparked the Industrial Revolution. Do you think that we are in the midst of another revolution? Explain.
What do you think historians will call this revolution?

How do computers, TV, the Internet, and DVDs affect the daily physical activity of children your age?

Compare your physical activity (amount and type) to the physical activity of children (11 to 14 years old) living in the early 1800s. Give several details to support your answer. How do you account for the difference?

Compare your free time (amount and uses of it) to the free time of children (11 to 14 years old) living in the early 1800s. How do you account for the difference?

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Extension Activity 34.1

Relating the Past to the Present

How is your lifestyle different from that of your grandparents when they were your age? Interview a grandparent, great-aunt or -uncle, neighbor, or friend of the family who was 11 to 14 years old during the 1930s, 1940s, or 1950s. Ask the following questions. Record the answers and your answers to the same questions in the table.

Compare your responses to those of the adult you interviewed. Which of you had (has) a more active lifestyle at 11 to 14 years old? How do you explain the differences?

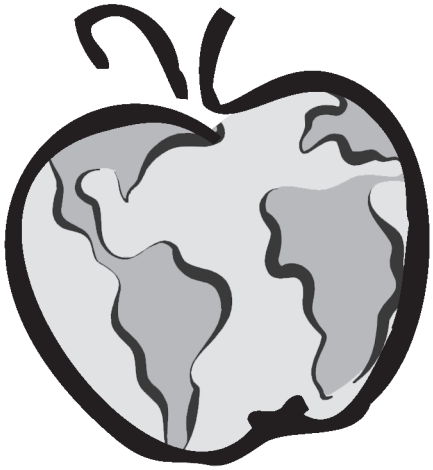
Question: When you were 11 to 14 years old . . .	**Adult response**	**Your response**
During what years were you this age?		
Did you walk to school? If yes, how far did you walk?		
Did you walk home for lunch?		
What time did school get out?		
How much free time did you have?		
What did you do after school?		
What did you do for fun in the summer?		
What kind of chores did you have to do?		
Did your family own a car? How did you get around?		
Did school offer competitive sports? What kinds? Were there any competitive girls' teams?		
Did you have a job? What was it?		
What kinds of games did you play? Where did you play them?		
How old were you the first time you watched TV? Owned a TV?		
How much TV do you currently watch on a typical day?		

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Lesson 35

Food Rituals and Society

Lifestyle Theme



Through class discussion as well as a group activity, students learn that in addition to its nutritional value, food is often associated with religious and secular (nonreligious) traditions or ethnic celebrations. Special dishes that may include expensive or hard-to-get ingredients, used once a year, are often prepared. This lesson is designed to infuse information about everyday foods and "sometimes foods" into a classroom unit on food rituals.

Behavioral Objective

For students to understand that "sometimes foods" can be eaten on special occasions

Learning Objectives

Students will be able to do the following:

1. Examine the association between food and various religious, secular (nonreligious), and ethnic traditions
2. Give examples of religious and secular food traditions
3. State that food rituals often include "sometimes foods" (foods that should be eaten in moderation because they are high in saturated fat, trans fat, or sugar or low in vitamins and minerals)

Materials

- Student resource 35.1, Secular and Religious Food Rituals and Celebrations
- Activity 35.1, Food Rituals Today
- *Optional:* Student resource 21.1, What's the Rap on Fat?, in lesson 21 (see page 290)

Procedure

1. (5-8 minutes) Review the Teacher Resources. Talk about the 5-A-Day and fat guidelines and say explicitly that these are not meant to disrupt traditional practices. Some may choose lower-fat or healthier-fat alternatives, but others may not. Discuss with students some customs and rituals associated with food. In addition, discuss the role of everyday foods and "sometimes foods" in the diet. Highlight examples of religious holidays celebrated with special foods. Mention that "sometimes foods" are OK, important, and appropriate for special times.
2. (5-8 minutes) Discuss student resource 35.1, Secular and Religious Food Rituals and Celebrations. Ask students to categorize some of the ritual and celebration foods by food group and by whether they are everyday foods or "sometimes foods." Many foods such as pumpkin pie and latkes will be "sometimes foods." Emphasize that foods that are high in sugar or fat can be eaten occasionally—this is what is meant by eating in moderation. For example, students can eat them during celebrations and traditional meals but on most days choose foods low in saturated fat and containing no trans fat. They should try to make grains, especially whole grains, and fruits and vegetables the main components of their meals and eat less added sugars.
3. (15 minutes) Distribute activity 35.1, Food Rituals Today. Allow students to work in small groups of four or five using worksheets to examine their own experience of food rituals.
4. (15 minutes) Have group representatives report their findings to the class.

Extension Activities

1. Have a multicultural celebration. Ask students to bring in foods their families typically serve at holiday celebrations. Label each dish with the name of the holiday the food is served at and the food group category or categories it would fit into. You may want to ask students to research the historical significance of the food (for example, Why is turkey a favorite Thanksgiving food?).
2. Use PBS's *The Meaning of Food* classroom lesson and DVD. (Visit www.pbs.org/opb/meaningoffood/ to download a free lesson and purchase the DVD.)

Teacher Resources

GENERAL BACKGROUND MATERIAL

In preparing for this lesson, you may want to refer to the following resources:

- Web site of the Centers for Disease Control: www.cdc.gov/nccdphp/dnpa/5aday/index.htm.
- U.S. Department of Agriculture and U.S. Department of Health and Human Services, *Dietary Guidelines for Americans* (see appendix A)
- Student resource 13.2, How Much Fat Is OK? (page 196)
- The Food in Every Country Web site (www.foodbycountry.com/index.html), published by Thompson Gale, provides a country-by-country summary of foods, meal customs, geographic settings, religious and holiday customs, and recipes.
- www.pbs.org/opb/meaningoffood/: The three-part PBS series *The Meaning of Food* (including *Food and Life, Food and Family,* and *Food and Culture*) about American

food and culture, is intended to bring Americans together over food. Eating is a form of communication that is rich with meaning. Our relationships to food—a universal, comfortingly familiar, and ever-inviting topic—reveal much about us. The series presenters sit down to dinner with people from a wide variety of cultures across America, and through their stories explore and celebrate our shared human experience.

SPECIFIC BACKGROUND MATERIAL

"Sometimes Foods"

Some of the foods eaten during special celebrations are "sometimes foods." The term *sometimes foods* is a simple way to describe foods that should be eaten in moderation because they are high in saturated fat, trans fat, or sugar; are low in nutrients; or are not nutrient dense (i.e., the ratio of nutrients to calories is low). Examples of such foods are French fries, soda and other sweetened beverages, hot dogs, and candy bars.

Student resource 35.1 includes foods associated with some religious and secular celebrations. "Sometimes foods" are in italics. A list of ingredients and the method of preparation for some of these foods have been included. Note that in the West, Judaism, Christianity, and Islam are the most prevalent religions, but Hinduism and Buddhism are more prevalent in the East.

Everyday Foods

The term *everyday foods* describes foods such as grains, fruits, vegetables, lean cuts of meat, and low-fat dairy products that can be eaten daily because they provide plenty of nutrition and adequate amounts of fat and calories for health.

Healthy Eating (5-A-Day and Fat Guidelines)

To build a healthy eating pattern, students should make grains (especially whole grains), fruits, and vegetables the foundation of their meals. They should eat at least five servings of fruits and vegetables (combined) a day. Eating more servings matters for getting the health benefits of fruits and vegetables. Students should choose a diet low in saturated fat (10 percent of total calories) and containing no trans fat.

Not All Fat Is Created Equal

The fat in foods contains a mixture of saturated and unsaturated (monounsaturated and polyunsaturated) fatty acids (commonly called fat). Many animal-based foods, such as fatty meat, whole milk, butter, and lard, are high in saturated fat. This kind of fat typically is solid at room temperature. Eating too much saturated fat increases the risk of developing heart disease. Therefore, the U.S. *Dietary Guidelines* recommend a diet low in saturated fat (less than 10 percent of calories). Most of the fat you eat should be unsaturated because substituting unsaturated fat for saturated fat in the diet decreases the risk of developing heart disease. Most plant fat or oils are high in unsaturated fat and generally are liquid at room temperature. Vegetable oils (olive, canola, corn, peanut), most nuts, olives, and avocados are good sources of unsaturated fat. However, eating lots of any kind of fat may not be healthy, so try to get no more than 30 percent of your calories from total fat (unsaturated, saturated, and trans fat).

There are exceptions to the rule. Not all plant fat is healthy. Through a commercial process called hydrogenation, plant oils can be converted into solids called trans fat (also called partially hydrogenated vegetable oil). This is how some margarines are made. Not surprisingly, foods high in trans fat have been found to increase the risk of heart disease also. To avoid trans fat, check the ingredients lists on packaged foods such as cookies and crackers for partially hydrogenated vegetable oil. Also watch out for coconut oil and palm oil because these oils are naturally high in saturated fat.

Also, not all animal foods are high in saturated fat. Some ocean fish, such as salmon, mackerel, and tuna, are high in a polyunsaturated fat—called omega-3 fatty acid—that may protect against heart disease. So try to eat fish once a week or more often if you can.

Tips for Lowering Saturated Fat Intake

It's OK to eat high-fat foods once in a while. However, if you were to eat meals solely composed of "sometimes foods," you could exceed the recommended total fat intake (25 to 35 percent of total calories) or saturated fat intake (10 percent of total calories) perhaps in only one meal. The U.S. *Dietary Guidelines* offer these tips on how to lower the intake of saturated fat:

- Cook with vegetable oil instead of butter.
- Read food labels; choose foods lower in saturated fat and containing no partially hydrogenated vegetable oils.
- Trim fat from meat and remove the skin from poultry.
- Choose fat-free or low-fat milk, yogurt, and cheese.
- Choose fruit for dessert.
- Limit the intake of processed meats such as sausage, salami, and hot dogs.
- Limit the intake of candy, cookies, cake, and chips.
- Eat plenty of grains, especially whole grains, fruits, and vegetables.
- Choose two or three servings of fish or other lean meats daily.
- Choose dried beans, peas, or lentils often.

Name _____

Student Resource 35.1

Secular and Religious Food Rituals and Celebrations

Some of the foods eaten during special celebrations are "sometimes foods." This term is a simple way to describe foods that should be eaten in moderation because they are high in saturated fat, trans fat, or sugar or low in vitamins and minerals. If you were to eat meals solely composed of "sometimes foods," you could exceed the recommended total fat intake (30 percent of total calories) or saturated fat intake (10 percent of total calories) perhaps in only one meal. Remember that it's OK to eat high-fat foods once in a while (e.g., fried potato pancakes or chocolate cake) if you eat the lower-fat alternatives (e.g., baked potato, fruit, or a low-fat snack) most of the time. Also, be sure to get your daily intake of five or more fruits and vegetables by including one or more servings with every meal and snack.

The following are examples of secular (nonreligious) and religious celebrations. "Sometimes foods" are listed in italics.

Secular

St. Valentine's Day (February 14) has been dedicated to St. Valentine because he was martyred on that day in AD 269. This special day has ties to the ancient Roman lovers' festival called Lupercalia. Today, lovers and friends exchange affectionate cards as well as *candies,* flowers, and *chocolates.*

Birthdays are celebrated with the Happy Birthday song, which is about 100 years old and is the most popular song in the world. *Birthday cake* originated in Germany a few hundred years ago. Items such as coins and thimbles were baked into the cake. The party guest with the coin in his or her slice would have great wealth, and the person with the thimble would never marry. Many people enjoy *chocolate cake* on their birthday. *Chocolate cake* contains flour, baking powder, salt, sugar, spices, unsweetened chocolate, butter, sugar, eggs, milk, and vanilla. Birthday candles, now used in most parts of the world, are another German tradition. The candle's smoke was originally believed to carry prayers and wishes to the heavens.

Around the world, **weddings** frequently include large feasts often with elaborate meals and ornate layered *wedding cakes* and music.

Thanksgiving is a festival held the last Thursday in November celebrating a harvest that kept the Pilgrims alive in their new home. Foods commonly consumed include turkey, squash, *pumpkin pie,* cranberry sauce, and mashed potatoes. *Pumpkin pie* includes pie dough, pumpkin, evaporated milk, sugar, spices, and eggs. It is baked and is often served with *whipped cream.*

Religious

Chanukah (or **Hanukkah**) is the Jewish "feast of the dedication" and falls on the 25th of the Jewish month of Kislev (November/December). Celebrated for eight days, it commemorates the Jewish recapture of Judas Maccabaeus in 165 BC from the Syrian Greeks. The Jews had only a day's supply of sanctified oil to light the temple. Miraculously, the oil lasted for eight days. Frying food in oil is a way of celebrating this miracle. Foods eaten include pea soup, chicken, vegetables, salads, *macaroons, cheese strudels, cheesecakes,* and *latkes. Latkes,* the most special Chanukah food, are prepared by grating potatoes and mixing them with eggs, flour, salt, and grated onion. They are fried in cooking oil.

(continued)

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Secular and Religious etc. *(continued)*

Student Resource 35.1

Christmas is the Christian commemoration of the birth of Jesus Christ, observed on December 25. Holiday meals vary, but often include roast turkey or ham, vegetables, bread, and hot punch. Two traditional Christmas desserts are the French *bûche de Noël,* a rich cake shaped like a Yule log, and British *plum pudding.* In British superstition everyone must take turns stirring the unbaked pudding clockwise (the direction the sun was assumed to rotate around the earth) and make a wish. Stirring counterclockwise was bound to bring trouble! *Eggnog,* also served at Christmas, is a rich beverage prepared with chilled *cream,* eggs, *sugar,* and vanilla.

During **Ramadan,** the ninth month of the Islamic calendar, Muslims customarily invite guests to break the sunrise-to-sunset fast and dine in the evening. This is traditionally regarded as the month when the first revelation of the Koran was made to Mohammad. Sweets are enjoyed such as *vermicelli pudding* with dried fruits, lamb, special rice with meat and vegetables (biryani), dried fruits, olives, and nanns (bread).

Diwali, the feast of the lights, is a Hindu New Year's celebration held in the fall. Clay lamps are lit to welcome King Rama, who returned home after 14 years in the forest. Foods eaten include *halvah* (a candy made from sesame seeds), snacks made from deep-fried legumes, special rice dishes, breads including pooris (puffed breads), and *gulab jaman sweets. Gulab jaman* consists of cottage cheese balls fried in ghee (ghee is butter with the milk solids removed, also known as clarified butter) and dipped in sugar.

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

Name _____

Activity 35.1

Food Rituals Today

Break into small groups and complete this worksheet as a group. Then select two people from the group to briefly present your findings to the class. (Continue on the other side of this sheet if necessary.)

Student names _____ _____

_____ _____

1. Discuss rituals and traditions at your homes that involve special foods or meals. Try to list four rituals or traditions from the group.

2. Select one of these rituals and list special foods associated with it.

3. Mark the food group category (or categories) associated with each of the special foods in question 2, and list which foods are "sometimes foods."

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

SECTION 3

Physical Education Microunits

The *Planet Health* physical education curriculum is composed of two components: microunits and FitChecks. This introduction describes these components and provides guidance on how to teach the PE curriculum. The PE materials are in eight parts:

- Introducing Exercise and Fitness
- FitCheck
- Getting Started
- Improving Fitness
- Measuring Fitness
- Be Active Now!
- Get Ready to Exercise
- Fitness Is Fun!

Components of the Physical Education Curriculum

The *Planet Health* physical education curriculum includes PE microunits and FitChecks.

PE Microunits

Microunits are simple five-minute lessons introduced by PE teachers during the warm-up or cool-down period of PE class. The microunits teach students about the health benefits of physical activity and motivate students to work toward their personal fitness potential. They encourage students to make space for physical activity in their lives by decreasing TV viewing and other screen time activities.

FitChecks

FitCheck is a self-assessment tool that encourages students to reflect on their current activity and inactivity levels and set goals for improving or maintaining healthy behaviors.

Students are encouraged to create goals that trade their inactive time for active time. They evaluate their progress in meeting their personal goals by completing a FitCheck two or three times during the school year.

Using the Physical Education Curriculum

You can teach the microunits at the start of PE class or during the cool-down period at the end of class. Start with microunits 1 through 7 so that students learn how to do FitCheck as early as possible in the school year. After this, you may want to change the order of the microunits to better coordinate with your own sport and fitness curriculum.

The units are written in a read-aloud style. Although some teachers may find this convenient, others may feel uncomfortable with the scriptlike quality. Feel free to paraphrase if it makes you more comfortable; however, first familiarize yourself with the key elements of the microunit so you will be sure to include all of the main concepts. We also encourage you to personalize the microunits with your own fitness-related experiences.

You can easily vary the pace and complexity according to student interest and other considerations. In some classes, you may have time to combine microunits or elaborate; in other classes, you may need to slow down by either simplifying a microunit, splitting it up over two classes, or repeating the same information in two or more classes. We recommend that at least one microunit be included each week. You may use all of the microunits in one year, or spread them out over two years.

Most microunits include extensions, which appear in shaded boxes. Extensions add depth when students are ready for more advanced information. You can include them or not include them as you see fit. For example, if you will be teaching the same students for more than one year, you can leave the extensions out the first year you teach the units and add them in the second year.

Structuring the Presentation

Here is a suggested format for presenting the microunits:

1. At the start of class, tell students the day's fitness tip (located at the beginning of each microunit).
2. Teach the fitness microunit and how-to sections (or do so at the end of class).
3. Complete your scheduled activity for the class.
4. Teach the fitness microunit and how-to if you did not do so at the beginning of class.
5. Reiterate the fitness tip.

To make the microunits more interactive, you can get students to discuss the how-to section with you and to respond to the questions for students as time permits. Their answers will help you know whether they understand the microunit and whether you need to slow down or elaborate on the concepts you present.

FitCheck Overview

FitCheck is a self-assessment tool that physical educators can use to help children identify, understand, and reflect on their own patterns of physical activity and inactivity. Use it if it matches your students' abilities and fits into your curriculum.

FitCheck components are as follows:

- **FitScore and SitScore sheets.** Students keep track of their physical activities and screen time activities over a seven-day period and translate their results into FitScores and SitScores. This is completed at home.
- **Goal-setting sheet.** Students set activity goals based on their FitScores and SitScores.
- **FitScore and SitScore progress charts (bar graphs).** Students graph their scores when they complete each FitCheck or two or three times during the year. (Try to make one time close to the end of the school year.)

Using FitCheck

Microunits 4 through 7 introduce FitCheck to students.

- **Microunit 4, Charting Your FitScore, Fit ★ Score, and SitScore.** This microunit introduces FitCheck.
- **Microunit 5, What Could You Do Instead of Watching TV?** This is one of two microunits preparing students for goal setting (microunit 7). It presents recommendations for limiting TV use and offers alternatives to TV, video and computer games, and DVDs.
- **Microunit 6, Making Time to Stay Fit.** This is the second microunit preparing students for goal setting (microunit 7). Students make a group goal for class that day and evaluate their progress at the end of class. You may want to do this microunit several times with students until they are comfortable with goal setting and evaluation.
- **Microunit 7, Setting Goals for Personal Fitness.** Students set goals to improve their FitScores and SitScores. At the next FitCheck they evaluate their progress.

For more information, see the Teacher's Guide to FitCheck on page 462.

Coordinating With Classroom Teachers

Planet Health implementation can be enhanced by coordination among teachers from different subject areas including PE. Having one or two teachers that can take the lead in this regard really helps. PE and classroom teachers have assumed this role in the past. To enhance your understanding of *Planet Health*'s classroom component, and also if you are interested in being a coordinator at your school, read the introduction to Classroom Lessons (page 17).

Including Students With Special Health Care Needs

There are many practices you can use to include students with special health care needs in PE. (See, for example, page 78 of the School Health Index on the CD-ROM). Examples of special health care needs include temporary physical limitations, learning disabilities, developmental disabilities, behavioral disabilities, physical disabilities, and chronic health conditions such as asthma and diabetes. These practices can include modifying activities if indicated in individualized education plans, asthma plans, or 504 plans. Modifications can

include adapted PE classes, modified equipment, using a second teacher or aide, or peer teaching. Be creative and active!

Microunit Summaries

The following sections briefly summarize what is covered in each part of section 3. The microunits can be read like a script or adapted to fit your own teaching style.

Part VI Introducing Exercise and Fitness

Microunits 1 through 3 introduce students to the concept of physical fitness and the benefits of living an active lifestyle.

Part VII FitCheck

Microunits 4 through 7 teach students how to use the *Planet Health* FitCheck to reflect on their activity and inactivity patterns and set goals for becoming more active. Students are encouraged to increase their activity and decrease their inactivity by trading screen time (TV and computer time) for more active types of play. Before teaching these microunits, be sure to read the Teacher's Guide to FitCheck on page 462.

Part VIII Getting Started

Microunits 8 through 12 introduce students to the FIT & T rule for improving physical fitness.

Part IX Improving Fitness

Microunits 13 through 15 teach students how to improve their cardiorespiratory endurance, muscular strength, and flexibility.

Part X Measuring Fitness

Microunits 16 through 18 teach students how to modify their own fitness programs and how to assess whether their fitness is improving.

Part XI Be Active Now!

Microunits 19 through 21 discuss the long-term health benefits of living an active lifestyle.

Part XII Get Ready to Exercise

Microunits 22 through 25 discuss factors that affect optimal performance: nutrition, fluid replacement, proper clothing, and drug and food supplement use.

Part XIII Fitness Is Fun!

Microunits 26 through 31 discuss the benefits, locations, equipment, and safety tips for six popular physical activities: aerobic dance, calisthenics, running (including jogging and fitness walking), swimming, bicycling, and yoga.

Student Introduction to the Microunits

Fitness tip: The microunits will help you learn how to get fit, stay fit, and make fitness fun.

Introduction Microunit

This year I'd like you to [continue to] work toward being physically active on a regular basis and achieving fitness levels you feel good about. I will be introducing you to some basic facts about physical fitness and physical activity through microunits. Microunits are made up of a fitness tip and fitness lesson and will take about five minutes at the beginning of class. The information provided on physical activity is for everyone, whether or not you are an athlete.

In addition to the microunits, you'll also get some practice setting and working on personal activity goals. To do this, two or three times this year you'll have a FitCheck, which will help you measure how active and inactive you are. The goals you set will help to maintain or increase your current activity level.

Before we start, it's important to understand that being fit means being physically conditioned, which gives you the energy to do things without feeling very tired or drained. It is not about being an athlete or team star. If you work on being more active, you'll become more fit, feel good about yourself, look good, and be healthier. Remember, all of you have a personal physical fitness potential that you can achieve. Being fit will help you to do your best, not only in sports and exercise, but in all activities throughout your life.

[In the next class,] we will begin with a lesson on being physically active.

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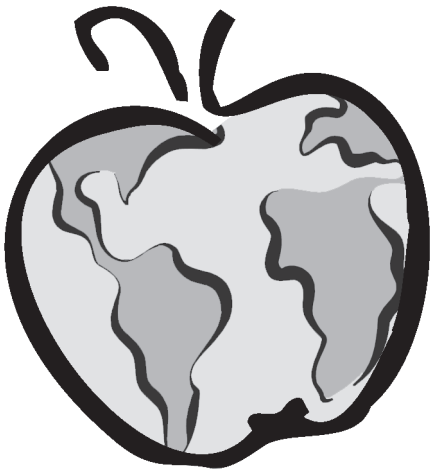
PART VI



Introducing Exercise and Fitness

PE Microunit 1

Thinking About Activity, Exercise, and Fitness

☆ **Fitness tip:** Any physical activity is better than none.

A Brief Introduction to Physical Fitness

- Being fit means you have the energy you need to
  - work,
  - exercise,
  - play, and
  - get from place to place without easily tiring.
- To get fit, you need to be physically active.

Any Physical Activity Is Better for You Than None

- Exercise is physical activity that is planned and structured, such as running a mile or playing soccer for an hour. Many people think that only exercise improves fitness.
- In fact, many kinds of movement can improve your health and fitness level:
  - Dancing
  - Jumping rope
  - Walking the dog
  - Throwing a ball
  - Climbing stairs
  - Swimming
- But, the more active you are, the more fit you will become.

In addition to physical activity, healthy eating will also help you stay fit. We'll discuss more about this aspect of fitness later.

Positive Effects of Physical Fitness

- Being physically fit
  - makes you healthier,
  - helps you build a positive self-image, and
  - helps you feel better about yourself.
- Fitness is fun, and it feels great!

Long-Term Health Benefits of Physical Activity

Learning to be active now will help you become an active adult. If you become fit now and stay active as you get older, you'll lower your risk of having certain health problems as an adult, such as obesity, heart disease, broken bones, bone loss, diabetes, and certain types of cancers. Moderate amounts of physical activity will help you prevent these health problems.

Planet Health Physical Activity Recommendations for Adolescents

Adolescents should strive for a total of 60 minutes or more of moderate to vigorous activity each day. As part of this, they should participate in at least three sessions per week of vigorous physical activity lasting 20 minutes or more. The guidelines are recommended minimum levels of activity for health.

HOW-TO

1. Start thinking about the physical activities you do and the things you do that are not active, such as
   - watching TV,
   - playing video and computer games, and
   - watching movies.
2. Next, think about ways to increase your activity level. You can do this by replacing inactive time with active time. For instance, you can
   - ride your bike instead of watching a show on TV that you don't really like, or
   - play basketball instead of playing a video game.
3. Remember, being active will help you stay healthy now, and as you grow up.

Questions for Students

1. What are some of the things that you do to be physically active?

2. What can you do to increase your physical activity?

3. What are the benefits of being fit?

4. What kinds of things get in the way of your being more physically active?

PE Microunit 2

Warm Up Before You Exercise

☆ **Fitness tip:** Always warm up before you exercise.

How Warm-Ups Work

- Warm-ups heat up your body by gradually increasing your heart rate.
- Warm-ups also prepare your muscles and joints for strenuous activity.

Benefits of Warming Up

- Warm-ups help to
  - stretch and soften muscles,
  - increase joint flexibility, and
  - improve circulation.
- Warming up will help you do better when you start your exercise or game.
- Warm-ups reduce the chances of muscle and joint injuries.
- Warming up can take less than five minutes.

Determining Warm-Up Length and Intensity

In general, the length and intensity of the warm-up should increase when you prepare for an activity that is either very strenuous or is going to require a sudden and great output of energy (such as a sprint). However, if the activity can be started gradually, a shorter warm-up is sufficient because the exercise itself will act as a warm-up.

HOW-TO

1. Before you participate in endurance or strength-training activities, warm up with 5 to 10 minutes of
   - bicycling,
   - walking, or
   - jogging in place.
2. Follow your cardiorespiratory warm-up with gentle stretching.
   - Flexibility exercises should be done slowly and smoothly until you feel mild tension in your muscles.
   - Always stretch muscles until they are taut (pulled or drawn tight), but not beyond that point.
   - To warm up, hold the stretch for 10 to 60 seconds for one to three repetitions.
   - Remember to breathe while you stretch.
   - Concentrate on lengthening the time of the stretch.

Questions for Students

1. How do warm-ups benefit exercise?

2. How much time should you spend on warm-ups?

3. What exercises can you do to warm up?

PE Microunit 3

Cool Down After You Exercise

☆ **Fitness tip:** Always cool down after a cardiorespiratory or muscular strength workout.

When to Cool Down

- Cool down when you are finished with your cardiorespiratory and strength-training workouts with stretching and gentle walking.
- Cooling down generally takes 5 to 10 minutes, depending on whether your activity was light or strenuous.

Benefits of Cooling Down

- Cooling down helps you to get your breathing and circulation back to normal.
- It also helps keep your muscles from becoming sore and stiff.

Cooling Down Is Important

A gradual cool-down can help you maintain flexibility and bring your breathing and circulation back to normal. If you don't cool down, you may get dizzy or nauseated. You may even faint because less blood is circulating to your heart and brain.

Stretch When Cooling Down

You may be tempted to end your workout after bringing your heart rate back to normal, without stretching. Don't skip this part! Stretching thoroughly while your muscles are warmest is important for keeping you flexible and for avoiding soreness later.

HOW-TO

1. After exercising for 30 minutes or so (in a typical PE class), allow 5 to 10 minutes to cool down.
2. Walk around for a few minutes, relax your muscles, and breathe deeply until your breathing returns to normal.
3. Once you have relaxed, stretch all of the major muscle groups you used during your workout—it is safer and more effective to stretch warm muscles.
4. Cool-down stretches can be the same as warm-up stretches.

Questions for Students

1. Why should you cool down after exercising?
2. What can happen if you don't cool down?
3. How much time should you spend on cooling down?
4. What exercises can you do to cool down?

PART VII

FitCheck

Teacher's Guide to FitCheck

FitCheck is a self-assessment tool that physical educators can use to help children identify, understand, and reflect on their own patterns of physical activity and inactivity. Use it if it matches your students' abilities and fits into your curriculum.

FitCheck components are as follows:

- **FitScore and SitScore sheets.** Students keep track of their physical activities and screen time activities over a seven-day period and translate their results into FitScores and SitScores. This is completed at home.
- **Goal-setting sheet.** Students set activity goals based on their FitScores and SitScores.
- **FitScore and SitScore progress charts (bar graphs).** Students graph their scores when they complete each FitCheck or two or three times during the year. (Try to make one time close to the end of the school year.)

The following sections will prepare you to present FitCheck to your students:

- Using FitCheck
- Using the FitScore and SitScore Progress Charts
- Interpreting FitScores and SitScores
- Tips for Teaching FitCheck. These points summarize the main ideas to review before teaching the FitCheck sheet.
- FitCheck Questions. We have anticipated some of the questions students might have. It may be helpful to keep this set of questions handy the first few times you teach FitCheck.
- Coordinating the Microunits and FitChecks

You may choose to do scoring and goal-setting activities in separate classes so they take as little time as possible. We recommend that you complete two or three FitChecks throughout the school year.

Using FitCheck

Microunits 4 through 7 introduce FitCheck to students.

- **Microunit 4, Charting Your FitScore, Fit ★ Score, and SitScore.** This microunit introduces FitCheck.
- **Microunit 5, What Could You Do Instead of Watching TV?** This is one of two microunits preparing students for goal setting (microunit 7). It presents recommendations for limiting TV use and offers alternatives to TV, video and computer games, and videotapes and movies.
- **Microunit 6, Making Time to Stay Fit.** This is the second microunit preparing students for goal setting (microunit 7). Students make a group goal for class that day and evaluate their progress at the end of class. You may want to do this microunit several times with students until they are comfortable with goal setting and evaluation.
- **Microunit 7, Setting Goals for Personal Fitness.** Students set goals to improve their FitScores and SitScores. At the next FitCheck they evaluate their progress.

Using the FitScore and SitScore Progress Charts

There is no microunit to accompany the progress charts. After each FitCheck, or at two or three times during the school year, you should have students graph their scores so they can see their progress over time. This is an activity that could be coordinated with a math teacher or even carried out in math class.

Interpreting FitScores and SitScores

FitCheck encourages students to aim for a total of at least 60 minutes of moderate to vigorous physical activity on five to seven days a week (a FitScore of 5-7). To help achieve this, strive for at least 20 minutes of vigorous activity on three or more days each week (a Fit ★ Score of 3 or more). It also encourages them to shoot for a total screen time of no more than two hours each day (a SitScore of 5-7). However, because children of this age have difficulty tracking time on tasks, students are asked to record what they do for activity and inactivity and to estimate whether it is more or less than these time recommendations, rather than recording the exact number of minutes.

We are asking students to aim for a total of 60 minutes nearly every day. The National Association for Sport & Physical Education recommends that children accumulate at least 60 minutes, and up to several hours, of physical activity on most, if not all, days of the week.

Expert recommendations for physical activity and inactivity for adolescents:

- *Healthy People 2010* physical activity goals include the following:
  1. 22-6: Increase the proportion of adolescents who engage in moderate to vigorous physical activity for at least 60 minutes on five or more of the previous seven days.
  2. 22-7: Increase the proportion of adolescents who engage in vigorous physical activity that promotes cardiorespiratory fitness three or more days per week for 20 or more minutes per session.
- The American Academy of Pediatrics recommends that children and teens spend no more than two hours per day on leisure-time screen media: watching TV and movies and playing video and computer games.

Tips for Teaching FitCheck

1. Read through all the FitCheck units (4 through 7) first.
2. Plan a schedule of FitChecks for the year. We recommend doing at least two during the school year. You can spread out scoring, goal-setting, and charting assignments over several classes to maximize physical activity time in your classes. If your students are not able to handle goal setting and evaluation, you can still do the scoring sheets.
3. Set up a filing system. The easiest method is to set up a manila file folder for each student and to store these in a box or drawer.
4. You may want to coordinate with a math teacher to do the bar graph exercise (FitScore and SitScore Progress Charts).

5. Youth have difficulty tracking time on tasks. So rather than having them record the exact number of minutes of activity and inactivity, encourage them to record what they do and estimate whether it is more or less than the time recommendations.
6. Students may have difficulty estimating how much of their activity was vigorous, or hard. To help them with this, review the examples of vigorous activities listed in microunit 4 and ask them which of their activities made them breathe hard.
7. Help students be realistic about their goals. Physical activity must fit in with other daily activities and family schedules and must be safe and supervised according to family rules. Students don't need to trade all inactive time for fitness activities. Trading one or two hours per week is probably realistic.

FitCheck Questions

What kind of physical activities should students choose for a goal?

Whatever they like. They can select an activity to get better at, or they can pick an activity they are totally unfamiliar with and develop skills in that area.

Do students have to choose a vigorous activity or a sport?

No. They can choose any physical activity to trade with their inactive time. This includes unstructured outdoor play.

What happens if a student's goal is unmet by the next FitCheck?

The student can explore what prevented goal attainment in the evaluation section of the goal-setting sheet. If this process is pursued in a noncritical fashion, it can help students modify their expectations and learn to set realistic goals.

Is losing weight by the end of the school year a reasonable goal?

No. FitCheck sheets should not be used as weight loss tools. Many young people who think they need to lose weight really don't need to. Weight loss can be unhealthy while children are growing. Encourage students who want to lose weight to talk with their parents, the school nurse, and their physicians.

Coordinating the Microunits and FitChecks

At the start of the year, determine how often you'll teach microunits and how often students will have FitChecks. We recommend teaching one microunit per class or per week, and having a FitCheck at least twice a year. On FitCheck days you do not need to teach a microunit.

Start with microunits 1 through 7 so that students learn how to do FitCheck as early as possible in the school year. After this, you may want to change the order of the microunits to better coordinate with your own sport and fitness curriculum.

Explaining the scoring and completing the goal-setting sheet of the FitCheck will take about 20 minutes the first time, so you may need to set aside the better part of a class for this when you begin. These sections should take less time as students become more familiar with them. The FitCheck may present challenges to your PE classes. Some students have difficulty setting goals and remembering to work on them. You may want to send students home with reminder cards that they can post in obvious places. If time and student abilities continue to be barriers to FitCheck implementation, try to keep doing the scoring activities even if it means cutting back on goal setting. Goal setting and evaluation are difficult concepts for some students in middle school.

Introduction to FitCheck

☆ **Fitness tip:** FitChecks will help you increase your activity level. Regular FitChecks will allow you to chart your progress in reaching your activity goals.

Fitness Microunit

[Next week] you'll begin *Planet Health*'s FitCheck. The FitCheck measures three things: your FitScore, the time you spend doing moderate activities such as walking; your Fit ★ Score, the time you spend doing vigorous activities such as running; and your SitScore, the time you spend doing screen activities such as watching TV. Based on these scores, you can create goals to improve your fitness. After the FitCheck week, the FitCheck sheets will remain in [location] at all times. Only you will have access to your FitCheck sheet. You'll use the FitCheck sheet [insert number of times per year]. If you need to look at your folder at a time other than during a FitCheck week, ask me to get it for you.

To chart your progress, you'll keep track of your FitScore, Fit ★ Score, and SitScore.

- A FitScore reflects the time you spend doing moderate physical activities.
- A Fit ★ Score reflects the time you spend doing vigorous activities, such as basketball, aerobics, and walking.
- A SitScore reflects the amount of time you spend doing screen activities such as watching TV or movies or playing video or computer games. A SitScore represents time when you are not moving around.

A FitCheck consists of:

- totaling your FitScore, Fit ★ Score, and SitScore;
- setting a goal; and
- reflecting on your progress in reaching your goal.

Progress evaluation begins at the second FitCheck.

FitCheck # _____

Planet Health

Name _____ Grade _____ **FitScore**

Date _____

Examples of FitScore activities

Chores	**Conditioning**	**Recreation**	**Sports**	**Transportation**
• shoveling	• running	• tag	• soccer	• walking
• raking	• doing sit-ups	• skiing	• swimming	• biking
• cleaning	• jumping rope	• sledding	• hockey	• in-line skating
• vacuuming	• weightlifting	• skateboarding	• basketball	• stair climbing

If you were active for a total of 60 min or more

If your FitScore activities include vigorous activity for 20 min or more

Day of the week	**List your physical activities** Anything that you do	Give yourself a √	Give yourself a ★
1			
2			
3			
4			
5			
6			
7			
	Count up your √s and ★s	FITSCORE	FIT★SCORE

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

FitCheck # _____

Planet Health

Name _____ Grade _____ SitScore

Date _____

Examples of SitScore activities

- watching TV
- surfing the Internet for fun
- watching videos or DVDs
- watching movies
- playing computer games
- playing video games

If your total screen time is 2 hours or less

Day of the week	**List your screen time activities**	Give yourself a √
1		
2		
3		
4		
5		
6		
7		
	Count up your √s	SITSCORE

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

FitCheck # _____

Planet Health

Name _____ Grade _____

Date _____

Goal Setting

My FitScore was _____

I need to (circle one)	**Score**
keep it up!	5–7
be more active.	0–4

My Fit★Score was _____

I need to (circle one)	**Score**
keep it up!	3 or more
add more vigorous activities.	0–2

My SitScore was _____

I need to (circle one)	**Score**
keep it up!	5–7
trade screen time for active time.	0–4

You could:
- trade some screen time for active time, like riding your bike instead of watching TV.
- do more of what you're already doing, like in-line skating for 30 minutes instead of 15.
- work harder at what you're already doing.
- add new activities. Check to see if you can walk to school instead of getting a ride.

Set a goal to improve your fitness

For example:

I will *ride my bike instead of watching TV*

(for how long?) *for 30 minutes*

(when) *after school on Tuesdays and Fridays*

I will _____

(for how long?) _____

(when) _____

Date: _____

Reflect on your progress

Did you meet your goal? ☐ Yes ☐ No

Why or why not? Explain how you reached your goal, or why you did not reach your goal.

_____

_____

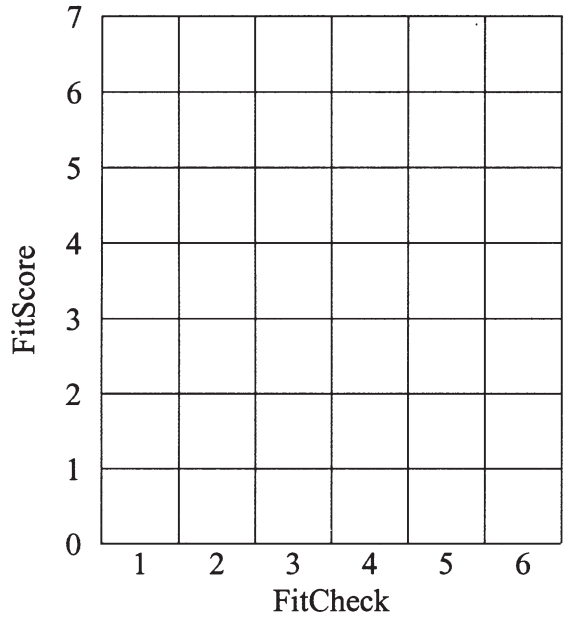
_____

From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

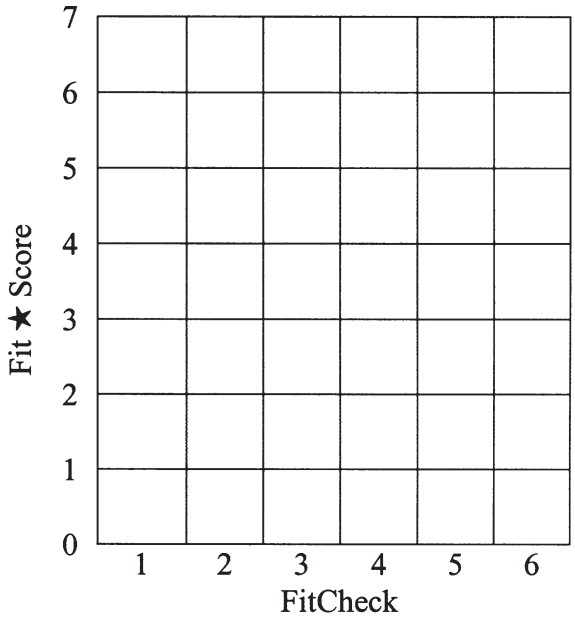
Name _____

FitCheck Progress Charts

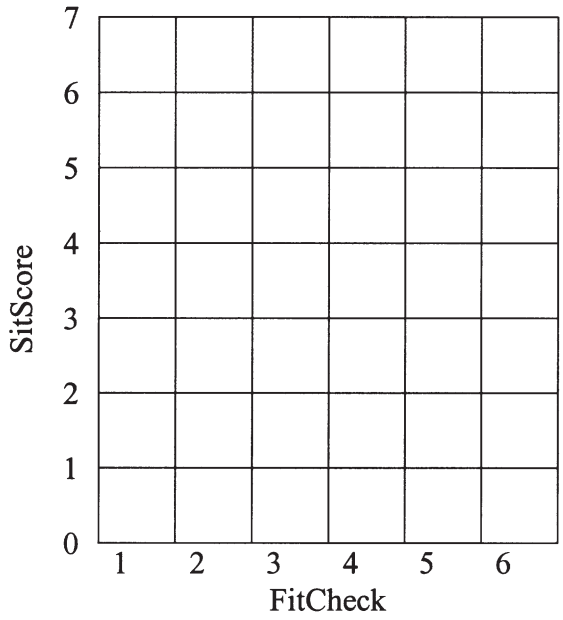
Graph your FitScore below



Graph your Fit ★ Score below



Graph your SitScore below



From J. Carter, J. Wiecha, K. Peterson, S. Nobrega, and S. Gortmaker, 2007, *Planet Health,* 2nd ed. (Champaign, IL: Human Kinetics).

PE Microunit 4

Charting Your FitScore, Fit★Score, and SitScore

☆ **Fitness tip:** The FitChecks will help you think about your activity and inactivity patterns. You can use this information to set personal goals.

What Is FitCheck?

- You'll use FitCheck to find out how often you are active as well as how much time you spend being inactive.
- Doing a FitCheck consists of doing the following:
  - Recording your physical activities and screen time (TV, computer and video games, movies) for a week and totaling your FitScore, Fit ★ Score, and SitScore at the end of the FitCheck week
  - Graphing your scores
  - Setting fitness goals
  - Evaluating your progress toward your goals

Use FitCheck to Chart Your FitScore

- Your FitScore represents the time you were physically active during the past week. It is the number of points you earn for time spent participating in moderately intense *and* vigorous activities.

- You'll keep track of your moderately intense physical activities such as the following:
  - Brisk walking
  - Biking on level terrain
  - Dancing
  - Recreational swimming
  - Mowing the lawn
- You'll also keep track of vigorous physical activities such as the following:
  - Running
  - Jumping rope
  - Biking up a hill
  - Swimming laps
  - Playing soccer or basketball
- Vigorous activities make you breathe hard.

Use FitCheck to Chart Your Fit ★ Score

- Your Fit ★ Score tracks the amount of time you spend engaged in vigorous physical activities.
- If your FitScore activities included vigorous activity for 20 minutes or more, you get a ★.

Use FitCheck to Chart Your SitScore

- Your SitScore represents the time you were not moving around during the past week because of screen time.
- To get an idea of how much time you spend being inactive, you'll record your screen time activities such as the following:
  - Watching TV
  - Playing computer or video games
  - Playing handheld computer games
  - Surfing the Internet for fun
  - Watching DVDs, videos, and movies

Defining Moderate and Vigorous Exercise Intensities

You should be able to carry on a conversation while participating in an activity of light to moderate intensity. Some examples of moderately intense activities are brisk walking or jogging, mowing the lawn with a motorized mower, dancing, recreational swimming, and biking on level terrain.

Vigorous activities make you breathe hard. You should still be able to talk, but you may not want to have an extensive conversation. Some examples of vigorous activities are running, mowing the lawn with a nonmotorized push mower, aerobic dancing, continuous swimming, and biking uphill.

HOW-TO

[Pass out one FitCheck sheet and a pencil to each student. Go over the instructions and use an example (possibly yourself) to demonstrate how to complete the FitCheck sheet.]

1. You'll complete the FitCheck for homework this week.
2. Complete the headings on pages 1 and 2.
3. You'll use the FitScore sheet (page 1) to track your physical activities, in school and outside of school, for seven days.
4. At the end of each day, write the day of the week in column 1. List all your physical activities in column 2. Include activities you participate in as part of PE classes, chores, sports, transportation, recreation, and conditioning.
5. Estimate how long you were physically active. If you were active 60 minutes or more, put a check mark in column 3. If you engaged in vigorous activity for 20 minutes or more, put a star in column 4. Begin filling this out tonight and continue for the next seven days.
6. Use the SitScore sheet (page 2) to track your screen time, which is time spent watching TV or videos or playing computer or video games (time spent on the computer doing homework does not count). This is inactive time. Of course, there are other times during the day when you are not moving around, such as when you sit in class at school. You can't decrease your class time, but you can choose to decrease your screen time.
7. At the end of each day, write the day of the week in column 1. List all your screen time activities in column 2. Estimate your screen time for the day. If your screen time is two hours or less, put a check mark in column 3.
8. At the end of the week, you'll figure out your FitScore, Fit ★ Score, and SitScore by counting your checks and stars.
   - Aim for a FitScore of 5 to 7. To achieve this, you'll need to be physically active for 60 minutes or more five to seven days this week.
   - Aim for a Fit ★ Score of 3 or more. To achieve this, you'll need to be vigorously active for at least 20 minutes three or more days this week.
   - Aim for a SitScore of 5 to 7. To achieve this, you'll need to limit your screen time to two hours or less on five to seven days this week.
9. Bring your completed FitCheck to school on [day of the week]. We will graph our scores in class that day.
10. You'll repeat the FitCheck two or three times during the school year. This will allow you to compare your scores and see whether your activity and inactivity patterns have changed. I will keep your completed FitCheck sheets. Only you will have access to them.

Questions for Students

1. What do your scores tell you about your lifestyle?
2. How might the FitCheck help you change your lifestyle?

PE Microunit 5

What Could You Do Instead of Watching TV?

☆ **Fitness tip:** Watching less than two hours of TV each day can help you get fit!

TV Cuts Down on Your Time to Be Active

- Many children your age spend a lot of their free time doing things that require sitting down.
- For some kids, this includes watching TV for about five hours a day.
- Think about how this cuts into your activity time.

Watching Too Much TV Can Make You Less Fit

- Being inactive day after day can quickly make you lose
  - flexibility,
  - muscular strength, and
  - cardiorespiratory endurance.
- When you sit still, you burn fewer calories than you would if you were moving around.

Watching Too Much TV Can Be Harmful to Your Health

When you sit in front of the TV, you lose a chance to be active and to improve your fitness level. Also, television advertising successfully encourages kids to eat a lot of unhealthy foods. Studies show that the kids who watch the least amount of TV are the kids who are least likely to be overweight. The combination of eating too much and moving less can cause people to gain too much weight over time. People who are overweight are more likely to develop health problems, making it harder to lead a happy, active life.

Warning!

Remember, you need plenty of healthy food for being active and growing, especially when you are growing fast. Never make a decision to cut back on the amount of food you eat without talking it over with your parents, your school nurse, or your doctor.

HOW-TO

1. Doctors recommend that children and teens watch no more than two hours of quality TV or DVDs each day. Less is better. This means you can watch up to four half-hour shows every day—but you can watch less, too.
2. Pay attention to the kinds of foods advertised on TV—most of them are not healthy choices.
3. Watch only shows you like.
4. Take note of the times when you watch TV but you aren't really interested—when you channel surf or watch reruns—and use that time to be physically active instead.
5. Try to limit your total screen time (television, computer games, DVDs) to no more than two hours each day.

Questions for Students

1. What is the maximum amount of TV that doctors recommend children watch per day?
2. What could happen if you watch too much TV?
3. Why is being active better than watching TV, watching movies, or playing video games?
4. What are some activities that you can do instead of watching TV?

PE Microunit 6

Making Time to Stay Fit

☆ **Fitness tip:** It's the *regular* in *regular activity* that's important. Make space for fitness!

Making Space for Fitness

- Find the time to be active.
- Set aside a specific time to exercise.
- Small increases in physical activity add up over time and can produce long-term health benefits.

Never Pass Up the Opportunity to Be Physically Active

- Stretch when you wake up in the morning.
- Take the stairs instead of the escalator or elevator at the mall.
- If it is safe for you, walk or bike instead of getting a ride or taking the bus.

Goal Setting

- It's important to set goals for increasing your physical activity.
- Today we will practice setting activity goals.
- We'll begin by trying to write a goal that will motivate each of you to be more active during today's class.

Exercise With Others

Exercising with others can make doing an activity more fun. Make a plan to exercise with a friend. You can also do active things you like with your parents, brothers, or sisters. Finally, you may want to join a team or class.

Finding Active Time at School

Think about times during the day when you can trade inactive time for physical activity. Try to be more active during PE, and walk briskly to your classes.

Finding Active Time Away From School

In addition, you can be more active while you are away from school. Invite friends over to play active games, practice dance, do aerobics, do gymnastics, or lift weights. Clean your room (and your house). Vacuuming, cleaning out closets, and other tasks require bending, stretching, and lifting. Have fun with it! Listen to music!

Quick Ideas to Become More Fit

- Help a younger sister or brother get started in an activity or sport.
- Learn how to baby-sit and play with young children.
- Try to be as active as a two- or three-year-old—it just might tire you out.
- Watch TV only if it's your favorite show.
- Exercise while you watch your favorite shows on TV.
- Borrow an exercise video from the video store or library.
- Take up an after-school activity or sport.
- Go for a walk or bike ride with a friend.
- Try to stay outside for an hour after school with your friends if your parents approve.

HOW-TO

Make one goal to be completed by all students in gym class today. For example, "I will warm up for five minutes before exercising, actively participate (break a sweat) in PE today, and spend five minutes cooling down at the end of class." You may want to discuss the goal with students and come up with one together.

1. Write the goal on the chalkboard (or in large print on sheets of paper hung on the wall), so students can see it throughout the class.
2. At the end of class, leave time for students to evaluate whether they reached their goal.
3. Ask students the following:
   - Did you reach the class goal?
   - For those of you who reached the goal, how do you know you reached it?
   - For those who didn't reach the goal, what could you have done to reach it?

4. You may want to repeat this lesson in PE class until students are comfortable with goal setting and evaluation.

Questions for Students

1. What are some ways you can make time to stay fit?
2. It's important to set realistic goals for yourself—ones that you have a reasonable chance of reaching. Which of the following goals is realistic for a student who currently gets a ride to school from her mom? Goal 1: I will walk to and from school instead of getting a ride every day for the next month. Goal 2: I will walk to school three mornings a week for the next month.

[*Planet Health*'s language arts curriculum also includes a goal-setting lesson (lesson 8). You may want to coordinate timing with the language arts teachers at your school. If you do, be sure to tell the students they'll have another opportunity to work on this topic.]

PE Microunit 7

Setting Goals for Personal Fitness

☆ **Fitness tip:** Set fitness goals that fit your life. Trade some sit time for fit time.

Setting Personal Fitness Goals

- Setting fitness goals is a good first step to getting fit.
- Today you'll learn more about goal setting.
- You'll use FitCheck to set a personal fitness goal.
- While setting goals, keep in mind how much time you spend in front of a screen. If you have a lot of inactive time, set a goal to trade inactive time for active time.

Trading Bored Time for Fun Time

How much of your screen time is spent channel surfing, watching shows you don't like, watching reruns, or playing video games because you have nothing better to do? You should trade that time for active time. Play a sport, do an aerobics tape with a friend, play an active video game such as Dance Dance Revolution, or walk the dog. (See microunit 5 for more ideas.)

Planet Health Fitness Goals

Adolescents should strive for a total of 60 minutes or more of moderate to vigorous activity each day. As part of this, they should participate in at least three sessions per week of vigorous physical activity lasting 20 minutes or more. The guidelines are recommended minimum levels of activity for health.

HOW-TO

[Before discussing the goal-setting section of FitCheck, have students review their most recent FitScore and SitScore sheets. Then read these instructions to students:]

1. Write your most recent FitScore, Fit ★ Score, and SitScore above the appropriate box in the top section of the goal-setting sheet.
2. To figure out how you are doing, compare your scores to the ones listed in the boxes. Complete the sentence, "I need to . . ." by circling the phrase next to the range that includes your score. For example, say you have a SitScore of 2; that means that on two days during the FitCheck week, you watched two hours or less of TV each day. On five days, your screen time exceeded two hours. You would circle "trade screen time for active time."
3. Here are some goals for FitCheck scores:
   - Aim for a FitScore of 5 to 7. To achieve this, you'll need to be physically active for 60 minutes or more five to seven days this week.
   - Aim for a Fit ★ Score of 3 or more. To achieve this, you'll need to be vigorously active for at least 20 minutes three or more days this week.
   - Aim for a SitScore of 5 to 7. To achieve this, you'll need to limit your screen time to two hours or less on five to seven days this week.
4. Now use this information to set a fitness goal.
5. If your SitScore was low, consider trading screen time for active time. How about riding your bike instead of watching TV?
6. Here are some other goal options:
   - Participate more often in an activity you enjoy, such as in-line skating for 30 minutes instead of 15.
   - Work harder at the activities you already do.
   - Add new activities, such as walking to school instead of getting a ride.
7. Whatever you do, choose an activity you like. Remember that making a plan with a friend could make the activity more fun and help you do it more often.
8. [Give students time to complete their goals; then collect the FitCheck sheets.] You'll check your progress toward your goal the next time we do a FitCheck.

Goal Evaluation

1. Read your goal from the previous FitCheck.
2. Think about your progress toward the goal.
3. Fill in today's date in the section Reflect on Your Progress.
4. Answer the question, Did you meet your goal?
5. In one or two sentences, explain why you did or did not reach your goal. If you reached your goal, explain how you reached your goal.

Pass out a new FitCheck sheet to students and have them assess their FitScore, Fit ★ Score, and SitScore (see microunit 4, pages 471-473).

Questions for Students

1. Have you written a realistic goal? If not, how can you modify it to make it more reasonable to achieve?
2. What kinds of things might keep you from achieving your goal? How can you overcome these obstacles?

PART VIII

Getting Started

PE Microunit 8

Let's Get Started on Being Fit

☆ **Fitness tip:** For total physical fitness, work on cardiorespiratory endurance, muscular strength, and flexibility.

What Is Physical Fitness?

- Being physically fit means you have the energy and strength to handle the everyday demands of your life:
  - Walking to school
  - Playing a game of soccer during gym
  - Actively listening and participating in class
  - Completing daily chores
  - Participating in after-school activities
  - Doing a good job on your homework
  - Taking the stairs when the elevator doesn't work
- When you are physically fit, you can complete all of your daily activities without feeling overly fatigued.

Overall Physical Fitness

- Many factors contribute to your overall physical fitness.
- The factors that are most important to your health are
  - cardiorespiratory endurance (or cardiorespiratory fitness),
  - muscular strength, and
  - flexibility.

Three Areas of Physical Fitness

- There are many ways to look at fitness. *Planet Health* focuses on three components: cardiorespiratory endurance, muscular strength, and flexibility.
- Each one of these components helps your body to be physically fit in different ways.
- Cardiorespiratory endurance helps you do physical work or play for a long time without getting tired.
- Muscular strength helps you lift and move yourself and heavy stuff.
- Flexibility helps you reach, bend, twist, and move without injury.

A Closer Look at the Three Areas of Physical Fitness

- Cardiorespiratory endurance: Enables you to do continuous physical activity for long periods of time. This requires your heart, blood vessels, lungs, and muscles to efficiently carry and use oxygen.
- Muscular strength: Allows you to exert a force, such as lifting or moving yourself or a heavy object.
- Flexibility: Enables you to move your muscles and joints through the full range of motion without discomfort or injury.

Bone Integrity and Body Composition Are Two Other Components of Health-Related Fitness

Regular physical activity will help you build strong bones and maintain a healthy body composition. A fit person has strong bones and muscles and a healthy amount of body fat.

Although physical activity is good for everyone, people with disabilities may need to modify how they do activities, depending on the situation. Getting involved however you can is what's important.

Skill-Related Components of Physical Fitness

Success in sports and other physical activities may require you to develop some other abilities, such as the following:

- Agility
- Balance
- Power
- Speed
- Coordination
- Reaction time

HOW-TO

1. To improve your cardiorespiratory fitness, do physical activities that increase your heart and breathing rate:
   - Walk briskly
   - Run
   - Play basketball
   - Hike
   - Swim
   - Play dodge ball
   - Jump rope
   - Play soccer
   - Dance
   - Ride your bike
   - Do in-line skating
2. To improve your strength and muscular endurance, do work, play, or exercise that makes you repeatedly lift or move a load (an object, your body, a weight) that is heavier than you are used to.
   - Do push-ups, pull-ups, and sit-ups.
   - Pedal your bike up an incline.
   - Shovel snow.
   - Ask your physical education teacher to help you design a safe weight-training program.
3. Performing these activities in sets of repetitions will improve your muscular strength and endurance.
4. To improve your flexibility, stretch regularly. Activities such as gymnastics, yoga, dance, and figure skating require good flexibility.
5. To best improve your overall physical fitness, participate in a variety of physical activities.
6. Be sure to do activities that work and stretch the upper and lower body parts.

Questions for Students

1. Can you name some activities that will improve each component of physical fitness?
2. Which area of fitness do you think you need to improve the most?

PE Microunit 9

More About the Three Areas of Physical Fitness

☆ **Fitness tip:** To get fit, choose a mixture of activities that you can do regularly to build your cardiorespiratory endurance, muscular strength, and flexibility.

Physical Fitness

- We learned that to be physically fit and to meet the daily demands of work and play, a person must possess an adequate level of
  - cardiorespiratory fitness,
  - muscular strength, and
  - flexibility.
- To be fit, you need to work in all three areas of fitness because each area has a different effect on the body.

Some Activities Address One Area of Fitness, Whereas Others Address More Than One

- To be fit, you need to participate in a variety of physical activities.
- It is important that you be able to identify which activities belong to different fitness areas.
- Then you need to identify activities in each area that you enjoy and do them.

No One Type of Physical Activity Improves All Components of Fitness

Aerobic activities generally increase cardiorespiratory and muscular endurance, but not strength and flexibility. Similarly, many activities that build muscular strength and flexibility don't do much for endurance and only improve the body part being worked. Therefore, strength and flexibility exercises must be performed for each muscle group and at each joint.

HOW-TO

Let's think about some daily activities and exercises you do and figure out what areas of physical fitness they address. For example: What area of physical fitness do you work on when you do the following:

- Carry heavy boxes or grocery bags (improves upper-body strength)
- Bike to your friend's house (increases cardiorespiratory endurance)
- Shovel snow (improves muscular strength, muscular endurance, and cardiorespiratory endurance)

Ask students to name a few activities. Involve the class in identifying the components of physical fitness being addressed.

Questions for Students

1. Name three components of physical fitness.
2. Which component do you need to work on the most?
3. During class today we will play (or do) [activity]. What components of fitness will we be working on during this activity?

PE Microunit 10

Frequency, Intensity, Time, and Type

☆ **Fitness tip:** To be fit, keep the FIT & T rule in mind. How long, how hard, and how often you are active will determine how fit you are!

Designing a Program for Overall Fitness

- When you plan a fitness program for yourself, think about the frequency, intensity, time, and type of activities. This is the FIT & T rule:
  - Frequency is how often you do something.
  - Intensity is how hard you do something.
  - Time refers to how long the activity lasts.
  - Type refers to including a variety of activities in your routine.

Frequency

- Frequency refers to
  - how often you exercise, or
  - the number of times you are active per week.
- Frequency recommendations for each fitness component vary.

Intensity

- Intensity refers to how hard or strenuously you exercise—for example:
  - how fast your heart beats,
  - how much you stretch, or
  - how much weight you lift.

- The peak intensity at which you can do an activity will depend on your physical condition.
- As your fitness level improves, you can do more intense activities.

Time

- Time refers to how long you spend being active.
- Time recommendations for each component of fitness vary.

Type

- Type refers to the kind of exercise you choose to do—namely,
  - cardiorespiratory (aerobic) exercise (prolonged, nonstop, repetitive activity),
  - muscular strength or anaerobic exercise (short bursts of high-intensity activity such as sprinting or lifting heavy weights or other objects), and
  - stretching.

Health and Fitness Benefits

Following the FIT & T formula will improve your

- level of fitness in each fitness component,
- performance in sports and physical activities, and
- overall health.

The health benefits of physical activity can occur at levels less than those required for improving performance. Regularly doing even low-intensity activities such as leisure walking for 30 minutes or more can reduce an adult's risk for heart disease and help you maintain a healthy body weight.

HOW-TO

1. How often should you exercise?
   - Strive to be moderately to vigorously active for at least 60 minutes every day as part of play, transportation, chores, and exercise. You can get your 60 minutes all at once or in shorter bouts over the day.
   - Do vigorous activities at least three times per week for at least 20 minutes.
2. How hard should you exercise?
   - Increase the intensity of physical activity gradually.
   - Try to include activities of low, moderate, and vigorous intensity in your routine.
3. For how long should you exercise?
   - You should do moderately intense activities more frequently and for longer periods of time than vigorous activities, aiming to accumulate at least 60 minutes per day. Most kids do this without even trying very hard.

- Do moderately intense activities such as brisk walking for at least 30 minutes.
- Do more vigorous activities such as jogging for at least 15 minutes.
- Even low-intensity activities have health benefits if they are done regularly for prolonged periods of time.
- Aim for a total of 60 minutes or more of moderate to vigorous physical activity nearly every day.

4. What type of exercise should you do?
   - Find a combination of exercises you like that improve your overall fitness.
   - Aerobic activities such as jogging, basketball, and hiking improve your cardiorespiratory fitness and muscular endurance.
   - Carrying heavy objects and lifting weights make your muscles stronger.
   - Stretching improves your flexibility and is built into dance, yoga, and gymnastics.

Questions for Students

1. What does FIT & T stand for?
2. What types of physical activities do you like doing? Do you do them with enough frequency, with enough intensity, and for long enough to be fit?
3. Do you include enough variety of activities to work on each of the health-related components of physical fitness?

PE Microunit 11

Choose Activities You Think Are Fun

☆ **Fitness tip:** To become fit and stay fit, choose activities you think are fun.

Choose Activities You Like, and Vary Your Workout

- It is easier to stick with something if you enjoy it.
- If you do the same thing each time, you may get bored and stop working out. For example, if you choose to walk,
  - try out different safe routes,
  - explore new neighborhoods,
  - walk while you talk with friends,
  - listen to music, and
  - notice your environment.

There Are a Lot of Reasons to Be Active

- Being active may give you a sense of
  - pleasure,
  - self-expression, and
  - personal accomplishment.
- In addition to the personal satisfaction that being active may bring you, it can also help you
  - improve your health,
  - build character,
  - make new friends,
  - release energy, and
  - discover the environment.

Make Reasonable Goals When You Change Your Activity Routine

Improvement in physical fitness can be a slow process. To maintain or improve your fitness levels, find an activity you like, make sure you are active regularly, and gradually increase your activity intensity. Improvements are seen only if you regularly go beyond what your body is used to. However, too much too soon can lead to frustration, injury, and muscle pain. Remember, change does not happen overnight!

HOW-TO

1. Keep *frequency* in mind when planning a fitness schedule.
   - Make sure your activity can be done on a regular basis.
   - If your schedule gets interrupted and you don't exercise for a while, just start again.
2. *Intensity*, *time,* and *type* are also important.
   - Remember to gradually increase the intensity and time of your activity.
   - Likewise, remember to vary the type of exercise you do.
3. Be active regularly. Do moderately intense activity nearly every day and vigorous activity at least three times each week.
4. Increase your activity level *gradually.*

Questions for Students

1. What are some things to keep in mind while developing your fitness program?
2. What should you do if you stop being active for a week?
3. What are some good reasons to be physically active?

PE Microunit 12

How Often Should I Exercise?

☆ **Fitness tip:** Be moderately active daily as part of play, transportation, chores, and exercise. Do strength training two or three times per week. Stretch and do cardiorespiratory training at least three times per week.

How Often Should You Exercise?

- The frequency, or number of times you work out per week, varies depending on what area of physical fitness you are working on.
- Do strength training two or three times per week.
- Stretch and do cardiorespiratory (aerobic) training at least three times per week.
- No matter which area of physical fitness you are working on, begin slowly and build up gradually to longer times or harder activities.
- Try to do some physical activity every day. Even on the days you don't do planned exercise, you can do the following:
  - Walk to the store instead of getting a ride
  - Take the stairs instead of the elevator
  - Play outside with a friend instead of watching TV

Flexibility Activities

Plan to do flexibility activities at least three times per week, and hold each stretch for 10 to 30 seconds. If you are just starting to stretch, gradually increase the number of repetitions and lengthen the duration of the stretch.

Muscle-Strengthening Activities

Plan to do muscle-strengthening activities at least twice a week. Begin with one set of 10 to 15 repetitions, and then increase the number of sets to two and then to three. If you are using weights and can do three sets of 15 repetitions, increase the amount of weight you are using.

Cardiorespiratory Endurance Activities

Plan to do moderately to vigorously intense activity for at least 60 minutes nearly every day. As part of this, include vigorous aerobic activity for at least 20 minutes, three or more days a week. Vigorous activities are best for improving cardiorespiratory endurance. You must work harder or longer than you are used to to improve your cardiorespiratory endurance.

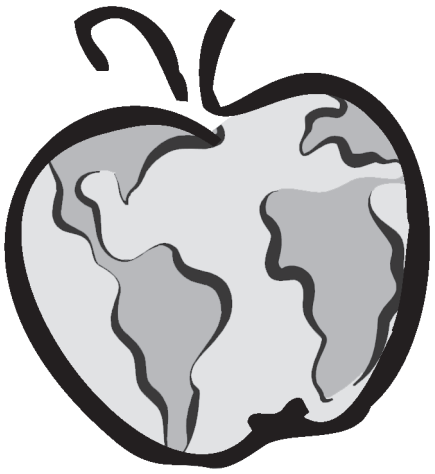
HOW-TO

1. Although we talk of physical fitness as a combination of three areas, most of us can integrate all three of these areas into one workout.
2. Start with flexibility exercises to stretch and warm up.
3. Go on to a cardiorespiratory activity such as playing basketball. This might include some moderate activity and some vigorous activity.
4. Then do some muscle-strengthening activities such as push-ups or sit-ups.
5. Finish by cooling down with some more flexibility exercises.
6. Remember, any activity is better than none.
   - If you are just getting started with physical activity, don't worry about how hard or how long you are active in the beginning.
   - Just find an activity you like and do it regularly.
   - Even participating regularly in low-intensity activities (such as golf, bowling, and leisure walking) can offer some protection against heart disease, obesity, diabetes, osteoporosis, and certain cancers. However, for optimal health benefits, try to include moderately intense activities nearly every day and vigorous activities three times a week.
7. If you want to excel at an activity, you will likely need to do the activity more often than we've recommended in this lesson. So don't get mad at your coach if he or she has you practice five days a week. Not only will you improve your performance, but you will also improve your fitness and further reduce your risk of developing heart disease (and the other diseases mentioned earlier).

Questions for Students

1. How often should you do flexibility activities in a week?
2. How often should you do muscle-strengthening activities in a week?
3. How often should you do cardiorespiratory activities in a week?
4. Define *repetition* and *set*.

PART IX



Improving Fitness

PE Microunit 13

Improving Cardiorespiratory Endurance

☆ **Fitness tip:** Doing physical activities that build your cardiorespiratory endurance now will help lower your risk of developing heart disease later in life. Stay healthy to have more fun!

Learning About Cardiorespiratory Endurance (Fitness)

- Your ability to do physical work or play for a long time without tiring is called your cardiorespiratory endurance.
- To have good cardiorespiratory endurance, your heart, blood vessels, lungs, and muscles must efficiently carry and use oxygen.
- People with good cardiorespiratory endurance can do vigorous physical activity for 20 minutes or more without getting tired.

Aerobic Exercise

- The best way to improve your cardiorespiratory endurance, or cardiorespiratory fitness as it is sometimes called, is to do aerobic exercise.
- Aerobic exercise increases your breathing and heart rate by means of nonstop, repetitive exercises.
- Following are examples of aerobic activities:
  - Aerobic dancing (or dance fitness)
  - Distance running

- Swimming
- Cycling
- Basketball
- Soccer
- Any active game that includes running

- Increasing cardiorespiratory endurance now and maintaining it when you grow up will lower your risk of chronic disease in adulthood.

A Closer Look at Aerobic Exercise

The term *aerobic* means "with oxygen." During aerobic exercise, the body is able to supply enough oxygen to continue the activity for long periods of time. Aerobic exercises can be done at low, moderate, or vigorous intensities and should last 20 minutes or more to be effective.

Aerobic exercise improves blood flow and oxygen supply to the heart, helps keep arteries clear, and can lower blood pressure, thus improving cardiorespiratory endurance and reducing the risk of heart disease later in life.

How Hard Do I Need to Exercise?

Regularly participating in even low-intensity activities (such as golf, bowling, and casual walking) offers some protection against heart disease, diabetes, obesity, and certain types of cancer. However, for optimal health benefits you need to do moderately intense and vigorous activities regularly. Even higher levels of cardiorespiratory endurance are needed to excel in competitive sports and physical activities.

HOW-TO

1. Becoming more fit is not a competitive activity. This is something you are doing to be healthy so you can keep having fun throughout your life!
2. Strive to be moderately to vigorously active for 60 minutes or more every day as part of play, transportation, chores, and exercise.
3. Following are some suggestions for improving your cardiorespiratory endurance:
   - Do vigorous activities (such as running) for at least 20 minutes on three or more days a week. Be sure to include warm-up and cool-down time, followed by stretching to prevent injury.
   - Do moderately intense activities more frequently and for a longer total time than vigorous activities. Aim for a total of 60 minutes or more of physical activity nearly every day. Remember, several short bouts are fine!
   - You must work harder or longer than you are used to to improve your cardiorespiratory endurance.

4. Set your aerobic pace. At your age, you can assume you are getting a good aerobic workout if your heart rate goes up and you begin to breathe faster and deeper, and you are working at a pace you can maintain for at least 20 minutes. Do the talk test: If your heart is beating faster but you can still carry on a conversation, you are exercising at a moderate to vigorous training intensity; if you become too out of breath to talk, you may be approaching a pace you cannot maintain.

Questions for Students

1. How do cardiorespiratory (aerobic) exercises help us stay fit?
2. What are some examples of cardiorespiratory (aerobic) activities?

PE Microunit 14

Improving Muscular Strength

☆ **Fitness tip:** Strength training can build muscular strength and help you avoid shoulder, knee, and back injuries. It can also improve performance in all activities, including sports.

Muscular Strength

- The ability of your muscles to generate force is called strength.
- The most weight that you can lift at one time is a measure of your muscular strength.

Focus on All of Your Muscles

Exercise all major muscle groups of your body:

- Quadriceps
- Hamstrings
- Lower-back muscles
- Abdominal muscles
- Chest muscles
- Upper-back muscles
- Shoulder muscles
- Triceps
- Biceps

Benefits of Strong Muscles

- Strong muscles have muscular endurance. This means they can work hard over a period of time.
- Strong muscles will also help you to perform better in other physical activities, sports, and games.

Key Words When Doing Strength Training

- *Repetition:* The number of times you can perform a movement without rest.
- *Set:* A group of repetitions for a particular exercise.

Learning About Joints

Every joint has muscles on both sides to do its work and bring it through its range of motion. It is important to exercise the muscles on both sides of every joint. Muscles work by contracting (shortening). When a muscle has done its work, it relaxes back to its resting length.

Preventing Injury and Pain

Strong muscles help prevent certain types of injury and pain. For example, strong thigh muscles (quadriceps) help keep the kneecap lined up properly, which can help prevent knee injuries. Similarly, strong abdominal muscles can help control lower-back problems by keeping the spine in proper position and decreasing the strain on the lower-back muscles. Strength training will make your muscles bigger by increasing the size of your muscle cells.

HOW-TO

1. Strength-training exercises can be done for all of the major muscle groups in the body. Train muscles according to their size.
2. Begin with larger muscles (e.g., leg muscles) and progress to smaller ones (e.g., torso or arm muscles).
3. Do all exercises through a complete range of movement to develop strength.
4. Always warm up before muscular strength (anaerobic) training and cool down afterward.

5. Strength training works best when it is done two or three times per week.
6. Train every other day, not daily. If you do strength training on the same muscle group every day, you will notice a decrease in strength from overtraining.
7. Increase your intensity when you can do three sets of 15 repetitions.

Questions for Students

1. Why is muscular strength important?
2. Is muscular strength needed only by athletes? Why or why not?
3. Identify exercises to strengthen and stretch the muscles at every major joint of the trunk, upper body, and lower body.

PE Microunit 15

Improving Flexibility

☆ **Fitness tip:** Flexibility training keeps joints limber and helps lower your chance of injury.

Review of Flexibility

- Your ability to move your muscles and joints through their full range of motion is called flexibility.
- People with good flexibility are able to bend, stretch, and twist with ease.
- To prevent or decrease muscle soreness and stiffness, include stretching exercises (during warm-up and cool-down periods).

Benefits of Stretching

- Stretching exercises can help prevent the loss of flexibility.
- Stretching exercises will also lower your chances of injury.
- Stretching can relax overstressed muscles and reduce soreness and cramps.
- However, too much stretching can make muscles sore.

Stretch Regularly

Most young children are very flexible but lose some range of motion as they grow older. Physical inactivity makes you lose flexibility. So, if you stay active and incorporate stretching into your exercise routine, you may be able to stay flexible long into your adult years. Stretching is relaxing and fun!

HOW-TO

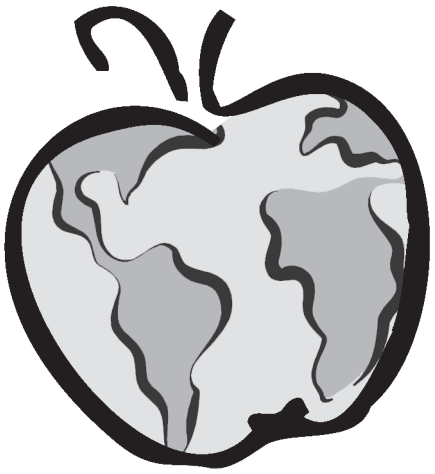
1. Flexibility exercises are muscle specific and should be done for all the major muscles.
2. Flexibility exercises are usually done for only a few minutes, at least three times each week.
3. You can do flexibility exercises on their own, or before or after cardiorespiratory or muscular strength-training exercises.
4. Remember, it's better and safer to stretch warm muscles than cold muscles.
5. For each exercise, always stretch to the point at which your muscles are taut (drawn tight), and not beyond that point.
6. Hold the stretch for 20 to 60 seconds for one to three repetitions.
7. Remember to breathe.
8. Concentrate on lengthening the time of the stretch.

Questions for Students

1. Why is flexibility important?
2. What are some of the activities you participate in to improve your flexibility?

PART X

Measuring Fitness



PE Microunit 16

Improving Your Overall Physical Fitness Levels

☆ **Fitness tip:** Improve your fitness level by progressing slowly and exercising regularly.

Gradual Improvements

- The way to improve physical fitness is to begin slowly and to gradually build up over time to activities that are harder and last longer.
- Improving gradually will help you avoid straining or injuring your muscles and joints.
- Improve at your own pace based on your current level of fitness and taking into account special circumstances, such as a disability.

Another Look at FIT & T

- Remember the FIT & T rule:
  - Frequency
  - Intensity
  - Time
  - Type
- You can improve fitness by
  - increasing the frequency (if you are not already exercising regularly),
  - increasing the intensity (doing something faster, doing more repetitions or sets, or using heavier weights), and
  - increasing the time you spend on each exercise (you might even choose more types of exercise to do).

Workout Recommendations

Flexibility and cardiorespiratory (aerobic) exercises should be done at least three times per week, and strength training should be done two or three times per week. When you are doing strength training, remember to gradually build up to three sets of 15 repetitions. If you can do this, you are ready to add more repetitions or sets. If you are using free weights, add more weight instead of more reps or sets.

HOW-TO

1. Check your frequency!
   - Are you physically active for at least 60 minutes every day as part of play, exercise, chores, and transportation?
   - Do you do vigorous activity at least three times per week for 20 minutes or more?
   - Add more exercises if you need to.
2. Think about the intensity! Can you stretch a little farther, or pick up the pace at aerobics or when running?
   - Slowly increase your intensity over time.
   - Gradually add more time to cardiorespiratory (aerobic) workouts such as running, cycling, and swimming.
   - Try to do moderately intense activities (such as brisk walking) for at least 30 minutes.
3. Try new types of exercises for different areas of fitness or for strengthening or stretching different muscles.

Questions for Students

1. How can you improve fitness?
2. Why is it important to make gradual progress?

PE Microunit 17

Knowing Your Resting Heart Rate

☆ **Fitness tip:** As your cardiorespiratory endurance improves, your resting heart rate goes down.

Resting Heart Rate

- Your resting heart rate is a measure of the number of times your heart contracts (or beats) each minute you are at rest or sleeping.
- It can be measured by taking your resting pulse rate.
- Your resting heart rate can go down when your cardiorespiratory endurance improves, because your heart gets stronger and can pump more blood with each beat.

Your Heart Rate During Exercise

- Your heart beats faster when you move around and varies depending on how active you are throughout the day.
- The more intense your activity is, the faster your heart beats, and the deeper and faster you breathe.
- Your heart contracts faster and with greater force to get more oxygen and nutrients to your working muscles.

Heart Rate Varies With Activity and Level of Fitness

An average resting heart rate is around 60 to 80 beats per minute. Because a stronger heart will pump more blood with fewer strokes, athletes usually have a lower resting heart rate than nonathletes. Some athletes have resting heart rates as low as 35 beats per minute.

HOW-TO

1. Take your pulse from inside the wrist.
   - First, turn your left wrist so that your palm faces up.
   - Then place two fingers of your right hand on your radial artery. The radial artery is next to the tendons on your wrist, on the side closest to your thumb. Do not use your thumb, because it has its own pulse. Can you feel your pulse?
   - Using a stopwatch (or second hand on a clock), count your pulse for 60 seconds. This is your heart rate per minute.

   [Or, while you keep track of time, have students count their pulse for 60 seconds.]
2. The best way to measure your resting heart rate is to take your pulse first thing in the morning, before you get out of bed.

Questions for Students

1. If you participate regularly in endurance activities, what will happen to your resting heart rate?
2. Why does your heart need to beat faster when you are moving than when you are at rest?

PE Microunit 18

Exercise Makes Your Heart Beat Faster

☆ **Fitness tip:** Exercise or play can strengthen your heart.

Aerobic Exercises Make Your Heart Stronger

- When you are doing aerobic exercise, you breathe faster and deeper, and your heart contracts faster and with greater force to get more oxygen and nutrients to your working muscles.
- Because your heart is a muscle, it makes sense that in time your heart will get stronger with this kind of exercise.

Knowing When Your Cardiorespiratory Endurance Is Improving

- As your cardiorespiratory endurance improves, your heart rate and breathing rate during a given activity (workload) will decrease.
- The activity will feel easier the more you do it.
- Your heart rate and breathing rate will also return to normal more quickly after exercise as you become more fit.

Just Move

Any activity or play in which you run around for a while is good for you. So move and have fun any way you like.

Aerobic Exercise

Aerobic exercise is nonstop, repetitive exercise that can be continued for a long time. It can be done at low, moderate, and vigorous intensities. Participating regularly in low-intensity aerobic activities provides some health benefits. However, moderately intense to vigorous activities are best for improving cardiorespiratory endurance.

Low-Intensity Aerobic Activities

Leisurely walking or strolling, stretching, table tennis, playing catch, bowling, and playing golf (leisurely) are all examples of low-intensity aerobic activities.

Moderately Intense Aerobic Activities

Brisk walking, in-line skating at a leisurely pace, low-impact aerobic dancing, bicycling on level terrain, light calisthenics, shooting baskets, playing softball, recreational swimming, skateboarding, climbing on playground equipment, raking, and scrubbing the floor are examples of moderately intense aerobic activities.

Vigorous Aerobic Activities

Running, hiking, or biking up an incline; lap swimming; skating at a vigorous pace; playing basketball, singles tennis, or soccer; shoveling snow; climbing stairs; and jumping rope are examples of vigorous aerobic activities.

HOW-TO

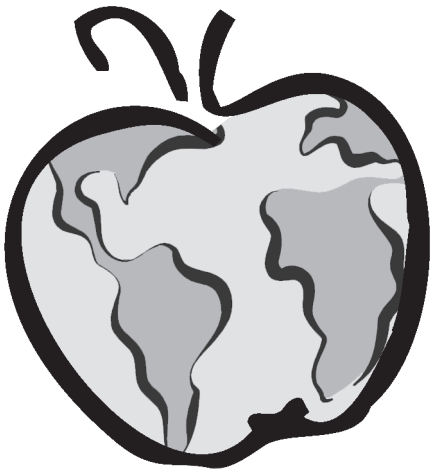
1. To improve your cardiorespiratory endurance, you must work harder or longer than usual.
   - Plan to do vigorous aerobic activities for at least 20 minutes, three or more days a week, because these activities are best for improving cardiorespiratory endurance.
   - Moderately intense activities also improve cardiorespiratory endurance, but they must be done more frequently and for a longer time than vigorous activities.
   - Aim for a total of 60 minutes or more of moderate to vigorous physical activity every day.
2. One way to measure how hard you're working is to measure your heart rate.
3. To check this out, sit down for a minute and then take your wrist pulse; then take a leisurely walk around the gym for one minute and check your pulse rate again.
   - How much did your heart rate change?
   - Repeat these steps for brisk walking and running.
   - What happened to your heart rate as you increased your exercise intensity?
4. The more intense the activity, the faster your heart beats.
5. Remember, any activity is better than none.
   - If you are just getting started with physical activity, don't worry about how hard or how long you are active at the beginning.
   - Just find an activity you like and do it regularly.

Questions for Students

1. Why does your heart need to beat faster when you're physically active than when you're at rest?
2. Name some examples of moderately intense and vigorous aerobic activities.
3. How can you tell when your cardiorespiratory endurance is improving?

PART XI

Be Active Now!



PE Microunit 19

Be Active Now for a Healthy Heart Later

☆ **Fitness tip:** Being active in your free time can lower your risk of cardiovascular disease later in life.

The Number One Killer

- Cardiovascular disease is a disease of the heart and blood vessels.
- It is the single largest cause of death in the United States for both men and women.

Preventing the Number One Killer

- You can lower your risk of developing cardiovascular disease by starting a lifelong commitment to regular exercise now.
- Maintaining a healthy weight, eating a balanced diet, and living smoke free will also help you prevent cardiovascular disease. A balanced diet includes abundant fruits, vegetables, and whole grains; healthy sources of protein and calcium; and healthy fat from fish and plant oils. Trans fat and saturated fat should be limited.

Cardiovascular Disease in the United States

Cardiovascular disease is actually a group of diseases that affect the heart and blood vessels. It includes coronary artery disease (a narrowing of the arteries in the heart that can cause a heart attack, chest pain, or both), high blood pressure, stroke, rheumatic heart disease, and many others. According to 2003 estimates, more than 71 million Americans have one or more forms of cardiovascular disease. More than 910,000 Americans died from cardiovascular disease in 2003 (accounting for 37 percent of all deaths).

Habits That Put Adults at Risk for Cardiovascular Disease Begin in the Teens

Poor diets and low levels of physical activity as well as smoking are all habits that could lead to cardiovascular disease.

HOW-TO

1. To prevent cardiovascular disease, develop good physical activity and eating habits at an early age and maintain them throughout your life.
2. Choose activities that make your heart and lungs stronger, such as the following:
   - Fast walking
   - Running
   - Bicycling
   - Tennis
   - Basketball
   - Swimming
   - In-line skating
   - Hiking . . . and many more!
3. Eat five or more fruits and vegetables a day.
4. Eat a diet low in saturated fat and avoid trans fat, but do include fish oils and vegetable-based oils.
5. Eat whole grains (e.g., whole wheat bread).
6. Finally, don't smoke!

Questions for Students

1. Name some physical activities that you like to do that will strengthen your heart.
2. Which of these activities do you think you will continue to do as an adult?

PE Microunit 20

Be Active Now for Healthy Bones Later

☆ **Fitness tip:** Building strong bones now can help prevent fractures and bone loss later in life.

Building Strong Bones

- Almost 50 percent of your bone mass is formed during your teen years. By the time you're 20, you've already formed 90 percent of your adult bone mass.
- Exercising and eating a balanced diet rich in calcium and vitamin D will help you build strong bones.
- Building strong bones now is a critical part of preventing osteoporosis from developing when you are older.
- Living a healthy lifestyle with no smoking and limited alcohol consumption during adulthood will keep your bones strong.
- People with osteoporosis have weak bones that are more likely to break. For example, hip fractures are common among the elderly and are a serious injury because older peoples' bones do not heal easily. More women than men develop osteoporosis.

Building Strong Bones With Exercise

- Weight-bearing exercises build strong bones.
- In weight-bearing exercises, your bones and muscles work against gravity; your feet, legs, or arms support your weight as you move. Some examples of this kind of activity are
  - walking,
  - stair climbing,
  - hiking,
  - racket sports,
  - dancing,

  - soccer,
  - push-ups,
  - curl-ups, and
  - basketball, but
  - *not* swimming or biking.
- Weight training also builds strong bones.
- Hitting a ball or landing on your feet after jumping stimulates more calcium to be deposited in your bones. More calcium makes your bones stronger.
- Most sports and daily physical activities require weight-bearing activities. If you participate regularly in a variety of physical activities, you will build strong bones.

Osteoporosis

Osteoporosis literally means "porous bone." Although the shape of the bones of people with this condition looks OK, they have fewer minerals in them. The minerals calcium and phosphorus are the major building blocks of bone. Bones that are low in these minerals are brittle and break more easily than healthy bones. It is estimated that 10 million Americans suffer from osteoporosis and 34 million have low bone density, putting them at risk for osteoporosis. Osteoporosis is more common among women than among men (roughly 80 percent of osteoporosis cases are in women).

Preventing Osteoporosis Also Requires Consuming Enough Calcium

To prevent osteoporosis, you need to make sure that you are consuming enough calcium. People 9 to 18 years old require three 8-ounce (250-milliliter) glasses of milk per day. Milk and other dairy products (yogurt, cheese) offer the largest amount of calcium per serving. Following are other excellent sources of calcium:

- Tofu
- Sardines with bones
- Calcium-fortified foods including orange juice, cereal, soy or rice milks, and cereal bars

Spinach, broccoli, and other green leafy vegetables are good sources of calcium, but they provide a lot fewer grams per serving than most milk products do. If you are unable to consume milk or milk products, try lactose-free products or lactose pills, and eat other calcium-rich foods.

HOW-TO

1. To build strong bones and prevent osteoporosis, develop good exercise and eating habits now.
2. Choose physical activities that put some stress on your bones.
3. Eat foods rich in calcium. Have three servings of low-fat dairy products such as milk, cheese, and yogurt every day.

Questions for Students

1. How does exercise help your bones?
2. How can you help prevent osteoporosis and bone fractures?

PE Microunit 21

Be Active Now to Stay in Shape

☆ **Fitness tip:** An active lifestyle will keep you in good shape for your whole life.

Energy Balance

- When you eat and drink, the food and beverages you take in are used
  - for growing,
  - to give you energy for activities, and
  - for your metabolism.
- Metabolism refers to your internal body functions, such as
  - respiration (breathing),
  - circulation,
  - digestion, and
  - other things.
- Usually, you are in an energy balance, meaning that your body generally uses all of the energy that you take in.

Physical Activity Helps Maintain an Energy Balance

- Energy that is not used for growth, activity, or metabolism is stored as fat. Some body fat is beneficial for temperature regulation, cushioning organs, making hormones, and as an energy reservoir.
- Although gaining a certain amount of fat is necessary and normal in a healthy growing teen, excess body fat can build up at any age.
- Physical activity can help regulate your appetite, burn calories, and keep you fit. This helps prevent excessive weight gain.

Normal Weight Gain

Before adolescence, both boys and girls tend to put on some weight. During adolescence, you will continue to gain weight, your body will change shape, and you will grow taller as you enter your final growth spurt to reach adult size and shape. Girls tend to begin this growth spurt earlier than boys do (two years earlier, on average). Some teenagers are nervous about these changes and try to diet in response. Remember, it is normal to gain weight during your teens, and dieting can be bad for your health.

Warning!

If you are concerned about gaining too much weight, talk with your parents, school nurse, or health care provider. They can help you determine if your weight gain is OK. Don't fall into the dieting trap! A balanced diet and active lifestyle will keep your body in shape for your *whole life!*

HOW-TO

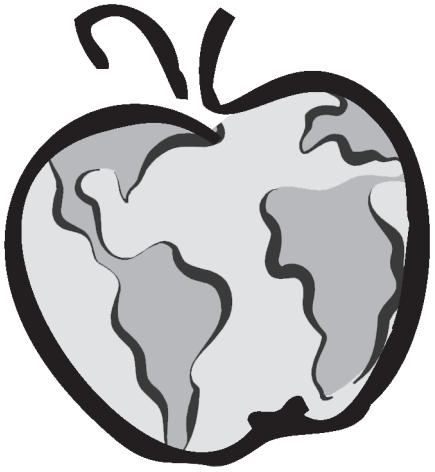
1. Be active by reducing the time you spend watching TV and movies and spending less time playing video and computer games. Try to keep screen time to less than two hours per day.
2. Instead, do things such as playing active games or exercising.

Questions for Students

1. Why is it normal for teens to gain weight?
2. What should you do if you are concerned about gaining too much weight?

PART XII

Get Ready to Exercise



PE Microunit 22

Energy for Exercise

☆ **Fitness tip:** Complex carbohydrate is an important source of energy, and good choices can help you feel great.

When You Exercise, Your Muscles Need Energy

- Your body relies heavily on stored carbohydrate (glycogen) to supply the energy needed by your muscles during exercise.
- You need to replace carbohydrate by eating healthy foods that have enough calories and are high in complex carbohydrate that help keep your blood sugar stable. Whole grain foods are good sources.
- Without complex carbohydrate, your muscles will not be able to restock their carbohydrate stores after exercise, and you will feel tired and run-down.

Eat Right for Optimal Performance

Foods such as cookies, candy, soft drinks, and sport drinks contain simple carbohydrate and are sometimes eaten before exercising for "quick energy." However, after this energy burst energy falls, and some people become irritable, exhausted, and dragged out. Eating foods that are high in sugar causes a sharp increase in blood glucose, followed by a sharp decrease. Some people are more sensitive to this than others. Although you may have a snack close to when you exercise, plan to wait at least one hour after a large meal before exercising strenuously. Your preactivity meal should be a healthy one with adequate fluid, complex carbohydrate, and some protein. Try not to have foods that will cause your blood sugar to peak and dive. An example of a healthy snack is whole wheat bread with peanut butter, hummus, or turkey and a healthy drink such as low-fat milk (no burger, fries, and soda for pregame meals).

Stored fat is another important source of energy during exercise. During brief periods of moderate exercise, your body burns carbohydrate and fat equally. As exercise continues for longer than an hour, fat becomes the more important energy source.

HOW-TO

1. Get the complex carbohydrate you need each day from foods in the grain, fruit, and vegetable food groups. Complex carbohydrate is in foods such as pasta, rice, bread, cereals, fruits, starchy vegetables (e.g., potatoes), and beans. Aim for six to eight servings from the grains group, and five or more servings (combined) of fruits and vegetables.
2. Choose whole grain foods at least half the time. Whole grain breads, cereals, or pasta will energize you without causing blood sugar swings. Processed grains provide complex carbohydrate and nutrients but don't do as good a job keeping your blood sugar stable. Some healthy whole grain choices are whole wheat bread, oatmeal bread, or other whole grain breads; brown rice; oatmeal; corn tortillas; tabouli salad; and whole barley soup.
3. Steer clear of foods with simple sugars (such as sweets, soda, and even some breads and cereals made with "refined" flour), because these can cause blood sugar swings, which will make you feel drained of energy.

Questions for Students

1. What types of food are high in complex carbohydrate?
2. Why is it important to eat the recommended number of servings of grains daily, especially when you exercise?
3. Why are foods made from whole grains better than those made from refined flour or starchy vegetables?

PE Microunit 23

Weather and Exercise

☆ **Fitness tip:** Be prepared for the weather when you exercise.

Preparing for the Weather

Thinking ahead and dressing appropriately for the weather can help you prevent muscle and joint injuries when it's cold, and heat injuries when it's hot. Remember to check the weather before you exercise.

Hot Weather Raises the Risk of Exercise-Related Heat Injuries

- Exercise-related heat injuries are problems that can be traced to dehydration and overheating.
- Because sweat evaporates quickly in hot, dry air, you may not feel sweaty and may not realize how much water you have lost.
- Prevent excessive fluid loss by drinking water before, during, and after exercise. This is important for good performance and for avoiding
  - heat cramps,
  - heat exhaustion, and
  - heat stroke.
- When your body loses a lot of water, you sweat less. Because the evaporation of sweat cools you off, heat builds up and your body temperature rises.
- Dehydration also causes your blood volume to decrease. As a result, your heart must beat faster to deliver oxygen to your working muscles.

Humidity on Top of Heat Increases the Risk of Heat Problems

- Sweat does not evaporate well in humid environments. Without evaporation, your body can't cool itself.
- If you are exercising and sweat is "dripping" from your skin, you may be missing the cooling benefit of sweat.

Be Careful in Cold Weather, Too!

- In cold weather, you need to keep your muscles warm.
- Cold muscles are stiff and raise your risk of strains and other injuries.

HOW-TO

1. In the heat:
   - Exercise at the coolest time of the day.
   - Avoid exercise or practice when the temperature peaks (usually from about noon to 3 p.m. when the weather is hot).
   - If you must work out during times of peak temperature, build up your heat tolerance by slowly increasing the amount of time you work out each day.
   - Wear the lightest clothing possible. There are lots of new fabrics that help keep you cool, but loose-fitting cotton will also work well. Consider jerseys with mesh on them, lightweight shorts, and low-cut socks. Wear sunscreen of SPF 15 or higher on exposed skin.
   - Drink plenty of water before, during, and after you exercise.
2. When it's cold:
   - Wear several layers of loose clothing, and when the temperature is below 40 °F (4.4 °C) wear a hat or an ear band.
   - By wearing layers, your body heat is trapped—but sweat can be absorbed by the clothing.
   - Wear synthetic fibers designed for sports or cotton next to your skin. Many synthetic fabrics don't absorb sweat well and will leave you cold and damp. Read labels to find clothes that will wick away moisture.
   - As you warm up, you can always remove a layer or two to avoid overheating.

Questions for Students

1. How should you dress when you exercise in hot and humid weather?
2. How should you dress when you exercise in cold weather?
3. What can you do to avoid excessive fluid loss (dehydration)?

PE Microunit 24

Getting Enough to Drink

☆ **Fitness tip:** Drink plenty of water before, during, and after exercising.

Dehydration Means Your Body Has Lost a Lot of Water

- To prevent dehydration, drink plenty of fluids before, during, and after exercise.
- Don't rely on thirst to tell you when to drink. It is not a good indicator because you won't feel thirsty until after your body has lost fluid. Most people don't drink enough to replace the fluid they've lost.

Drink Water to Avoid Dehydration

- Water is the best and most economical drink for activities lasting less than an hour.
- Water will help you replace your body's water lost from sweating and will keep you from getting overheated and dehydrated, which can be dangerous.

Use Sport Drinks or Diluted Juices When Exercise Lasts More Than an Hour

- Sport drinks are only recommended for exercise that lasts longer than one hour or is performed in high temperature and humidity. They contain a lot of sugar. A day at soccer camp and hiking up a mountain are examples of when you might use a sport drink.
- Sport drinks should taste good and contain 6 to 8 percent carbohydrate (20 grams per 8 ounces, or 250 milliliters). Check the label.
- 100 percent fruit juices can also be used, if they are diluted with water (half juice, half water).

Warning!

Never use salt tablets. You don't need them. They can make you sick to your stomach. Because one salt tablet increases the amount of water you need by one pint (16 ounces, or 2 cups), taking salt tables can make a dehydration problem worse.

Your Body's Response to Excess Heat

About 60 percent of your body weight is water, and about 80 percent of your muscles are water. Sweat is largely made up of water and just a small amount of minerals and electrolytes (sodium, potassium, and magnesium). Sweating is the body's mechanism for getting rid of excess heat. When sweat evaporates, it cools your skin. This helps keep your body from overheating by constantly drawing heat out to the surface of the skin. When you sweat, you lose water. Not drinking enough during exercise may lead to dehydration and will make you feel bad. Dehydration can cause heat injuries such as cramps, exhaustion, and heat stroke. Prevention is easy: Drink water before, during, and after you exercise!

HOW-TO

1. To avoid dehydration, drink 1 to 2 cups of water before exercising.
2. When you work out, start drinking early and at regular intervals (every 10 to 15 minutes).
3. Focus on drinking cool water or diluted fruit juices. Sport drinks contain lots of sugar, so reserve them for strenuous activities that last longer than one hour.
4. Continue to drink after your workout is over. Flavored drinks may encourage you to drink more during this recovery period.
5. Avoid drinking soda and caffeinated drinks (such as colas, coffee, and iced tea) to replace water loss. Caffeinated drinks can increase water loss through urine, and large amounts of sugar (from soda) slow down stomach emptying and increase the time it takes for the fluid to reach your blood.

Questions for Students

1. How can you prevent dehydration?
2. What does water do for you when you exercise?
3. What happens if you don't drink enough water?
4. Is thirst a good sign of whether you are drinking enough water while exercising?

PE Microunit 25

Food and Supplement Myths

☆ **Fitness tip:** For a healthy, fit body, stay away from drugs and supplements, and concentrate on physical activity and eating well.

Getting Fit

- The best way to get fit is through consistent training and eating well.
- There are no miracle drugs, nutrients, or foods that build fitness or athletic performance.

Stay Away From Drugs and Supplements

- You may have heard that anabolic steroids improve athletic performance, but in fact they are illegal, and using them can cause health problems.
- In addition, bee pollen, brewer's yeast, and protein supplements have no proven value in athletics.

Are Anabolic Steroids a Good Way to Build Muscles?

No! Using anabolic steroids to build muscles is dangerous and against the law! There are many health risks associated with anabolic steroids: stunted growth, acne, liver damage, cancer, and severe behavioral disturbances. Some of the side effects of anabolic steroids can be permanent. Although anabolic steroids do build muscles, this effect goes away when you stop taking them.

Are Tea and Coffee Good Drinks Before a Workout?

No. Both tea and coffee contain caffeine, an addictive stimulant. Excessive caffeine intake can cause headaches, nausea, and trembling, or "shakes." Although caffeine will increase the amount of time you can exercise, it can also increase urine production, which could contribute to dehydration in extremely hot and humid conditions. For drinks before competition, water and diluted fruit juice are the best choices.

Will Taking Vitamin and Mineral Supplements Improve Strength?

No. The vitamin and mineral requirements of an athlete are similar to those of nonathletes. Some vitamins can be toxic if taken in large amounts, whereas others simply are flushed out in urine when taken in high doses. Vitamins and minerals don't provide any energy. In addition, there is no evidence that special supplements such as bee pollen, ginseng, brewer's yeast, and protein supplements improve strength and endurance.

HOW-TO

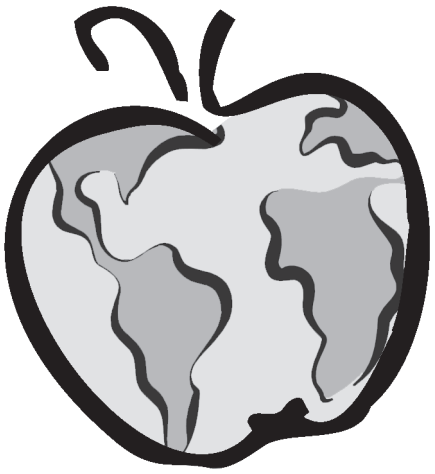
1. Stay away from drugs and supplements.
2. Just work hard every day to improve your fitness the natural way.
3. Have fun and get fit gradually.

Questions for Students

1. What is the best way to improve performance?
2. Are there any fitness advantages to taking supplements and drugs?
3. Besides the items we discussed, what are some foods or supplements that you have heard of to improve performance?

PART XIII

Fitness Is Fun!



PE Microunit 26

Dance for Fitness

☆ **Fitness tip:** Dance is a fun way to improve strength, flexibility, and cardiorespiratory endurance while moving to your favorite music.

Dance Can Give You a Great Workout!

- Dance improves strength, flexibility, and cardiorespiratory endurance by requiring you to perform many different movements to music.
- Both boys and girls can dance.

There Are Many Ways to Dance for Fitness

- Some dance sessions use special
  - slides,
  - step benches, or
  - small weights.
- Dance Dance Revolution is an exciting video that really keeps you going! Visit www.ddrfreak.com to learn more about this game. You can also find local hip hop and Junior Jazzercise classes for dance fitness.

Where

[Provide information on local dance and fitness opportunities if possible.]

You might try a high school, YMCA, Boys & Girls Club, church, or fitness club. You can also buy, rent, or borrow an instructional videotape or DVD to use at home by yourself or with your family and friends.

Equipment

For dance fitness, you will need a good pair of exercise shoes that support your feet well to prevent injury to your ankles, knees, hips, and back. Dress in comfortable, light clothes that allow you to move your arms and legs freely.

Safety Tips

To be safe while dancing for fitness, be sure to follow these safety tips:

- Always warm up and cool down.
- If you feel dizzy or light-headed, slow down or walk or jog in place briefly, check your heart rate, drink some water, and take time out! Stop if you are ever in pain.
- Follow your teacher's instructions carefully to avoid joint or muscle injury.

HOW-TO

1. Try developing some dance fitness routines with your friends.
2. Remember to start out slowly and gradually build to doing longer and tougher workouts.
3. Finally, remember to wear proper shoes and follow the safety tips.

Questions for Students

1. Do you know of any dance classes in town? What do they offer?
2. What kinds of songs give you the best workout?

PE Microunit 27

Calisthenics

☆ **Fitness tip:** Calisthenics are a great way to increase muscular endurance, strength, and flexibility.

What Are Calisthenics?

- Calisthenics are repetitive body movements that increase muscular strength, endurance, and flexibility using little or no equipment.
- The biggest advantage of this type of exercise is that you do not need any expensive equipment or clothing.

Examples of Calisthenics

- Some examples of calisthenics that work your upper body are
  - chin-ups,
  - dips,
  - push-ups, and
  - pull-ups.
- You can do a variety of abdominal curls (sit-ups) to work your abdominal muscles.
- You can do a variety of leg lifts and extensions to work your leg muscles.

Where

You can do calisthenics anywhere!

Equipment

You should wear loose-fitting clothing and comfortable athletic shoes when you are doing calisthenics.

Safety Tip

Warm up and cool down to avoid joint and muscle injury.

HOW-TO

1. Remember to warm up with light flexibility exercises before beginning your calisthenics exercises.
2. To increase your muscular endurance, gradually increase the number of times (repetitions) you do each exercise.
3. Be sure to include exercises that work all of your major muscle groups: trunk, arms, and legs.
4. Leave time for some stretching exercises at the end of your workout.
5. Try some calisthenics with your family.

Questions for Students

1. What is one major advantage of doing calisthenics?
2. Which components of fitness will calisthenics help you improve?

PE Microunit 28

Running, Jogging, and Fitness Walking

☆ **Fitness tip:** Distance running, jogging, and fitness walking are good for you and can be done anywhere. Go out and explore your neighborhood!

Running and Jogging

- Running and jogging are excellent forms of exercise that do not require learning any new skills.
- Running and jogging (a slower, less vigorous form of running) will improve your cardiorespiratory (aerobic) fitness and condition your leg muscles.
- The advantage of running and jogging is that you can run or jog almost anywhere or anytime—as long as it's not dark!

Fitness Walking

- Brisk walking is also a good form of cardiorespiratory exercise.
- You can walk practically anywhere. Just remember to walk with a buddy!
- Walking and talking can be a lot of fun!

Where

As long as it is safe, you can do these aerobic activities almost anywhere. Packed dirt and clay surfaces are better for your joints than concrete surfaces. Also, avoid roads with a lot of traffic.

Equipment

Dress for the weather—wear layers if it's cold; dress lightly if it's hot. You need good running or walking shoes; they can be expensive, but shoes are the only thing you have to buy. Have a salesperson at a sporting goods store explain the different shoes to you; do some comparison shopping before you buy. You will need shoes that fit you well, give your foot room to expand, and support and stabilize your heel. Running shoes should be loose in the toes and snug in the heel. Running in the wrong shoes can stress your feet, ankles, knees, hips, and spine.

Safety Tips

When you go running, be sure to follow these safety tips:

- Run with a buddy.
- Talk over your running route with your parents before you go.
- Don't run at night. Even at twilight, be sure to wear reflective gear.

HOW-TO

1. Warm up with flexibility exercises before running, jogging, or fitness walking.
2. In the beginning, set a pace slow enough to carry on a conversation. In time your body will figure out the best running pace.
3. Stop or slow down if you experience pain.
4. To avoid injuries, build up distance and speed gradually.
5. Keep your body straight and comfortable, shoulders dropped, elbows comfortably bent, and fingers lightly closed.
6. Cool down with gentle stretching after you finish your workout.

Questions for Students

1. Why is it better to run on packed dirt and clay surfaces than on concrete surfaces?
2. What is a good way to warm up before you walk, jog, or run?

PE Microunit 29

Swimming

☆ **Fitness tip:** Swimming is one of the best exercises for cardiorespiratory endurance and general conditioning.

Swimming Is One of the Best Exercises You Can Do!

- Long-distance swimming improves cardiorespiratory endurance.
- When you swim, you use almost every major muscle group in your body, promoting flexibility and strength.
- Because your body is supported by water, there is less risk of injury compared to some land sports.

Water Games Are Good Forms of Exercise, Too

- Remember, to keep fit, you need to keep moving.
- Water games such as water polo, sharks and minnows, and Marco Polo keep you moving and are fun to play.
- Going swimming with your friends or family can be a lot of fun.

Where

[Provide information on local swimming pools if possible. Check the Yellow Pages for help in locating swimming pools.]

You might try a high school, YMCA, Boys & Girls Club, or municipal pool.

Equipment

You will need goggles, a good swimsuit designed for swimming (for girls this means a one-piece suit with a racing back so your straps stay put), and possibly a bathing cap.

Safety Tips

To be safe when you swim, remember to follow these safety tips:

- Swim only where there are lifeguards.
- Swim with a buddy.
- The best way to enter the water is feet first. Never dive into shallow water or in places where you can't see the bottom—you may hit your head on a shallow bottom.
- Don't push, grab, or jump on others in the pool.
- If you are tired or get a cramp, float on your back and gently kick to shallow water.
- Never run on the pool decks.
- Always check out the pool rules before you go swimming.

HOW-TO

1. Learn to swim through a Red Cross or YMCA certified program, with qualified instructors.
2. When you are tired of swimming, try some games such as water basketball, water polo, tag, or whatever you can make up.

Questions for Students

1. What is one safety tip to remember when you go swimming?
2. Why is swimming one of the best exercises for you?

PE Microunit 30

Cycling

☆ **Fitness tip:** Cycling is an excellent cardiorespiratory exercise that helps build strong leg muscles.

Cycling Is Fun and It's Good for You!

- Cycling is an excellent cardiorespiratory (aerobic) exercise.
- It builds leg strength and is great cross-training for runners.
- It is a fun exercise that you can do either by yourself or with friends.

Choosing the Right Bike

- Many kinds of bicycles are available, but the important thing is to make sure your bike is the right size for you and works well.
- To make sure your bike is the right size, follow these tips. For a racing bike (dropped handlebars):
  - Make sure there is no more than an inch (2.54 centimeters) of clearance between you and the top tube.
  - Adjust the seat so your leg is just slightly bent at the bottom of your pedal stroke.
  - Adjust the handlebars to a comfortable height and angle.
- For a mountain bike:
  - Make sure there is a clearance of 2 to 3 inches (5 to 7.6 centimeters) between you and the top tube.
  - Adjust the seat so your leg is just slightly bent at the bottom of your pedal stroke.
  - Adjust the handlebars so you tilt slightly forward. Make sure your elbows are slightly bent and not locked.

Where

Use maps and guidebooks (sometimes free at bike shops) and ask around to find bike paths and roads with less traffic, or try biking off-road if you have a mountain bike. Find out if you have a converted rail trail nearby! Visit www.railstotrails.org.

Equipment

As with most sports, you can get very technical with bikes and buy all kinds of expensive extras. All you really need is a bike, comfortable clothes, sneakers, and a helmet. In time, when you are riding longer distances, you may consider getting some bike gloves, a bicycle pump, and tools.

Safety Tips

For maximum fun, follow these safety instructions:

- Always wear a helmet. Your helmet should fit comfortably and not move around on your head. Don't tilt your helmet back off your forehead—this exposes the front of your head to injury. Cyclists without helmets risk serious head injuries if they are hit by cars or fall off their bikes.
- Bike on sidewalks and trails if they are available. Watch for cars backing out of driveways.
- If you bike on the road, pay attention to the traffic. Enter the roadway when there is no traffic. Always ride on the right (not left) side, with the traffic. Keep to the edge; ride in a line, not beside your friends.
- Before turning, stop, look, listen, and use hand signals.
- Obey stop signs and traffic lights.
- Don't bike at night.
- Don't remove your bike's reflectors.
- Learn to change and patch a tire, and always carry your tools and a pump with you on long trips.

HOW-TO

1. If your bike has gears, use the easy gears to warm up.
2. Switch gears *before* you start climbing a hill.
3. Try to pedal at an even pace.
4. Shift gears to keep the pace you set.

Questions for Students

1. What side of the road should you ride on?
2. How can you tell whether a bike fits you properly?

PE Microunit 31

Yoga

☆ **Fitness tip:** Yoga builds strength, flexibility, balance, and focus, and it helps people feel calmer.

What Is Yoga?

Yoga is an ancient physical practice that integrates the body, mind, and spirit. It's not a religious practice. Yoga is all about you! It is not competitive. You learn and practice poses in a way that fits your abilities. The poses improve flexibility and strength in virtually all of your muscles. It's a great adjunct to other sports such as running or soccer, in which flexibility will help avoid injury. When you practice the poses, you clear your mind by paying attention to your breath and your body, which helps lots of yoga practitioners feel calmer and better about themselves.

Yoga Basics

A typical yoga practice uses the breath to guide your movements and is made up of poses that challenge your body and require you to focus. There are many styles of yoga (ranging from the meditative to the athletic). Most practices involve the following:

- Seated and standing poses, including some that involve balancing and others that involve twisting
- Holding a pose for several breaths and deepening the pose or stretch with each breath
- Focus on deep, slow breathing (the breath can be used as a point of focus, or as a prompt for moving from one position to the next)

Common Terms

Asana: Poses

Vinyasa: A series of poses done in a flowing manner

Pranayama: Breathing

Where

Yoga can be done as a class in school, or in a yoga studio. Many fitness and recreation centers offer yoga classes. It's best to learn the poses from a teacher who can make sure you're learning them right and help you with your body alignment. You can practice yoga poses in your home using a DVD, video, or book that you purchase or borrow from the library. One DVD to check out is *Yoga 4 Teens* by Christy Brock.

Equipment

All you really need to do yoga are comfortable clothes that allow you to move. You do not need shoes. Although some poses can be done on the floor or a rug, a yoga mat is useful to keep you from slipping and to provide a little cushioning. You may need blocks or pillows to help support you in some moves and poses. (Mats and props are provided by most yoga studios.)

Safety Tips

If taking a class outside of school, find a certified yoga instructor (see Web resources at the end of this microunit).

Do not push yourself into a pose; certain poses, if done incorrectly, can cause you to lose your balance or strain a muscle. Remember, yoga is neither a race nor a competition!

HOW-TO

1. Try taking a class with a friend, or try poses that rely on a partner.
2. Listen to the instructor and focus on your body, not on what others are doing.
3. Take your time to learn the poses, and practice.
4. Remember to breathe deeply! This not only helps you with challenging poses, but can also help you relax before bed or focus on a test at school.

Questions for Students

1. Are there any yoga studios or fitness centers near you? Can teens take classes there?
2. How does yoga improve fitness?
3. In addition to its fitness benefits, what else might yoga do for you?

Web Resources

www.yogasite.com/postures.html describes and illustrates basic postures to try.

www.yogamovement.com describes various yoga styles with tips for selecting the style that's right for you, and how to get started.

www.kidshealth.org/teen/food_fitness/exercise/yoga.html provides basic information on the benefits of yoga for teens.

Yoga Teaching Resources

www.yogakids.com focuses on elementary schools through a program, Tools for Schools, which brings yoga into the classroom and also connects you to certified yoga facilitators and trainers who specialize in children and adolescents.

www.yogaalliance.org has a database of certified instructors by location and style of yoga.

Nutrition Resources

American Heart Association. Dietary guidelines for children and adolescents: A guide for practitioners (*Circulation,* 2005; 112: 2061-2075; *Pediatrics,* 2006; 117: 544-559).

Find this resource online at http://circ.ahajournals.org/cgi/content/full/112/13/2061.

Hu, Frank B., and Willett, Walter C. 2002. Optimal diets for prevention of coronary heart disease. *Journal of the American Medical Association* 288: 2569-2578.

This article describes how more than 100 studies of diet and coronary heart disease (CHD) collectively show that a diet using nonhydrogenated unsaturated fat as the predominant form of dietary fat, whole grains as the main form of carbohydrate, an abundance of fruits and vegetables, and adequate omega-3 fatty acids can offer significant protection against CHD. Such a diet, together with regular physical activity, avoidance of smoking, and maintenance of a healthy body weight, may prevent the majority of cardiovascular disease in Western populations.

Koplan, J.P, Liverman, C.T., and Kraak, V.A., Eds. 2005. *Preventing childhood obesity: Health in the balance.* A report of the Institute of Medicine Committee on Prevention of Obesity in Children and Youth. Washington, DC: National Academics Press.

The report describes a vast array of factors that have contributed to the dramatic rise in the prevalence of overweight and obesity among children in the United States and outlines a prevention-focused action plan to reverse the trend.

National Institutes of Health and National Cancer Institute. 1995. *Time to take five: Eat 5 fruits and vegetables a day.* NIH publication 95-3862. (See pages 562-563.)

This pamphlet discusses the health rationale for eating five fruits and vegetables each day.

Popkin, Barry M., Armstrong, Lawrence E., Bray, George M., Caballero, Benjamin, Frei, Balz, and Willett, Walter C. 2006. A new proposed guidance system for beverage consumption in the United States. *American Journal of Clinical Nutrition* 83: 529-542.

This report provides guidance on the relative health and nutritional benefits and risks of various beverage categories.

U.S. Department of Health and Human Services. 2000. *Healthy people 2010,* conference edition, vols. I and II, www.healthypeople.gov/document.

This report describes national goals for health promotion, protection, prevention, and surveillance.

Dietary Guidelines for Americans

U.S. Department of Agriculture and U.S. Department of Health and Human Services. 2005. *Dietary guidelines for Americans,* 6th ed., www.healthierus.gov/dietaryguidelines.

In 2005 the U.S. Department of Agriculture and the U.S. Department of Health and Human Services released the sixth edition of the *Dietary Guidelines for Americans.* The new dietary guidelines pinpoint three basic messages to improve health and well-being:

1. Make smart choices from every food group.
   - Choose a variety of fruits and vegetables every day.
   - Make at least half your grains whole grains.
   - Select and prepare meat, poultry, beans, and milk products that are lean, low fat, or fat free.
2. Find your balance between food and physical activity.
   - Engage in at least 60 minutes of moderate to vigorous activity on most days of the week, while not exceeding caloric intake requirements.
3. Get the most nutrition out of your calories.
   - Choose and prepare foods and beverages with little added sugars or caloric sweeteners.
   - Keep total fat intake between 20 and 35 percent of calories, with most fat coming from sources of polyunsaturated and monounsaturated fat such as fish, nuts, and vegetable oils. For children ages 4 to 18 years, the recommended range is 25 to 35 percent.
   - Consume less than 10 percent of calories from saturated fat and keep trans fatty acid consumption as low as possible.

The *Dietary Guidelines for Americans* can be found online at www.healthierus.gov/dietaryguidelines/. To purchase printed copies of this 80-page report (Stock Number 001-000-04719-1), call the U.S. Government Printing Office toll free at (866) 512-1800, or access the GPO Online Bookstore at www.bookstore.gpo.gov.

A consumer booklet summarizing the *Dietary Guidelines for Americans* is also available. Download a PDF version of "Finding Your Way to a Healthier You: Based on the Dietary Guidelines for Americans," by visiting www.healthierus.gov/dietaryguidelines, or purchase printed copies of the booklet (Stock Number 001-000-04718-3) through the U.S. Government Printing Office as described earlier.

The U.S. Department of Agriculture also released a new Food Guide Pyramid in 2005 that can be found on page 560 or accessed online at www.mypyramid.gov.

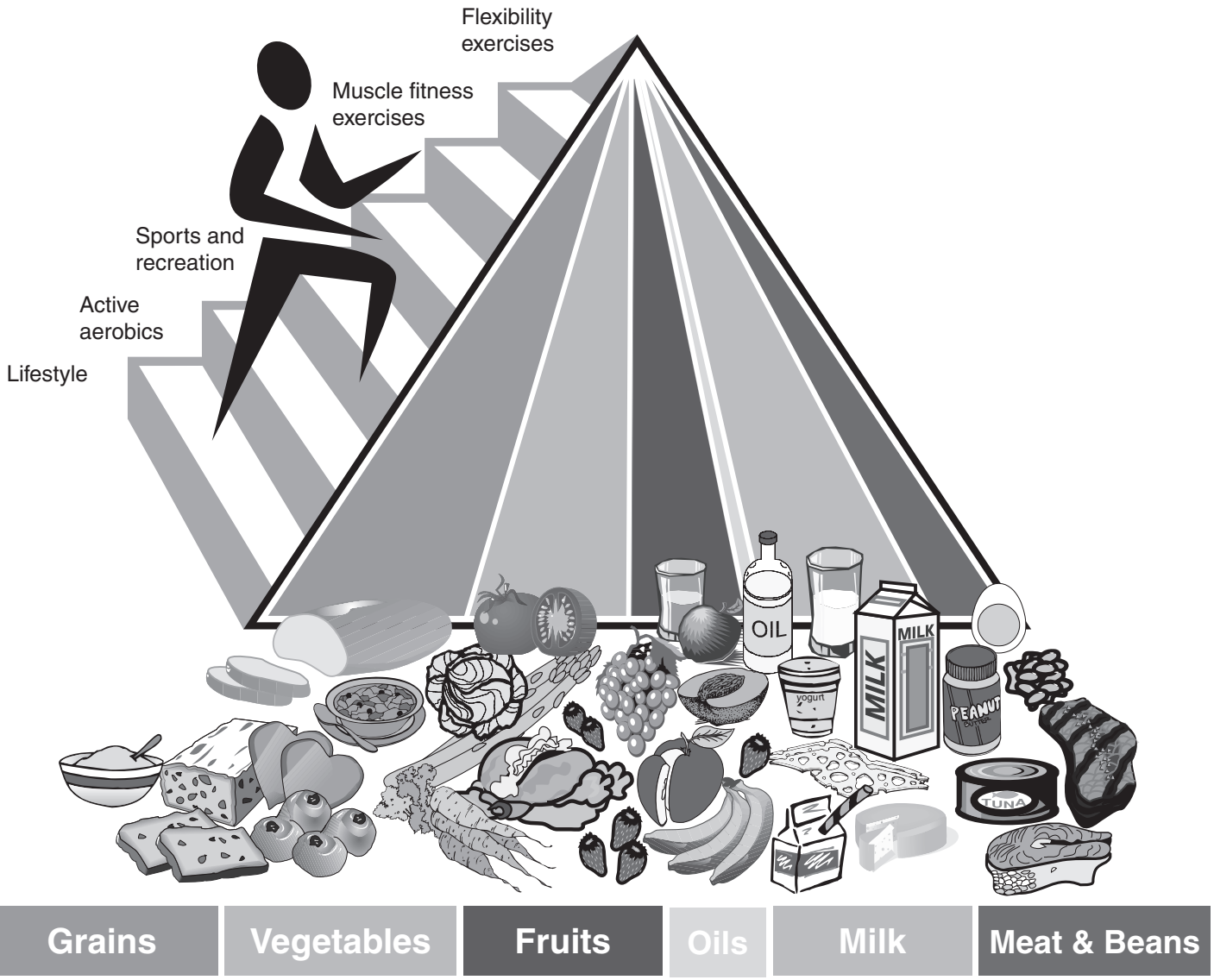
A Balanced Plate for Health

Everyday foods

"Sometimes" foods

The key to a balanced diet is to recognize that grains (especially whole grains),vegetables, and fruits are needed in greater proportion than are the foods from the meat, fish, and beans and milk groups.

USDA Food Guide Pyramid, 2005

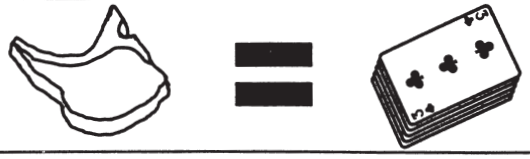


Reprinted from www.mypyramid.gov.

SEVEN WAYS TO SIZE UP YOUR SERVINGS

Measure food portions so you know exactly how much food you're eating.
When a food scale or measuring cups aren't handy, you can still estimate your portion. Remember:

1 3 ounces of meat is about the size and thickness of a deck of playing cards or an audiotape cassette.

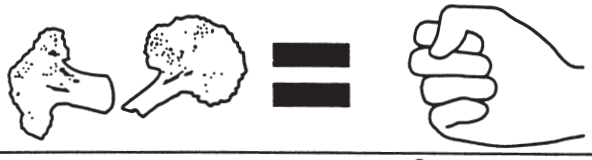


2 A medium apple or peach is about the size of a tennis ball.

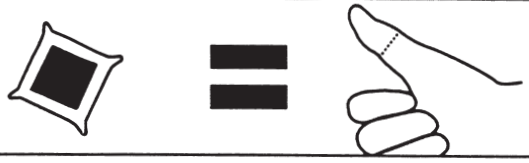
3 1 oz of cheese is about the size of 4 stacked dice.

4 ½ cup of ice cream is about the size of a racquetball or tennis ball.

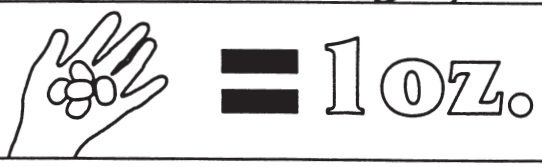
5 1 cup of mashed potatoes or broccoli is about the size of your fist.



6 1 teaspoon of butter or peanut butter is about the size of the tip of your thumb.



7 1 ounce of nuts or small candies equals one handful.



MOST IMPORTANT
Especially if you're cutting calories, remember to keep your diet nutritious.

- 2–4 servings from the Milk Group for calcium
- 2–3 servings from the Meat Group for iron
- 3–5 servings from the Vegetable Group for vitamin A
- 2–4 servings from the Fruit Group for vitamin C
- 6–11 servings from the Grain Group for fiber

Vegetables:

1. They're Easy to Fix and Serve
2. There Are So Many Choices
3. They're the Original Fast Food
4. They Taste Great
5. They're Good for Your Health

NATIONAL CANCER INSTITUTE

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
National Institutes of Health

NIH Publication No. 95-3862

This brochure is provided to you by:

TIME TO TAKE FIVE:

Eat 5 Fruits and Vegetables a Day

NATIONAL INSTITUTES OF HEALTH
National Cancer Institute

Facts on 5

PSSSSST! Want to be in on some hot news?? The word is that there are lots of reasons to eat more fruits and vegetables. You may already know that fruits and vegetables:

- are low in calories and fat
- are high in vitamins, minerals, and fiber
- taste great

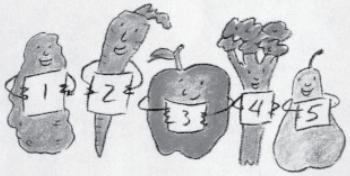
But, did you know that:

- Eating lots of fruits and vegetables as part of a low-fat, high-fiber diet may help reduce cancer risk?

And, did you know that:

- Fruits and vegetables are the original fast and easy food?

Getting 5 or more servings of fruits and vegetables a day is important to help you maintain your health. It's as simple as counting to five.



Reach for 5

Out of sight means out of mind. Make fruits and vegetables more visible at home and at work:

- **Keep a fruit bowl on the kitchen counter, table, or at the office.**
- **Store fruits and vegetables on a top shelf of the refrigerator.**

5 Count 'Em Up

What's a serving of fruits and vegetables? A serving is:

- 1 medium fruit or ½ cup of small or cut-up fruit
- ¾ cup of 100% fruit juice
- ¼ cup dried fruit
- ½ cup raw or cooked vegetables
- 1 cup raw leafy vegetables (such as lettuce, spinach)
- ½ cup cooked beans or peas (such as lentils, pinto beans, kidney beans)

Surveys show that most people are already eating 3 servings of fruits and vegetables a day. So, getting to 5 or more a day is easier than you think.

Here's how easy it can be to add 2 servings a day. Add a low-fat salad to lunch and crunch on an apple for a snack, and you've just done it. The possibilities are endless. Take a minute during the day and count up how many fruits and vegetables you've had already. Then you can plan for the other servings during the rest of the day.

5 A Day–Right Away

Everyone's hungry, and they want dinner now. What can you do to help get dinner ready quickly?

- **Make vegetables part of a quick dinner. Microwave or steam them–it only takes minutes.**
- **Add fruit–a quick, easy dessert.**

Alive with 5

Fruits and vegetables taste great and it's easy to eat more of them. Most fruits and vegetables are also low in calories and fat. There are other things that make them special, too. Research has suggested that people who eat diets with lots of fruits and vegetables may have lower risks for some cancers than people who eat few of these foods.

The fiber, vitamins, or other components in fruits and vegetables may be responsible for this protective effect. Fruits and vegetables are good sources of many nutrients. Some examples are included in the table below.

Eat a variety of vitamin-rich foods, including fruits and vegetables, rather than relying on vitamin and mineral supplements to help protect yourself from cancer.

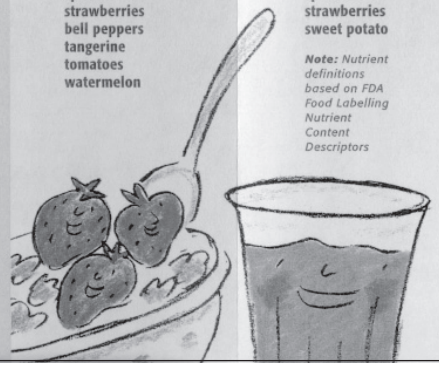
High in Vitamin A	High in Vitamin C	High in Fiber or Good Source of Fiber
apricots	apricots	apple
cantaloupe	broccoli	banana
carrots	Brussels sprouts	blackberries
kale, collards	cabbage	blueberries
leaf lettuce	cantaloupe	Brussels sprouts
mango	cauliflower	carrots
mustard greens	chili peppers	cherries
pumpkin	collards	cooked beans and peas (kidney, navy, lima, pinto, lentils, black-eyed peas)
romaine lettuce	grapefruit	dates
spinach	honey dew melon	figs
sweet potato	kiwi fruit	grapefruit
winter squash (acorn, hubbard)	mango	kiwi fruit
	mustard greens	orange
	orange	pear
	orange juice	prunes
	pineapple	raspberries
	plums	spinach
	potato with skin	strawberries
	spinach	sweet potato
	strawberries	
	bell peppers	
	tangerine	
	tomatoes	
	watermelon	

Note: Nutrient definitions based on FDA Food Labelling Nutrient Content Descriptors

5 on the Go

Want to start the day out right? Add fruit and/or juice in the morning.

- **drink 100% juice**
- **top your cereal with berries, banana, or peach**
- **top yogurt, pancakes, or waffles with fruit**
- **grab a piece of fruit or a canned fruit snack pack as you head out the door**



5 All Day

Need a pick-me-up? Have a fruit or vegetable snack.

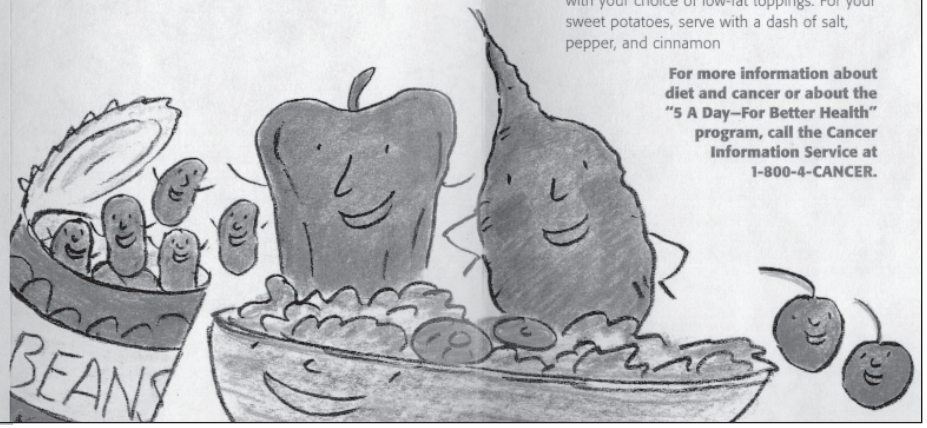
- **any time is a good time to snack on fruits and vegetables; try dried apples or apricots, applesauce, carrots, bananas, broccoli, and any others in the morning, after school, while reading or watching TV**
- **pack a piece of fruit or a packet of dried fruit in your pocket, briefcase or backpack so it's there when you want it**

In Season with 5 A Day

Fruits and vegetables come in all sizes, shapes, and a lot of colors. They are available fresh, frozen, canned, and dried. And, they all count towards getting your 5 A Day. These days, the only limit to your choices is your imagination.

- Crave some strawberries in December? Your supermarket freezer case will have them.
- Want to whip up some quick bean tacos? Just reach for a can of pinto beans.
- Interested in a jazzy salad to go with dinner? The salad bar will have fresh vegetables to make it easy. Add some garbanzo beans and beets for crunch and color.
- Hungry for a snack? Have a sweet, crunchy red pepper, pear or a snack pack of prunes.
- Thirsty? Just pour some 100% fruit juice into a glass, add some ice, and enjoy.

When you shop, get the fresh fruits and vegetables you want. Then stock up on some frozen, canned, and dried varieties as well. That way, you won't run out before you get to the store the next time.



5 A Day– 5 Minutes Away

Many are ready to go when you are. What could be faster than:

- a box of raisins
- a banana
- grapes
- cherry tomatoes
- carrot sticks

For vegetables that need preparation, a finished dish is only a few minutes away:

- steam broccoli spears for 5 minutes and sprinkle with lemon juice
- add frozen green peas and corn to a beef stew or chicken casserole for the last 5 minutes of cooking
- stir-fry thin slices of zucchini and yellow squash for 1 minute in a teaspoon of oil; sprinkle with parmesan cheese
- pierce a baked or medium sweet potato with a fork in several places; microwave on high for 4–5 minutes. Serve the baked potato with your choice of low-fat toppings. For your sweet potatoes, serve with a dash of salt, pepper, and cinnamon

For more information about diet and cancer or about the "5 A Day–For Better Health" program, call the Cancer Information Service at 1-800-4-CANCER.

Appendix B

Physical Activity Resources

Government Resources

Centers for Disease Control and Prevention, fact sheets on physical activity, www.cdc.gov/HealthyYouth/PhysicalActivity (accessed June 28, 2006).

The fact sheet "Physical Activity and the Health of Young People" provides information on physical activity levels among youth and lists the health benefits of physical activity. For more information, contact the Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Adolescent and School Health, 4770 Buford Highway NE, MS K-12, Atlanta, GA 30341-3717; 1-888-231-6405 or HealthyYouth@cdc.gov.

Physical Activity Guidelines

Ainsworth, B.E., Haskell, W.L., Whitt, M.C., Swartz, A.M., Strath, S.J., O'Brien, W.L., Bassett, D.R. Jr., Schmitz, K.H., Emplaincourt, P.O., Jacobs, D.R. Jr., and Leon, A.S. 2000. Compendium of physical activities: An update of activity codes and MET intensities. *Medicine & Science in Sports & Exercise* 32 (9 Suppl): S498-504. (See the excerpt on the following pages.)

This journal article contains a list of MET values (rate of energy expenditure) for many activities that is updated from the authors' original 1993 article.

National Association for Sport & Physical Education. 2004. *Physical activity for children: A statement of guidelines for children ages 5-12,* 2nd ed. Reston, VA: Author.

This report provides information concerning how much physical activity is appropriate for preadolescent children (ages 5 to 12).

U.S. Department of Health and Human Services. 2000. *Healthy people 2010*, conference edition, vols. I and II, www.health.gov/document.

This report describes national goals for health promotion, protection, prevention, and surveillance.

Compendium of Physical Activities: Classification of Energy Costs of Human Physical Activities

A coding scheme was originally presented in 1993 and updated in 2000 for classifying physical activity by the rate of energy expenditure; that is, by intensity. Energy cost was established by a review of published and unpublished data. This coding scheme employs five digits that classify activity by purpose (i.e., sports, occupation, self-care), the specific type of activity, and its intensity as the ratio of work metabolic rate to resting metabolic rate (METs). Energy expenditure in kilocalories or kilocalories per kilogram of body weight can be estimated for all activities, specific activities, or activity types. The updated version includes two new major headings of volunteer and religious activities, extends the number of specific activities from 477 to 605, and provides updated MET intensity levels for selected activities.

METs for Selected Activities

Activity	METs	Activity	METs
Bicycling		**Lawn and garden**	
< 10 mph (16 km/h)	4.0	Mowing lawn, hand mower	6.0
10-11.9 mph (16-19 km/h), light effort	6.0	Mowing lawn, power mower	4.5
12-13.9 mph (19.2-22.2 km/h), moderate effort	8.0	Raking leaves	4.3
14-15.9 mph (22.4-25.4 km/h), vigorous effort	10.0	Shoveling snow	6.0
Dancing		**Running**	
General	4.5	Jogging, general	7.0
Aerobic, general	6.5	Running, cross-country	9.0
Aerobic, low impact	5.0	Running, general	8.0
Aerobic, high impact	7.0	Running up stairs	15.0
Home activities (chores)		**Sports**	
Cleaning house, general	3.0	Baseball	5.0
Washing dishes	2.3	Basketball, game	8.0
Cooking or food preparation	2.5	Rope jumping, moderate	10.0
Child care	3.0	Skateboarding	5.0

(continued)

Activity	METs	Activity	METs
Walking		**Sports *(continued)***	
Hiking, cross-country	6.0	Skating, roller	7.0
Race walking	6.5	Soccer, general	7.0
Walking, moderate pace	3.3	Ultimate Frisbee	8.0
Walking, vigorous pace	3.8	**Water activities**	
Winter activities		Canoeing, rowing, moderate effort	7.0
Skating, ice, general	7.0	Canoeing, rowing, vigorous effort	12.0
Skiing, cross-country	8.0	Swimming laps, moderate effort	7.0
Skiing, downhill, moderate effort	6.0	Swimming laps, vigorous effort	10.0
Skiing, downhill, vigorous effort	8.0	**Miscellaneous**	
Inactivity		Sitting, reading	1.3
Watching TV	1.0	Sitting, studying	1.8
Sleeping	0.9	Sitting, in class	1.8
Reading	1.0		
Talking on phone	1.0		
Conditioning			
Calisthenics, moderate effort	3.5		
Calisthenics, vigorous effort	8.0		
Weightlifting, light effort	3.0		
Weightlifting, vigorous effort	6.0		

Television Viewing and Other Screen Time Resources

Gortmaker, S.L., Must, A., Sobol, A.M., Peterson, K., Colditz, G.A., and Dietz, W.H. 1996. Television viewing as a cause of increasing obesity among children in the United States, 1986-1990. *Archives of Pediatrics & Adolescent Medicine* 150: 356–362.

This article provides evidence that excessive TV viewing contributes to obesity and suggests that decreasing TV time can help prevent this health condition.

Gortmaker, S.L., Peterson, K., Wiecha, J., Sobol, A.M., Dixit, S., Fox, M.K., and Laird, N. 1999. Reducing obesity via a school-based interdisciplinary intervention among youth: *Planet Health*. *Archives of Pediatrics and Adolescent Medicine* 153: 409-418.

This study shows how the *Planet Health* materials lead to reductions in TV viewing among both boys and girls and improvements in dietary intake as well as reduced obesity in girls.

Hancox, R.J., Milne, B.J., and Poulton, R. 2004. Association between child and adolescent television viewing and adult health: A longitudinal birth cohort study. *Lancet* 364 (9430): 257-262.

This study demonstrates a positive association between childhood television viewing and negative adult health outcomes at 26 years, such as overweight, elevated serum cholesterol, smoking, and poor fitness.

Henry J. Kaiser Family Foundation. 2004, February. Issue brief: The role of media in childhood obesity, www.kff.org.

This report reviews more than 40 studies and concludes that children who spend the most time with media are more likely to be overweight.

Henry J. Kaiser Family Foundation. 2005, March. *Generation M: Media in the lives of 8- to 18-year-olds* (A Kaiser Family Foundation study), www.kff.org.

This study examined media use among a nationally representative sample of more than 2,000 3rd- through 12th-graders who completed detailed questionnaires, including nearly 700 self-selected participants who also maintained seven-day media diaries.

Institute of Medicine. 2005. *Food marketing to children and youth: Threat or opportunity?* National Academy Press, www.iom.edu/kidsfoodmarketing.

Read and purchase the report at www.nap.edu. Download fact sheets and the executive summary at www.iom.edu/kidsfoodmarketing. This report explores what is known about current food and beverage marketing practices, the influence of these practices on the diets and health of children and youth, and public and private strategies that can be used to promote healthful food and beverage choices in children and youth.

Wiecha, J.L., Peterson, K.E., Ludwig, D.S., Kim, J., Sobol, A., and Gortmaker, S.L. 2006. When children eat what they watch: Impact of television viewing on dietary intake in youth. *Archives of Pediatric & Adolescent Medicine* 160 (4): 436-442.

This article shows how increases in TV viewing can lead to excess intake of food (in particular, foods that are heavily advertised on TV) including sugar-sweetened beverages and fast food.

Appendix D

Social Studies Resources

Massachusetts Resources

The following resources are specific to Massachusetts but can be used to provide an example of how a state makes a law. You should be able to find government resources for your own state at your state's Web page. To obtain the following resources, contact the Secretary of the Commonwealth, Tours and Government Education Division, State House Room 194, Boston, MA 02133 (phone 617-727-3676), or visit the listed Web sites.

- "The Ladybug Story: A Story About Lawmaking." This resource on lawmaking for students tells how a second-grade class worked to have the ladybug named the official Massachusetts state bug: www.sec.state.ma.us/cis/ciskidlbs/lbsidx2.htm.
- Lawmaking in Massachusetts. This resource on lawmaking for the teacher provides a more detailed description of the lawmaking process and includes a glossary of important terms: www.mass.gov/legis/lawmaking.htm.

The Ladybug Story: A Story About Lawmaking

This is a true story about Ms. Pamela Johnson's second-grade class at the Kennedy School in Franklin, Massachusetts. One day Ms. Johnson told the class that, by law, there is a state bird—the chickadee—and state tree—the American Elm—and a state fish—the cod.

"What about a state bug?" somebody asked. "Do we have one?"
"No," said the teacher.
"I think there should be a state bug," said one little boy.
"I think so too," said a little girl, "and I think it should be a ladybug." All of the children agreed.
"What a good idea," said their teacher. "Maybe our class can make the ladybug the state bug. Maybe we can help make it a law!"

All of the boys and girls began to talk excitedly. They agreed that they would like very much to try. It would take a long time, the teacher told them, but in the end it would be worth it.

The class learned that everyone who lives in Massachusetts has the right to give legislators, the men and women who make the laws, ideas for new laws. This right is called the right of free petition. So Ms. Johnson wrote to the State House, the capitol building in Boston, and in a few days the class received a petition form. They wrote their idea about a state bug on the special form. Then, Ms. Johnson told them, they would have to get their petition signed by a legislator.

She explained that there are two kinds of legislators: representatives, who speak for one or two towns, and senators, who speak for several towns. They found out that their town, Franklin, has its own senator and its own representative. So the children wrote to their representative. He wrote back to say that he would be glad to sign the petition. After their petition was signed, it began its long journey to becoming a law.

The class decided to find out everything that would happen to their petition on its journey and make sure to be there when anything important happened along the way. First, their petition had to become a bill. The House Clerk in the House of Representatives takes care of this. He read their ladybug petition and gave it its own number, H.5155. Then, he had to decide which of the committees in the House of Representatives to send the bill to. Different committees study different kinds of subjects. When the House Clerk picked the right committee, he had copies of the bill made and sent to all of the senators and representatives on the committee so they could study it.

Meanwhile, at school, the children in Ms. Johnson's class were busy making ladybug costumes to wear when the time came for them to visit the State House. They wanted to show everyone there how much they really cared about making the ladybug the official bug!

When the class heard which committee was studying their bill, they wrote to find out when their bill would be "heard." A committee has a public hearing for each bill it studies. At a hearing, anyone can come and say why he or she thinks a bill should or should not be made a law or passed into law.

On the day of the public hearing, Ms. Johnson's second grade class dressed in ladybug costumes, got on the yellow school bus, and rode all the way to Boston to the State House. They walked inside the enormous building with the shiny golden dome and into the room where the hearing was being held. They wanted to testify—to tell the legislators about their idea.

When it was their turn, some of the boys and girls stood up and told the legislators why they thought it would be a wonderful idea to make the ladybug the official state bug. "They're so beautiful with their shiny orange backs and bold black spots," they said, "and they can be found in everyone's backyard."

The committee listened very carefully while the children explained how they felt. Then the committee had to decide what to tell all the legislators, who would later vote on the new idea. You will be glad to hear that the committee told the House of Representatives that they believed the ladybug bill should be passed into law! The class was very happy.

A few weeks later, Ms. Johnson's class got back on the school bus and headed for Boston. It was the day that all of the representatives were going to discuss the ladybug bill for the first time.

This time the class went to the beautiful chambers of the House of Representatives. They stood high up in a balcony where they could see and hear everything that was happening.

The class found out that there are three readings of every bill before a final vote can be taken. So between the three readings, the class visited some of the representatives in their offices and wrote to others to ask them to vote for the bill.

The House of Representatives voted for the ladybug bill, and then sent it to the Senate to be read and voted on again. The children once again returned to Boston and this time they sat in the gallery of the Senate chamber to hear the Senators talk about the ladybug bill. The Senate also liked the bill and wanted it to be made into a new law. The children cheered!

Now the bill was printed on very special paper called parchment and sent back to the House of Representatives for a final vote called enactment. Soon, the Senate also did the same.

At last, the bill could go to the governor. If he agreed that the ladybug should be the state bug, he would sign the bill. The governor agreed! He invited Ms. Johnson's second grade class to be there when he wrote his signature on the bill.

They all wore their best clothes and piled once again into the bus to make the last, familiar journey to the State House in Boston. They walked up the grand staircase to the governor's office and watched as he signed their bill into law. They were very proud.

And that is how the ladybug came to be the official state bug of Massachusetts.

Massachusetts Curriculum Frameworks

Following are some examples of alignment between *Planet Health* and the Massachusetts Curriculum frameworks.

From Massachusetts Department of Education.

Lesson	Theme	Subject	Learning standard/strand
Lesson 1 Do you Make Space for Fitness and Nutrition?		Comprehensive Health English Language Arts Mathematics	Physical health strand (standards physical activity and fitness and nutrition) Language strand (standards 1 and 2) Composition strand (standards 19 and 23) Patterns, Relations, and Algebra Data Analysis, Statistics, and Probability
Lesson 2 Power Down: Charting TV Viewing Time	Lifestyle	Comprehensive Health English Language Arts Mathematics	Physical health strand (standards: physical activity and fitness and nutrition) Language strand (standards 1 and 2) Composition strand (standards 19 and 23) Patterns, Relations, and Algebra Data Analysis, Statistics, and Probability
Language Arts			
Lesson 3 Food Power	Balanced diet	Comprehensive Health English Language Arts	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 3) Literature strand (standard 9) Composition strand (standards 19 and 23)
Lesson 4 Carbohydrate: Energy Food	Balanced diet	Comprehensive Health English Language Arts	Physical health strand (standard: nutrition) Language strand (standard: 1, 2, and 4) Literature strand (standards 9, 10, 11, and 15) Composition strand (standard 20)
Lesson 5 The Language of Food	Fruits and vegetables	Comprehensive Health English Language Arts	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standards 9 and 13) Composition strand (standards 19 and 23)

(continued)

Lesson	Theme	Subject	Learning standard/strand
Language Arts *(continued)*			
Lesson 6 Keep It Local	Fruits and vegetables	Comprehensive Health English Language Arts	Physical health strand (standard: nutrition) Personal and community health strand (community and public health standard) Language strand (standards 1, 2, 3, and 4) Literature strand (standards 9, 10, 13, and 15) Composition strand (standard 20)
Lesson 7 Write a Fable: Important Messages About Activity	Activity	Comprehensive Health English Language Arts	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, and 4) Literature strand (standards 9 and 10) Composition strand (standards 20 and 22)
Lesson 8 Go for the Goal	Activity	Comprehensive Health English Language Arts	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, and 4) Literature strand (standards 9 and 11)
Lesson 9 Lifetime Physical Activities: Research One, Describe One, Try One!	Lifestyle	Comprehensive Health English Language Arts	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, 3, and 4) Literature strand (standard 9) Composition strand (standards 19 and 22)
Lesson 10 Choosing Healthy Foods	Lifestyle	Comprehensive Health English Language Arts	Physical health strand (standard: nutrition) Language strand (standards 1, 2, 3, and 4) Literature strand (standard 9) Media strand (standard 27)
Math			
Lesson 11 Problem Solving: Making Healthy Choices	Balanced diet	Comprehensive Health English Language Arts Mathematics	Physical health strand (standard: nutrition) Language strand (standards 1, 2, 3, and 4) Literature strand (standard 9) Number Sense and Operations Patterns, Relations, and Algebra
Lesson 12 Figuring Out Fat	Balanced diet	Comprehensive Health English Language Arts Mathematics	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Number Sense and Operations Patterns, Relations, and Algebra
Lesson 13 Looking for Patterns: What's for Lunch?	Balanced diet	Comprehensive Health English Language Arts Mathematics	Physical health strand (standard: nutrition) Language strand (standards 1, 2, 3, and 4) Literature strand (standard 9) Patterns, Relations, and Algebra Data Analysis, Statistics, and Probability
Lesson 14 Apples, Oranges, and Zucchini: An Algebra Party	Fruits and vegetables	Comprehensive Health English Language Arts Mathematics	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Patterns, Relations, and Algebra

Lesson	Theme	Subject	Learning standard/strand
Lesson 15 Plotting Coordinate Graphs: What Does Your Day Look Like?	Activity	Comprehensive Health English Language Arts Mathematics	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Patterns, Relations, and Algebra
Lesson 16 Survey the Class	Activity	Comprehensive Health English Language Arts Mathematics	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Data Analysis, Statistics, and Probability
Lesson 17 Circle Graphs: Where Did the Day Go?	Lifestyle	Comprehensive Health English Language Arts Mathematics	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Composition strand (standard 19) Number Sense and Operations Patterns, Relations, and Algebra Measurement Geometry
Lesson 18 Energy Equations	Lifestyle	Comprehensive Health English Language Arts Mathematics	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Composition strand (standard 19) Number Sense and Operations Patterns, Relations, and Algebra Data Analysis, Statistics, and Probability
Science			
Lesson 19 Passing the Sugar	Balanced diet	Comprehensive Health English Language Arts Mathematics Science and Technology/ Engineering	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Measurement Life Science (Biology) (strand 2) Physical Sciences (Chemistry and Physics) (strand 3)
Lesson 20 Mighty Minerals: Calcium and Iron	Balanced diet	Comprehensive Health English Language Arts Science and Technology/ Engineering	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Composition strand (standard 19) Life Science (Biology) (strand 2)
Lesson 21 Fat Functions	Balanced diet	Comprehensive Health English Language Arts Science and Technology/ Engineering	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Life Science (Biology) (strand 2)

(continued)

Lesson	Theme	Subject	Learning standard/strand
Science *(continued)*			
Lesson 22 Smart Snacks	Balanced diet	Comprehensive Health English Language Arts Science and Technology/ Engineering	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Life Science (Biology) (strand 2)
Lesson 23 The Plants We Eat	Fruits and vegeta-bles	Comprehensive Health English Language Arts Science and Technology/ Engineering	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Life Science (Biology) (strand 2)
Lesson 24 Foods for Energy	Activity	Comprehensive Health English Language Arts Science and Technology/ Engineering	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Life Science (Biology) (strand 2)
Lesson 25 Muscle Mysteries	Activity	Comprehensive Health English Language Arts Science and Technology/ Engineering	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Life Science (Biology) (strand 2)
Lesson 26 The Human Heart	Lifestyle	Comprehensive Health English Language Arts Science and Technology/ Engineering	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Life Science (Biology) (strand 2)
Lesson 27 How Far Can You Jump?	Lifestyle	Comprehensive Health English Language Arts Science and Technology/ Engineering	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Life Science (Biology) (strand 2)

Lesson	Theme	Subject	Learning standard/strand
Social Studies			
Lesson 28 Food Through the Ages	Balanced diet	Comprehensive Health English Language Arts History and Social Science	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Composition strand (standard 19) History standard (world history 1.7c)
Lesson 29 Democracy and Diet	Balanced diet	Comprehensive Health English Language Arts History and Social Science	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Composition strand (standard 19) Civics and government standard (U.S. history, 13-19)
Lesson 30 Global Foods	Fruits and vegeta-bles	Comprehensive Health English Language Arts History and Social Science	Physical health strand (standard: nutrition) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Composition strand (standard 19) Geography standard
Lesson 31 Around the World With Five a Day	Fruits and vegeta-bles	Comprehensive Health English Language Arts History and Social Science	Physical health strand (standard: nutrition) Language strand (standards 1, 2, 3, and 4) Literature strand (standard 9) Composition strand (standard 19) History standard Geography standard
Lesson 32 Map Maker	Activity	Comprehensive Health English Language Arts History and Social Science	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Composition strand (standard 19) Geography standard
Lesson 33 Free to Be Fit	Activity	Comprehensive Health English Language Arts History and Social Science	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Composition strand (standard 19) Civics and government standard (U.S.I. 14, 15, 17, 19, 21)

(continued)

Lesson	Theme	Subject	Learning standard/strand
		Science *(continued)*	
Lesson 34 Impact of Technology	Lifestyle	Comprehensive Health English Language Arts History and Social Science	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, and 4) Literature strand (standard 9) Composition strand (standard 19) History standard (U.S.I. 27-29) Geography standard Economics standard
Lesson 35 Food Rituals and Society	Lifestyle	Comprehensive Health English Language Arts History and Social Science	Physical health strand (standard: physical activity and fitness) Language strand (standards 1, 2, 3, and 4) Literature strand (standard 9) Composition strand (standard 19) History standard Geography standard

Following are descriptions of some of the Massachusetts Curriculum Frameworks. For additional details and current updates, go to www.doe.mass.edu/frameworks.

Comprehensive Health

Physical Activity and Fitness standard: Students will, by repeated practice, acquire and refine a variety of manipulative, locomotor, and nonlocomotor movement skills, and will utilize principles of training and conditioning, will learn biomechanics and exercise physiology, and will apply the concept of wellness to their lives.

Nutrition standard: Students will gain the knowledge and skills to select a diet that supports health and reduces the risk of illness and future chronic diseases.

Community and Public Health standard: Students will learn the influence of social factors on health and contribution of public health, and will gain skills to promote health and to collaborate with others to facilitate healthy, safe, and supportive communities.

English Language Arts

Standard 1: Discussion (Language Strand): Students will use agreed-upon rules for informal and formal discussions in small and large groups.

Standard 2: Questioning, Listening, and Contributing (Language Strand): Students will pose questions, listen to the ideas of others, and contribute their own information or ideas in group discussions or interviews in order to acquire new knowledge.

Standard 3: Oral Presentation (Language Strand): Students will make oral presentations that demonstrate appropriate consideration of audience, purpose, and the information to be conveyed.

Standard 4: Vocabulary and Concept Development (Language Strand): Students will understand and acquire new vocabulary and use it correctly in reading and writing.

Standard 9: Making Connections (Reading and Literature Strand): Students will deepen their understanding of a literary or nonliterary work by relating it to its contemporary context or historical background.

Standard 10: Genre (Reading and Literature Strand): Students will identify, analyze, and apply knowledge of the characteristics of different genres.

Standard 11: Theme (Reading and Literature Strand): Students will identify, analyze, and apply knowledge of theme in a literary work and provide evidence from the text to support their understanding.

Standard 15: Style and Language (Reading and Literature Strand): Students will identify and analyze how an author's words appeal to the senses, create imagery, suggest mood, and set tone, and provide evidence from the text to support their understanding.

Standard 19: Writing (Composition Strand): Students will write with a clear focus, coherent organization, and sufficient detail.

Standard 20: Consideration of Audience and Purpose (Composition Strand): Students will write for different audiences and purposes.

Standard 22: Standard English Conventions (Composition Strand): Students will use knowledge of standard English conventions in their writing, revising, and editing.

Standard 23: Organizing Ideas in Writing (Composition Strand): Students will organize ideas in writing in a way that makes sense for their purpose.

Standard 27: Media Production (Media Strand): Students will design and create coherent media productions (audio, video, television, multimedia, Internet, emerging technologies) with a clear controlling idea, adequate detail, and appropriate consideration of audience, purpose, and medium.

Mathematics

In the curriculum framework, five strands organize the mathematical content: 1) Number Sense and Operations, 2) Patterns, Relations, and Algebra, 3) Geometry, 4) Measurement, and 5) Data Analysis, Statistics, and Probability.

Science and Technology/Engineering

Strand 2: Life Science (Biology): The life sciences investigate the diversity, complexity, and interconnectedness of life on earth. Students are naturally drawn to examine living things, and as they progress through the grade levels, they become capable of understanding the theories and models that scientists use to explain observations of nature.

Strand 3: Physical Sciences (Chemistry and Physics): The physical sciences (physics and chemistry) examine the physical world around us. Using the methods of the physical sciences, students learn about the composition, structure, properties, and reactions of matter and the relationships between matter and energy.

History and Social Science

In the curriculum framework, the four disciplines of history, geography, economics, and civics and government are integrated in the learning standards.

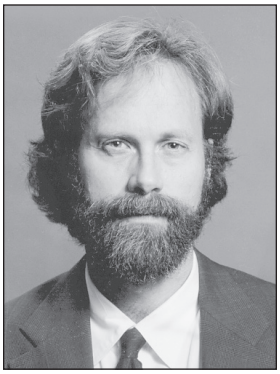
About the Authors

Jill Carter, MA, EdM, is wellness coordinator for Boston Public Schools. For the past 10 years, she has worked on curriculum development, implementation, training, and research of school-based nutrition and physical activity programs. From 1996 to 1997 she was the curriculum development coordinator for the School-Based Wellness Initiative in the department of health and social behavior at the Harvard School of Public Health. Ms. Carter's years of experience as a high school and middle school science teacher provided her with the experience to design a curriculum that encourages active, inquiry-based learning across multiple disciplines. She earned her master of education degree in teaching and curriculum from Harvard University and her master of arts degree in exercise physiology from the University of Iowa.

Jean Wiecha, PhD, is a senior research scientist for the Harvard School of Public Health. Dr. Wiecha's research focuses on improving children's nutrition and physical activity habits. She has been working in the field for over 20 years and has published numerous studies on child nutrition and prevention of obesity. From 1994 to 1997, as a project director for the School-Based Wellness Initiative in the department of health and social behavior at the Harvard School of Public Health, she managed the federal research grant to develop, implement, and evaluate *Planet Health*. Dr. Wiecha earned her doctoral and master of science degrees in human nutrition from Tufts University.

Karen E. Peterson, ScD, is an associate professor of nutrition in the departments of nutrition and of society, human development and health at the Harvard School of Public Health. As director of public health nutrition, she oversees a program of translational research and graduate training focused on solving nutrition-related public health problems through leadership, innovation, and partnership. She draws from 15 years of experience counseling and administering nutrition services for children in clinical, community, and state health care settings. Dr. Peterson was coprincipal investigator of the Planet Health intervention trial. She earned her doctorate in nutrition from the Harvard School of Public Health.

Suzanne Nobrega, MS, is an independent project consultant in health communications and is project manager for a worksite health promotion intervention study. Both her master of science and bachelor of science degrees are in nutritional science, and she has over 15 years of experience in program management and materials development for health promotion programs aimed at children and families.



Steven L. Gortmaker, PhD, is a senior lecturer in the department of health and social behavior at the Harvard School of Public Health and principal investigator and director of the Harvard Research Prevention Center. He was also principal investigator of the Planet Health intervention trial. For the past 20 years, he has researched and practiced in the areas of children's nutrition and physical activity and has published more than 80 research articles. He was involved in early studies to document the increase of obesity in young people and television viewing as a cause of obesity. He earned his doctorate in sociology from the University of Wisconsin at Madison.

CD-ROM User Instructions

System Requirements

You can use this CD-ROM on either a Windows®-based PC or a Macintosh computer.

Microsoft Windows®

- IBM PC compatible with Pentium® processor
- Windows® 98/2000/XP
- Adobe Reader® 8.0
- Microsoft® PowerPoint® Viewer 2003 (included)
- 4x CD-ROM drive

Macintosh®

- Power Mac® required
- System 10.4 or higher
- Adobe Reader® 8.0
- Microsoft® PowerPoint® Viewer OS9 or OS10 (included)
- 4x CD-ROM drive

User Instructions

Microsoft Windows®

1. Insert the *Planet Health* CD-ROM. (Note: The CD-ROM must be present in the drive at all times.)
2. Select the "My Computer" icon from the desktop.
3. Select the CD-ROM drive.
4. Open the file you wish to view. See the "Start.pdf" file for a list of the contents.

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3. Open the file you wish to view. See the "Start.pdf" file for a list of the contents.

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