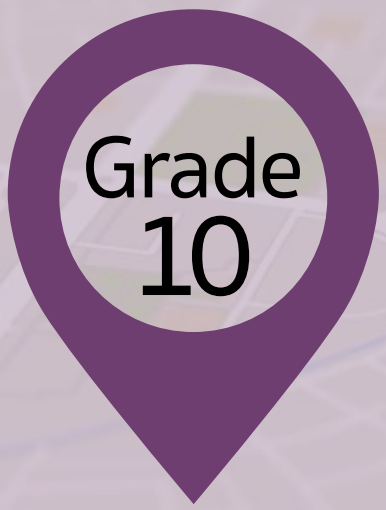
Healthy Living

STEM Road Map for High School



Edited by Carla C. Johnson,
Janet B. Walton, and Erin Peters-Burton

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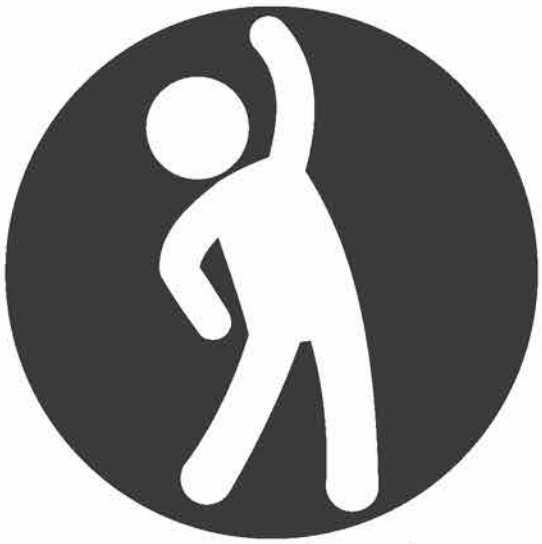

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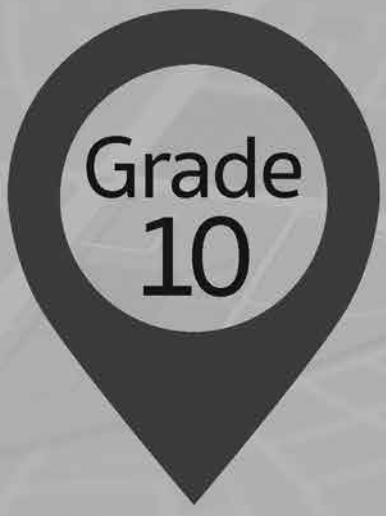

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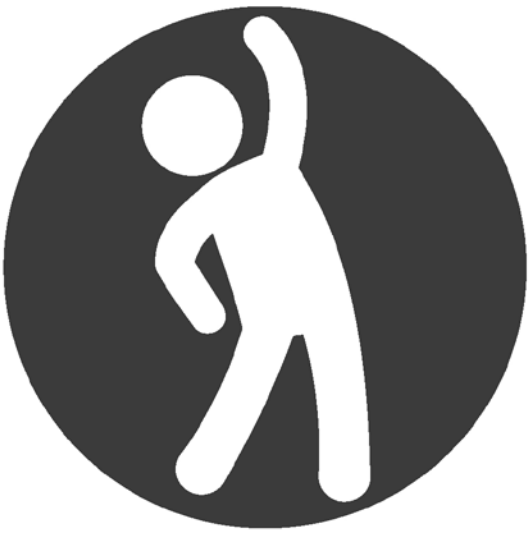

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STEM Road Map for High School

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nsta Press
National Science Teaching Association
Arlington, Virginia

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Dr. Erin Peters-Burton is the Donna R. and David E. Sterling endowed professor in science education at George Mason University in Fairfax, Virginia. She uses her experiences from 15 years as an engineer and secondary science, engineering, and mathematics

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teacher to develop research projects that directly inform classroom practice in science and engineering. Her research agenda is based on the idea that all students should build self-awareness of how they learn science and engineering. She works to help students see themselves as "science-minded" and help teachers create classrooms that support student skills to develop scientific knowledge. To accomplish this, she pursues research projects that investigate ways that students and teachers can use self-regulated learning theory in science and engineering, as well as how inclusive STEM schools can help students succeed. During her tenure as a secondary teacher, she had a National Board Certification in Early Adolescent Science and was an Albert Einstein Distinguished Educator Fellow for NASA. As a researcher, Dr. Peters-Burton has published more than 100 articles, books, book chapters, and curriculum books focused on STEM education and educational psychology. She received the Outstanding Science Teacher Educator of the Year award from ASTE in 2016 and a Teacher of Distinction Award and a Scholarly Achievement Award from George Mason University in 2012, and in 2010 she was named University Science Educator of the Year by the Virginia Association of Science Teachers.

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3

HEALTHY LIVING MODULE OVERVIEW

Jennifer Drake-Patrick, Anthony Pellegrino, Erin Peters-Burton, Bradley D. Rankin, Susan Poland, Janet B. Walton, and Carla C. Johnson

THEME: Cause and Effect

LEAD DISCIPLINE: Science

MODULE SUMMARY

Messages about being healthy permeate society. In this module, students explore the concept of healthy living by thinking like a cell biologist, nutrition scientist, biochemist, physiologist, public health practitioner, and consumer. This module consists of three lessons. The first lesson builds background knowledge students need to successfully accomplish the challenge. Students develop an in-depth understanding of what the body needs to function properly by closely examining cell metabolism and structure. Students work in teams to investigate what it means to live a healthy lifestyle, examining the physiological effects of exercise and nutrition on health. They learn how exercise affects metabolism at a cellular level. In the second lesson, students investigate how the nutrient and ingredient composition of foods affects health. Students identify factors that inhibit and enhance health and interview key stakeholders in their communities. Based on their learning throughout the module, student teams will (a) design an innovative product or process to help individuals manage their nutrition or exercise regimens and (b) construct a prototype or model of the product or process. In the third lesson, students work in groups to complete the module challenge, demonstrating their knowledge of healthy lifestyles. Based on their learning throughout the module, student teams design a documentary for a chosen audience that explains what they have learned about being healthy, including cellular processes. Student teams create video documentaries and associated print or digital materials to share with a local audience about the importance of a healthy lifestyle to a community. This project highlights students' understanding of this issue from biological and societal perspectives. The purpose of this project is to build students'

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knowledge about a healthy lifestyle and their understanding of the impacts of an individual's lifestyle choices on society (adapted from Peters-Burton et al. 2015).

ESTABLISHED GOALS AND OBJECTIVES

At the conclusion of this module, students will be able to do the following:

- Understand how a healthy diet and exercise contribute to optimal health
- Explain how diet and exercise affect an individual's health at a cellular level
- Explain the extent to which certain foods (plant, animal, or industry-produced) are beneficial for health
- Critically evaluate media messages and scientific research about healthy lifestyles
- Analyze the effects of individuals' health choices on the community
- Use an engineering design process (EDP) to design a product or process to help individuals manage their nutrition or exercise regimens
- Use an EDP to create a prototype or model of the product or process they designed
- Create a video documentary and supplementary print or digital materials demonstrating their understanding of a healthy lifestyle

Teaching integrated curricula can be difficult at the high school level, where teachers are often organized into content departments and may not have the same students across classes. There are three ways you might integrate this module:

1. The science teacher teaches all of the module through science classes, weaving in the other content area activities (mathematics, English language arts [ELA], and social studies) as much as possible.

2. The science teacher teaches most of the module through science classes, weaving in other content areas as much as possible. Other content area teachers teach their portions of the module in ways that can support the science teacher. Alternatively, the other content area teachers can assist the science teacher with planning.

3. Teachers from all content areas teach the module collaboratively during their class periods.

You may also choose the level of integration depending on the amount of time available. Option 1 represents the shortest amount of time needed to teach the module, and option 3 represents the full five-week implementation of the module.

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CHALLENGE OR PROBLEM FOR STUDENTS TO SOLVE: THE HEALTHY LIVING DOCUMENTARY CHALLENGE

Using information they learned throughout the module and from interviews with key stakeholders in their communities, such as doctors and nutritionists, student teams are challenged to design and construct a prototype or model of an innovative product or process to help individuals manage diet and exercise regimens. Student teams are then challenged to create video documentaries about living a healthy lifestyle to present at a local venue (e.g., school board, town meeting, Rotary club).

Driving Questions: What does it mean to be healthy? How do I contribute to the healthy functioning of my body? What factors help and what factors hinder the health of our cells?

CONTENT STANDARDS ADDRESSED IN THIS STEM ROAD MAP MODULE

A full listing with descriptions of the standards this module addresses can be found in the appendix. Listings of the particular standards addressed within lessons are provided in a table for each lesson in Chapter 4. The crosscutting concepts in the module are patterns related to healthy living and cause and effect, because students will begin to see how a healthy diet and exercise affect the overall health of individuals and communities. Students engage in science and engineering practices such as asking questions and defining problems; designing and using models; planning and carrying out investigations; analyzing and interpreting data; using mathematics and computational thinking; constructing explanations (for science) and designing solutions (for engineering); engaging in argument from evidence; and obtaining, evaluating, and communicating information by analyzing the messages media sends about healthy living. Students also examine whole organism metabolism, considering how diet and exercise affect individuals on a cellular level. Language objectives are met through the use of argumentation in science, social studies objectives are met through examining community health options and initiatives, and mathematics objectives are met through communicating how a person can calculate his or her BMI and apply that knowledge to aid in living a healthier life.

STEM RESEARCH NOTEBOOK

Each student should maintain a STEM Research Notebook, which will serve as a place for students to organize their work throughout this module (see p. 12 for more general discussion on setup and use of the notebook). All written work in the module should be included in the notebook, including records of students' thoughts and ideas, fictional accounts based on the concepts in the module, and records of student progress through an EDP. The notebooks may be maintained across subject areas, giving students the

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opportunity to see that although their classes may be separated during the school day, the knowledge they gain is connected. You may also wish to have students include the STEM Research Notebook Guidelines student handout in their notebooks.

Emphasize to students the importance of organizing all information in a Research Notebook. Explain to them that scientists and other researchers maintain detailed Research Notebooks in their work. These notebooks, which are crucial to researchers' work because they contain critical information and track the researchers' progress, are often considered legal documents for scientists who are pursuing patents or wish to provide proof of their discovery process.

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STUDENT HANDOUT

STEM RESEARCH NOTEBOOK GUIDELINES

STEM professionals record their ideas, inventions, experiments, questions, observations, and other work details in notebooks so that they can use these notebooks to help them think about their projects and the problems they are trying to solve. You will each keep a STEM Research Notebook during this module that is like the notebooks that STEM professionals use. In this notebook, you will include all your work and notes about ideas you have. The notebook will help you connect your daily work with the big problem or challenge you are working to solve.

It is important that you organize your notebook entries under the following headings:

1. **Chapter Topic or Title of Problem or Challenge:** You will start a new chapter in your STEM Research Notebook for each new module. This heading is the topic or title of the big problem or challenge that your team is working to solve in this module.
2. **Date and Topic of Lesson Activity for the Day:** Each day, you will begin your daily entry by writing the date and the day's lesson topic at the top of a new page. Write the page number both on the page and in the table of contents.
3. **Information Gathered From Research:** This is information you find from outside resources such as websites or books.
4. **Information Gained From Class or Discussions With Team Members:** This information includes any notes you take in class and notes about things your team discusses. You can include drawings of your ideas here, too.
5. **New Data Collected From Investigations:** This includes data gathered from experiments, investigations, and activities in class.
6. **Documents:** These are handouts and other resources you may receive in class that will help you solve your big problem or challenge. Paste or staple these documents in your STEM Research Notebook for safekeeping and easy access later.
7. **Personal Reflections:** Here, you record your own thoughts and ideas on what you are learning.
8. **Lesson Prompts:** These are questions or statements that your teacher assigns you within each lesson to help you solve your big problem or challenge. You will respond to the prompts in your notebook.
9. **Other Items:** This section includes any other items your teacher gives you or other ideas or questions you may have.

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MODULE LAUNCH

In the opening activity, students examine their own beliefs about what a healthy lifestyle entails. This is a critical exercise because it is an opportunity for you to identify any misconceptions to inform future lessons and assess students' background knowledge. Post the following statement to engage students in purposeful exploration of the topic: *An individual's healthy lifestyle choices have no impact on society.*

Have students discuss their positions on this statement, the extent to which they agree or disagree, and why. Compile their ideas on the board or in a web-based document. Students will likely begin discussing what they consider to be "healthy." After discussing the impacts of healthy lifestyle choices on society, begin a discussion of what students might consider to be a healthy lifestyle. Note ideas on the board or in a web-based document. Also tell students to record all resources and ideas they have from the launch point in their STEM Research Notebooks.

PREREQUISITE SKILLS FOR THE MODULE

High school students have had experience with life science and health in middle school and therefore should have basic knowledge about cell structure and functioning, cellular respiration, and healthy lifestyle habits. The focus of this unit will be on how exercise and proper diet affect systems in the body and how the overall health of individuals affects the community. Students should have also had some basic experience analyzing data to identify trends and compare information. Additionally, students will have some working knowledge of technology and ways to create using technology.

Students enter this module with a wide range of preexisting skills, information, and knowledge. Table 3.1 provides an overview of prerequisite skills and knowledge that students are expected to apply in this module, along with examples of how they apply this knowledge throughout the module. Differentiation strategies are also provided for students who may need additional support in acquiring or applying this knowledge.

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Table 3.1. Prerequisite Key Knowledge and Examples of Applications and Differentiation Strategies

Prerequisite Key Knowledge	Application of Knowledge by Students	Differentiation for Students Needing Knowledge
• Understand that behavioral and social factors affect a person's health.	• Students examine media messages and local policies and initiatives on healthy living to determine social factors that affect healthy living. • Students examine proper diet and exercise plans to determine behavioral factors that affect healthy living.	• Provide a teacher review or place students in a group with others who can share their knowledge. • Use media presentations from the resource list to further develop students' background knowledge as needed.
• Understand cell structure and functions.	• Students create a model of cellular respiration.	• Provide a teacher review of these concepts.

POTENTIAL STEM MISCONCEPTIONS

Students enter the classroom with a wide variety of prior knowledge and ideas, so it is important to be alert to misconceptions, or inappropriate understandings of foundational knowledge. These misconceptions can be classified as one of several types: "preconceived notions," opinions based on popular beliefs or understandings; "nonscientific beliefs," knowledge students have gained about science from sources outside the scientific community; "conceptual misunderstandings," incorrect conceptual models based on incomplete understanding of concepts; "vernacular misconceptions," misunderstandings of words based on their common use versus their scientific use; and "factual misconceptions," incorrect or imprecise knowledge learned in early life that remains unchallenged (NRC 1997, p. 28). Misconceptions must be addressed and dismantled in order for students to reconstruct their knowledge, and therefore teachers should be prepared to take the following steps:

- *Identify students' misconceptions.*
- *Provide a forum for students to confront their misconceptions.*
- *Help students reconstruct and internalize their knowledge, based on scientific models. (NRC 1997, p. 29)*

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Keeley and Harrington (2010) recommend using diagnostic tools such as probes and formative assessment to identify and confront student misconceptions and begin the process of reconstructing student knowledge. Keeley's *Uncovering Student Ideas in Science* series contains probes targeted toward uncovering student misconceptions in a variety of areas. In particular, the probes about cell function in volume 1 and of *Uncovering Student Ideas in Life Science* (Keeley 2011) may be useful resources for addressing student misconceptions in this module.

Some commonly held misconceptions specific to lesson content are provided with each lesson so that you can be alert for student misunderstanding of the science concepts presented and used during this module. The American Association for the Advancement of Science has also identified misconceptions that students frequently hold regarding various science concepts (see the links at *http://assessment.aaas.org/topics*).

SRL PROCESS COMPONENTS

Table 3.2 illustrates some of the activities in the Healthy Living module and how they align with the self-regulated learning (SRL) process before, during, and after learning.

Table 3.2. SRL Process Components

Learning Process Components	Example From Healthy Living Module	Lesson Number and Learning Component
BEFORE LEARNING		
Motivates students	Students discuss the thought provoking statement "an individual's healthy lifestyle choices have no impact on society."	Lesson 1, Introductory Activity/Engagement
Evokes prior learning	Students answer probing questions to move students toward thinking about their knowledge of what happens inside of the body. Possible questions include How do we keep the body healthy? How do we study what happens in the body? What conditions affect the body's overall health?	Lesson 1, Introductory Activity/Engagement
DURING LEARNING		
Focuses on important features	Using research completed earlier in the lesson on a particular food additive of interest, students create posters about the relative safety of the use of the chosen food additive in processed foods.	Lesson 2, Explanation

Continued

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Table 3.2. (*continued*)

Learning Process Components	Example From Healthy Living Module	Lesson Number and Learning Component
Helps students monitor their progress	Students summarize their findings and provide interesting findings on their posters. Student posters will be evaluated with a rubric by the teacher and the student.	Lesson 2, Explanation
AFTER LEARNING		
Evaluates learning	Students complete the culminating activity in this module—a documentary based on their understandings of health in their communities. The documentary will be evaluated by community members and the teacher.	Lesson 3, Explanation
Takes account of what worked and what did not work	Students write a reflection of the review of their challenge presentation.	Lesson 3, Elaboration/ Application of Knowledge

STRATEGIES FOR DIFFERENTIATING INSTRUCTION WITHIN THIS MODULE

For the purposes of this module, differentiated instruction is conceptualized as a way to tailor instruction—including process, content, and product—to various student needs in your class. A number of differentiation strategies are integrated into lessons across the module. The problem- and project-based learning approach used in the lessons is designed to address students' multiple intelligences by providing a variety of entry points and methods to investigate the key concepts in the module. Differentiation strategies for students needing support in prerequisite knowledge can be found in Table 3.1 (p. 29). You are encouraged to use information gained about student prior knowledge during introductory activities and discussions to inform your instructional differentiation. Strategies incorporated into this lesson include flexible grouping, varied environmental learning contexts, assessments, compacting, and tiered assignments and scaffolding.

Flexible Grouping. Students work collaboratively in a variety of activities throughout this module. Grouping strategies you might employ include student-led grouping, grouping students according to ability level or common interests, grouping students randomly, or grouping them so that students in each group have complementary strengths (for instance, one student might be strong in mathematics, another in art, and another in writing). You might also group students based on prior knowledge about nutrition,

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exercise, metabolism, and cellular respiration. You can maintain the same student groupings for all three lessons, or you might choose to regroup students for Lesson 2 into design teams that they will maintain throughout the remainder of the module.

Varied Environmental Learning Contexts. Students have the opportunity to learn in various contexts throughout the module, including alone, in groups, in quiet reading and research-oriented activities, and in active learning through inquiry and design activities. In addition, students learn in a variety of ways, including through doing inquiry activities, journaling, reading texts, watching videos, participating in class discussion, and conducting web-based research.

Assessments. Students are assessed in a variety of ways throughout the module, including individual and collaborative formative and summative assessments. Students have the opportunity to produce work via written text, oral and media presentations, and modeling. You may choose to provide students with additional choices of media for their products (for example, PowerPoint presentations, posters, or student-created websites or blogs).

Compacting. Based on student prior knowledge, you may wish to adjust instructional activities for students who exhibit prior mastery of a learning objective. For instance, if some students exhibit mastery of cellular respiration in Lesson 1, you might limit the amount of time they spend practicing these skills and instead introduce mathematics, ELA, or social studies connections with associated activities.

Tiered Assignments and Scaffolding. Based on your awareness of student ability, understanding of concepts, and mastery of skills, you may wish to provide students with variations on activities by adding complexity to assignments or providing more or fewer learning supports for activities throughout the module. For instance, some students may need additional support in identifying key search words and phrases for web-based research or may benefit from cloze sentence handouts to enhance vocabulary understanding. Other students may benefit from expanded reading selections and additional reflective writing or from working with manipulatives and other visual representations of mathematical concepts. You may also work with your school librarian to compile a set of topical resources at a variety of reading levels.

STRATEGIES FOR ENGLISH LANGUAGE LEARNERS

Students who are developing proficiency in English language skills require additional supports to simultaneously learn academic content and the specialized language associated with specific content areas. WIDA (2012) has created a framework for providing support to these students and makes available rubrics and guidance on differentiating instructional materials for English language learners (ELLs). In particular, ELL students may benefit from additional sensory supports such as images, physical modeling, and graphic representations of module content, as well as interactive support through

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collaborative work. This module incorporates a variety of sensory supports and provides ongoing opportunities for ELL students to work collaboratively. The focus in this module on understanding what contributes to good human health through various perspectives affords opportunities to access the culturally diverse experiences of ELL students in the classroom.

When differentiating instruction for ELL students, you should carefully consider the needs of these students as you introduce and use academic language in various language domains (listening, speaking, reading, and writing) throughout this module. To adequately differentiate instruction for ELL students, you should have an understanding of the proficiency level of each student. The following 9–12 WIDA standards are relevant to this module:

- Standard 1: Social and Instructional Language. Focus on social behavior in group work and class discussions.
- Standard 2: The Language of Language Arts. Focus on forms of media, elements of text, comprehension strategies, main ideas and details, persuasive language, creation of informational text, and editing and revision.
- Standard 3: The Language of Mathematics. Focus on measurement, analysis, and strategies for problem solving.
- Standard 4: The Language of Science. Focus on scientific research, scientific processes, and scientific inquiry.
- Standard 5: The Language of Social Studies. Focus on impacts of individual choice on community interactions.

SAFETY CONSIDERATIONS FOR THE ACTIVITIES IN THIS MODULE

There are no specific safety notes for this module. For general safety guidelines, see the Safety in STEM section in Chapter 2 (p. 18).

DESIRED OUTCOMES AND MONITORING SUCCESS

The desired outcomes for this module are outlined in Table 3.3 (p. 34), along with suggested ways to gather evidence to monitor student success. For more specific details on desired outcomes, see the Established Goals and Objectives sections for the module and individual lessons.

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Table 3.3. Desired Outcomes and Evidence of Success in Achieving Identified Outcomes

Desired Outcome	Evidence of Success	
	Performance Tasks	Other Measures
Students can explain outcomes of healthy eating and exercise on the body at a cellular level and are able to use that knowledge to inform others about why it is important to be healthy.	• Students maintain STEM Research Notebooks that contain data from research on food additives and nutrients. • Students create models of cellular respiration. • Students create posters to identify the facilitators of and barriers to healthy living.	Students communicate healthy lifestyle strategies to inform individuals and the community.

ASSESSMENT PLAN OVERVIEW AND MAP

Table 3.4 provides an overview of the major group and individual *products* and *deliverables*, or things that student teams will produce in this module, that constitute the assessment for this module. See Table 3.5 for a full assessment map of formative and summative assessments in this module.

The assessment plan for this module can be conceptualized in three segments: how healthy diet and exercise are related to metabolism, how healthy lifestyles affect society, and how students can lead healthy lives. Each of the segments has several formative assessments leading to a summative assessment. The assessments have different approaches, including modeling, presentations, poster development, and documentary development. Some of the assessments are group projects, and others are completed individually.

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Table 3.4. Major Products and Deliverables in Lead Disciplines for Groups and Individuals

Lesson	Major Group Products and Deliverables	Major Individual Products and Deliverables
1	• Cellular respiration model • Health Investigation report • History of nutrition poster	• STEM Research Notebook entries • Metabolism Video Note Sheet • Healthy Living Log
2	• Argumentation graphic organizer • Contributions to group production, including interview questions for community stakeholder	• STEM Research Notebook entries • Healthy Living Log • Food additive poster
3	• Final video documentary and associated print materials on how healthy living affects society • Computer simulations • Storyboard for the video documentary	• STEM Research Notebook entries

Table 3.5. Assessment Map for Healthy Living Module

Lesson	Assessment	Group/ Individual	Formative/ Summative	Lesson Objective Assessed
1	STEM Research Notebook *prompt*	Individual	Formative	• Evaluate how a healthier lifestyle can affect the community.
1	Metabolism Video Note Sheet *handout*	Individual	Formative	• Describe the components of the human body's cellular system and how they function together. • Explain whole organism metabolism and describe the roles of fats, proteins, and carbohydrates.
1	STEM Research Notebook *prompt*	Individual	Formative	• Calculate BMI, explain how it is derived, and what it means.
1	Health Investigation *report*	Group	Summative	• Design a research study that shows the relationship of exercise to an individual's health. • Perform the investigation. • Analyze the data and communicate the findings using evidence to back the claim.

Continued

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Table 3.5. (*continued*)

Lesson	Assessment	Group/ Individual	Formative/ Summative	Lesson Objective Assessed
1	Cellular Respiration Model *rubric*	Group	Summative	• Create a model of cellular respiration.
2	STEM Research Notebook *prompt*	Individual	Formative	• Describe the food choices in the school cafeteria and analyze whether they are healthy or unhealthy.
2	STEM Research Notebook *prompt*	Individual	Formative	• Understand how companies try to make their products seem healthier.
2	STEM Research Notebook *prompt*	Individual	Formative	• Understand how chemicals are used in food processing.
2	Argumentation *graphic organizer*	Individual	Formative	• Make an argument for the food industry's role (positive and negative) in healthy diets and the implications of food marketing.
2	STEM Research Notebook *prompt*	Individual	Formative	• Apply knowledge of the information learned in the module to one's own lifestyle and to the documentary challenge.
2	Food Additive Poster *rubric*	Individual and group	Summative	• Define nutrition and give examples of healthy and unhealthy eating choices. • Explain how chemicals are used in food processing. • Analyze how food processing can affect the body's cellular functioning. • Explain the role of good nutrition and exercise in maintaining health.
3	Documentary Presentation *rubric*	Group	Summative	• Develop a video (or script) documentary that can inform. • Synthesize information from multiple sources. • Demonstrate understanding of concepts in presentation.

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MODULE TIMELINE

Tables 3.6–3.10 (pp. 37–40) provide lesson timelines for each week of the module. The timelines are provided for general guidance only and are based on class times of approximately 45 minutes.

Table 3.6. STEM Road Map Module Schedule for Week One

Day 1	Day 2	Day 3	Day 4	Day 5
Lesson 1 *You Are What You Eat* • Launch the module with a discussion of a healthy lifestyle. • Students explore their own knowledge of healthy living by creating mind maps and generating class questions to guide their investigation of healthy living. • Students set up their STEM Research Notebooks.	*Lesson 1* *You Are What You Eat* • Students discuss health-related media messages. • Students analyze the process of whole-body metabolism by watching a video, and students chart information about vocabulary words used in the video. • Students devise a plan to collect personal data on physical activity and eating in order to study their own healthy living habits.	*Lesson 1* *You Are What You Eat* • Students research online articles about healthy living and make and defend claims based on their findings. • Students create a chart or timeline documenting changes in government dietary guidelines.	*Lesson 1* *You Are What You Eat* • Students continue to explore whole-body metabolism by focusing on the metabolic process of cellular respiration.	*Lesson 1* *You Are What You Eat* • Students generate a model of cellular respiration.

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Table 3.7. STEM Road Map Module Schedule for Week Two

Day 6	Day 7	Day 8	Day 9	Day 10
Lesson 1 *You Are What You Eat* • Students present their models through a gallery walk and provide peer feedback.	*Lesson 1* *You Are What You Eat* • Students calculate their BMI and discuss other ways to measure body fat. • Students explore the history of the use of BMI and discuss its advantages and disadvantages.	*Lesson 1* *You Are What You Eat* • Students develop a research question about how exercise affects the body and test their hypothesis.	*Lesson 1* *You Are What You Eat* • Students continue the exercise lab and present their findings to their peers in 5-minute presentations.	*Lesson 1* *You Are What You Eat* • Guest speaker talks to class about a local health problem. • Students discuss the larger implications of healthy living.

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Table 3.8. STEM Road Map Module Schedule for Week Three

Day 11	Day 12	Day 13	Day 14	Day 15
Lesson 2 *Healthy Living, Healthy Community* • Students begin exploration of facilitators and barriers to a healthy diet, with a specific focus on researching the impacts of food marketing and processing. • Students use the Argumentation Graphic Organizer for note-taking.	*Lesson 2* *Healthy Living, Healthy Community* • Students hold a structured academic controversy classroom discussion on the government's role in public health. • Students research food marketing and processing techniques; the effects of eating too much fat, sugar, or sodium; and particular food additives of interest. • Students share what they found out about the additives in a class discussion.	*Lesson 2* *Healthy Living, Healthy Community* • Students create a poster from their research to explain factors that inhibit or enhance the healthy functioning of the body. • Students begin gathering information and footage for their Healthy Living Documentary Challenge and work in pairs to start drafting questions for interviews with community members.	*Lesson 2* *Healthy Living, Healthy Community* • Students share posters in class through a gallery walk and receive peer feedback. • Students continue preparing to conduct interviews for inclusion in their documentaries.	*Lesson 2* *Healthy Living, Healthy Community* • Students create and share elevator speeches about the topics they want to address in the documentary challenge. • Students begin to use an EDP to design a product or process to help individuals manage their health or nutrition regimens.

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Table 3.9. STEM Road Map Module Schedule for Week Four

Day 16	Day 17	Day 18	Day 19	Day 20
Lesson 2 *Healthy Living, Healthy Community* • Students create maps of locations in their community that support healthy living. Class discusses differences in access to healthy-living resources in different parts of the community. • Students continue their product or process design and begin building a prototype or model.	*Lesson 3* *Cells Are the Building Blocks of Health* • Students complete their product or system prototype or model. • Students begin computer simulations of the interaction of the cellular system in the body. • Students begin to conduct interviews via Skype, by e-mail, or face to face.	*Lesson 3* *Cells Are the Building Blocks of Health* • Students continue to conduct interviews. • Students brainstorm a plan for their video documentaries. • Students develop a timeline for creating their videos and begin preproduction planning (e.g., creating scenes and a storyboard, list of materials needed, locations).	*Lesson 3* *Cells Are the Building Blocks of Health* • Students continue to conduct interviews. • Students begin to create video documentaries.	*Lesson 3* *Cells Are the Building Blocks of Health* • Students continue to conduct interviews. • Students continue to work on video documentaries.

Table 3.10. STEM Road Map Module Schedule for Week Five

Day 21	Day 22	Day 23	Day 24	Day 25
Lesson 3 *Cells Are the Building Blocks of Health* • Students work on editing documentaries and designing print resources.	*Lesson 3* *Cells Are the Building Blocks of Health* • Students continue to work on editing documentaries and designing print resources.	*Lesson 3* *Cells Are the Building Blocks of Health* • Students finalize documentaries and print resources.	*Lesson 3* *Cells Are the Building Blocks of Health* • Students conduct peer reviews of video documentaries.	*Lesson 3* *Cells Are the Building Blocks of Health* • Students continue to conduct peer reviews of video documentaries.

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RESOURCES

The media specialist can help you locate resources for students to view and read about healthy living. Special educators and reading specialists can help find supplemental sources for students needing extra support in reading and writing. Additional resources may be found online. Community resources for this module may include doctors, nurses, personal trainers or leaders of recreation programs, leaders of health-focused companies, dietitians or nutritionists, or anyone else who might have a stake in health in the local community.

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Grade 10

STEM Road Map for High School

Healthy Living

What if you could challenge your 10th graders to develop a product or process that helps people embrace diet and exercise *and* has a positive impact on society? With this volume in the *STEM Road Map Curriculum Series,* you can!

Healthy Living outlines a journey that will steer your students toward authentic problem solving while grounding them in integrated STEM disciplines. Like the other volumes in the series, this book is designed to meet the growing need to infuse real-world learning into K–12 classrooms.

This interdisciplinary, three-lesson module uses project- and problem-based learning to help students build their knowledge about health from the varied perspectives of a cell biologist, nutrition scientist, biochemist, physiologist, public health practitioner, and consumer. To support this goal, students will do the following:

- Explain how diet and exercise affect an individual's health at a cellular level.
- Explain the extent to which certain foods (plant, animal, or industry-produced) are beneficial for health.
- Critically evaluate media messages and scientific research about healthy lifestyles.
- Analyze the effects of individuals' health choices on the community.
- Interview community stakeholders about factors that harm or enhance health.
- Use an engineering design process to create a prototype that individuals can use to manage their nutrition or exercise regimen.
- Create a video documentary demonstrating their understanding of a healthy lifestyle.

The *STEM Road Map Curriculum Series* is anchored in the *Next Generation Science Standards*, the *Common Core State Standards*, and the Framework for 21st Century Learning. In-depth and flexible, *Healthy Living* can be used as a whole unit or in part to meet the needs of districts, schools, and teachers who are charting a course toward an integrated STEM approach.

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Grade 10

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