

		CCD Foundational Skills
<b>COMMON CORE SCIENCE</b>		<b>2016</b>
Lesson Schedule & Plans Common Core Basics Common Core Exercise		

**2016 SCIENCE CALENDAR**

<b>JANUARY</b>	<i>*Writing Emphasis - Apostrophes</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 01.04 - 01.08</i>		
<i>Week of 01.11 - 01.15</i>		
<i>Week of 01.18 - 01.22</i>		
<i>Week of 01.25 - 01.29</i>	<b><u>1.1 SKELETAL AND MUSCULAR SYSTEMS</u></b>	
<b>FEBRUARY</b>	<i>*Writing Emphasis - Apostrophes</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 02.01 - 02.05</i>	<b><u>1.1 SKELETAL AND MUSCULAR SYSTEMS</u></b>	
<i>Week of 02.08 - 02.12</i>	<b><u>1.2 DIGESTIVE, RESPIRATORY, EXCRETORY, AND CIRCULATORY SYSTEMS</u></b>	
<i>Week of 02.15 - 02.19</i>	<b><u>1.3 NERVOUS, ENDOCRINE, AND REPRODUCTIVE SYSTEM</u></b>	
<i>Week of 02.22 - 02.26</i>	<b><u>1.4 HEALTH AND DISEASE</u></b>	
<i>Week of 02.29 - 03.04</i>	<b>CHAPTER 1 REVIEW AND CHECK YOUR UNDERSTANDING</b>	
	<b>CHAPTER 1 APPLICATION OF SCIENCE PRACTICE</b>	

<b>M A R C H</b>	<i>*Writing Emphasis - Subject / Verb Agreement</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 03.07 - 03.11</i>	<a href="#"><b>2.1 FLOWERING PLANTS</b></a>	
<i>Week of 03.14 - 03.18</i>	<a href="#"><b>2.2 RESPIRATION</b></a>	
<i>Week of 03.21 - 03.25</i>	<b>SPRING BREAK</b>	
<i>Week of 03.28 - 04.01</i>	<a href="#"><b>2.3 FERMINTATION</b></a>	
	<b>CHAPTER 2 REVIEW AND CHECK YOUR UNDERSTANDING</b> <b>CHAPTER 2 APPLICATION OF SCIENCE PRACTICE</b>	
<b>A P R I L</b>	<i>*Writing Emphasis - Modifiers</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 04.04 - 04.08</i>	<a href="#"><b>3.1 ECOSYSTEMS</b></a>	
<i>Week of 04.11 - 04.15</i>	<a href="#"><b>3.2 CARRYING CAPACITY</b></a>	
<i>Week of 04.18 - 04.22</i>	<a href="#"><b>3.3 SYMBIOSIS</b></a>	
<i>Week of 04.25 - 04.29</i>		
<b>M A Y</b>	<i>*Writing Emphasis - Clauses / Phrases</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 05.02 - 05.06</i>	<a href="#"><b>3.4 DISRUPTION</b></a>	
<i>Week of 05.09 - 05.13</i>	<a href="#"><b>3.5 ENVIRONMENTAL ISSUES</b></a>	
<i>Week of 05.16 - 05.20</i>	<b>CHAPTER 3 REVIEW AND CHECK YOUR UNDERSTANDING</b> <b>CHAPTER 3 APPLICATION OF SCIENCE PRACTICE</b>	
<i>Week of 05.23 - 05.27</i>		
<i>Week of 05.30 - 06.03</i>	<b>MEMORIAL BREAK</b>	

<b>J U N E</b>	<i>*Writing Emphasis - Sentence Combining</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 06.06 - 06.10</i>		
<i>Week of 06.13 - 06.17</i>		
<i>Week of 06.20 - 06.24</i>		
<i>Week of 06.27 - 07.01</i>		
<b>J U L Y</b>	<i>*Writing Emphasis -</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 07.04 - 07.08</i>	<b>7.1: <a href="#">ENERGY</a></b>	
<i>Week of 07.11 - 07.15</i>	<b>7.1: <a href="#">ENERGY</a></b>	
<i>Week of 07.18 - 07.22</i>	<b>SCIENCE WRITING PROMPTS</b>	
<i>Week of 07.25 - 07.29</i>	<b>7.2: <a href="#">WAVES</a></b>	
<b>A U G U S T</b>	<i>*Writing Emphasis -</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 08.01 - 08.05</i>		
<i>Week of 08.08 - 08.12</i>		
<i>Week of 08.15 - 08.19</i>		
<i>Week of 08.22 - 08.26</i>		
<i>Week of 08.29 - 09.02</i>		

<b>S E P T E M B E R</b>	<i>*Writing Emphasis -</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 09.05 - 09.09</i>		
<i>Week of 09.12 - 09.16</i>		
<i>Week of 09.19 - 09.23</i>		
<i>Week of 09.26 - 09.30</i>		

<b>O C T O B E R</b>	<i>*Writing Emphasis -</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 10.03 - 10.07</i>		
<i>Week of 10.10 - 10.14</i>		
<i>Week of 10.17 - 10.21</i>		
<i>Week of 10.24 - 10.28</i>		
<i>Week of 10.31 - 11.04</i>		

<b>N O V E M B E R</b>	<i>*Writing Emphasis -</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 11.07 - 11.11</i>		
<i>Week of 11.14 - 11.18</i>		
<i>Week of 11.21 - 11.25</i>		
<i>Week of 11.28 - 12.02</i>		

<i>D E C E M B E R</i>	<i>*Writing Emphasis -</i>	
	<i>Day One</i>	<i>Day Two</i>
<i>Week of 12.05 - 12.09</i>		
<i>Week of 12.12 - 12.16</i>		
<i>Week of 12.19 - 12.23</i>		
<i>Week of 12.26 - 12.30</i>		

# COMMON CORE BASICS

## UNIT 1 LIFE SCIENCE

	PRE-TEST POST-TEST
Chapter 1: Human Body and Health	1.2: <a href="#">SKELETAL AND MUSCULAR SYSTEMS</a> 1.2: <a href="#">DIGESTIVE, RESPIRATORY, EXCRETORY, AND CIRCULATORY SYSTEMS</a> 1.3: <a href="#">NERVOUS, ENDOCRINE, AND REPRODUCTIVE SYSTEM</a> 1.4: <a href="#">HEALTH AND DISEASE</a> CHAPTER 1 REVIEW AND CHECK YOUR UNDERSTANDING CHAPTER 1 APPLICATION OF SCIENCE PRACTICE
Chapter 2: Life Functions and Energy Intake	2.1: <a href="#">FLOWERING PLANTS</a> 2.2: <a href="#">RESPIRATION</a> 2.3: <a href="#">FERMINTATION</a> CHAPTER 2 REVIEW AND CHECK YOUR UNDERSTANDING CHAPTER 2 APPLICATION OF SCIENCE PRACTICE
Chapter 3: Ecosystems	3.1: <a href="#">ECOSYSTEMS</a> 3.2: <a href="#">CARRYING CAPACITY</a> 3.3: <a href="#">SYMBIOSIS</a> 3.4: <a href="#">DISRUPTION</a> 3.5: <a href="#">ENVIRONMENTAL ISSUES</a> CHAPTER 3 REVIEW AND CHECK YOUR UNDERSTANDING CHAPTER 3 APPLICATION OF SCIENCE PRACTICE

Chapter 4: Foundations of Life	<b>4.1: <a href="#">THE CELL</a></b> <b>4.2: <a href="#">SIMPLE ORGANISMS</a></b> <b>4.3: <a href="#">INVERTEBRATES</a></b> <b>4.4: <a href="#">VERTEBRATES</a></b> <b>CHAPTER 4 REVIEW AND CHECK YOUR UNDERSTANDING</b> <b>CHAPTER 4 APPLICATION OF SCIENCE PRACTICE</b>
Chapter 5: Heredity	<b>5.1: <a href="#">GENETICS</a></b> <b>5.2: <a href="#">GENOTYPES AND PHENOTYPES</a></b> <b>CHAPTER 5 REVIEW AND CHECK YOUR UNDERSTANDING</b> <b>CHAPTER 5 APPLICATION OF SCIENCE PRACTICE</b>
Chapter 6: Evolution	<b>6.1: <a href="#">BIOLOGICAL EVOLUTION</a></b> <b>6.2: <a href="#">COMMON ANCESTRY AND CLADOGRAMS</a></b> <b>6.3: <a href="#">SPECIATION</a></b> <b>CHAPTER 6 REVIEW AND CHECK YOUR UNDERSTANDING</b> <b>CHAPTER 6 APPLICATION OF SCIENCE PRACTICE</b>
<b>UNIT 2 PHYSICAL SCIENCE</b>	
Chapter 7: Energy	<b>7.1: <a href="#">ENERGY</a></b> <b>7.2: <a href="#">WAVES</a></b> <b>7.3: <a href="#">ELECTRICITY AND MAGNETISM</a></b> <b>7.4: <a href="#">SOURCES OF ENERGY</a></b> <b>7.5: <a href="#">ENDOTHERMIC AND EXOTHERMIC REACTIONS</a></b> <b>CHAPTER 7 REVIEW AND CHECK YOUR UNDERSTANDING</b> <b>CHAPTER 7 APPLICATION OF SCIENCE PRACTICE</b>
Chapter 8: Work, Motion, and Forces	<b>8.1: <a href="#">NEWTON'S LAWS OF MOTION</a></b> <b>8.2: <a href="#">FORCES AND MACHINES</a></b> <b>CHAPTER 8 REVIEW AND CHECK YOUR UNDERSTANDING</b> <b>CHAPTER 8 APPLICATION OF SCIENCE PRACTICE</b>



Chapter 9: Chemical Properties	<p>9.1: <a href="#">MATTER</a></p> <p>9.2: <a href="#">THE ATOM</a></p> <p>9.3: <a href="#">COMPOUNDS AND MOLECULES</a></p> <p>9.4: <a href="#">CHEMICAL REACTIONS AND SOLUTIONS</a></p> <p>9.5: <a href="#">THE CHEISTRY OF LIFE EQUATIONS</a></p> <p>9.6: <a href="#">CHEMICAL EQUATIONS</a></p> <p>CHAPTER 9 REVIEW AND CHECK YOUR UNDERSTANDING</p> <p>CHAPTER 9 APPLICATION OF SCIENCE PRACTICE</p>
<b>UNIT 3 EARTH AND SPACE SCIENCE</b>	
Chapter 10: Earth and Living Things	<p>10.1: <a href="#">CYCLES OF MATTER</a></p> <p>10.2: <a href="#">FOSSIL FUELS</a></p> <p>CHAPTER 10 REVIEW AND CHECK YOUR UNDERSTANDING</p> <p>CHAPTER 10 APPLICATION OF SCIENCE PRACTICE</p>
Chapter 11: Earth	<p>11.1: <a href="#">GEOLOGY</a></p> <p>11.2: <a href="#">OCEANOGRAPHY</a></p> <p>11.3: <a href="#">METEOROLOGY</a></p> <p>CHAPTER 11 REVIEW AND CHECK YOUR UNDERSTANDING</p> <p>CHAPTER 11 APPLICATION OF SCIENCE PRACTICE</p>
Chapter 12: The Cosmos	<p>12.1: <a href="#">EARTH'S ORIGINS</a></p> <p>12.2: <a href="#">ORIGINS OF THE UNIVERSE</a></p> <p>12.3: <a href="#">ORIGINS OF THE MILKY WAY AND THE SOLAR SYSTEM</a></p> <p>12.4: <a href="#">EARTH AND THE MOON</a></p> <p>CHAPTER 12 REVIEW AND CHECK YOUR UNDERSTANDING</p> <p>CHAPTER 12 APPLICATION OF SCIENCE PRACTICE</p>

## Human Body and Health

### MATERIALS

- o CCB Science pages 16 - 23

### CCR STANDARDS

- o 4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
- o 5 Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.

### OBJECTIVES

- o Identify main parts of the human skeletal system
- o Classify different types of joints
- o Explain how the skeletal and muscular systems work together for movement

### KEY CONCEPT

- o The human skeletal and muscular systems work together for support, protection, and movement.

### VOCABULARY

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o organization</li> <li>o voluntary</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o cardiac muscle</li> <li>o ligaments</li> <li>o marrow</li> <li>o skeletal muscle</li> <li>o smooth muscle</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o</li> </ul>

## 1.1: Skeletal and Muscular Systems

### BEFORE LESSON

Determine students' readiness for learning about the skeletal and muscular systems by asking them to imagine themselves running or think of a marathon runner during a race. Encourage students to compare the job of the bones in the runner's legs to the job of the muscles. Ask how bones and muscles are alike and how they are different. Guide them toward a discussion of the purpose of each system.

### BACKGROUND

Explain to students that bones and muscles work together to provide support and movement. Different kinds of muscles are specialized to do different tasks in different parts of the body. Some muscles are under conscious control, while others are not. Ask students who have broken a bone or damaged a muscle to describe how the injury affected their ability to move.

### GUIDED PRACTICE

- o Set a Purpose for Reading
- o The Skeletal System
- o Joints
- o The Muscular System
- o Importance of Exercise

### CORE SKILL

#### Understand Text Organization

Read the text with students. Then return to the text to ask students to describe the text's organization. Ask guiding questions such as: Why did the author begin the text by explaining the purpose of ligaments? Why is the text related to joints that can twist and glide presented before text related to joints that allow only a little or no movement? Does this text's organization communicate important ideas effectively? Would you make any changes if you were rewriting this text?

#### Determine Meaning

Read the text with students. Then ask volunteers to explain the relationship between voluntary and involuntary muscles and voluntary and involuntary nervous system responses. Ask students to explain the

*EVIDENCE-BASED READING***Set a Purpose for Reading**

- Draw a KWL chart on the board. Title the chart: The Skeletal System. Label the columns: What I Know; What I Want to Know; and What I Learned. Explain to students that a KWL chart is one of many effective tools they can use to make meaning of a text. Tell students that you're going to complete this chart together. Begin by inviting students to share what they know about the skeletal system. Record their responses in the chart. Then ask them to tell you what they want to know about the skeletal system. Again, record their answers in the chart. After reading the text, revisit the chart to complete the last column. If students don't find the answers to all of their questions, discuss what they could do to find the answers they seek.

*21<sup>ST</sup> CENTURY SKILL***Communication and Innovation**

- Invite students to discuss the value of precision in writing. Engage them in a discussion of the value of stating what's most important without cluttering a text with unrelated information. Also ask them how visuals, such as diagrams, can clarify text further. Then read the text together and emphasize points in the text that correspond to points students made during the discussion. Have them work in pairs or in small groups to complete the writing task. Ask students to share their work.

*INTERACTIVE STRATEGY*

connection between involuntary responses and survival.

*EXTENSION***Explain a Diagram**

Gather students into small groups. Encourage them to examine the diagram of the arm on page 20 and use their own words to explain the role of muscle pairs in the raising and lowering of the forearm. Students may want to number the steps they describe, either orally or on paper, as they explain.

**Construct a Model to Show How a Knee Flexes**

Challenge students to research the parts of a knee, including bones, ligaments, cartilage, membranes, and bursa, or fluid-filled sacs. Have students examine how the parts work together to allow movement. Ask them to use the data they gather to build and explain a model of a knee in a flexed position.

*LESSON REVIEW*

*WRITING TOPIC*

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*WRITING PRACTICE*

- o Remind students to think through the physical activity or exercise that they have selected before attempting to write. Help students decide which pattern of organization- order of importance, time order, or cause-and-effect order- is best suited for describing their chosen subject.

## Human Body and Health

## 1.2: Digestive, Respiratory, Excretory, and Circulatory Systems

*MATERIALS*

- o CCB Science pages 24 - 29

*CCR STANDARDS*

- o 7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

*OBJECTIVES*

- o Recognize the organs and processes of the digestive, excretory,
- o circulatory, and respiratory systems
- o Explain how these systems work together to provide the
- o body's cells with energy and remove cellular wastes

*KEY CONCEPT*

- o To carry out life activities, cells require food and oxygen. They also produce wastes. Each system plays a role in delivering the materials that cells need and carrying away wastes they make.

*VOCABULARY*

<i>Tier 2</i>	o
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o excretory system</li> <li>o plasma</li> <li>o platelet</li> <li>o respiratory system</li> </ul>
<i>Test Words</i>	o

*EVIDENCE-BASED READING***Words as Context Clues**

## BEFORE LESSON

Determine students' readiness for learning about the digestive, respiratory, excretory, and circulatory systems by asking volunteers to name one organ from each system. Provide assistance, if necessary. Ask students to brainstorm aloud about what they think the function of each organ is. Guide students to recognize that every organ plays a role in two vital tasks: providing cells with energy and removing cellular waste.

## BACKGROUND

Tell students that the levels of organization in the body include cells, tissues, organs, and body systems. Just as every cell in the body is interdependent, so are the body systems. Communication and teamwork among these systems make it possible for the body to do jobs such as pumping blood and getting rid of wastes. Stress interdependence as students read.

## GUIDED PRACTICE

- o The Digestive System
- o Integrate Text and Visuals
- o The Excretory System
- o The Circulatory System
- o The Heart
- o The Respiratory System

## CORE SKILL

**Determine Central Ideas**

As a class, look for the central idea of the first paragraph of "The Excretory System." Encourage students to read this paragraph to find one or more words (such as remove, waste, or filters) that suggest the function of the excretory system.

**Integrate Text and Visuals**

Read the text with students. Encourage students to discuss how integrating text and visuals helps them make meaning of text and understand complex concepts or processes.

- Invite students to work with a partner to reread the text on this page. Model questions that students can ask themselves while reading, such as: What is this paragraph about? How is this paragraph organized? What are the important ideas? Do they form a pattern? After reading, have students underline words that serve as context clues. Point out that the words in, down, into, there, across carries, passes, and leave indicate location and movement from place to place. Students will notice that the text follows the sequence of food as it moves through the body. Help students recognize that the writer has placed ideas in the order that events happen. The text therefore follows a time-order pattern of organization.

### 21<sup>ST</sup> CENTURY SKILL

#### Information Literacy

- Have students read the text and then explain the meaning of the terms *reliable* and *reputable* in their own words. Invite students to give specific examples of how they can assess the reliability of a website and the articles found there. A reliable article should list an author, along with the author's credentials (information about their qualifications, degree, and employer). Remind students to look for the purpose of a website. For example, is the site selling a product? If so, information at the site might be biased.

### INTERACTIVE STRATEGY

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### WRITING TOPIC

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### WRITING PRACTICE

## EXTENSION

### Practice Pronunciation

Select words or phrases that students might find difficult or that do not transfer well from their first languages. Model intonation and emphasize the stressed syllable in multisyllabic words. Have students repeat the words.

### Investigate Body Systems

Have small groups of students work together to find additional details about a body system. They might research the system in more detail, identify diseases associated with the system, and determine the cause and effects of each disease. In their research, students should cite evidence regarding the cause of each disease and summarize possible treatments.

## LESSON REVIEW

- Answers will vary, depending on which diagram the student selects. Remind students to use information from both the text and the diagram when writing their paragraphs.

## Human Body and Health

## 1.3: Nervous, Endocrine, and Reproductive System

*MATERIALS*

- o CCB Science pages 30 - 35

*CCR STANDARDS*

- o 1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- o 2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

*OBJECTIVES*

- o Recognize the organs and processes of the nervous and endocrine systems
- o Differentiate between male and female reproductive organs
- o Sequence the events in the development of a fetus from a fertilized egg
- o Identify conclusions and supporting details

*KEY CONCEPT*

- o The nervous system and the endocrine system are responsible for communications within the body. They control many processes in the body, including those of the reproductive system.

*VOCABULARY*

<i>Tier 2</i>	o labor
<i>Tier 3</i>	o fetus o hormones o menstrual cycle
<i>Test Words</i>	o sequence

## BEFORE LESSON

Determine students' readiness for learning about the nervous, endocrine, and reproductive systems by asking them to brainstorm a list of the various ways that messages can be delivered throughout an office building. Some messages might be delivered from person to person (via intercom, telephone, or e-mail), while other messages automatically occur in response to physical conditions in the building. Ask students to think about different kinds of conditions that can be "sensed" by a room in a building. Examples might include monitoring devices that turn off the room lights when no one is present, or thermostats that adjust the room temperature when it becomes too warm or too cold. Help students to distinguish between messages that are very quick (for example, a telephone call) and those that take longer (for example, a thermostat that eventually turns the heat on or off). Explain to students that these messaging systems are similar to the nervous and endocrine systems.

## BACKGROUND

Hormones, produced by the endocrine system, are chemical messengers. They tell various organs what to do and when to do it. This is particularly true of the reproductive system, which relies on hormones to function. The brain, however, is the master organ that sends hormones to their targets. As the main organ of the nervous system, the brain coordinates all of the human body systems. Point out the connection between the brain and other organs as students read the lesson.

## GUIDED PRACTICE

- o The Nervous System
- o Identify Conclusions
- o The Brain
- o The Endocrine System
- o The Reproductive System
- o Growth of the Fetus

## CORE SKILL

**Determine Central Ideas**

Invite students to work with you to identify the key words and statements



*EVIDENCE-BASED READING***Word Parts**

- Write the words *cerebrum* and *cerebellum* on the board. Invite students to point out the portion of each word that is shared by both words, and then circle the word part “cere”. Explain to students that the word *cerebrum* comes from the Latin word for brain. The word *cerebellum* is the Latin diminutive for *cerebrum*, meaning “little brain.” Explain to students that a diminutive is a word form that indicates smallness. Explain to students that it is possible to understand the meaning of many words if they know the meanings of the word parts. Ask students to look up the meaning of the word *cerebral* in a dictionary.

*21<sup>ST</sup> CENTURY SKILL***Communication and Collaboration**

- Have students read the text and then write a paragraph describing a successful collaboration. Invite students to share specific examples of their experiences. Ask students to offer opinions on why collaboration might be particularly helpful in the workplace.

*INTERACTIVE STRATEGY*

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*WRITING TOPIC*

- During What Period is the embryo very sensitive?
- During what period is good nutrition especially important?
- What’s the relationship between the endocrine system and the reproductive system

**Include:** A Restatement of the question, A quotation supporting answer, An explanation of your answer

that help readers understand the central ideas in this passage about the brain. After students have finished the central idea/supporting details graphic organizer in their notebooks, draw a blank version of this graphic organizer on the board. Encourage student volunteers to fill in their ideas regarding the central idea and the supporting details.

**Cite Textual Evidence**

Help students look for the words and phrases (such as: as soon as, begin, begins, during, and at the end of) that are cues identifying actions occurring in sequence. Invite students to point out the portions of the passage that state the development periods when the embryo is very sensitive and when good nutrition is especially important.

*EXTENSION***Elaborate**

Discuss words associated with the reproductive system that students might not know, such as fertilization, nutrition, and contraction. Help students understand some details about each word, such as how each uses the suffix -ion, which refers to the act, result, or state of something.

**Draw Conclusions about Hormones**

Challenge students to find out more about hormones. Ask them to research how hormones were discovered, and to summarize the names, sites of origin, and functions of some major hormones of the body. Encourage students to share what they learn in a class presentation.

*LESSON REVIEW*

*WRITING PRACTICE*

- o Remind students that a *claim* is a statement or conclusion that is based on evidence and knowledge. Help students identify supporting details in the text.

## Human Body and Health

## 1.4: Health and Disease

*MATERIALS*

- o CCB Science pages 36 - 45

*CCR STANDARDS*

- o 1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- o 9 Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

*OBJECTIVES*

- o Identify common diseases and their causes
- o Discuss the types of nutrients used by the body
- o Relate different types of drugs to their effects on the body

*KEY CONCEPT*

- o To promote wellness and avoid common diseases, it is important to maintain a well-balanced diet and avoid any substances that change the normal functioning of the body.

*VOCABULARY*

<i>Tier 2</i>	o Drug
	o well-balanced diet
	o calorie
	o immunity
	o prescription
<i>Tier 3</i>	o symptom
	o antibiotic
	o over-the-counter

*BEFORE LESSON*

Determine students' readiness for learning about health and disease by asking them to briefly describe health-related stories that they have recently seen in the media. Ask students what stories have been the most interesting to them and which ones have been most relevant to their life or to the lives of their family members. Tell students that the public must be skeptical when hearing popular health-related news, and remind them that they must use their critical thinking skills before accepting every news story at face value.

*BACKGROUND*

Ask a student volunteer to read the two paragraphs following the Key Concept. Ask students to describe the ways in which the roles played by gasoline (in a car) and food (in the body) are similar. Introduce the term wellness and ask students how many of them have heard this term. Point out that the current emphasis on maintaining wellness places a greater emphasis on one's personal responsibility to choose actions that will maintain one's health, just as a car's owner takes responsibility for maintaining his or her automobile.

*GUIDED PRACTICE*

- o Health and Disease
- o Compare Multimedia Sources
- o Workplace Connection
- o Nutrition and Diet
- o A Balanced Diet
- o Drugs
- o Inventing New Drugs

*CORE SKILL***Evaluate Conclusions**

Have students read aloud the first two paragraphs. Ask students to point out the factors in each paragraph that are known to increase the risk of heart and blood vessel disease. Remind students that clinical evidence supports the conclusions about the dangers of these factors.

**Compare and Contrast Multimedia Sources**

*Test Words* | ○ acquire

## EVIDENCE-BASED READING

### Clarify Meaning

- Tell students that charts and tables hold information in an organized way and help to clarify the meaning of the text. Have students look at the chart at the top of page 37. Tell students to look at the heading of each row and column to determine the content of the chart, and explain how to locate information on the chart using the headings.

## 21<sup>ST</sup> CENTURY SKILL

### Flexibility and Adaptability

- Before reading the text, direct students' attention to the My Plate.gov diagram. Explain that an online image search will lead you to earlier nutritional models promoted by the USDA. Choose one or more of these models to share with students, and ask them to explain why such models change. Help students understand that such changes reflect flexibility and adaptability in scientific thinking. As technologies change and scientists have access to more information, they revise existing models.

## INTERACTIVE STRATEGY

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## WRITING TOPIC

### Note Taking

- Disease / Condition
- What is it?
- Symptoms
- Cause / Effects
- Treatment

## WRITING PRACTICE

Have students look for a media item aimed at children and ask them to analyze and evaluate its educational effectiveness. Ask them to identify who created the item and describe its purpose. Challenge students to describe how a story written by a company selling health-related products might differ from a story in a newspaper.

## EXTENSION

### Extend Language

Discuss and define additional common words associated with health and disease with which students might not be familiar. Ask students to identify words from the lesson that are unfamiliar and help them to understand their definitions.

### Collect and Display Nutrition

Information Invite students to collect and display nutrient labels from a variety of snack-food packages. Ask students to create posters classifying the foods as high or low in food value and to assess the overall nutrient content of each food. When finished, encourage students to share their completed posters with the class.

## LESSON REVIEW

- Remind students to write down their notes about the main idea and the supporting details before attempting to write their summary.

## Life Functions and Energy Intake

### MATERIALS

- o CCB Science pages 54 - 61

### CCR STANDARDS

- o 7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

### OBJECTIVES

- o Identify the basic parts of a flowering plant
- o Understand the food-making process in a plant
- o Describe how flowering plants reproduce

### KEY CONCEPT

- o Flowers contain male and female reproductive structures and attract pollinators that transfer reproductive materials.

### VOCABULARY

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o Precise</li> <li>o Reproduction</li> <li>o Visual</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o Chlorophyll</li> <li>o Photosynthesis</li> <li>o Pistil</li> <li>o Pollination</li> <li>o Stamen</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o</li> </ul>

### EVIDENCE-BASED READING

#### Collaborative Reading

- o Read aloud the section titled Reproduction in Flowering Plants. Read the first sentence, and then select a student to read next. The student reads a sentence and selects the next

## 2.1: Flowering Plants

### BEFORE LESSON

Determine students' readiness for learning by discussing prior knowledge of flowers and flowering plants. As a class, make a list of various kinds of flowering plants along with brief descriptions. Point out that there is great variety in the appearance of flowers, including their shape and color.

### BACKGROUND

Explain to students that just like humans, flowering plants contain specific reproductive structures for passing on their genetic material and producing offspring. Other (non-reproductive) structures are also important in helping the plant remain healthy and capable of reproducing. Pollination is the process by which plants transfer reproductive materials between one another. Lead a discussion exploring why certain flowers and plants might attract different kinds of pollinators.

### GUIDED PRACTICE

- o Flowering Plants
- o Integrate Text and Visuals
- o Photosynthesis
- o Reproduction in Flowering Plants

### CORE SKILL

#### Apply Scientific Models

Read the text with students and work with them to answer each question. Afterward, ask students why models are so useful in science. Then write the term computer model on the board. Explain that a computer model is a program that simulates an event, or in other words, shows how an event happens in the real world. For example, explain that in 2007, researchers at the University of Illinois used a computer model to simulate photosynthesis, a process too elaborate and microscopic to observe in nature. Invite students to discuss the kinds of computer models they have seen or would like to see to help them understand a natural process.

#### Integrate Text and Visuals

Review the illustration on this page with the class. Lead a discussion about how the illustration, along with its labels, helps in understanding the text on the page. Be sure to point out the use of labels in identifying

reader. Repeat until every student has had a chance to read aloud. Assist students as needed.

### *21<sup>ST</sup> CENTURY SKILL*

- Ask students to review the diagrams in the lesson. Ask: What purpose does each of these diagrams have? Are they the same purpose? Help students see that different diagrams have different purposes, including describing, explaining, and giving examples. Then discuss how visual tools provide details that are critical to clear communication. Read the sidebar text with students. Invite them to work independently or in pairs to write about a topic of interest. Remind them to include critical details that help readers understand the topic. Also encourage them to provide a diagram or some other visual device to communicate content related to their topics. Encourage students to share their final work.

### *INTERACTIVE STRATEGY*

○

### *WRITING TOPIC*

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### *WRITING PRACTICE*

- Remind students to think through every part of their journey before attempting to write. Encourage students to use the best possible type of diagram to show their journey, such as a map or a flow chart. Afterward, ask students to compare their visuals with the visuals in the lesson. Explain that the visuals in the lesson provide levels of detail and accuracy sufficient to help readers understand important concepts. Ask: Does your visual have sufficient detail and accuracy to make it useful to

structures.

### EXTENSION

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#### **Demonstrate with a 3-D Model**

To help students understand the parts of a flower, bring a flower to class. Help students identify each part of the flower and create labels for each part.

#### **Construct an Advertisement**

Have students select a particular flower and market that flower to potential pollinators. Have them develop a brochure, poster, or video that advertises the flower's merits to its potential pollinators.

### LESSON REVIEW

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someone unfamiliar with your neighborhood?  
What could you do to make it more useful?



## Life Functions and Energy Intake

## 2.2: Respiration

*MATERIALS*

- o CCB Science pages 62 - 69

*CCR STANDARDS*

- o 3 Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
- o 4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

*OBJECTIVES*

- o Relate respiration to energy
- o Identify step-by-step scientific procedures
- o Describe the role of oxygen in the process of respiration
- o Explain the process of cellular respiration

*KEY CONCEPT*

- o When you breathe, you respire, or bring oxygen into your body. This process is called respiration. There's another kind of respiration, too. Within your cells, microscopic structures use the oxygen that you respire to release the energy locked in food molecules.

*VOCABULARY*

- |               |   |
|---------------|---|
| <i>Tier 2</i> | <ul style="list-style-type: none"> <li>o aerobic</li> <li>o initiative</li> <li>o procedure</li> <li>o process</li> </ul> |
| <i>Tier 3</i> | <ul style="list-style-type: none"> <li>o cellular respiration</li> <li>o glycolysis</li> <li>o mitochondria</li> </ul>    |

*BEFORE LESSON*

This lesson requires students to be familiar with the process of respiration in living organisms. Students learn that oxygen is required for cellular respiration, and carbon dioxide is given off as a waste product. Ask students to describe how their bodies responded to a period of heavy exercise or rigorous sport. Prompt students to explain how their activities affected their breathing rates. Explain that these experiences are connected to what they will learn about in this lesson.

*BACKGROUND*

Explain to students that respiration, or breathing, has two parts-inhalation and exhalation. Tell them that during inhalation, they breathe in oxygen, which leaves the lungs and enters the bloodstream, where it is delivered to the body's cells. The cells use it to break down sugar molecules to produce high-energy ATP molecules. The process releases carbon dioxide as a waste gas. Relate this process to students' descriptions of how their breathing changed during heavy exercise or sport. Invite a volunteer to draw a simple diagram on the board to represent the gas exchange that occurs during rest and during activity.

*GUIDED PRACTICE*

- o The Need for Energy
- o Mitochondria
- o Inside the Cell
- o Bioremediation

*CORE SKILL***Determine Meaning of Terms**

Read the explanation aloud and as a class use the word parts to define each term. Encourage students to construct and share sentences that use the words.

**Follow a Multistep Procedure**

Review the steps in the procedure for examining microorganisms in pond water. If possible, have students use tools and samples of pond water to complete the procedure. Discuss the value of writing numbered steps. Help students understand the value of writing explicit instructions for a

*Test Words* | ○*EVIDENCE-BASED READING***Word Parts**

- Write the word carbohydrate on the board. Explain that the word comes from two word parts: carbo +hydrate. Also explain that the word part carbo comes from the chemical element carbon, and the word part hydro comes from the Greek word *hydor*, meaning "water." Remind students that the chemical structure of water is H<sub>2</sub>O, or two hydrogen atoms bonded to one oxygen atom. Explain that all carbohydrates, from simple sugars to starches, are a combination of carbon, hydrogen, and oxygen atoms. Show or project models of the chemical structures of a variety of carbohydrates and invite students to identify the carbon, hydrogen, and oxygen atoms in each structure

*21<sup>ST</sup> CENTURY SKILL***Initiative and Self-Direction**

- Have students read the text and then explain initiative and self-direction in their own words. Invite students to give specific examples of personal initiative and explain that the result or effect of that initiative. Ask students to offer opinions on why such behaviors might be particularly helpful in the workplace.

*INTERACTIVE STRATEGY*

○

*WRITING TOPIC*

○

*WRITING PRACTICE*

scientific investigation. (Steps make the investigation reproducible, meaning results should be similar.)

*EXTENSION***Explain a Diagram**

Gather students into small groups. Encourage them to examine the close up of a mitochondrion in the diagram on page 64 and explain cellular respiration in their own words. Students may want to number the steps they describe, either orally or on paper, as they explain.

**Interpret a Multistep Process**

Organize students into small groups and provide drawing materials. Have students write the steps for a familiar process, such as repairing a bicycle or changing an automobile tire. Have students draw diagrams to support the directions in each step.

*LESSON REVIEW*

- Remind students to think through the process of the experiment before attempting to write. Then have them order and number the steps. If possible, have students compare their steps with a partner to determine if all necessary steps are included and ordered properly.

## Life Functions and Energy Intake

## 2.3: Fermentation

*MATERIALS*

- o CCB Science pages 70 - 77

*CCR STANDARDS*

- o 3 Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
- o 9 Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

*OBJECTIVES*

- o Relate fermentation to energy
- o Relate the absence of oxygen to fermentation
- o Explain the process of fermentation

*KEY CONCEPT*

- o Fermentation is a process that produces energy within a cell in the absence of oxygen.

*VOCABULARY*

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o accountability</li> <li>o productivity</li> <li>o research</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o anaerobic</li> <li>o fermentation</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o compare</li> <li>o contrast</li> </ul>

*EVIDENCE-BASED READING***Model Fluent Reading**

- o Remind students that each punctuation mark in a text serves a purpose. Review the first paragraph on page 70 as a class, asking students to identify the places where commas

*BEFORE LESSON*

In this lesson students will learn about the process of fermentation as a means of breaking the bonds of sugar molecules to harvest the energy of those bonds in the absence of oxygen. To determine their readiness for the lesson, invite students to discuss their experiences baking or observing the preparation of yeast breads, such as loaf bread, rolls, and doughnuts. Or bring in a loaf of bread, and ask students to observe the bread's texture. Ask students to predict what might cause the holes they see to form.

*BACKGROUND*

Explain to students that cellular fermentation is similar to cellular respiration, in that cells use the process to harvest the energy locked in the chemical bonds of sugar molecules. However, cellular respiration occurs in the presence of oxygen, so it is aerobic. Fermentation occurs in the absence of oxygen, so it is anaerobic. Ask students when they have heard or read the terms aerobic before. Prompt them, if necessary, to think of aerobic exercise, and that such exercise requires more oxygen intake. Then explain that the prefix *an-* means "without." Ask a volunteer to define the term anaerobic.

*GUIDED PRACTICE*

- o Fermentation
- o Ethanol: An Alternative Energy Source

*CORE SKILL***Apply Scientific Processes**

Invite students to discuss professionals who conduct investigations, collect data, or information, and form hypotheses, or conclusions based on that data. Students may say, for example, that police officials conduct investigations to gather data and come to some conclusions about specific crimes. Companies hire chemists and engineers to collect data on new products to be sure they are safe for consumers. Help students understand that no matter the purpose of their work, these professionals follow similar procedures to be sure their conclusions are valid. Read the text in the Core Skill with students. Then organize students into small

appear. Ask students what those commas tell a reader to do. Then ask students to listen as you read the paragraph aloud, first reading while ignoring the commas and then reading while acknowledging the commas. Afterward, ask students to describe the differences in what they heard. Invite volunteers to read the paragraph again, modeling fluent reading.

## 21<sup>ST</sup> CENTURY SKILL

### Productivity and Accountability

- Write the words productivity and accountability on the board or on a chart. Ask students to explain what they think each word means. Guide their responses to help them understand that productivity is the effective use of time and resources to produce a result, and accountability is personal responsibility for making something happen. Encourage students to give examples of times they have been both productive and accountable. Then have them read the text and explain how their behaviors are similar to the behaviors of scientists.

## INTERACTIVE STRATEGY

○

## WRITING TOPIC

○

## WRITING PRACTICE

- Remind students to read carefully before beginning to write. Encourage them to think in terms of their own experiences as they write.

groups, and have each group draw and label the steps in the scientific process. Encourage students to share their work.

### Compare and Contrast Information

After students have completed the investigation, ask them to use print, online, or other resources to find a similar experiment to observe the process of fermentation. Invite volunteers to describe similarities and differences between the investigation they conducted and the investigations they found. Ask students to consider the similarities and differences to offer suggestions for improving the investigation they conducted.

## EXTENSION

### Explain a Diagram

Gather students into small groups. Encourage them to recall the "Blow Up a Balloon" experiment. Ask students to use their own words to explain why the balloon inflated. Invite students to write simple sentences or draw illustrations to support their explanations.

### Write an Explanation of a Process

Encourage students to learn more about yeast, a microscopic fungus that reproduces rapidly in certain conditions. Have them work in pairs, small groups, or independently to learn how yeast are manufactured for use in baking. Ask students to collaborate to write an explanation for how yeast work in the baking process.

## LESSON REVIEW

## Ecosystems

## 3.1: Ecosystems

### MATERIALS

- CCB Science pages 88-95
- [PowerPoint: Biomes and Ecosystems](#)
- [PowerPoint: Cycles on Ecosystems](#)

### CCR STANDARDS

- 4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
- 6 Assess how point of view or purpose shapes the content and style of a text.

### OBJECTIVES

- Understand the organization of ecosystems
- Describe interactions between organisms
- Identify biomes of the world

### KEY CONCEPT

- Within an ecosystem, organisms interact with one another and with nonliving things in their environment.

### VOCABULARY

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>○ Environment</li> <li>○ Interact</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>○ Biome</li> <li>○ Biosphere</li> <li>○ Ecosystem</li> <li>○ Foods Chain</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>○ Prediction</li> </ul>

### EVIDENCE-BASED READING

○

### BEFORE LESSON

Determine students' readiness for learning by discussing prior knowledge about how organisms interact with their environment. Remind students that the word organisms includes not only animals but also plants and even microorganisms. Ask students to start by thinking about the environment outside their school. Then have them consider environments that are very unlike the school environment. Lead a discussion with the class about how the nature of the environment affects the organisms that live in it.

### BACKGROUND

Ask students to think of examples of ways they interact with their environment at home, at school, or at work. Remind students that they interact with other people, with furniture, with appliances and other machines, with the air they breathe, and with the water and food they ingest. Discuss cause-and-effect relationships among these interactions and what the consequences of removing items from these environments might be.

### GUIDED PRACTICE

- Communities of Living Things
- Energy Cycles
- Biomes
- Protecting Biomes
- Ecology

### CORE SKILL

#### Analyze Author's Purpose

Reviewing the way the text is structured can be helpful in analyzing an author's purpose. Have students review the information about biomes on this page and the next. Ask students whether they think the author had a purpose in organizing the biomes in the order shown. Have students provide the reasoning behind their answers.

#### Understand Text

Read the text as a class. Then ask students to think about the ecosystem models they created and the labels they used to identify organisms in their

*21<sup>ST</sup> CENTURY SKILL***Social and Cross-Cultural Skills**

- Write the words independently and collaboratively on the board. Ask students to explain what these words mean when they are applied to how people work. Invite students to give examples of times they have worked collaboratively to complete a project. Then read the text in the sidebar as a class. Ask students to consider the text and the examples they shared to answer the following questions: How do sharing your ideas and considering people's responses to those ideas challenge you to be more creative? How does sharing responsibility for completing a task increase a group's productivity?

*INTERACTIVE STRATEGY***Biomes Map**

- Have students predict where world Biomes located. Gather information from the text and label where biomes are located. Check student responses using PowerPoint.

*WRITING PRACTICE*

- Using Reference Sources to Understand Meaning
- Identify Stages of a Food Chain
- Have partners exchange their predictions about biomes and tell why the predictions did or did not match the text.

models. Ask students to explain the relationship between the labels in their models and jargon. Invite students to share other examples of texts they have read that contained jargon. Ask students to explain the value of identifying and interpreting jargon before they use a product.

*EXTENSION***Using Reference Sources to Understand Meaning**

Tell students that a thesaurus is a good reference source. Have them look up vocabulary terms they do not know to locate synonyms that are more familiar. Have them use those synonyms in meaningful sentences, and then replace those familiar terms with the lesson vocabulary term.

**Identify Stages of a Food Chain**

Have students select a particular biome, such as a desert. Have them create a diagram of a typical food chain within that biome. The food chain should include a producer, an herbivore, and a carnivore. Invite students to present their diagrams to the class in a creative way.

*LESSON REVIEW*

## Ecosystems

## 3.2: Carrying Capacity

*MATERIALS*

- o CCB Science pages

*CCR STANDARDS*

- o 1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- o 4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

*OBJECTIVES*

- o

*KEY CONCEPT*

- o

*VOCABULARY*

<i>Tier 2</i>	o
<i>Tier 3</i>	o
<i>Test Words</i>	o

*EVIDENCE-BASED READING***Forms of a Word**

- o Write the word habitat on the board. Next to the word, write: from the Latin word "habitare", meaning "it dwells or lives." Ask a volunteer to define the term as it is used in the lesson. Next, write the following words on the board: habit, habitable, habitual, habitation, inhabitant, and habilitate. Read the words aloud. Remind students of the

*BEFORE LESSON*

This lesson requires students to explain the concept of carrying capacity. To determine their readiness for the lesson, write the words serving size on the board, and ask students to describe where and when they have seen those words. Ask students to imagine that they have opened a package containing two serving sizes, but they must share the contents among four people. Have students explain some of the possible consequences of having fewer servings than are needed.

*BACKGROUND*

To understand the concept of carrying capacity, students need to fully grasp the concept of an ecosystem and of habitats of varying sizes within ecosystems. A habitat is the place where a population lives. An ecosystem is a collection of populations of different plants and animals that occupy and interact within a physical environment, either on land or water. The largest terrestrial ecosystems, or biomes, include different kinds of grasslands, deserts, forests, and alpine or mountain biomes. Ask students to identify the largest ecosystem in which they live. For example, the town or city in which students live may be on a prairie or in the foothills of a mountain ecosystem. Ask students to describe the physical environment and to name some of the organisms that live in the ecosystem.

*GUIDED PRACTICE*

- o Carrying Capacity
- o Relationships in a Habitat
- o Reindeer on the Pribilof Islands
- o Dietary Diversity

*CORE SKILL***Cite Textual Evidence**

Ask students to read the text and identify supporting evidence before discussing changes to the moose population as a class. Invite students to share their answers and the evidence they used to construct those answers. If students provide answers without citing evidence, have them skim the text again, and if necessary, revise their answers.

**Understand Text**



origins of the word habitat, and then ask them to use that meaning to define the terms you listed. Offer examples of sentences using the related words to guide student understanding. Ask students to explain how knowing a word's history can help them define related words.

### 21<sup>ST</sup> CENTURY SKILL

○

### WORKPLACE CONNECTION

#### **Wildlife Management**

- Ask a volunteer to read the text aloud. Then ask students to explain the responsibilities of a wildlife manager. Remind students that some managers may mark and track wildlife movement in an ecosystem. Encourage students to discuss what managers can learn about animals by monitoring their movement.

### INTERACTIVE STRATEGY

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### WRITING TOPIC

○

### WRITING PRACTICE

- Work with students to identify possible areas in the community where humans are putting pressure on environmental resources or species. Then select one of the areas and ask students to apply the concepts of limiting factors and carrying capacity to describe what might be happening there.

Before students do the activity, ask them to give examples of jargon associated with math, history, art, or any other area of study. Begin by providing a few common examples from a particular discipline, such as equation, variable, area, perimeter, and volume from mathematics. Then have students read the text before inviting them to describe what they would do first in an attempt to parse the text to define the jargon. Then have volunteers restate the text in their own words.

### EXTENSION

#### **Explain a Diagram**

Encourage students to describe the diagram of the sea otter's dietary diversity in their own words. Explain any words in the diagram that are unfamiliar to students while drawing their attention to the pictures. Cover one or more of the foods in the diagram and ask students to explain the consequences of removing these organisms from sea otters' diets.

#### **Sketch Your Plan**

Provide graph paper and drawing materials. Have students use the paper and materials to develop the ideas they presented in Write to Learn. Ask students to draw the area they wrote about and show how organisms are affected by human activity. Encourage students to share and compare their work.

### LESSON REVIEW

## Ecosystems

## 3.3: Symbiosis

*MATERIALS*

- o CCB Science pages

*CCR STANDARDS*

- o 2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

*OBJECTIVES*

- o Define symbiosis
- o Describe mutualism, commensalism, and parasitism
- o Give real-world examples of each type of symbiotic relationship

*KEY CONCEPT*

- o The term symbiosis describes specific kinds of relationships between organisms in the same environment.

*VOCABULARY*

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o host</li> <li>o mutualism</li> <li>o parasite</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o antibodies</li> <li>o symbiosis</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o summarize</li> </ul>

*EVIDENCE-BASED READING***Word Parts**

- o Write the word symbiosis on the board. Underline the base word bios. Explain that its history is Greek, and means "one's life, or way of living." Next, explain that letters attached to the beginning and end of a base word, or affixes, change the meaning of the word.

*BEFORE LESSON*

This lesson requires students to be familiar with biotic and abiotic factors in the environment. To determine their readiness, write the words living and nonliving on the board. Ask students to describe some of the living and nonliving things they see around them. Record their responses on the board. Then have students go beyond the classroom to consider spaces on the school campus. Continue adding students' examples to the lists on the board.

*BACKGROUND*

Explain to students that in any ecosystem, living things interact with each other and with the physical environment. These organisms are constantly competing for resources, such as food, water, and shelter. Organisms live symbiotically, or with other living things. The relationships that organisms share may benefit both, harm one organism, or help one while having no effect on another. Ask students to think of examples of familiar symbiotic relationships within a family, such as a parent and child or two siblings. Invite students to talk about how the two members of those relationships interact and help or benefit one another.

*GUIDED PRACTICE*

- o Interactions Among Living Things
- o Mutual Symbiosis
- o Termites and Bacteria
- o Acacia Trees and Ants
- o Oxpeckers, Rhinos, and Zebras and Humans and E. coli
- o Parasitic Symbiosis
- o Commensal Symbiosis

*CORE SKILL***Identify Hypotheses**

Read the sidebar text aloud. Give students time to consider the scientists' observations of the acacia trees and form hypotheses. Invite students to share their ideas. Record their ideas on the board. (Acacia trees do not have a mutually beneficial relationship with the different kind of ant.)

**Summarize Text**

Letters attached to the beginning are called prefixes. Circle the prefix “symand” explain that it means “together.” Explain that letters attached to the end of a word form a suffix. Circle the suffix -is. Explain that it most closely means “having the character of.” Ask students to use their understanding of the word parts to define the term symbiosis.

### 21<sup>ST</sup> CENTURY SKILL

#### Critical Thinking and Problem Solving

- Invite volunteers to talk about the university website they researched. Have students identify their chosen universities and describe the kinds of science investigations that are being conducted there. Ask them to state the hypotheses university scientists are studying and the methods they're using. Encourage students to talk about the investigations that most intrigue them.

### INTERACTIVE STRATEGY

○

### WRITING TOPIC

○

### WRITING PRACTICE

- Remind students to think through the different kinds of symbiosis before writing. Students should describe the interaction of the mother and the puppy before identifying the kind of symbiotic relationship the two share. Mothers and offspring have a parasitic relationship, as developing fetuses and newborns depend on the mother for resources, leaving fewer resources for the mother.

Remind students to think about what, why, and how as they reread their summaries. Tell them to be sure these three questions are addressed.

### EXTENSION

#### Summarize and Illustrate

Organize students into small groups. Have students reread different sections of the text aloud ("Mutual Symbiosis," "Parasitic Symbiosis," and "Commensal Symbiosis") and explain what they have read in their own words. Have them select one section to label and illustrate.

#### Hypothesize and Propose an Experiment

Have students review the lesson and the organisms mentioned in it. Invite students to choose an organism, ask a question that can be answered through an investigation, form a hypothesis, and propose an experiment. You may want to ask students to write their hypotheses and proposals.

### LESSON REVIEW

## Ecosystems

## 3.4: Disruption

*MATERIALS*

- o CCB Science pages

*CCR STANDARDS*

- o 1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- o 4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

*OBJECTIVES*

- o Identify laws of ecology
- o Give examples of environmental disruptions
- o Explain the consequences of disruptions

*KEY CONCEPT*

- o A disruption is a change that greatly alters an environment. Disruptions transform environments. In some cases, one ecosystem can temporarily or permanently replace another. In other cases, an ecosystem can become degraded, making it unfit for living things. Still other ecosystems are destroyed altogether.

*VOCABULARY**Tier 2*

- o degradation
- o destruction
- o destruction
- o fragmentation
- o threatened

*BEFORE LESSON*

Determine students' readiness by engaging them in a discussion about what keeps an ecosystem healthy. Write different scenarios on note cards: mouse population in a field ecosystem grows too large; a wetland undergoes a dry period; a mountain ecosystem has too many predators; a desert ecosystem's cactus plants die off; and so on. Gather students into groups and give each group a note card. Ask students to read their scenarios and describe how equilibrium might be restored.

*BACKGROUND*

Remind students that an ecosystem includes both living and nonliving factors. Point out that in an ecosystem, organisms interact with one another and with their physical and chemical environment. Organisms depend on the stable functions of each other and the water, gases, and chemicals that cycle through the ecosystem. Invite volunteers to describe the living and nonliving elements of an ecosystem they have visited or would like to visit.

*GUIDED PRACTICE*

- o The Laws of Ecology
- o Responding to Change
- o Fire and Floods as Disruptions
- o Introduced Species as a Disruption
- o Habitat Loss as a Disruptive Force

*CORE SKILL***Determine Meaning**

Ask students to think of their favorite sport or hobby. Encourage them to give examples of words that are unique to those activities, such as foot fault and stoppage time in soccer. Explain that most areas of interest and study have unique vocabulary associated with them. Read the text aloud and give students time to find and mark words on the first three pages of the lesson that use specialized words. Recall the word parts and meanings you have already studied to help define certain words. Remind students to mark other words as they continue reading.

**Cite Textual Evidence**

<p><i>Tier 3</i></p>	<ul style="list-style-type: none"> <li>o abiotic</li> <li>o biodiversity</li> <li>o biotic</li> <li>o invasive species</li> </ul>	<p>Give students time to read the text and complete the activity. Encourage students to share specific examples of text evidence that supports the IUCN's conclusion.</p>
<p><i>Test Words</i></p>	<ul style="list-style-type: none"> <li>o</li> </ul>	<p>EXTENSION</p>
<p><i>EVIDENCE-BASED READING</i></p> <p><b>Repeated Reading</b></p> <ul style="list-style-type: none"> <li>o Ask students to read aloud with you as you read "Introduced Species as a Disruption" (beginning on page 112) several times. Tell students to pay special attention to how the punctuation marks, introductory terms such as sometimes and however, and introductory phrases that signify time-order sequence all affect the way you read. Emphasize accuracy and phrasing until the group reading sounds smooth and consistent.</li> </ul> <p><i>21<sup>ST</sup> CENTURY SKILL</i></p> <p><b>Media Literacy</b></p> <ul style="list-style-type: none"> <li>o Have students read the text and then share how they find reliable media sources. Ask students to give factors that indicate whether a website or resource is trustworthy. Invite students to explain why being media literate is important to their work and their roles as citizens.</li> </ul> <p><i>INTERACTIVE STRATEGY</i></p> <ul style="list-style-type: none"> <li>o</li> </ul> <p><i>WRITING TOPIC</i></p> <ul style="list-style-type: none"> <li>o</li> </ul> <p><i>WRITING PRACTICE</i></p> <ul style="list-style-type: none"> <li>o Invite students to share their explanations for ways governments can use biodiversity</li> </ul>		<p><b>Use a Graphic Organizer</b></p> <p>Gather students into small groups. Ask students to reread Commoner's laws of ecology presented on page 110 and explain them in their own words. Have students make a four-column chart with a column for each law. Then have students draw or write an example of each law in the chart.</p> <p><b>Collect and Display Data</b></p> <p>Organize students into small groups. Have them use print and online media to find examples and non-examples of disruption as it relates to ecosystems. Have students organize their research into tables and encourage them to share their work.</p> <p>LESSON REVIEW</p>

measures to make decisions. Encourage students to discuss how the measures may or may not influence decision making.

## Ecosystems

## 3.5: Environmental Issues

*MATERIALS*

- o CCB Science pages

*CCR STANDARDS*

- o 1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- o 8 Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

*OBJECTIVES*

- o Distinguish between nonrenewable and renewable resources
- o Identify types of pollution
- o Understand the effects of human activities on the environment

*KEY CONCEPT*

- o Increased human population makes increased demands on Earth's resources and adds to pollution in the environment.

*VOCABULARY*

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o climate</li> <li>o fact</li> <li>o speculation</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o conservation</li> <li>o natural resources</li> <li>o pollution</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o</li> </ul>

*EVIDENCE-BASED READING*

## BEFORE LESSON

Draw a two-column chart titled Resources. Ask students to name resources they use regularly, such as water and gas. Place renewable resources in the left column and nonrenewable resources in the right. Do not tell the students which column is which. After the list is made, ask students to explain the difference between the two columns.

## BACKGROUND

Discuss with the class recent news concerning pollution, the use of natural resources, and the environment. Encourage students to offer personal knowledge and experience with recycling, pollution, climate change, or other environmental issues. Return to the discussion, as appropriate, as you go through the lesson.

## GUIDED PRACTICE

- o Environmental Problems
- o Pollution
- o Uses of Land and Water and Endangered Species
- o Global Climate Change

## CORE SKILL

**Distinguish Between Facts and Speculation**

Tell students that when researching information about environmental problems, they must be very careful to distinguish between facts and speculation in the materials they find. When doing online research, students should rely mainly on websites that end in ".gov" or ".edu" to ensure they are reviewing research that can be relied on to be factual and objective.

**Cite Textual Evidence**

Have students compare their answers to the Core Skill activity on this page. Have students discuss the conservation methods that have helped the American bison and bald eagle recover. Have students work together to learn more about some of the other animals listed in this section.

## EXTENSION

**Practice Accuracy**

**Preview the Lesson**

- Write the word preview on the board. Underline the base word view, and ask students to provide a synonym, or word with a similar meaning. Then circle the prefix pre-, and explain that when these letters appear before a base word, they mean "before." Ask students to explain what people do when they preview a text, such as a lesson in this book. Then organize students into pairs. Give students time to work with their partners to preview the lesson. Tell them that they are going to read titles, subtitles, boldfaced words, and visuals to find clues as to what the text is about. Afterward, give students time to share the clues they found. Explain that previewing a text before reading is an effective comprehension strategy they can apply with any text.

*21<sup>ST</sup> CENTURY SKILL***Information, Communications, and Technology Literacy**

- Have a class discussion to learn about the results of students' research on satellite technology. Discuss with students that while satellites give us the technology to study what is happening to polar ice caps and glaciers, it does not give us the means to change what is happening. Have students do further internet research to determine ways that scientists propose we can slow or stop polar ice melting.

*INTERACTIVE STRATEGY*

○

*WRITING TOPIC*

○

Invite students to take turns closing their eyes and pointing to a word on a page. Have them read the word silently and then clap once for each syllable in the word, saying the word aloud at the same time. Help students understand that by recognizing syllables in words, they are better able to read word parts instead of individual letters, which leads to greater fluency.

**Identify Research Questions**

Have students work in pairs or small groups and ask them to select an environmental news story from the television, internet, radio, or a magazine that they can read together. As they read, have them identify and write down questions for further research. Have students compile their lists and select the points of research they will pursue. When their further research is completed, have them create a report that includes their own research.

LESSON REVIEW



*WRITING PRACTICE*

- Review with students that cause and effect relationships do not begin and end with one event but continue on, with the effect becoming the cause of another effect, and so on. Have students treat the effect from their original paragraph as the cause of the next event and write another paragraph following the same rules as before.

## Foundations of Life

### MATERIALS

- o CCB Science pages 132 - 175
- o PowerPoint: [Cell Structures](#)

### CCR STANDARDS

- o 1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- o 2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

### OBJECTIVES

- o Identify the basic structure of cells
- o Identify similarities and differences in plant and animal cells
- o Understand how cells work

### KEY CONCEPT

- o Cells are the basic units of structure and function in living things

### VOCABULARY

<i>Tier 2</i>	o Function
<i>Tier 3</i>	o Cell o Diffusion o Nucleus
<i>Test Words</i>	o

### EVIDENCE-BASED READING

o

### 21<sup>ST</sup> CENTURY SKILL

o

## 4.1: The Cell

### BEFORE LESSON

### BACKGROUND

### GUIDED PRACTICE

#### The Structure of Cells

#### Cell Structures

#### Specialized Cell Structures

#### Specialized Cell Structures in Plants

#### How a Cell Works

#### Diffusion

#### Active Transport

### CORE SKILL

#### Determine Conclusions

After students have read the text, have students work together in pairs. Have one student write a conclusion that answers the question **Why does a cell have specialized parts?** Ask the other student to point out the sentences in the text that serve as evidence supporting this conclusion.

#### Support Conclusions

Tell students that most of the time, in science writing, conclusions will be easy to determine and there will be plenty of supporting material included. This is because the practice of science requires that evidence be provided for hypotheses and other scientific statements. Ask students what might happen if scientists did not provide information that supports their conclusions when they share their findings with other scientists.

### EXTENSION

#### Create and Label Drawings

Have students draw and label the plant cell and the animal cell shown on page 136. Then ask students to prepare a three-column table. Have students' list plant cell structures in the first column and animal cell structures in the second column. Remind students that many of these

*INTERACTIVE STRATEGY*

- Create and Label Drawings

*WRITING TOPIC*

- Write To Learn (Diffusion)

*WRITING PRACTICE*

- Determine Conclusions
- Use Reasoning, Planning, and Evidence

structures are found in both plant and animal cells. In the third column, ask students to use their own words to state the function of each structure.

**Use Reasoning, Planning, and Evidence**

Challenge students to research the use of intravenous saline solution to treat dehydration. Ask students to cite evidence supporting the use of IV saline solutions and challenge them to draw conclusions about why an intravenous saline solution is used instead of water.

---

**LESSON REVIEW**

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Foundations of Life	4.2: Simple Organisms
<i>MATERIALS</i>	BEFORE LESSON
◦ CCB Science pages	
<i>CCR STANDARDS</i>	BACKGROUND
◦	
<i>OBJECTIVES</i>	GUIDED PRACTICE
◦	
<i>KEY CONCEPT</i>	CORE SKILL
◦	
<i>VOCABULARY</i>	EXTENSION
<i>Tier 2</i>   ◦	
<i>Tier 3</i>   ◦	LESSON REVIEW
<i>Test Words</i>   ◦	
<i>EVIDENCE-BASED READING</i>	
◦	
<i>21<sup>ST</sup> CENTURY SKILL</i>	
◦	
<i>INTERACTIVE STRATEGY</i>	
◦	
<i>WRITING TOPIC</i>	
◦	
<i>WRITING PRACTICE</i>	
◦	

Foundations of Life	4.3: Invertebrates						
<i>MATERIALS</i> <ul style="list-style-type: none"><li>o CCB Science pages</li></ul>	<u>BEFORE LESSON</u>						
<i>CCR STANDARDS</i> <ul style="list-style-type: none"><li>o</li></ul>	<u>BACKGROUND</u>						
<i>OBJECTIVES</i> <ul style="list-style-type: none"><li>o</li></ul>	<u>GUIDED PRACTICE</u>						
<i>KEY CONCEPT</i> <ul style="list-style-type: none"><li>o</li></ul>	<u>CORE SKILL</u>						
<i>VOCABULARY</i> <table><tr><td><i>Tier 2</i></td><td>o</td></tr><tr><td><i>Tier 3</i></td><td>o</td></tr><tr><td><i>Test Words</i></td><td>o</td></tr></table>	<i>Tier 2</i>	o	<i>Tier 3</i>	o	<i>Test Words</i>	o	<u>EXTENSION</u>
<i>Tier 2</i>	o						
<i>Tier 3</i>	o						
<i>Test Words</i>	o						
<i>EVIDENCE-BASED READING</i> <ul style="list-style-type: none"><li>o</li></ul>	<u>LESSON REVIEW</u>						
<i>21<sup>ST</sup> CENTURY SKILL</i> <ul style="list-style-type: none"><li>o</li></ul>							
<i>INTERACTIVE STRATEGY</i> <ul style="list-style-type: none"><li>o</li></ul>							
<i>WRITING TOPIC</i> <ul style="list-style-type: none"><li>o</li></ul>							
<i>WRITING PRACTICE</i> <ul style="list-style-type: none"><li>o</li></ul>							

## Foundations of Life

## 4.4: Vertebrates

## MATERIALS

- o CCB Science pages

## CCR STANDARDS

- o

## OBJECTIVES

- o

## KEY CONCEPT

- o

## VOCABULARY

Tier 2	o
Tier 3	o
Test Words	o

## EVIDENCE-BASED READING

- o

21<sup>ST</sup> CENTURY SKILL

- o

## INTERACTIVE STRATEGY

- o

## WRITING TOPIC

- o

## WRITING PRACTICE

- o

## BEFORE LESSON

## BACKGROUND

## GUIDED PRACTICE

## CORE SKILL

## EXTENSION

## LESSON REVIEW

## Heredity

### MATERIALS

- CCB Science pages 174 - 197
- Website Activity: [An Inventory of My Traits](#)
- Website Activity: [Generations of Traits](#)
- Website Activity: [A Recipe For Traits](#)
- Website Activity: [Create a DNA Fingerprint](#)
- PowerPoint:

### CCR STANDARDS

- 1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- 2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

### OBJECTIVES

- Relate genes to chromosomes
- Identify how traits are passed from parents to offspring
- Explain the structure and processes of DNA

### KEY CONCEPT

- Genes carry the codes for human traits. They are located on chromosomes within the nucleus of every living cell.

### VOCABULARY (WORD ANALYSIS)

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>○ Dominant</li> <li>○ Trait</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>○ Chromosome</li> <li>○ Genes</li> <li>○ Genetics</li> <li>○ Recessive</li> </ul>

## 5.1: Genetics

### BEFORE LESSON

#### 5.1: Genetics - [An Inventory of My Traits](#)

Create a Survey of classroom traits; Yes or No answers. During survey introduce vocabulary: Trait, Dominant, Recessive

Create a graph; Make a scientific statement using the data. Challenge the use of a Fraction, Decimal, and Percentage to explain results.

### BACKGROUND

### GUIDED PRACTICE

#### Genetics - [Generations of Traits](#)

During activity introduce vocabulary: Purebred, Hybrid, Chromosome, Gene, Variation

#### Gregor Mendel

#### Purebred and Hybrid

#### Genes and Alleles

#### Human Traits Chromosomes and DNA

#### The Genetic Code - [A Recipe For Traits](#)

### CORE SKILL

#### Make Predictions

Tell students that a prediction involves using your thinking and experience to make a guess about what will happen next. Then have students complete the activity as they read about Mendel's pea plant research. Ask students whether their predictions were correct.

#### Summarize Text

Have students apply the skills they learned in "Summarize Accurately" on page 177 to summarize page 179. Tell students to self-edit their work, making sure it contains facts only and not their own ideas or opinions.

### EXTENSION

#### Retell

Assign or have students choose a text excerpt from the lesson to retell in

*Test Words* | ○ Prediction

*EVIDENCE-BASED READING*

○

*21<sup>ST</sup> CENTURY SKILL*

○

*INTERACTIVE STRATEGY*

○

*WRITING TOPIC*

○

*WRITING PRACTICE*

○

their own words. This is an opportunity to evaluate students' comprehension and ability to articulate information. Correct syntax as needed.

### **Design a Flow Chart to Show Critical Stages**

Have students draw a flow chart that outlines Gregor Mendel's method for his landmark experiment on pea plants. Encourage students to use all the vocabulary words from this lesson in the flow chart.

### **LESSON REVIEW**

### **Write to Learn**

Before students begin to write, ask them to recall your discussion of using summarization as a comprehension strategy. Then explain that pausing occasionally to make predictions about what they are reading is another effective strategy. Help students understand that predictions are based on existing knowledge, so they must understand a text before they can make predictions related to the text. After students have completed the write



## Heredity

## 5.2: Genotypes and Phenotypes

*MATERIALS*

- CCB Science pages

*CCR STANDARDS*

- 

*OBJECTIVES*

- 

*KEY CONCEPT*

- 

*VOCABULARY*

<i>Tier 2</i>	◦
<i>Tier 3</i>	◦
<i>Test Words</i>	◦

*EVIDENCE-BASED READING*

- 

*21<sup>ST</sup> CENTURY SKILL*

- 

*INTERACTIVE STRATEGY*

- 

*WRITING TOPIC*

- 

*WRITING PRACTICE*

- 

## BEFORE LESSON

## BACKGROUND

## GUIDED PRACTICE

## CORE SKILL

## EXTENSION

## LESSON REVIEW

**Evolution****6.1: Evolution***MATERIALS*

- o CCB Mathematics pages 198 - 234

*CCR STANDARDS*

- o 1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- o 2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

*OBJECTIVES*

- o Understand the theory of evolutionary development
- o Recognize adaptations that enable organisms to survive in their environments
- o Understand the importance of fossil evidence

*KEY CONCEPT*

- o Fossils indicate that organisms have changed over time. The theory of evolution is scientists' best explanation for how those changes occur.

*VOCABULARY (RELATE WORDS)*

<i>Tier 2</i>	o Evidence
<i>Tier 3</i>	o Adaption o Evolution o Fossil o Mutation
<i>Test Words</i>	o

*EVIDENCE-BASED READING*

o

## BEFORE LESSON

**6.1: Biological Evolution****6.2: Common Ancestry and Cladograms****6.3: Speciation**

## BACKGROUND

## GUIDED PRACTICE

**The History of Life****Darwin, Modified****Mutations****Fossils****Eras of Life on Earth**

## CORE SKILL

**Identify Hypotheses**

Draw a framework for a flow chart on the board, beginning with the word hypothesis and ending with the word theory. Invite students to read the sidebar and then underline the words and phrases in the sidebar that describe what takes place after a hypothesis is proposed. Ask students to fill in the flow chart, using the underlined words and phrases (careful experimentation, investigation, and extensive and repeated testing) that occur before a hypothesis can be considered a theory.

**Cite Textual Evidence**

Review with students the first two paragraphs of the main text. Invite students to point out the sentences that supply specific evidence supporting the definition of fossil in the first sentence.

## EXTENSION

**Recognize Supporting Details**

Explain that to recognize the main idea and supporting details, students should ask themselves questions: What is each sentence about? Is there one sentence that tells about the whole paragraph or that is more important than the others? Help students identify the main ideas and

*21<sup>ST</sup> CENTURY SKILL*

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*INTERACTIVE STRATEGY*

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*WRITING TOPIC*

○

*WRITING PRACTICE*

○

supporting details in sections in which students may need more support

**Summarize Darwin's Journey**

Assign students to research the journey of the HMS Beagle, the ship on which Charles Darwin sailed to study evolution. Invite students to plot Darwin's course on a map and summarize each point with a quote or discovery that Darwin made. Students could also illustrate the discoveries on the map. Then have them write a summarizing statement about the effect of the trip on Darwin's subsequent theory of evolution.

---

**LESSON REVIEW****Write to Learn**

When students have finished writing their paragraphs, invite one or more student volunteers to share their paragraphs with the class. If students are having trouble thinking of supporting details to add to their paragraphs, read aloud a magazine or a newspaper article covering a current event and point out the descriptive details used by the writer.

## Evolution

## MATERIALS

- o CCB Mathematics pages 210 - 219
- o Squiggles, Ziggles, and Zares
- o [NOVA Fish Sorting](#)

## CCR STANDARDS

o

## OBJECTIVES

- o Describe the purpose of cladistics
- o Interpret a cladogram
- o Identify assumptions behind cladistics

## KEY CONCEPT

- o Cladistics is an analytical method scientists use to hypothesize about the relationships among existing organisms. The foundation of the method is an agreement that members within any clade, or group, share a common evolutionary past.

## VOCABULARY (RESPONSE)

Tier 2	<ul style="list-style-type: none"> <li>o Ancestry</li> <li>o Assumptions</li> <li>o Diverge</li> </ul>
Tier 3	<ul style="list-style-type: none"> <li>o Cladistics</li> <li>o Cladogram</li> <li>o Homologous</li> <li>o Phylogeny</li> <li>o Systematics</li> <li>o Taxonomy</li> </ul>
Test Words	o

## EVIDENCE-BASED READING

o

## 6.2: Common Ancestry and Cladograms

## BEFORE LESSON

## BACKGROUND

## GUIDED PRACTICE

**What is Cladistics?****The Main Ideas Behind Cladistics****How Do you Make a Cladogram?****Ingroups and Outgroups****The Principle of Parsimony****The Parts of a Cladogram**

## CORE SKILL

**Determine Meaning**

Read the first two paragraphs with students. Discuss the text to be sure students understand how to apply the meanings of word parts to define new words.

**Integrate Explanations with Visual Representations**

Read the text with students. Then ask them to examine the Venn diagram. Ask students to explain how the diagram helps them identify two features that the nambaroo and kangaroo share. Afterward, ask students to name other ways the information could be presented visually.

## EXTENSION

**Clarify Language**

Ask students to revisit the cladogram on page 212 and explain its meaning in their own words. Ask students to tell you what illustrations they would use to help explain each label, and have them justify their decisions.

**Formulate Research Questions**

Have students review the sidebar on page 213, the text on page 217, and the Write to Learn box on page 217. Ask students to write research questions related to the topics presented in those sections. Encourage

21<sup>ST</sup> CENTURY SKILL

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INTERACTIVE STRATEGY

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WRITING TOPIC

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WRITING PRACTICE

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students to select one of their questions to research and answer. Have students present their answers in the form of written explanations supported by at least one visual.

LESSON REVIEW

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## Evolution

## MATERIALS

- o CCB Mathematics pages 220 - 229
- o Squiggles, Ziggles, and Zares
- o [NOVA Fish Sorting](#)

## CCR STANDARDS

o

## OBJECTIVES

- o Identify different types and causes of speciation
- o Describe different kinds of evolution

## KEY CONCEPT

- o Speciation refers to the evolutionary process by which new biological species form. The pressures of a different environment, the isolation of a population, or genetic changes that result in successful adaptations may lead to a species with characteristics unlike its ancestors.

## VOCABULARY

## Tier 2

- o Fossil Record
- o Gene Flow
- o Hierarchy
- o Lineage

## Tier 3

- o Continental Drift
- o Incipient Species
- o Natural Selection
- o Speciation

## Test Words

o

## EVIDENCE-BASED READING

o

## 6.3: Speciation

## BEFORE LESSON

## BACKGROUND

## GUIDED PRACTICE

**Classifying Organisms****Lamarck and Darwin****Evolution and the Fossil Record****Continental Drift****Reproduction Isolation****Speciation****Allopatric Speciation**

## CORE SKILL

**Determine Central Ideas**

Read the opening paragraph aloud. Then invite volunteers to read each bulleted item aloud. Organize students into small groups and ask them to follow the bulleted steps as they reread the text on continental drift. Afterward, ask one person in each group to share their interpretation of the text's central idea. Discuss similarities and differences among groups' responses.

**Analyze Text Structure**

As a class, read all but the last paragraph in the text and review the clue words that signal particular types of text structure. Then read the last paragraph aloud, and give students time to search for examples of text structures in the parts of the lesson they have read and the parts that remain.

## EXTENSION

**Use Examples**

Ask students to revisit the table on page 224. Ask students to explain how each kind of speciation process occurs by relying on specific examples

*21<sup>ST</sup> CENTURY SKILL*

◦

*INTERACTIVE STRATEGY*

◦

*WRITING TOPIC*

◦

*WRITING PRACTICE*

◦

presented in the text.

**Predict Based on Models**

Have students conduct research either independently or collaboratively into the geodynamic models that predict continental movement over the next several hundred million years. Ask students to draw and explain the changes that some scientists have predicted based on their models.

---

**LESSON REVIEW****Make Connections**

Organize students into pairs. Ask each pair to imagine that they are recording a conversation between Lamarck and Darwin about how the giraffe came to have such a long neck. Have students identify and connect points of view by writing a conversation in the form of a dialogue between the two scientists. Encourage pairs to perform their dialogues.

**Energy****7.1: Energy***MATERIALS*

- o CCB Science pages 238 - 243

*CCR STANDARDS*

- o

*OBJECTIVES*

- o Define energy
- o Differentiate between kinetic and potential energy
- o Recognize different types of energy and energy transformations

*KEY CONCEPT*

- o Energy, the ability to do work, occurs in different forms that can be changed from one type to another.

*VOCABULARY*

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o Contract</li> <li>o Efficient</li> <li>o Energy</li> <li>o Expand</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o Law of Conservation of Energy</li> <li>o Transformation</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o</li> </ul>

*EVIDENCE-BASED READING***Reread/Read More Slowly**

- o Have students work with a partner to read the text passages on this page. Remind students that informational text containing many details will often need to be read more than once. As students read, point out that the first two paragraphs define two different kinds of

*BEFORE LESSON*

Discuss with students what they know about energy and heat. Students may be familiar with forms of energy that they use in their daily lives, such as riding a bike or turning on a light. Ask students how they would define the word energy and write their responses on the board. Explain that scientists have a very specific yet simple way of defining this term, which they will learn in this lesson.

*BACKGROUND*

Explain to students that there are two types of energy. Potential energy is stored energy; kinetic energy is energy in motion. Potential energy is transformed into kinetic energy when an object moves. Ask students to provide an example of kinetic energy that they encountered on the way to school. (Sample answers: riding in a car, walking, brushing teeth, riding a bike)

*GUIDED PRACTICE*

- o Energy
- o Heat

**Determine the Central Idea of a Text**

- o Remind students that headings, subheadings, and captions tell what information is going to follow and allows the reader to determine the central idea of the text. Have students read the text and complete the activity. After the lesson, have them go back and decide whether they correctly determined the central idea.

*CORE SKILL***Determine the Central Idea of a Text**

Have students read the text. Ask students to discuss the activity with a partner and summarize the central idea of the section Energy Changing Form in a sentence. When finished, write each group's sentence summary of the central idea on the board. As a class, determine which sentence is most accurate.

**Determine Meaning**

Have students read the text and complete the activity. Students may say they can observe a change in air temperature by feel or with a



energy (kinetic energy and potential energy), while the second two paragraphs describe how energy behaves.

### 21<sup>ST</sup> CENTURY SKILL

#### **Flexibility and Adaptability**

- Have students read the text and discuss examples of flexibility and adaptability in their own lives. Then have them work in small groups to research and describe another historical situation where the scientific community was flexible and adaptable.

### INTERACTIVE STRATEGY

○

### WRITING TOPIC

○

### WRITING PRACTICE

- Before students' attempt to write, brainstorm with the class various energy conversions that occur on a typical day. Make sure the student's titles and opening sentences reflect the central idea.

thermometer. Students may be able to observe the change in the temperature of hot cocoa more easily. Ask students to predict what will happen to the temperature of the hot cocoa after it sits for thirty minutes; ask students to state where the heat is going as the cocoa cools. Then ask what will happen to a cold drink that is removed from the refrigerator and allowed to sit for thirty minutes. Challenge students to explain where heat is moving in this instance. Lead students to understand that this process of heat transfer is what cools a hot drink or warms a cold drink.

### EXTENSION

#### **Rephrase or Restate Language**

Read aloud the text in the Reading Skill box on page 240. Point out the heading Energy Changing Form at the top of the page. Invite students to work in teams of two. One member of each team will read the two paragraphs below the heading Energy Changing Form. The other member will read and study the Types of Energy diagram. (Help students understand the meaning of each symbol used in the diagram.) When students are finished, have each team member explain the information in the text or the diagram to the other team member.

#### **Sketch Heat Transfer**

Have students draw a diagram that shows the differences between conduction, convection, and radiation. Have students research to find examples that were not discussed in the text.

### LESSON REVIEW

## Energy

## 7.2: Waves

## MATERIALS

- o CCB Science pages 244 - 251

## CCR STANDARDS

- o

## OBJECTIVES

- o Relate the characteristics of a wave to the electromagnetic spectrum
- o Compare low-energy and high-energy waves
- o Describe the visible spectrum

## KEY CONCEPT

- o

## VOCABULARY

<i>Tier 2</i>	o frequency
<i>Tier 3</i>	o electromagnetic spectrum o prism o reflect o refract o ultraviolet
<i>Test Words</i>	o

## EVIDENCE-BASED READING

- o

21<sup>ST</sup> CENTURY SKILL**Communication and Collaboration**

- o After students read the text, lead a discussion about ways in which they have worked together to analyze each other's work and conclusions like scientists. When scientists publish their findings, they can be read and discussed by other scientists. Have students think of other ways scientists can share their

## BEFORE LESSON

Discuss students' prior knowledge about waves. They may have seen ocean waves or they may be familiar with radio waves and the concept of light and sound waves.

## BACKGROUND

All ocean waves carry energy. They release high amounts of energy as they break and crash along a shore. The properties of an energy wave determine how much energy it has and how it can be used.

## GUIDED PRACTICE

- o Wave Theory
- o How Light Travels
- o Sound

**Cite Textual Evidence**

- o Explain to students that it can help to build a mental framework of a text before reading in detail. Lead students to understand that a well-written paragraph will start with the main idea and then list details that support the main idea. Have students read the text and find two details that support the main idea. Have them compare their findings with a partner.
- o Before students read pages 245-246, have them divide a sheet of paper into three columns and label them High-Energy Waves, The Visible Spectrum, and Low Energy Waves. As students read the text, have them list characteristics and examples of each type of wave. Help students recognize the ways in which high-energy waves can be damaging to humans. Ask a student volunteer to summarize some of the ways in which low-energy waves are useful. Point out to students the correct pronunciation of the term infrared (in-fruh-RED); explain to students that the prefix infra- means "below," so infrared wavelengths are below the wavelengths of red light. Discuss how the Prism diagram on page 246 is an expanded version of the central portion of the Electromagnetic Spectrum diagram on page 244.

## CORE SKILL

**Cite Textual Evidence**

Have students read the text. Lead a discussion comparing textual evidence

claims and ideas.

#### *INTERACTIVE STRATEGY*

○

#### *WRITING TOPIC*

○

#### *WRITING PRACTICE*

- After students complete the activity, have them exchange their conclusions about why sonar is an effective method for mapping the ocean floor and analyze each other's justifications. Explain to students that the word sonar is derived from the letters at the beginnings of the words Sound Navigation Ranging. Encourage students to do online research to learn more about the development of sonar technology and how it works.

to the other types of evidence discussed at the beginning of the lesson. Lead students to understand that citing textual evidence makes their responses more convincing and believable. Have students complete the activity and then exchange papers with a partner to critique each other's evidence.

#### **Draw Conclusions**

In small groups, have students discuss their conclusions and identify the details from the text they used to support their conclusions.

#### **EXTENSION**

##### **Use a Graphic Organizer**

Before students begin the Write to Learn activity, ask them to make a Word Web to represent their conclusion. Have them write the conclusion in the center and the supporting details in the surrounding circles.

##### **Categorize Objects by Opacity**

Have students create a poster that illustrates the differences between transparent, opaque, and translucent objects. Have students attach examples of each type of material to their poster.

#### **LESSON REVIEW**

## Energy

## MATERIALS

- o CCB Science pages 252 - 257

## CCR STANDARDS

- o

## OBJECTIVES

- o Discuss how electric current is produced and used
- o Identify parallel and series circuits
- o Describe an electromagnet and how it works

## KEY CONCEPT

- o Electric current flowing through a circuit can be harnessed for its energy, and it produces magnetic effects.

## VOCABULARY

Tier 2	o magnets
Tier 3	o circuit o electricity o electromagnet o generator o resistance
Test Words	o interpret

## EVIDENCE-BASED READING

## Choral Read

- o Organize students into groups and assign each group one of the headings or subheadings in the lesson. Ask groups to choral read the section. Then ask groups to describe what part of the reading task they found most challenging and what they can do to make the process easier.

## 7.3: Electricity and Magnetism

## BEFORE LESSON

Engage students in a discussion of electricity. Invite students to discuss what they know about it. For example, invite students to discuss what they rely upon electricity to do each day. Ask students if they know the source of that electricity and how it reaches their homes and school.

## BACKGROUND

Explain to students that the flow of charged particles results in electricity. Charged particles are invisible, but they occur everywhere. Ask: Who has shuffled along a carpet, touched a doorknob, and seen sparks or felt a shock? Explain that this is an example of static electricity. Next, ask students to describe displays of lightning they have observed during a storm. Afterward, explain that lightning is another form of static electricity. When electric charges flow in a continuous circuit, however, they form an electric current. Static and current forms of electricity can be harnessed, but the latter produces more powerful effects.

## GUIDED PRACTICE

- o Electricity
- o Electric Current
- o Circuits
- o Magnets
- o Electromagnetism

## Determine Meaning of Symbols

- o Examine the diagram as a class and invite students to interpret what they see. Then read the text with students. Afterward, ask volunteers to interpret the diagram again. Point out the various symbols in the diagram, including the symbols for ohms, volts, and light-emitting diodes. Ask students to suggest what could be added to the diagram to make it more useful. In this diagram, for example, students might say that a caption or a list of symbols and their meanings would be helpful.

## CORE SKILL

## Determine Meaning of Symbols

Read the first paragraph with students. Then ask students to read the second paragraph independently. Afterward, ask volunteers to share which

*21<sup>ST</sup> CENTURY SKILL***Media Literacy**

- Write the word literate on the board and explain that it means being able to read and write. Literacy, then, is the state or condition of being literate. However, people who are literate must be able to do more than read and write. They must be able to comprehend, analyze, determine the quality of, and transfer understandings across media. Write the word media on the board, and ask volunteers to list as many examples of media as they can. Then ask students what it means to be media literate. Give students time to read the text in the 21st Century Skill. Afterward, discuss how students determine the reliability of the media they use when doing research.

*INTERACTIVE STRATEGY*

- 

*WRITING TOPIC*

- 

*WRITING PRACTICE*

- Explain to students that before they can write, they will need to locate an instruction manual that accompanied an electric machine they use at home. Encourage students to examine carefully the diagram they find before attempting to write. It may also help them to list details they want to include in their summaries before writing begins.

lines from the text they used to interpret the meaning of each symbol on the batteries.

**Understand Text**

Before reading ask students to recall some of the comprehension strategies they shared at the beginning of the lesson. Review the strategies, including skimming titles and subtitles, scanning diagrams, determining important ideas and supporting details, and using key details to summarize. Have students read the text. Then give them time to summarize the text related to magnets. Encourage students to share their summaries.

Ask volunteers to define the term compound word, and give examples, such as footprint, skateboard, and homemade. Give students time to read the text and locate the words that are shortened and combined to create the word maglev (magnetic levitation).

*EXTENSION***Understand Diagrams**

Ask students to summarize what they see in the diagram on page 254. Have them read the text on the page and compare it to the diagram. Ask: What does the diagram explain? What labels would you add to the diagram to make it clearer and easier to understand? If possible, provide students with simple circuit-building materials. Encourage students to build circuits and discuss the process.

**Determine Cause and Effect**

A power surge is a spike in the voltage of an electric current. Have students investigate different causes of power surges and write an explanation of what happens during a power surge event. Have students include a visual to support their explanations. Also ask them to describe the damage that can result from power surges and how people can prevent them. Encourage students to share their work.

*LESSON REVIEW*

## Energy

## 7.4: Sources of Energy

## MATERIALS

- o CCB Science pages 258 - 267

## CCR STANDARDS

- o

## OBJECTIVES

- o Compare and contrast different sources of energy
- o Distinguish between renewable and nonrenewable resources

## KEY CONCEPT

- o Energy takes different forms, and each form can be used to do work.

## VOCABULARY

Tier 2	<ul style="list-style-type: none"> <li>o Crowdsourcing</li> <li>o Nonrenewable</li> <li>o Renewable</li> <li>o reservoir</li> </ul>
Tier 3	<ul style="list-style-type: none"> <li>o biomass</li> <li>o energy density</li> <li>o magma</li> <li>o nuclear fission</li> </ul>
Test Words	<ul style="list-style-type: none"> <li>o</li> </ul>

## EVIDENCE-BASED READING

## Word Analysis

- o Write the prefix hydro- on the board and explain that it comes from the Greek word hudor, meaning "water." Next, write the words hydropower, hydroelectric, and hydraulic on the board. Ask students what conclusion they can come to regarding the meaning of all of these words. (They are all related to water in

## BEFORE LESSON

Engage students in a discussion on energy, particularly the forms of energy they depend upon in their daily lives. Invite students to discuss energy-related topics that they hear on the news or from family members. Ask students to describe their dependence on energy. Have them discuss how they imagine the future depends on finding or creating new sources of energy

## BACKGROUND

Explain to students that we depend on energy to live. Energy comes from many sources, even the food we eat. Energy may come from a living resource, such as the crops we grow, or a nonliving resource, such as the air we breathe. A resource may also provide us with the energy we need to power our cars or heat our homes.

## GUIDED PRACTICE

- o Renewable and Nonrenewable Sources of Energy
- o Biomass
- o Wind Power
- o Solar Power
- o Hydropower
- o Geothermal Power
- o Fossil Fuels
- o Nuclear Power
- o The Law of Conservation of Energy
- o Choosing a Source of Energy

## CORE SKILL

## Analyze an Author's Purpose

Read the text with students. Afterward, invite volunteers to summarize the symptoms of "wind turbine syndrome." Then, discuss students' answers to the question that concludes the text. Encourage students to use the term author's purpose in their explanations to emphasize that authors always have reasons for writing.

## Analyze Text Structure

some way.)

## 21<sup>ST</sup> CENTURY SKILL

### Information Literacy

- Read the text with students. Before giving students time to respond to the question at the end of the text, ask them to summarize the purposes and advantages of crowdsourcing. Ask students to offer opinions on why crowdsourcing might be helpful in the workplace. (creativity, expense, collaboration)

## INTERACTIVE STRATEGY

○

## WRITING TOPIC

○

## WRITING PRACTICE

- Since the combination of ethanol and gas would be used as the energy source, less gasoline would be used than if the fuel consisted of only gas. Using less gasoline per gallon makes supplies of gasoline last longer.

Review the different kinds of text structure listed in the text. Have students revisit the 21st Century Skill sidebar on page 262 to determine which text structure the author used to organize the text. (problem and solution)

## EXTENSION

### Explain a Diagram

Ask students to "walk" through the lesson with you, pausing at each diagram or image to discuss its content and its relationship to the lesson.

### Cite Evidence and Develop a Logical Solution

Organize students into small groups. Have students address an everyday problem related to energy sources or consumption and offer a solution. Encourage students to cite evidence from research to explain their problems and support their solutions. Have students share their solutions.

## LESSON REVIEW

## Energy

*MATERIALS*

- o CCB Science pages 268 - 275

*CCR STANDARDS*

- o

*OBJECTIVES*

- o Recognize endothermic and exothermic reactions
- o Relate changes in energy to endothermic and exothermic reactions

*KEY CONCEPT*

- o Chemical reactions change one substance into another and change their potential energy. When energy is released, the chemical reaction is called exothermic. When energy is absorbed, it is called endothermic.

*VOCABULARY*

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o catalyst</li> <li>o chemical reaction</li> <li>o compounds</li> <li>o potential energy</li> <li>o product</li> <li>o reactant</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o activation energy</li> <li>o endothermic</li> <li>o exothermic</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o</li> </ul>

*EVIDENCE-BASED READING***Alphabetic Suffixes -ity, -al, -ly**

- o Model adding suffixes to these words: dense+ ity (density), origin+ al (original), potential+ ly (potentially). Discuss the meaning of each

**7.5: Endothermic and Exothermic Reactions***BEFORE LESSON*

Engage students in a discussion of heat transfer, a concept they learned about in the first lesson of this chapter. To prompt discussion, ask students to use a cup of steaming cocoa to explain the transfer of heat from an area of greater to lesser thermal energy. Also invite volunteers to explain convection, conduction, and radiation as processes of heat transfer.

*BACKGROUND*

Explain to students that a chemical reaction is a reaction between two or more substances that produces a new substance. While physical changes can be reversed, chemical changes usually cannot. Each substance has its own set of chemical and physical properties. The properties can be used to identify unknown substances.

*GUIDED PRACTICE*

- o Chemical Reactions
- o A Familiar Example
- o Kinds of Energy
- o Exothermic Reactions
- o Endothermic Reactions
- o Potential Energy in Chemical Reactions
- o Catalysts

*CORE SKILL***Make Predictions**

Read the text with students, emphasizing the relationship between prior knowledge and predictions. Have students write what they know about chemical reactions in the chart, or create a new, larger chart on their own paper. Tell students that they will be able to add more information to the chart after reading about endothermic reactions.

**Follow a Multistep Procedure**

Review the steps in the procedure for making "hot ice," which results in an exothermic reaction. If possible, have students write numbered steps for the procedure. Help students understand the value of writing such explicit instructions for a scientific investigation. Help students understand that



word and point out any changes that occurred to the base word when the suffix was added. Ask students to identify other base words that can be changed using these suffixes, such as gravitation and probable.

### 21<sup>ST</sup> CENTURY SKILL

#### **Creativity and Innovation**

- Have students read the text and then explain creativity and innovation in their own words. Invite students to give specific examples of personal creativity and what it led them to innovate. Ask students to offer opinions on why such talents and behaviors might be particularly helpful in science.

### INTERACTIVE STRATEGY

○

### WRITING TOPIC

○

### WRITING PRACTICE

- Remind students of the definitions of exothermic and endothermic reactions before they begin to describe examples. Explain to students that they must justify their examples.

steps make an investigation reproducible, meaning other people who repeat the procedure should get similar results.

### EXTENSION

#### **Describe a Multistep Procedure**

Ask students to take turns describing processes that they know how to do well, such as tuning a guitar or folding origami to create a figure. Have them explain each step involved in the process, from beginning to end.

#### **Relate a Process**

Organize students into small groups. Have them use print and digital media to write an explanation of chemical reactions for young students. Remind students that their explanations must use age-appropriate examples. Encourage students to share their explanations with the class, consider constructive criticism, revise their explanations, and then present them to younger students

### LESSON REVIEW

**Work, Motions, and Forces***MATERIALS*

- o CCB Science pages

*CCR STANDARDS*

- o

*OBJECTIVES*

- o Apply the characteristics of speed, velocity, and acceleration to describe motion
- o Apply Newton's laws of motion to describe the motion of familiar objects

*KEY CONCEPT*

- o Forces must act upon an object to change its motion. Newton's three laws of motion explain the relationships between forces and moving objects.

*VOCABULARY*

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o Acceleration</li> <li>o Distance</li> <li>o Motion</li> <li>o speed</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o inertia</li> <li>o velocity</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o</li> </ul>

*EVIDENCE-BASED READING***Use Prior Knowledge**

- o Encourage students to think about what they already know before they read. To get students started, provide self-questioning models, such as Have I read about this topic before? Does this sound familiar? When students can create a context or framework of known information in which to place new

**8.1: Newton's Laws of Motion***BEFORE LESSON*

Determine students' readiness by engaging them in a discussion of motion. Invite students to discuss the motion of familiar objects, such as skateboards, bicycles, cars, and even feet upon a sidewalk. Ask them to describe the motion of these objects and what's required to make them turn, speed up, slow down, and stop.

*BACKGROUND*

Toss a foam ball or dribble a basketball. As students observe the ball's motion, explain that the movement of any object depends upon its position and upon the forces that are acting on it. Tell students that when we describe motion, we usually use Earth as our frame of reference because, despite Earth's movement, it appears stationary. Explain that the concepts of distance, speed, velocity, and acceleration are all related to motion and that Isaac Newton described these relationships in the set of laws called Newton's Laws of Motion.

*GUIDED PRACTICE*

- o Position and Motion
- o Distance
- o Speed and Velocity
- o Acceleration
- o Newton's Laws of Motion

**Determine the Central Idea of a Text**

- o Remind students that every text has a central or "big" idea. Read the introductory text with students. Then give them time to read the text in the text box and answer the question that follows. Afterward, ask volunteers to share their statements of the central idea. Discuss any discrepancies that may occur.

*CORE SKILL***Determine Meaning of Terms**

Read the text as a class. Before students complete the activity, discuss the value of making personal connections with a text. For example, ask volunteers to describe ways that terms are used on this page, including distance, speed, velocity, and acceleration relate to their personal

information, they consciously monitor their own comprehension.

### *21<sup>ST</sup> CENTURY SKILL*

#### **Initiative and Self-Direction**

- Ask volunteers to describe topics they enjoy so much that they read about or investigate those topics whenever they have time. Engage students in a discussion of self-direction. What does the term mean at home, in school, and at work? Read the text as a class, and then continue the previous discussion by asking students to share specific experiences that left them wanting to know more. Encourage students to talk about what actions they took to learn more.

### *INTERACTIVE STRATEGY*

○

### *WRITING TOPIC*

○

### *WRITING PRACTICE*

- Encourage students to review the word inertia, mass, force, and momentum before they attempt to use them in an original passage. You may want to invite students to complete this writing task with partners.

experiences. Ask students how thinking of these terms in their scientific context can change their impressions of travel.

#### **Determine the Central Idea of a Text**

The central idea in a paragraph is the most important idea. It can usually be found in the first or last sentence of the paragraph. The central idea of a text or a selection is rarely stated in a particular place in a text. Students must understand the overall meaning of the selection and use the supporting details to identify the selection's central idea. Finding the central idea requires students to apply a variety of skills, such as synthesizing information and making inferences. In other words, students need to connect the ideas that are linked across the text, and they sometimes have to make educated guesses about information that is not directly stated.

### *EXTENSION*

#### **Review the Text**

Place students in pairs and ask them to explain to their partner something they know, such as the proper way to prepare for an activity. Then have the partner identify what he or she believes to be the central idea of the explanation and provide details that support that central idea.

#### **Relate a Procedure**

Have students review the lesson and seek more examples that demonstrate each of Newton's Laws of Motion. Then have them choose an example and write the steps for performing a procedure that would demonstrate the relationship between the example and a corresponding law of motion. Ask students to demonstrate and explain their procedures for the class.

### *LESSON REVIEW*

## Work, Motions, and Forces

## 8.2: Forces and Machines

*MATERIALS*

- o CCB Science pages

*CCR STANDARDS*

- o

*OBJECTIVES*

- o Define work
- o Describe the relationship between forces and work
- o Identify simple machines and compound machines

*KEY CONCEPT*

- o Work occurs when a force is applied to move an object over a distance.

*VOCABULARY*

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o Force</li> <li>o friction</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o compound machine</li> <li>o equilibrium</li> <li>o simple machine</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o distinguish</li> </ul>

*EVIDENCE-BASED READING***Ask Questions**

- o Explain that when students ask questions to get information as they read, they can better understand the text and accomplish their purpose for reading. Students' questions vary depending on their purpose for reading and the information they want to gain from the text. Choose a portion of text for students to read or reread. Have students write a question they have about the text. Ask students to

*BEFORE LESSON*

Ask students if they've ever been able to move an object without using some kind of force. Discuss with them that in science, work cannot be accomplished without force. Ask students if they've ever heard of the word work used in a scientific context.

*BACKGROUND*

At its simplest, a force is a push or pull. Gravity is an example of a pull. Moving something, such as a shopping cart, from a position behind it is an example of a push. When the forces acting on an object are the same in opposite directions, an object is said to be in equilibrium, meaning that the object will not move. Help students identify the push or pull of forces as they read through the lesson.

*GUIDED PRACTICE*

- o Forces
- o Machines
- o Pulleys
- o Wheel and Axle
- o Gears

**Distinguish between Facts and Speculation**

- o Have students read aloud the passage in the white box. Ask: How would you find out whether this information is fact or speculation? Tell students to look for certain clues in the text that help tell whether the author is using facts. Have students ask these questions as they read: Can the statement be proved? Is the statement based on data or reliable information? Is the statement free of words that express beliefs and feelings? Does the author avoid using words that express judgment? If the answer to any of these questions is yes, the statement is probably a fact.

*CORE SKILL***Distinguish Between Facts and Speculation**

Have students write down their speculations about future machines. Then divide the class into small groups and have them share their speculations with one another. Have each group decide which of the machines is most

trade questions with a partner and look for the answers in the lesson. Then ask students how they might find answers to questions not answered in the text.

### 21<sup>ST</sup> CENTURY SKILL

#### **Creativity and Innovation**

- Students may find it unusual that creativity is associated with scientific knowledge. Discuss with students how scientists must sometimes think creatively to solve problems and pursue investigations. Discuss with them how keeping an open mind about results through trial and error often helps the creative spirit. Ask students to discuss personal experiences with creativity.

### INTERACTIVE STRATEGY

- 

### WRITING TOPIC

- 

### WRITING PRACTICE

- Explain to students that the words affect and effect are easily mixed up. The word effect is a noun that means the result of something. The word affect is a verb, meaning that someone or something has an impact or influence on someone or something else. Have students use each word in a sentence to clarify the meaning before they begin writing.

likely to be developed the soonest. Have groups share their results with the class.

#### **Distinguish Cause and Effect**

After students have finished their charts, create a chart on the board that includes all of their entries. Did students have different causes and effects for the same machines? Discuss any differences in causes and effects for each type of machine.

### EXTENSION

#### **Elaborate on Cause and Effect**

To help students identify cause-and-effect relationships, have them make a list of causes and effects using events from their lives. For example, if a person sleeps late (cause), he or she might be late for work or an appointment (effect).

#### **Collect and Display**

Data Have students draw or find images of various simple and compound machines. Have students label the images and explain how each one satisfies the definition of simple or compound. Challenge students to be creative with their choices and collect diverse examples.

### LESSON REVIEW

## Chemical Properties

## 9.1: Matter

### MATERIALS

- o CCB Mathematics pages 302 - 355
- o Worksheet: [Matter - Chemical or Physical](#)
- o PowerPoint: [Matter](#)
- o Experiment: Sugar Crystals

### CCR STANDARDS

- o 2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
- o 9 Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

### OBJECTIVES

- o Recognize the four different states of matter
- o Distinguish between chemical and physical properties and changes
- o Explain the relationship between energy and states of matter

### KEY CONCEPT

- o Matter is anything that has mass and takes up space. Matter exists on Earth in one of four states - solid, liquid, gas, or plasma

### VOCABULARY

<i>Tier 2</i>	o Stimulation
<i>Tier 3</i>	o Chemical Property o Element o Matter o Physical Property o State of Matter
<i>Test Words</i>	o Conclusion

### BEFORE LESSON

Determine students' readiness for learning about matter by discussing water. Invite students to tell you what they know about water. Encourage discussion of the different forms that water can take. Give examples, if necessary, such as water in a glass, an ice cube, and steam from a kettle of boiling water. Once students are able to recognize that water is matter and that it exists in different forms, explain that these forms are called states of matter.

### BACKGROUND

Matter is anything that has mass and volume. Matter can take different forms: solid, liquid, gas, or plasma. Matter cannot be created or destroyed, but its form can change. All matter has energy. Remind students of the discussion of water that occurred while you determined student readiness for learning. Ask a volunteer to identify the three states of water on Earth. Explain that water, regardless of its state, has mass, meaning it is made of a measurable amount of matter. It also has volume, meaning it is possible to measure the space the liquid, frozen, or gaseous water occupies.

### GUIDED PRACTICE

- o The States of Matter
- o Properties of Matter
- o Early Ideas About the Elements

### Compare and Contrast

- o Write the words Text and Simulation on the board. Ask students to compare and contrast the terms, helping them recognize that a text explains a real-world process, while a simulation represents or models that process. Then read the introductory text as a class. Give students time to read the example independently. Afterward, invite students to discuss the advantages of using simulations and experiments to support science texts.

### CORE SKILL

### Compare and Contrast Information

Read the text with students, and then ask them to compare and contrast the information they gather from both the diagram and the text.

*EVIDENCE-BASED READING*

- 

*21<sup>ST</sup> CENTURY SKILL***Social and Cross-Cultural Skills**

- Read the text with students. Invite them to suggest how cultural differences among scientists can increase scientific productivity and accomplishments. Give them time to conduct their research and share their results.

*INTERACTIVE STRATEGY*

- Charts

*WRITING TOPIC*

- Experiment: Sugar Crystals

*WRITING PRACTICE*

- Suggest that each student share his or her conclusion with a partner. Each partner should ask questions about the event or incident described to see if there are more details available. Students should then augment their conclusions based on the additional details elicited by their partners.

Afterward, invite students to discuss what they are able to observe in the illustrated simulation that they would not be able to observe in an experiment. Prompt students to recognize that in an experiment, they would be unable to see how a substance's particle structure changes as the environment changes.

**Draw Conclusions**

Read the text with students. Then organize students into small groups. Have each group review the list of changes and categorize them as chemical or physical changes. When students have completed the task, have someone from each group write the results on the board. Examine the results as a class, discussing and resolving any discrepancies that may exist. Encourage students to justify their decisions.

*EXTENSION***Explain Connections**

Revisit the concept map that students began building at the beginning of the lesson. Ask students to explain the connections they see in the map. Encourage students to add further information or clarify existing information.

**Summarize a Multistep Procedure**

Have students use print or online materials to find examples of science experiments that demonstrate changes of state. Ask students to select an experiment, such as producing sugar crystals on a string or clouds in a bottle. Have students gather the necessary materials, follow the procedure, collect data, and summarize their findings in a presentation.

*LESSON REVIEW*

## Chemical Properties

## 9.2: The Atom

*MATERIALS*

- CCB Mathematics pages 312 - 319
- Video: [Our Friend the Atom](#)
- Video: [Bill Bye - Atoms and Molecules \(1/2\)](#)
- Video: [Bill Nye - Atoms and Molecules \(2/2\)](#)
- Video: [PBS - Making Stuff Smarter](#)

*CCR STANDARDS*

- 1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support
- 7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

*OBJECTIVES*

- Describe the structure of an atom
- Identify properties of the elements using the periodic table of the elements

*KEY CONCEPT*

- Elements are made of tiny particles called atoms.

*VOCABULARY*

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>○ Model</li> <li>○ Neutral</li> <li>○ Table</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>○ Atom</li> <li>○ Electron</li> <li>○ Neutron</li> <li>○ Proton</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>○</li> </ul>

*EVIDENCE-BASED READING**BEFORE LESSON*

Determine students' readiness for learning by discussing prior knowledge about atoms, elements, and electric charge. Examine the Periodic Table of the Elements on pages 316 and 317 and have students identify elements they are already familiar with.

*BACKGROUND*

Explain to students that atoms are the basic building blocks of matter. Discuss what this statement means and lead students to understand that matter is considered solid, liquid, or gas (or plasma). Have students look at the Bohr Model on page 312 and discuss the structure of atoms.

*GUIDED PRACTICE*

- Structure of the Atom
- Atomic Number and Atomic Mass
- Organizing the Elements
- Using the Periodic Table
- Why the Table Works

**Cite Textual Evidence**

- Remind students that two or more related sentences can form a paragraph, and that each paragraph has a main idea. That main idea is normally stated, often in the first or last sentence. The remaining sentences contain factual details, or information that support the main idea. Explain that factual details represent textual evidence, and readers can cite textual evidence to answer questions and justify their answers. Have volunteers read and summarize the first two paragraphs. Then read aloud the directions presented in the third paragraph and give students time to complete the task. Afterward, ask students to identify the sentence that states the paragraph's main idea. (the first sentence) Then ask them to explain the purpose of the remaining sentences. (facts that support the main idea)

*CORE SKILL***Cite Textual Evidence**

Have students read the text and then apply what they learned on page 313 to complete the activity.



**Roots**

- Write the word nucleus on the board. Next to the word, write: from the Latin word nucleus, meaning "kernel," which derives from the Latin word nucula, meaning "little nut." Invite a volunteer to suggest reasons why scientists called the central part of an atom a "nucleus." Then ask students if they can recall other uses of the word nucleus. (A cell's DNA is found in its nucleus. The grandparents form the nucleus of a large extended family.)

*21<sup>ST</sup> CENTURY SKILL***Critical Thinking and Problem**

- Solving Have students research online for Mendeleyev's original periodic table. Point out for research purposes that his name is often spelled "Mendeleev." Have students discuss in groups how Mendeleyev knew those elements must exist. Then have them work in pairs to research how the elements were discovered.

*INTERACTIVE STRATEGY*

○

*WRITING TOPIC*

○

*WRITING PRACTICE*

○

**Apply Scientific Models**

Provide students with small, round objects or candies to model the parts of an atom. If possible, provide different colors for protons, neutrons, and electrons. Have students read the text and complete the activity. Encourage students to be creative with their models while also maintaining accuracy. Allow students to compare their models.

*EXTENSION***Interact with the Periodic Table**

Invite students to explore Earth's elements through the use of an interactive periodic table like the one available through Wikipedia. Project the table and invite volunteers to come forward to select an element and click on it to learn the element's name and properties. Have students identify and share one important fact about each of the elements they choose.

**Design a Game**

Challenge students to use a print or digital version of the periodic table to create a game to help younger learners learn about the relationship between atomic number and chemical and physical properties of elements. Have students focus on elements in groups I, II, VII, and VIII. Have students write the rules for their games, observe as players play their games,

*LESSON REVIEW*

## Chemical Properties

*MATERIALS*

- o CCB Science pages 320 - 325

*CCR STANDARDS*

- o

*OBJECTIVES*

- o Explain how individual atoms interact to form compounds
- o Compare and contrast different types of chemical bonds
- o Communicate the structure of molecules using chemical formulas

*KEY CONCEPT*

- o Individual atoms form compounds by making chemical bonds with one another. To do this, each atom gains, loses, or shares electrons.

*VOCABULARY*

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o Bonding</li> <li>o Compound</li> <li>o Formula</li> <li>o symbol</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o molecule</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o cause</li> <li>o effect</li> </ul>

*EVIDENCE-BASED READING***Make Connections**

- o After students read the text on this page, ask them to examine the diagram once more. Reread paragraphs three through six. Pause after each paragraph to discuss how the diagram explains or models important ideas in the text. Discuss the value of looking for

## 9.3: Compounds and Molecules

## BEFORE LESSON

Determine students' readiness for learning by discussing prior knowledge about atoms and their electrons. Have students recall what happens when an atom loses or gains an electron. (An ion results.)

## BACKGROUND

Explain that compounds are made up of atoms that are bonded. There are various kinds of bonds, which may be strong or weak. Review the difference between mixtures and compounds. Mixtures are formed when molecules are physically combined. Compounds, on the other hand, are formed when molecules are chemically combined.

## GUIDED PRACTICE

- o Compounds and Bonding
- o Chemical Formulas

**Determine Meaning**

- o Have students read the first two paragraphs and then identify symbols used in the lesson. Then have students read the passage and complete the activity.

## CORE SKILL

**Understand Text**

Write the words cause and effect on the board. Leave a space between the words. Then draw an arrow from cause to effect. Ask students to interpret the symbol, or the meaning of the arrow. (A cause leads to an effect.) Next, write the words since, because, so, consequently, thus, and therefore on the board. Explain that the words you wrote are signal words, or words that indicate cause-effect relationships. Before students read the text and complete the task, invite volunteers to use signal words to create sentences that describe cause-effect relationships.

**Determine Meaning**

Ask students to recall the earlier discussion of symbols. Have students scan the text on the page to find examples of symbols. For example, students will find letters that stand for elements, numbers that stand for quantities, and plus and minus symbols that represent electrical charges. Then read the text with students and invite volunteers to identify the

connections between visuals and text to support comprehension.

### *21<sup>ST</sup> CENTURY SKILL*

#### **Productivity and Accountability**

- Write the word accountable on the board. Explain that people hold one another accountable for their work, their decisions, and the products they make. Offer an example, such as how auto manufacturers are held accountable for making vehicles that meet specific safety regulations. Invite students to offer other or more personal examples of accountability, such as the responsibility they take for children left in their care. Invite students to discuss what kind of accountability is expected of scientists (accurate reporting of investigative results, for example) and why this accountability is necessary. Then read the text with the class, and invite volunteers to explain scientists' obligations to the larger community.

### *INTERACTIVE STRATEGY*

○

### *WRITING TOPIC*

○

### *WRITING PRACTICE*

- Before they begin writing, have students discuss in groups or pairs how they would describe how chemical bonding occurs. Encourage students to use words or phrases that signal cause-and-effect relationships, such as because, as a result, therefore, and due to.

symbols in  $H_2O$  and  $C_3H_{12}$ .

### EXTENSION

### LESSON REVIEW

## Chemical Properties

## MATERIALS

- o CCB Science pages 326 - 331

## CCR STANDARDS

- o

## OBJECTIVES

- o Recognize a balanced chemical equation
- o Understand and apply the law of conservation of matter
- o Identify different types of solutions

## KEY CONCEPT

- o Matter can neither be created nor destroyed. When elements or compounds enter chemical reactions, the number of their atoms always remains the same.

## VOCABULARY

Tier 2	<ul style="list-style-type: none"> <li>o Acid</li> <li>o Balanced</li> <li>o Base</li> <li>o solution</li> </ul>
Tier 3	<ul style="list-style-type: none"> <li>o equation</li> <li>o law of conservation of</li> <li>o matter</li> </ul>
Test Words	<ul style="list-style-type: none"> <li>o</li> </ul>

## EVIDENCE-BASED READING

## Word Forms

- o Direct students' attention to the boldfaced words on the page. Then write the words solution, solute, and solvent on the board. Next to the words, write: from the Latin word solutus, the past participle of the Latin verb solvere, meaning "to loosen, untie, solve,

## 9.4: Chemical Reactions and Solutions

## BEFORE LESSON

Discuss with students what they know about chemical bonds and chemical formulas. Write  $2H_2O$  and  $2NH_3$  on the board and have students identify which digits represent the number of molecules and which digits represent the number of atoms. Then have a volunteer sketch the molecular structure.

## BACKGROUND

A chemical reaction can be represented by a chemical equation. The equation shows the chemicals that react on the left side, and the result on the right side. Have students recall the format of a mathematical equation, such as  $4 + 2 = 6$ . Explain that in a chemical equation, an arrow replaces the equal sign.

## GUIDED PRACTICE

- o Chemical Reactions
- o Solutions

## Compare and Contrast

- o Information Explain to students that there is so much information available in today's society that they may often find contradictions. They will need to be able to choose which source to trust.
- o Have students read the section and discuss the activity in small groups. Lead students to recognize that the information in the blog is not only inaccurate, but it includes opinions instead of facts.

## CORE SKILL

## Analyze Structure

Explain to students that compound words are made up of two shorter words. Students can use the meanings of the shorter words to understand the compound word. Write the word photosynthesis on the board. Beneath the word part photo, write: from the Greek word photo-, meaning "light." Beneath the word part synthesis, write: from the Greek word syntithenai, meaning "put together, combine." Ask a volunteer to define the terms. Lead students to understand that photosynthesis is the process of using light to combine carbon dioxide and water to make glucose (energy).

## Compare and Contrast Information

dissolve." Read the Latin root's meaning aloud. Then ask students to tie the root's meaning to the meanings of the boldfaced words.

### 21<sup>ST</sup> CENTURY SKILL

#### Communication and Collaboration

- Discuss the importance of models in science. Models are useful if the object being studied is too big, too small, or otherwise too difficult to interact with. Ask students to think of situations where models would be helpful. Examples include atomic models and models of the solar system.

### INTERACTIVE STRATEGY

○

### WRITING TOPIC

○

### WRITING PRACTICE

- Read the text with students before they write. Discuss how it's possible, particularly with access to online media, to find numerous articles related to the same topic. Help students identify topics of interest before they begin searching for related articles.

Before reading the text, ask students to explain the value of visual representations. Then read the text as a class, and guide students as they search for good particle models of solutions. Encourage students to collaborate as they compare and contrast the visual representations and text descriptions.

### EXTENSION

#### Clarify Language

Ask students to look at the boldface words in the lesson and look for context clues that help define them. Check students' pronunciation of each word.

#### Formulate a Procedure

Have students formulate a procedure for making an electrolyte solution, an acid solution, an alkaline solution, or a salt. Instruct students to research online to find examples that are not in the text.

### LESSON REVIEW

## Chemical Properties

*MATERIALS*

- o CCB Science pages 332 - 337

*CCR STANDARDS*

- o

*OBJECTIVES*

- o Understand the importance of organic chemistry
- o Identify the advantages and disadvantages of using hydrocarbons
- o Describe the four groups of organic compounds found in living things

*KEY CONCEPT*

- o Carbon forms strong bonds and is the basis for the chemistry of living things.

*VOCABULARY*

<i>Tier 2</i>	o protein
<i>Tier 3</i>	o biomolecules o carbohydrates o distillation o hydrocarbons o organic chemistry o polymer
<i>Test Words</i>	o replicate

*EVIDENCE-BASED READING***Use Context Clues**

- o After reading about the classes of biomolecules, have students locate the term complex carbohydrate. Then help them find clues in the text that explain the meaning of the term. For example, students will find that the text offers a clear definition of the term. It

## 9.5: The Chemistry of Life

## BEFORE LESSON

Display or project an image of a food label. An online search for "food labels" results in numerous images of labels that provide nutrition facts. Select a label that identifies fat s, carbohydrates, and proteins. Discuss the label as a class, inviting students to share what they know about these categories of ingredients. Explain that in this lesson, students will learn more about these food groups and the molecules that make them.

## BACKGROUND

Ask a volunteer to define the term organically grown. Explain that the term was first used in the 1940s to describe plants that were grown without the use of pesticides and fertilizers. Then write the term organic chemistry on the board. Explain that this field of chemistry began in the 1800s, and it focuses on the study of carbon-containing compounds. Explain that while not all organic compounds come from living or once living things, carbon is the basic element of all living things.

## GUIDED PRACTICE

- o The Chemistry of Life
- o Organic Polymers

**Analyze Author's Purpose**

- o Have a volunteer read the section about the scientific method aloud. Then have students work in pairs or small groups to complete the activity. Direct them to discuss the paragraph with a partner and come to agreement as to the author's purpose. Be sure to add the vocabulary word replicate to the word map.

## CORE SKILL

**Understand Text**

Read the text with students. Then project an image from an online search for "fractional distillation of hydrocarbons" to show students a visual explanation of the distillation process and the products that result. Invite students to use what they learn through examination of the visual and discussion to predict how water is distilled. Then give students time to find images and texts related to the "water distillation process" to confirm or revise their predictions. Or, write students' predictions on the board and

also gives examples of complex carbohydrates. Emphasize that definitions, examples, and explanations are clues that help readers define unfamiliar terms.

### *21<sup>ST</sup> CENTURY SKILL*

#### **Leadership and Responsibility**

- Discuss with students the influence science has on public policy. Have students read the text and complete the research activity. Allow students to discuss whether they use the recommendations and have them provide explanations. Lead students to focus on a central question that they can research and report on.

### *INTERACTIVE STRATEGY*

○

### *WRITING TOPIC*

○

### *WRITING PRACTICE*

- Before students begin to write, discuss the meaning of bias. A bias is a tendency to choose a particular option or favor one thing, person, idea, or group over another. Ask students why it is important to identify bias in informational text.

conduct an online search for information as a class.

#### **Analyze Author's Purpose**

Ask students if they were surprised by the last sentence of the section. Students may expect textbooks to inform rather than tell them what to do. How would you rewrite the final sentence of the paragraph so that the author's purpose is no longer persuasive but informational?

### *EXTENSION*

#### **Understand Word Parts**

Write the prefixes bio-, poly-, carbo-, and hydro- on the board. Remind students of the meaning of each prefix (life, many, carbon, hydrogen). Then have them look for words containing these word parts (biomolecule; polymer; carbohydrate; hydrocarbon). Ask students to use their understanding of the word parts to define the words they find.

#### **Collect and Display**

Information Have students interview a dietician or nutritionist and find one or more reliable sources on the internet to gather information about the benefits and problems of including fats in the diet. Have students develop specific topic questions before conducting the interview that focus on the information they want to include in their report. Have students present their findings to the class. Student authors/presenters should make available the list of topic questions as well as the report. Have student audience members look for clues of bias in the presentation.

### *LESSON REVIEW*

## Chemical Properties

*MATERIALS*

- o CCB Science pages

*CCR STANDARDS*

- o

*OBJECTIVES*

- o Balance a chemical equation
- o Identify types of chemical reactions

*KEY CONCEPT*

- o Chemical reactions can be expressed symbolically in the form of chemical equations. Familiarity with chemical equations makes it easier to understand and predict some reactions.

*VOCABULARY*

<i>Tier 2</i>	o combust
<i>Tier 3</i>	o chemical equilibrium o decomposition reaction o double replacement reaction o net forward reaction o reversible reaction o single replacement reaction o stoichiometric coefficient o synthesis reaction
<i>Test Words</i>	o

*EVIDENCE-BASED READING*

- o

*21<sup>ST</sup> CENTURY SKILL***Information and Communication Literacy**

- o Engage students in a discussion of the value

## 9.6: Chemical Equations

## BEFORE LESSON

To determine student readiness, ask students to define the terms molecule and compound and explain their connections to physical and chemical properties.

## BACKGROUND

Chemical reactions are processes of change. Atoms combine, rearrange themselves, and form bonds to produce new substances with properties unlike the properties of the original elements that made them. Chemical reactions may be accompanied by observable effects, such as the emission of heat or light, the production of gas, or the formation of a precipitate or a solid that falls out of a solution. Ask students to recall the chemical equation representing the process of photosynthesis in lesson 9.4. Ask students to identify the substances that react, or combine, to make new products and to identify the new substances that form.

## GUIDED PRACTICE

- o Chemical Equations
- o Understanding the Symbols
- o What Is a Stoichiometric Coefficient?
- o The Law of Conservation of Mass
- o Different Types of Chemical Reactions
- o Single Replacement Reaction
- o Double Replacement Reaction

## CORE SKILL

**Information and Communication Literacy**

Engage students in a discussion of the value of communication literacy. In other words, ask students to explain why it is important for all people to have the skills that allow them to access, interpret, and communicate information and ideas. Also ask students how critical thinking and creativity are related to communication literacy. Next, explain the concept of peer review. Have students read the text and then explain how peer review contributes to information and communication literacy.

**Determine Central Ideas**

Explain that the second paragraph is the first paragraph of a paper on the



of communication literacy. In other words, ask students to explain why it is important for all people to have the skills that allow them to access, interpret, and communicate information and ideas. Also ask students how critical thinking and creativity are related to communication literacy. Next, explain the concept of peer review. Have students read the text and then explain how peer review contributes to information and communication literacy.

### *INTERACTIVE STRATEGY*

○

### *WRITING TOPIC*

○

### *WRITING PRACTICE*

- Encourage students to be descriptive in their observations and methodical in their approach. A final paragraph should explain the net forward reaction.

topic of global warming. Ask students to read the paragraph in search of the thesis statement. Afterward, work as a class to find which sentence best summarizes the paper's claim. (the last sentence)

### EXTENSION

#### **Describe a Diagram**

Ask students to examine the diagram on page 342. Have students use their own words to interpret the diagram. Ask students to explain the sequence of steps in the process illustrated in the diagram. Write the steps on the board. Afterward, read the words with students and ask students to help you determine whether more information is necessary to fully understand the process.

#### **Evaluate Two Sources of Information**

Have students use the internet or print resources to identify two sources of information that explain the environmental consequences of the production of nitric oxide. Ask students to examine each source and compile relevant data from each to write a summary. Tell students to conduct further research to resolve any discrepancies that appear in the two sources of information.

### LESSON REVIEW

## Earth and Living Things

### MATERIALS

- o CCB Mathematics pages 358 - 367
- o PowerPoint: [Cycles in Ecosystems](#)

### CCR STANDARDS

- o 2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
- o 3 Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

### OBJECTIVES

- o Define a biogeochemical cycle
- o Identify five kinds of biogeochemical cycles

### KEY CONCEPT

- o All living things depend on specific nutrients, such as carbon, oxygen, hydrogen, nitrogen, and phosphorus. Although matter is neither created nor destroyed, it may change form. Nutrients are matter. They move in cycles through living organisms, rocks, soils, and water, and chemical compounds. These cycles are called biogeochemical cycles.

### VOCABULARY

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o Producers</li> <li>o Weathering</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o Algae</li> <li>o Biogeochemical Cycle</li> <li>o Detritivore</li> <li>o Nitrogen Fixers</li> <li>o Nutrient</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o</li> </ul>

## 10.1: Cycles of Matter

### BEFORE LESSON

Ask students to identify the source of the oxygen they breathe and the water they drink. Then ask them to describe what they think happens to the carbon dioxide that they exhale. Based on their answers, assess how much students recall about the ways in which living things are connected to their environments and the manner in which nutrients are recycled. Ask students to list the three states of matter (gas, liquid, solid).

### BACKGROUND

The nutrient and water cycles are critical to supporting life on Earth. Evaporation, condensation, and precipitation are the main components of the water cycle. Carbon and nitrogen are the main nutrients that plants and animals depend on. Oxygen is produced by photosynthetic organisms as a product of photosynthesis. Phosphorus is an element found in the energy molecule ATP and also in DNA, which carries the cell's genetic information.

### GUIDED PRACTICE

- o What are Nutrients?
- o Biogeochemical Cycles
- o Decomposers and Biological Cycles
- o The Carbon Cycle
- o The Oxygen Cycle
- o The Hydrologic Cycle
- o The Nitrogen Cycle
- o The Phosphorus Cycle

### CORE SKILL

#### Follow a Multistep Procedure

Review the steps in the procedure for examining the rate of decomposition of rubber latex balloons. If possible, have students use activators and materials to complete the procedure. In either case, discuss the value of writing and following numbered steps. Explain the value of following such explicit instructions for a scientific investigation makes the investigation reproducible.

#### Draw Conclusions

*EVIDENCE-BASED READING***Suffix -vore; Prefixes earn-, herb-, omni-, and detri-**

- Students may be familiar with the term carnivore. Point out that the suffix -vore is from the Latin word vorare, which means "to swallow up or to devour." The prefix earn- is from the Latin word caro, meaning "meat." Ask students to use dictionaries or etymology websites to look up the terms herbivore, omnivore, and detritivore; challenge them to describe the meaning of the prefix in each term.

*21<sup>ST</sup> CENTURY SKILL***Media Literacy**

- Have students read the text and answer the question at the end of the sidebar activity. Invite students to give specific examples of personal experiences with the reliability of information they have found in an advertisement or on a website. Ask students to offer opinions on how being media literate can help them.

*INTERACTIVE STRATEGY*

○

*WRITING TOPIC*

○

*WRITING PRACTICE*

- Have students review the text on the hydrologic cycle before beginning to write. Encourage students to make an outline before writing and use the outline to guide the development of their ideas.

Ask students to read the text and write a conclusion about oxygen levels in water where large amounts of phosphorus contribute to increased plant growth. Invite students to share their conclusions, citing text details and their own knowledge to support their ideas.

*EXTENSION***Explain a Cycle**

Ask students to select one of the cycles discussed in the lesson and explain it in their own words. If possible, project the cycle they choose on the board or a wall and give students the option of pointing to elements in the diagram as they explain the process.

**Interpret Information from a Graph**

Have students conduct an online investigation to locate graphs summarizing water-use data in their town or state. Ask students to describe patterns or trends in the data and use the data to predict trends in the next decade. Invite students to share the graphs they found and explain their interpretations and predictions.

*LESSON REVIEW*

## Earth and Living Things

## 10.2: Fossil Fuels

*MATERIALS*

- o CCB Science pages 368 - 375

*CCR STANDARDS*

- o

*OBJECTIVES*

- o Identify fossil fuels
- o Explain the processes by which fossil fuels formed
- o Describe environmental consequences of using fossil fuels

*KEY CONCEPT*

- o People depend on fossil fuels to meet their energy needs. Those fuels include oil, natural gas, and coal. Each fuel formed through a process of decay over millions of years.

*VOCABULARY*

Tier 2

o

Tier 3

o

Test Words

o

*EVIDENCE-BASED READING***Base Words**

- o Write the following base words and their definitions on the board: Latin *petra*, meaning "rock" and Latin *oleum*, meaning "oil." Read the base words and definitions aloud. Then, write the word *petroleum* on the board, and ask students to define the term.

*21<sup>ST</sup> CENTURY SKILL***Information, Communication, and Technology Literacy***BEFORE LESSON*

To determine students' readiness for this lesson on fossil fuels, ask students to think about the different kinds of energy they used before coming to school today. Help students build an awareness of their dependence on energy.

*BACKGROUND*

Explain to students that energy resources are materials in the environment that people use as sources of energy. Energy resources are vital to a growing society. Some resources, like solar, water, wind, geothermal, biomass, and biofuel are renewable. Others, like fossil fuels and nuclear energy, are nonrenewable and have other drawbacks, such as pollution and toxic byproducts.

*GUIDED PRACTICE*

- o What Are Fossil Fuels?
- o Crude Oil
- o Natural Gas
- o Coal
- o The Consequences of Burning Fossil Fuels
- o Alternative Fuels

*CORE SKILL***Make Predictions**

Have students read the text and make predictions about why CDCL isn't more widely used. Help students understand that there are costs associated with altering existing power plants to use new technologies as they become available.

**Compare and Contrast Information**

Encourage students to discuss experiences in which they have found conflicting information, such as different summaries of news events. Invite students to talk about what they do when they find conflicting information. Then discuss how comparing and contrasting sources on the same topic makes it more likely that they will find accurate information. Then read the second paragraph aloud, explaining the task.

- Have students read the text and summarize how scientists use technology to find supplies of crude oil. Have students use the Internet to find resources to answer the questions at the conclusion of the text. Afterward, ask students to share and justify their answers.

#### *INTERACTIVE STRATEGY*

- 

#### *WRITING TOPIC*

- 

#### *WRITING PRACTICE*

- Encourage students to brainstorm ideas about the advantages and disadvantages of switching from fossil fuels to biofuel before creating their outlines.

#### EXTENSION

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##### **Retell Information**

Invite students to identify information from this lesson that they found most interesting. Encourage students to retell this information using their own words and to explain what made that information so interesting.

##### **Investigate Biofuels**

Have students review the information about alternative fuels on page 373. Have them use online resources to investigate how biofuels have been applied both successfully and unsuccessfully as alternative fuels. Ask students to write a summary of their findings and use evidence to predict the impact of biofuels on future energy consumption.

#### LESSON REVIEW

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**Earth****11.1: Geology***MATERIALS*

- o CCB Mathematics pages 382 - 389
- o [NOAA | Lesson 13: Plate Tectonics I](#)

*CCR STANDARDS*

- o 7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

*OBJECTIVES*

- o Describe the structure of Earth
- o Relate movement of Earth's crust to geologic activity
- o Describe the three main types of rock and how they change in the rock cycle

*KEY CONCEPT*

- o Earth is made of several layers. Rocks change form in a never-ending process called the rock cycle.

*VOCABULARY*

<i>Tier 2</i>	o
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o Igneous</li> <li>o Inner Core</li> <li>o Metamorphic</li> <li>o Outer Core</li> <li>o Rock Cycle</li> <li>o Sedimentary</li> </ul>
<i>Test Words</i>	o

*EVIDENCE-BASED READING***Collaborative Oral Reading**

- o Read aloud Earth's Structure on page 382. Read the first sentence, then select a student to read the next sentence. After the student

*BEFORE LESSON*

Determine students' readiness for learning about geology by asking them to describe what they know about the different ways that rocks can form. Prompt students as needed to determine how much general information they can recall about the processes that form igneous, sedimentary, and metamorphic rock.

*BACKGROUND*

Geology is the study of Earth's layers and the processes that affect them. Tell students that they will examine Earth's structure, tectonic movements, the rock cycle, and minerals. Encourage students to apply what they learn by taking nature walks or visiting a local museum of natural history. Have students search the internet for information about local geological features and write a list of possible topics for further research.

*GUIDED PRACTICE*

- o Earth's Structure
- o Movement of the Crust
- o Weathering and Soil

**Integrate Text and Visuals**

- o Have students read the text on this page. Challenge students to find the three steps explaining how to use visual tools. After students have found the steps (in the third paragraph), ask them to number the sentences describing the steps as 1, 2, and 3. Invite student volunteers to explain how the text and diagram work together to help them understand the process of deformation using the three steps.

*CORE SKILL***Integrate Text and Visuals**

Review the Formation of a Volcano and the Path of Volcanic Islands diagrams with students. Ask students to describe the specific ways in which the diagrams integrate, or build in, and support the text.

**Apply Scientific Models**

Have student volunteers share their new models of the rock-cycle process. Invite class members to review and critique the models. Help students remember that any model must show that some of the steps of the rock

reads, have him or her select the next reader. Continue until the entire page has been read. Assist students as needed. Have students pause at the end of the first paragraph in order to find the sentence that forecasts the remaining content on this page. (Instead of three layers, however, it has four.)

## 21<sup>ST</sup> CENTURY SKILL

### Initiative and Self-Direction

- Have students read the text and find the definition of initiative (the ability to take action and follow through on completing a task) in the first paragraph. Point out that initiative and self-direction are important in all careers. Ask students to describe examples of situations in which workers in different fields need these qualities. Challenge students to suggest reasons why they might be especially important for someone who works alone in his or her own business.

## INTERACTIVE STRATEGY

○

## WRITING TOPIC

○

## WRITING PRACTICE

- Invite students to describe why a map illustrating how to get to a location might be more helpful than a written description of how to find that location. For example, ask students if two people are likely to provide the same written description, or if two people are likely to point out the same landmarks along the way.

cycle can move in either direction. Remind students that scientists often use models to help people understand a concept that they cannot observe directly.

## EXTENSION

### Promote Interactive Learning

When dividing students into groups, make sure each group contains both English language learners and fluent English speakers. Ask pairs to say and define the boldfaced words in the lesson. Have one student say the word and the other define the word. Then have them switch tasks. Fluent speakers can help English language learners with difficult vocabulary by explaining complex topics in simpler terms.

### Draw Conclusions about Earthquakes

Have students visit the US Geological Survey's Web site to learn more about earthquakes. Allow students to discover how many earthquakes occur around the world every day. Then have them create a world map indicating where the ten most recent earthquakes over a magnitude of 6.0 occurred. Have students compare the distribution of these ten earthquakes to the boundaries of tectonic plates shown in the Plates and Quakes map on page 386, and ask students to draw conclusions about the relative likelihood of earthquakes in these areas.

## LESSON REVIEW

## Earth

## 11.2: Oceanography

*MATERIALS*

- o CCB Science pages 390 - 395

*CCR STANDARDS*

- o

*OBJECTIVES*

- o Identify Earth's major oceans and the features of the ocean floor
- o Recognize the effects of ocean currents and waves

*KEY CONCEPT*

- o Oceans cover most of Earth's surface. They affect Earth's climate and the shape of land.

*VOCABULARY*

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o Current</li> <li>o pattern</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o continental shelf</li> <li>o ecological succession</li> <li>o mid-ocean ridge</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o</li> </ul>

*EVIDENCE-BASED READING***Make Connections**

- o If possible, project the Ocean Zones diagram on the board or on a wall. Write the following words on the board: intertidal zone, neritic zone, bathyal zone, abyssal zone. Ask volunteers to read the specific text related to each term and locate the term on the diagram. Then ask students to explain how making connections between text and visuals helps them comprehend important details and develop a better understanding of main ideas.

*BEFORE LESSON*

Engage students in a discussion of oceans and ocean life. Although students have not yet read the lesson, they are probably aware of or interested in some aspect of oceanography. Ask: Have you read about underwater exploration or the discovery of shipwrecks? Some students may also have considerable knowledge about ocean animals, such as dolphins, whales, or sharks. Engage students in an active discussion of the ocean, and use questions related to prior knowledge to guide the discussion.

*BACKGROUND*

Write the word oceanography on the board. Explain that the suffix -graphy at the end of a word can have different meanings. It can refer to a style, method, or kind of writing, as in biography and calligraphy. It can refer to a written list, such as a bibliography. It can also refer to a descriptive science, such as geography and oceanography. Explain that oceanography is the description of the chemical, physical, and biological sciences related to the world's oceans. For example, the components of seawater and the reactions that occur within it are chemical features. Their floors, mountains, and basins represent physical features, as do their waves and currents. Ocean zones and ecological succession are biological features.

*GUIDED PRACTICE*

- o Earth's Oceans
- o Ocean Zones
- o The Ocean Floor
- o Currents
- o Waves
- o Lake to Land

**Determine Meaning**

- o Read the text as a class. Then give students time to read the passage, identify unfamiliar words, use context clues to predict meaning, and then use a print or online dictionary to check their predictions.

*CORE SKILL***Determine Central Ideas**



Use the diagram on page 392 to repeat this activity.

## 21<sup>ST</sup> CENTURY SKILL

### Flexibility and Adaptability

- Have students imagine planning a camping trip with friends. Ask them why it might be necessary for them to remain flexible and adaptable as they choose a destination, travel dates, and methods of transportation. Encourage students to discuss the advantages of such traits in life in general, in school, and in the workplace.

## INTERACTIVE STRATEGY

○

## WRITING TOPIC

○

## WRITING PRACTICE

- Encourage students to select a very familiar activity as the focus of this assignment. Students with identical interests may want to collaborate to complete the writing task.

Explain to students that sometimes, titles and visuals provide enough clues to determine the central idea of a text, even before reading the text. For example, point to the title "Currents." Then point to the diagram and read the title and subtitle aloud. Ask: Are the subtitle and the visual sufficient for you to determine the central idea of the text? Then, read the text as a class.

### Determine Meaning

Write the term ecological succession on the board. Ask volunteers to define the term. Guide them to understand that the word ecological refers to ecology, or the study of relationships between living and nonliving things in an environment, and the word succession refers to things or people with similar characteristics that follow one another. Then read the text as a class and ask students to complete the activity presented in the second paragraph while reading the related text.

## EXTENSION

### Describe a Process

Use print or online sources to show students diagrams of ecological succession, both on land and in lakes and ponds. Discuss the process, encouraging students to talk about the stages of succession in the examples of ecosystems you share.

### Explain Phenomena in Terms of Concepts

Challenge students to research an example of ecological succession within their community, town, or city. Have them seek information from print and online texts, and from local experts, such as county agricultural agents and parks and wildlife scientists. Ask students to record notes of their research and interviews, and then use those notes to write an explanation of the specific example of ecological succession they have studied.

## LESSON REVIEW

## Earth

## 11.3: Meteorology

*MATERIALS*

- o CCB Science pages 396 - 401

*CCR STANDARDS*

- o

*OBJECTIVES*

- o Identify the factors that cause weather
- o Explain how winds form
- o Describe major storms and their causes

*KEY CONCEPT*

- o The atmosphere includes temperature, air pressure, and moisture content. These factors interact to cause weather.

*VOCABULARY*

<i>Tier 2</i>	<ul style="list-style-type: none"> <li>o Forecast</li> <li>o Humidity</li> <li>o Weather</li> <li>o Wind</li> </ul>
<i>Tier 3</i>	<ul style="list-style-type: none"> <li>o air pressure</li> <li>o greenhouse effect</li> <li>o meteorology</li> </ul>
<i>Test Words</i>	<ul style="list-style-type: none"> <li>o</li> </ul>

*EVIDENCE-BASED READING***Base Words**

- o Explain to students that asking questions and looking for answers while they read is an effective comprehension strategy. Looking for answers can include finding specific information in a text, combining information in the text with reasoning based on prior knowledge or experience to infer answers, and using other sources to collect more

*BEFORE LESSON*

Determine students' readiness by engaging them in a discussion of what they know about weather. Have students describe the weather at the moment, and how the weather tends to change from day to day and season to season. Ask volunteers to share their prior knowledge of extreme weather, either from weather they have experienced or they have observed while watching news.

*BACKGROUND*

Weather is the daily condition of Earth's atmosphere at a particular place and time, and it is different from climate. Climate is the long-term average of atmospheric patterns over a specific region. Ask students to restate their understanding of the difference between weather and climate in their own words.

*GUIDED PRACTICE*

- o Earth's Atmosphere and Weather
- o Differences and Changes in the Weather
- o Composition of the Atmosphere
- o The Greenhouse Effect
- o Air Pressure
- o Thunderstorms
- o Tornadoes and Hurricanes

*CORE SKILL***Apply Scientific Models**

Read the text with students before giving them time to work in small groups to research other models meteorologists use to predict weather patterns. You may want to direct students toward online government sites, such as NOAA, for information.

**Distinguish Between Facts and Speculation**

Have students read the text and follow the directions to identify facts that support the main ideas about tornadoes and hurricanes that were presented in the lesson. Ask students why they should not expect to find examples of speculation in this book.

information. Encourage students to ask questions such as "I wonder ... " and "What does the author mean by ... " to support comprehension.

### *21<sup>ST</sup> CENTURY SKILL*

#### **Creativity and Innovation**

- Invite students to use prior knowledge and experience to define the words creativity and innovation. Encourage them to give specific examples of both. Engage students in a discussion of how creativity and innovation in science, medicine, and engineering can affect their daily lives. Have students read the text and share the questions they would like scientists to answer.

### *INTERACTIVE STRATEGY*

○

### *WRITING TOPIC*

○

### *WRITING PRACTICE*

- Encourage students to think carefully about the topic they will write about. Explain that the topic can be any nonfiction science topic; it doesn't have to be restricted to meteorological topics. Emphasize the importance of recording important facts before beginning to write.

## EXTENSION

### **Describe a Concept**

Ask students to tell you what they know about each topic identified in the titles and subtitles on pages 398-399. Ask questions to guide further discussion of any topic students appear to find most interesting or most difficult to understand.

### **Collect and Display Data**

Have students gather weather data for seven consecutive days. Data should include temperatures, humidity, wind speeds, and precipitation. Have students organize the data in charts and graphs and then use them to present a weather report in the form of a live presentation or a prerecorded video.

## LESSON REVIEW

## The Cosmos

## 12.1: Earth's Origins

### MATERIALS

- o CCB Mathematics pages 410 - 429

### CCR STANDARDS

- o 2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
- o 4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

### OBJECTIVES

- o Describe the unique characteristics of Earth that allow it to sustain life
- o Sequence events in the development of Earth and the Moon

### KEY CONCEPT

- o Earth, which formed 4.6 billion years ago, has unique characteristics that allow it to support life.

### VOCABULARY

<i>Tier 2</i>	o habitable
<i>Tier 3</i>	o mantle o nebula
<i>Test Words</i>	o comprehension

### EVIDENCE-BASED READING

#### Choral Reading

- o Have students read aloud "Dating Earth" on page 410. Tell students that when they read chorally, they should use the same pace, expression, and intonation as the group. Some

### BEFORE LESSON

Determine students' readiness for learning about Earth's origins by asking them to recall what they already know about how Earth was formed. Have students begin a KWL chart to connect what they already know, what they want to know, and what they will learn from the lesson.

### BACKGROUND

Our planet, Earth, is the third planet from the Sun. Its distance from the Sun provides Earth with the ideal environment for fostering life. Earth's unique atmosphere, made up of gases and oxygen given off by plants, forms a blanket of protection between the Sun and us. Of course, life could not survive without Earth's abundant supply of water. Students will also read about Earth's moon and its origin.

Ask students what they need to live. For example, people need air, water, and food. List their responses on the board. Ask students if they think they could get what they need from another celestial body in our solar system. Discuss the reasons why or why not.

### GUIDED PRACTICE

- o Earth and Its Origins
- o Conditions for Life

### CORE SKILL

#### Understand Science Texts

Before students begin reading the lesson, divide the class into teams of two. Ask one member of each team to read aloud the first paragraph on this page to the other team member, pausing to circle any word or phrase that seems confusing. When the first student is finished, direct the two team members to work together to look for descriptions, examples, or other context clues that can help the student better understand the text. Have team members switch roles and read the second paragraph.

#### Identify Hypotheses

Draw a flow chart with three boxes on the board (the third box should be large). In the first box, write the words Origins of Earth's Water. Have a volunteer write his or her summary of the current hypothesis in the second box of the flow chart. Invite students to research how scientists

words in this lesson, such as radioactive, expelling, debris, and ignited, could be unfamiliar to some students, so review them before reading.

## 21<sup>ST</sup> CENTURY SKILL

### Information Literacy

- Point out the six recommended questions (in italics) that students should ask when evaluating a web page. Invite six individual volunteers to each read aloud one of the six questions, and then encourage students to ask any questions they might have. Have students, either working singly or as small groups, visit a web site and use these questions to critically evaluate the site. Ask at least one individual or group to share their findings with the class.

### INTERACTIVE STRATEGY

- 

### WRITING TOPIC

- 

### WRITING PRACTICE

- Invite students to share their written explanations of why they found a particular strategy effective for evaluating an online science article. Have them describe the strategy as steps in a sequence.

are investigating this hypothesis. Then have volunteers write a brief description of the investigations in the box following the hypothesis.

## EXTENSION

### Practice Pronunciation

Use the words in the vocabulary list to demonstrate pronunciation of multi-syllable words. After you have pronounced the words, ask students to do the same. Correct any mispronunciations.

### Compare Science and Myths

Challenge students to investigate a myth or legend that describes how Earth and the Moon came into existence. Suggest students compare what the myth or legend says to what they are learning and use a Venn diagram to compare the similarities and differences. (See the Graphic Organizer section of the Instructor Resource Binder for a blackline master of a Venn diagram.)

## LESSON REVIEW

## The Cosmos

## 12.2: Origins of the Universe

*MATERIALS*

- o CCB Mathematics pages 414 - 417

*CCR STANDARDS*

- o 2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
- o 7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

*OBJECTIVES*

- o Describe the big bang theory
- o Discuss the origins of the elements that make up Earth

*KEY CONCEPT*

- o According to the big bang theory, the universe began with an explosion of matter and energy from an extremely small and dense particle. The universe has been expanding ever since. Reactions that occur during the life cycle of a star form the elements found on Earth.

*VOCABULARY*

<i>Tier 2</i>	o assumption
<i>Tier 3</i>	o light-year o nebula o supernova
<i>Test Words</i>	o

*EVIDENCE-BASED READING*

- o Ask Questions
- o Pair students and have them read "An Expanding Universe" independently, recording questions they can ask about the text.

*BEFORE LESSON*

Invite students to recall what they learned about Earth's origins in the previous lesson. Ask questions, such as: How are crashing nebula related to the origins of stars and planets? What happened inside the clouds of gas and dust that led to the creation of the Sun and Earth? Students' answers will reveal their understanding of the enormous energy that leads to the birth of stars, the topic of this lesson.

*BACKGROUND*

The big bang theory describes the birth of the universe and formation of the galaxy and solar system. From the same materials- cosmic dust and gases-that formed the stars came the planets, including Earth. Explain to students that although those stars are now light-years away, the nebulae from which new stars come are always forming in space. Given this information, ask: What does the constant presence of nebulae tell you about the universe? (Stars continue to form.) Invite students to suggest reasons stars continue to form. After reading, ask students to revise their suggestions, if necessary.

*GUIDED PRACTICE*

- o Origins of the Universe
- o The Big Bang
- o An Expanding Universe
- o The "Life" of a Star
- o Element Factories

**Determine the Conclusions of a Text**

- o Invite three volunteers to read one of the first three paragraphs of the text aloud and then paraphrase it. Then read the fourth paragraph to students, explaining the directions for the activity. Give students time to read the passage and identify the scientists' conclusion. Resolve any discrepancies that may occur.

*CORE SKILL***Apply Scientific Models**

Read the first paragraph of text with students. Then ask them to paraphrase the principle of Occam's Razor. Help students understand that

Questions might include: What 1929 discovery helps scientists explain movement within the universe today? What is happening to galaxies beyond the Milky Way and even to the Milky Way itself? What question do scientists want to answer regarding Hubble's 1929 discovery? Give students time to ask and answer their questions, working together to use the text to clarify any misunderstandings.

### 21<sup>ST</sup> CENTURY SKILL

- Critical Thinking and Problem Solving
- Write the word rigorous on the board and explain that it has a number of similar meanings. Write the following synonyms on the board and read them aloud: strict, inflexible, severe, exact, and precise. Ask students to use these synonyms to define the term rigor as it is applied to scientific work. Read the text as a class and give students time to record their ideas. Then discuss how rigor applies to other kinds of work, such as art, music, writing, mathematics, and engineering.

### INTERACTIVE STRATEGY

○

### WRITING TOPIC

○

### WRITING PRACTICE

- Read the task aloud to help students understand that they may choose any news article of interest to them. Then while reading, they should highlight or note the article's main points and use those points to determine if the writer used them to write a conclusion. If students select articles with conclusions, help them understand that their task is to evaluate the strengths and weaknesses of

observations can lead scientists to a simpler and more truthful explanation of an event. Read the last paragraph aloud, and ask students why, once scientists have formed an explanation, they continue to search for facts that support the explanation. Help students recognize that additional observations can further scientists' understanding of an event, or cause them to revise their thinking.

### Determine the Conclusion of a Text

Read the text as a class. Invite several students to define the term assumption in their own words. As a class, review the lesson, seeking other examples of assumptions they can make based on the text.

### EXTENSION

#### Revisit Vocabulary

Write the words light-year, nebula, and supernova on the board. Ask students to explain each term in their own words, citing evidence from the text to support their explanations. Provide support, if necessary.

#### Show Time Scale

To help students gain an appreciation for the time scale involved in the formation of the universe, have them make a time line to show the following events: the big bang, formation of our solar system, and formation of Earth. Remind students to use a scale that can be shown with relative ease (for example, 1 inch = 1 billion years). Then they will write a summary explanation of the relationship between the events as illustrated on the time line.

### LESSON REVIEW

those conclusions. However, if they select articles with no conclusions, they should use the main points they noted to write conclusions.



## The Cosmos

*MATERIALS*

- o CCB Mathematics pages 418 - 423

*CCR STANDARDS*

- o 6 Assess how point of view or purpose shapes the content and style of a text.
- o 8 Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

*OBJECTIVES*

- o Describe the Milky Way galaxy
- o Identify the objects that make up the solar system
- o Understand the definition of a planet

*KEY CONCEPT*

- o Earth is one of eight planets that orbit the Sun in our solar system. Other objects in the solar system include asteroids, dwarf planets, and comets.

*VOCABULARY*

<i>Tier 2</i>	o criteria
<i>Tier 3</i>	o asteroid o comet o galaxy o satellite o solar system
<i>Test Words</i>	o bias

*EVIDENCE-BASED READING***Reread/Read More Slowly**

- o Have students work with a partner to read the text on page 418. Remind students that

**12.3: The Milky Way and the Solar System***BEFORE LESSON*

Determine students' readiness for learning about the Milky Way and the Solar System by gauging how much students can recall about the stars, constellations, and planets that make up the Milky Way galaxy. Ask students to share their ideas about what they think a planet is, and ask them why a star is not a planet.

*BACKGROUND*

Earth originated as a result of a collision between the remains of an exploding star and a cloud of cosmic dust and gas. The development of early photosynthetic organisms produced Earth's first oxygen about one billion years after Earth's formation. The development of an atmosphere containing the oxygen and other gases and the presence of abundant water made it possible for Earth to support life.

*GUIDED PRACTICE*

- o The Milky Way Galaxy
- o The Solar System
- o The Planets

**Analyze Author's Purpose**

- o Read Analyze Author's Purpose as a class. Encourage students to focus on the four italicized questions in the fourth paragraph. Invite volunteers to ask and answer these four questions as they read the boxed passage. Point out to students that the author's purpose here is twofold, to inform and to entertain. Have students compare the portions of the passage that are informative with the portions that are entertaining.

*CORE SKILL***Analyze Author's Purpose**

Have students identify clues that help them determine that the lesson is informational text. Point out to students that topics are introduced at the beginnings of paragraphs, with details following in the subsequent sentences. For example, point out that the second paragraph introduces the concept of inner planets and then discusses their characteristics, while the third paragraph introduces the outer planets and then discusses their

informational text containing many details will often need to be read more than once. As students read, have them occasionally pause to connect what they already know about our solar system and the Milky Way galaxy with what they read. Then have them reread the page without stopping.

### *21<sup>ST</sup> CENTURY SKILL*

#### **Information, Communication, and Technology Literacy**

- Have students read the text. Prepare a two-column chart on the board. Label the first column Benefits and the second column Hazards. Enter students' ideas into the chart as they discuss the potential benefits and possible hazards that may ensue when scientists use the internet to share their experimental results.

### *INTERACTIVE STRATEGY*

○

### *WRITING TOPIC*

○

### *WRITING PRACTICE*

- Ask students to discuss how they can identify the differences among informative text, entertaining text, and persuasive text. Invite student volunteers to read aloud the three paragraphs that they have written and challenge the rest of the class to identify the type of writing used in each paragraph.

features.

#### **Evaluate Conclusions**

Guide students through the second paragraph on this page, which discusses Pluto's new classification as a dwarf planet. Ask students how and why Pluto was reclassified and guide them to the recognition that scientists reevaluate conclusions whenever new information becomes available.

### *EXTENSION*

#### **Recognizing Bias**

To demonstrate author's bias, write two sentences on the board: one that is a fact and another that is an opinion. Ask a volunteer to identify which is which. Then have students write fact or opinion sentences and have others identify them.

#### **Collect and Display Information about the Solar System**

Have students make a mobile of the solar system, organizing the eight planets at their relative distances from the Sun. Students should estimate the relative sizes of the planets and distinguish between the inner planets and the outer planets. Students can also include other celestial objects of their choosing. All of the pieces should be labeled. Allow them to do further research if they need additional information.

### *LESSON REVIEW*

## The Cosmos

## 12.4: Earth and the Moon

*MATERIALS*

- o CCB Mathematics pages 418 - 423

*CCR STANDARDS*

- o 1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- o 7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

*OBJECTIVES*

- o Relate Earth's motion to day and night and to the seasons
- o Discuss the characteristics that make Earth habitable for living things
- o Identify the interactions between the Earth, Sun, and Moon that cause the phases of the Moon and tides

*KEY CONCEPT*

- o Earth is in constant motion. It turns on its axis, causing the cycle of day and night. Earth's tilt on its axis and its movement around the Sun result in Earth's seasons. Earth's distance from the Sun makes it habitable, a place for living things.

*VOCABULARY*

<i>Tier 2</i>	o Interactions
	o Revolution
	o Rotation
	o tides

<i>Tier 3</i>	o habitable
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*BEFORE LESSON*

Begin a concept map on the board or on a large sheet of paper attached to a wall. Draw a circle in the center of the map and label it Earth. Invite students to add information about Earth to the concept map, making as many connections as possible. Use students' contributions to the map to determine their readiness for the lesson.

*BACKGROUND*

Project an animation of the positions of the Earth, Sun, and Moon. Explain that Earth rotates on its axis, and that it takes one day for Earth to make one rotation. Discuss how this movement leads to day and night. Then explain that while Earth is rotating, it is also revolving around the Sun. Explain that it takes one year to complete one revolution, and that as Earth revolves, it tilts toward and away from each hemisphere, leading to the changing seasons. At the same time, the Moon is rotating as it revolves around Earth about once each month. The Moon's proximity to Earth and its movements result in tides. Invite students to share what they know about tides and to predict the cause of these changes in sea level.

*GUIDED PRACTICE*

- o Earth's Journey
- o A Habitable Planet
- o The Moon
- o Tides

**Cite Textual Evidence**

- o Invite three volunteers to read the first three paragraphs of the text aloud and paraphrase it. Then read the fourth paragraph to students, explaining the directions for the activity. Give students time to read the passage and identify the statements that provide evidence supporting the passage's main idea. Ask a volunteer to read the sentence that establishes the paragraph's main idea (Sentence 3). Then ask another volunteer to summarize the purpose of sentences 4 and 5. (They are supporting details.) Invite students to discuss the purpose of the paragraph's first two sentences.

*CORE SKILL*

	o phase
<i>Test Words</i>	o

*EVIDENCE-BASED READING***Use Prior Knowledge**

- o Before students begin reading, ask them to discuss with a partner what they already know about seasons and the changing shape of the Moon throughout a month. Then have partners read the text together and have them confirm their prior knowledge or correct any misconceptions or misunderstandings they may have had.

*21<sup>ST</sup> CENTURY SKILL***Communication**

- o Before reading the text, ask students to identify different ways people communicate. Then ask them to describe the qualities of good communication. Give students time to complete the activity presented in the last paragraph. Afterward, invite pairs of volunteers to role-play providing an explanation of how to do something, such as accessing the internet on a smartphone, to another student. Have one member of a pair provide an explanation that lacks precision and a member of the other pair provide a precise explanation. Then have the other members of each pair demonstrate or explain the consequences of the explanations.

*INTERACTIVE STRATEGY*

o

*WRITING TOPIC*

o

*WRITING PRACTICE***Cite Textual Evidence**

In their reading and discussion of the section "A Habitable Planet," students recorded the attributes that make Earth habitable. Ask students to return to their statements and cite specific evidence from the text to support their statements.

**Apply Scientific Models**

Read the text as a class and discuss the lunar cycle and what questions students may have about the existing models scientists use. Give students time to contact experts or consult print or online resources to find the answers to their questions. Encourage students to share their findings. As a class, discuss any discrepancies that students have found among their answers. Ask them to suggest ways to resolve these discrepancies.

*EXTENSION***Explain the Seasons**

Explaining the occurrence of seasons is challenging for many students. While you use the globe to model Earth's revolution around the Sun, ask students to explain the differences in the angle of light reaching each part of the globe at different points along its orbit. You may want to use a flashlight to represent the Sun. Engage students in a discussion of how the changing angle of light results in seasons in the northern and southern hemispheres.

**Collect and Display Data**

Have students research the most effective and safest ways to observe a solar eclipse. Ask students to create a guide for viewing a solar eclipse that includes safety measures, viewing tips, and an explanation of why eclipses happen. Encourage students to illustrate their guides to assist in explaining important steps, precautions, or information.

*LESSON REVIEW*

- Remind students that they are writing two paragraphs describing a favorite sport or hobby, and that each paragraph must have its own main idea supported by specific details. For example, if students write about playing tennis, the main idea of the first paragraph might be the sport's history, and the main idea of the second paragraph might be the current rules of the game.