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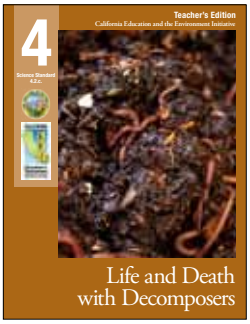
California Education and the Environment Initiative
Increasing Environmental Literacy for K–12 Students…
Because the Future is in Their Hands

TEACH COMMON CORE STANDARDS
WITH THE EEI CURRICULUM

Created with your needs in mind, this document shows the correlation between the EEI Curriculum and the California Common Core State Standards. By teaching the EEI unit lessons in your classroom, you will be simultaneously addressing the Common Core standards depicted in this guide.

4.2.c.—Life and Death with Decomposers



In this unit, students learn about decomposers and their important role in breaking down the remains of living things and cycling nutrients in every ecosystem. Students read about composting and take part in a composting demonstration with bananas and yeast. They examine descriptions and photographs of decomposers and scavengers and compare characteristics. Then they observe and discuss evidence of decomposition, interpret a diagram showing a wastewater management system, and investigate why decomposers and humus are important to agriculture.

LESSONS	RI.4.1	RI.4.2	RI.4.3	RI.4.4	RI.4.5	RI.4.7	RI.4.8	RI.4.9	RI.4.10	W.4.2	W.4.9	SL.4.2	SL.4.3	L.4.4	L.4.6
California Connections	✓	✓		✓	✓		✓		✓					✓	
1	✓	✓	✓	✓	✓		✓		✓			✓		✓	✓
2	✓			✓								✓		✓	
3			✓	✓		✓		✓				✓		✓	✓
4				✓		✓		✓		✓		✓		✓	
5	✓		✓	✓		✓			✓	✓		✓	✓	✓	
6				✓		✓			✓	✓		✓		✓	✓
Traditional Assessment										✓					
Alternative Assessment											✓				

COMMON CORE STANDARDS

Note: *For your reference, the list of California Common Core State Standards abbreviations is on the following page.*

Using the EEI-Common Core Correlation Matrix

The matrix on the front page identifies a number of Common Core standards that are supported by this EEI unit. However, the check marks in the matrix do not necessarily signify that the Common Core standards checked will be taught to mastery by using this EEI unit alone. Teachers are encouraged to select which Common Core standards they wish to emphasize, rather than teaching to every indicated standard. By spending more time on selected standards, students will move toward greater Common Core proficiency in comprehension, critical thinking and making reasoned arguments from evidence. Teaching this EEI unit will provide opportunities for teachers to implement the shift in instructional practice necessary for full Common Core implementation.

California Common Core State Standards Abbreviations

- **CCCSS:** California Common Core State Standards
- **L:** Language Standards
- **RI:** Reading Standards for Informational Text
- **SL:** Speaking and Listening Standards
- **W:** Writing Standards

Note: *Since each Common Core standard includes a breadth of skills, in this correlation, the portion of the standard description that is featured in the Common Core standards and applications is cited, using "…" to indicate omitted phrases. For a list of the complete standard descriptions, please see the Common Core Reference Pages located on pages 25–26 of this document.*

A Note about Common Core Speaking and Listening Standards

Many of the EEI units provide various learning structures, materials, and groupings that lead toward students working in pairs or small groups to discuss concepts and ideas. This supports the skill in Speaking and Listening Standard 1 "Participate effectively in a range of collaborative discussions (one-on-one, groups…) with diverse partners." With prior instruction in collaborative discussion techniques, students can be placed in pairs or small groups to discuss the lesson topics. To aid in teacher planning, the lessons are listed below along with their learning structures for whole class, pairs/partners, and/or small groups.

- **Lesson 1:** Whole class, groups of 4
- **Lesson 2:** Whole class, groups of 4
- **Lesson 3:** Whole class
- **Lesson 4:** Whole class
- **Lesson 5:** Whole class, pairs
- **Lesson 6:** Whole class, groups of 4 (same as Lesson 1)

National Geographic Resources

No maps or posters are used with this unit.

Unit Assessment Options

Assessments	Common Core Standards and Applications
Traditional Assessment	
Students answer multiple choice questions as well as questions requiring 2–3 sentence answers. Then they view a diagram showing a decomposition process in a corn field and write sentences to describe what decomposers do for other things and for people.	**W.4.2b:** Develop the topic with facts, definitions, concrete details…or other information and examples…
Alternative Assessment	
Students create a decomposition poster featuring decomposers in an ecosystem. Their poster must give details that describe the decomposers in the ecosystem, their role, what the ecosystem receives from them, and why they are important to humans. A scoring rubric is provided.	**W.4.9b:** Apply grade 4 Reading standards to informational texts… ***Suggestion:*** *Have students refer to the information they have read throughout the unit to provide the details they include in their posters.*

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Lesson 1: Breaking It Down

Students read a story about three approaches to composting, identify the decomposers in the described compost bins, and diagram the food chains represented. They set up a composting lab using bananas and yeast, and make predictions about the decomposition process.


Lesson 1

Breaking It Down

Use this correlation in place of the **Procedures** on pages 34–35 of the Teacher's Edition.

Procedures	Common Core Standards and Applications
Vocabulary Development	
Use the **Dictionary** and the vocabulary **Word Wall Cards** to introduce new words to students as appropriate. These documents are provided separately.	**L.4.4c:** Consult reference materials (e.g., dictionaries…)…to… determine or clarify the precise meaning of key words… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 1	
Ask students to explain what a food chain is, and to give examples of food chains. (*A food chain shows how energy in food moves from one living thing to another. It also shows where living things get their energy* [*from what they eat*]. *One example might be a plant with a seed, which a mouse eats; an owl then eats the mouse.*) Draw or write one of the food chains students describe on the board. Ask students to identify the producers and consumers in the food chain on the board. (*Students should name the plants* [*or plant parts*] *as producers and the animals and people as consumers.*)	n/a
Step 2	
Ask students, "Where do producers get their energy?" (*From the Sun*) "Is sunlight all that plants need to grow?" (*No, they also need water and nutrients from the soil and carbon dioxide from the air.*) "Where does the soil get the nutrients it contains?" (Students may know that the nutrients in soil come from dead plants and animals.) Tell students that the soil gets the nutrients it contains from plants and animals through an important process called "decomposition."	**L.4.6:** Acquire and use accurately grade-appropriate… domain-specific words and phrases… ***Suggestion:*** *Have the students use the word "decomposition" in a sentence that reveals the meaning in context.*

Procedures	Common Core Standards and Applications
Step 3	
Distribute a **Student Workbook** to each student and have them put their names on the cover. Tell students to turn to ***California Connections: Wonderful Compost*** (Student Workbook, pages 4–8). Have the class read the story aloud. After students have finished reading the story, review the definitions of "decomposer" and "scavenger" and ask students to identify the decomposers and scavengers in the story. (*Decomposers: Bacteria and fungi; Scavengers: Mites, pill bugs, snails, springtails, beetles, ants, flies, earthworms*) Help students to see how the decomposers in the story fit into the food chain by asking the following questions: ■ On what things did the decomposers feed? (*The decomposers fed on the fruit and vegetables and the wastes of the worms.*) ■ What happened to the things on which the decomposers fed? (*The decomposers broke down the things they fed on into their simplest parts.*) ■ What organisms ate the decomposers? (*The worms ate the decomposers.*) ***Tip:*** *If you will be reusing the* ***Student Workbooks*** *each year, determine ahead of time which pages may need to be copied, or which can be done on binder paper.*	**L.4.4a:** Use context…as a clue to the meaning of a word or phrase. ***Suggestion:*** *In the text, have students identify the surrounding context that helps readers understand words such as: compost, decomposer, bacteria, fungi, organisms, scavengers, castings, vermi-composting, landfill.* **RI.4.1:** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. ***Suggestion:*** *When answering questions, have students identify the text that supports their answers.* **RI.4.2:** Determine the main idea of a text and explain how it is supported by key details; summarize the text. ***Suggestion:*** *Have students review the text and determine the main idea, then list the key details that support the main idea.* **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text… ***Note:*** *See suggestion under standard* ***L.4.4a.*** **RI.4.5:** Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text. ***Suggestion:*** *Review the text, tracing its overall structure, especially noting words and phrases that show the structures listed in standard* ***RI.4.5.*** **RI.4.8:** Explain how an author uses reasons and evidence to support particular points in a text. ***Suggestion:*** *Either as a class, or in small groups, have students reread* ***Student Workbook,*** *pages 7–8, starting from the heading "Composting at Home," and note/list the reasons and evidence the author gives to support the idea that composting is useful.* **RI.4.10:** …read and comprehend informational texts, including…science…texts…proficiently… ***Suggestion:*** *Have students reread the* ***California Connections*** *selection with partners, pausing to summarize key information about decomposers.*

Procedures	Common Core Standards and Applications
Step 4	
Have a student volunteer come up to the board and diagram the food chain in the story that included the earthworm and bacteria. (*apple core > bacteria > earthworm > bacteria*) Ask students what they think would happen to the food chain if the decomposers were not there. (*The fruit and vegetables would not get broken down. The dead earthworm would not get broken down. The wastes of the worms would not get broken down. The worms would not have bacteria to eat.*) Tell students that compost bins are not part of nature, and ask them where decomposition might happen in nature. (*In a garden, on a forest floor*) Ask students to give examples of what worms and bacteria help to break down besides fruit scraps like apple cores. (*Answers should include leaves, tree trunks and stumps, flowers, fruit, and dead animals.*)	**RI.4.3:** Explain…ideas, or concepts in a…scientific…text. ***Suggestion:*** *In addition to diagramming the food chain, have student pairs explain the details that are part of the process, using the text for needed information.*
Step 5	
Organize the class into groups of four. Tell students to turn to **Decomposition Vocabulary** (Student Workbook, pages 2–3). Instruct students to read the **Word Wall Cards**, find these words on the **Decomposition Vocabulary** pages, and copy the definitions from the **Word Wall** into their **Student Workbooks**. Distribute the composting lab materials while students are working on the vocabulary.	**L.4.4c:** Consult reference materials (e.g., dictionaries…)…to… determine or clarify the precise meaning of key words… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 6	
Tell students that they are going to work in groups to prepare a composting demonstration of their own. Organize the class into groups of four. Distribute the composting lab materials to each group. Instruct one student in each group to write their initials and the date on both plastic bags and the word "yeast" on one and the words "no yeast" on the other. (Write the word "yeast" on the board to help students with spelling.) Instruct another student in each group to place a slice of banana in each of the bags. Circulate around the room with the bag of yeast to give each student a look at it. Tell the class that yeast is a fungus and a decomposer—a living thing that breaks down the sugar in other living things. When you get to each group, have a third student from the group use the teaspoon to take half a spoonful of yeast from the bag and sprinkle it onto the banana slice in the bag that is labeled with the word "yeast." Check to make sure that the other bag in each group is marked "no yeast" and contains a slice of banana. Tell the fourth student in each group to carefully seal both bags.	**SL.4.2:** Paraphrase portions of…information presented…orally. ***Suggestion:*** *After giving the first step of directions, ask students to paraphrase the directions to a partner in their group.*

Procedures	Common Core Standards and Applications
Step 7	
Tell students to turn to **Banana Composting Lab Sheet** (Student Workbook, pages 9–10). Ask students to write their predictions as to what they think will happen to the bananas in each of the bags. (*Note: Students should complete only the first observation drawing on page 9.*) Give students time to answer the first question in Part 3, at the bottom of page 10. Have the student who marked the bags for each group carefully bring both bags to the area where their "compost" will be stored, and have the rest of the group make sure that the remaining materials are back on the plastic trays or in the center of the workspace.	**RI.4.1:** Refer to details and examples in a text when explaining what the text says explicitly… ***Suggestion:*** *Remind students to use information they gleaned from the text to help make their predictions, and to refer to the text in* ***California Connections*** *to answer the first question in Part 3 of the* **Student Workbook,** *page 10.*
Step 8	
Collect **Student Workbooks** and use **Banana Composting Lab Sheet** for assessment.	n/a

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Lesson 2: Decomposers and Scavengers

Students match descriptions of decomposers and scavengers to the pictures and names of actual organisms. They compare characteristics of decomposers to those of scavengers. Using clues, students identify examples of decomposers and scavengers on information cards.


Lesson 2

Lesson 2

Decomposers and Scavengers

Learning Objectives

Background

Key Vocabulary

Use this correlation in place of the **Procedures** on pages 48–49 of the Teacher's Edition.

Procedures	Common Core Standards and Applications
Vocabulary Development	
Use the **Dictionary** and the vocabulary **Word Wall Cards** to introduce new words to students as appropriate. These documents are provided separately.	**L.4.4c:** Consult reference materials (e.g., dictionaries…)…to… determine or clarify the precise meaning of key words… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 1	
Redistribute the students' individual **Student Workbooks**. Tell them to turn to **Decomposer or Scavenger?** (Student Workbook, page 11) and read the instructions. While students are reading, place **Decomposers and Scavengers** (Information Cards #1–8) with the photographs showing, on various tables around the room, one card per table.	n/a
Step 2	
Assign four students to each of the tables on which you placed one of the **Decomposers and Scavengers** information cards. Ask students to look at each information card, read the caption, and take note of the number written in the left-hand corner of the card. Tell students to write the name of the organism in the correct box on **Decomposer or Scavenger?**. Remind them that the name next to the number on page 11 should match the number they see on the information card at their table. When the groups have finished examining their first information card, have them rotate from table to table every three minutes until every student has had a chance to see every information card. When they have all completed the task, have the students return to their regular seats. Gather the information cards from the tables. ***Tip:*** *While completing this activity, students can try to determine whether each is a decomposer or scavenger and write a D or an S beside each organism's name on their Workbook page.*	n/a

Procedures	Common Core Standards and Applications
Step 3	
Review the terms "decomposer" and "scavenger." Remind students what they learned from the ***California Connections: Wonderful Compost*** story about chemical decomposers and scavengers. Ask students, "What is the main difference between decomposers and scavengers?" (*Only decomposers can break down dead plants and animals into their simplest parts. Scavengers can grind, bite, or tear the matter into smaller pieces, but they cannot break it down chemically.*) Point out the new words on the Word Wall. Have students use the **Dictionary** to add the definitions of these terms to **Decomposition Vocabulary** (Student Workbook, pages 2–3).	**L.4.4c:** Consult reference materials (e.g., dictionaries…)…to …determine…meanings… **RI.4.1:** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. ***Suggestion:*** *Have students reread a portion of* ***California Connections: Wonderful Compost*** *with the prompt to find the text that explains the main difference between decomposers and scavengers. When they explain the differences, be sure they cite where the text gives that information.* **RI.4.4:** Determine the meaning of…domain-specific words or phrases in a text… **SL.4.2:** Paraphrase…information presented…orally. ***Suggestion:*** After reviewing the differences, have partners explain the differences to each other.
Step 4	
Ask students, "Which organisms on the information cards are scavengers?" (*California condor, earthworm, millipede, pill bug, blowfly*) As students name these, hold up these information cards for the class to see, and then tape them to one side of the board. Ask students, "Which organisms on the information cards are decomposers?" (*Bacteria, mold, mushroom, blowfly*) As students name these, hold up these inforation cards for the class to see, then tape them to the other side of the board. Write "Scavengers" above the group of information cards showing scavengers and "Decomposers" above the group of information cards showing the decomposers. Point to the **Blowfly** information card once again. Tell students that some scientists think the blowfly belongs in both categories. It uses its mouth parts to bite and suck up food, but also uses chemicals to soften the food it bites into its basic chemical components. ***Tip:*** *If students labeled their workbook page with Ds and Cs already, as suggested in Step 2, they can make any needed corrections during this explanation.*	**SL.4.2:** Paraphrase…information presented…orally. ***Suggestion:*** *Before giving the explanation, you may first wish to ask students to try to explain why some scientists think the blowfly belongs in both categories. Once a thorough explanation has been heard, have students turn to partners to explain the characteristics that place the blowfly into both categories.*

Procedures	Common Core Standards and Applications
Step 5	
Tell students to return to **Decomposer or Scavenger?** in the **Student Workbook**. Instruct them to write a letter "D" next to the organisms that are decomposers and "S" next to the organisms that are scavengers. Read each of the names of the organisms aloud as students do this. (*Number 1 is bacteria [D], number 2 is a California condor [S], number 3 is an earthworm [S], number 4 is mold–a type of fungus [D], number 5 is a mushroom–also a type of fungus [D], number 6 is a millipede [S], number 7 is a blowfly [both S and D], and number 8 is a pill bug [S].*) Point out that some scavengers are large organisms that eat dead animals (like the condor) and that others (like the earthworm) are small organisms that live in the soil, and eat dead plant and animal matter. ***Tip:*** *If this step was done in Step 2 on previous page, have students check their answers.*	n/a
Step 6	
Instruct students to answer the questions below the list of organisms on **Decomposer or Scavenger?**. Collect **Student Workbooks** and use **Decomposer or Scavenger?** for assessment.	**SL.4.2:** Paraphrase…information presented…orally. ***Suggestion:*** *Students will write the information they learned by listening during this lesson and by reading information in the previous lesson.*

Lesson 3: A Big Job for a Tiny Crew

Students observe evidence of decomposition and apply this concept in a discussion about the role of decomposers in ecosystems. They listen to two narratives describing decomposition, and create diagrams showing decomposers and scavengers in the food web.

Use this correlation in place of the **Procedures** on pages 64–65 of the Teacher's Edition.

Procedures	Common Core Standards and Applications
Vocabulary Development	
Use the **Dictionary** and the vocabulary **Word Wall Cards** to introduce new words to students as appropriate. These documents are provided separately.	**L.4.4c:** Consult reference materials (e.g., dictionaries…)…to… determine or clarify the precise meaning of key words… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 1	
Redistribute students' individual **Student Workbooks**. Point out the new words on the Word Wall. Have students use the **Dictionary** to add the definitions of these terms to **Decomposition Vocabulary** (Student Workbook, pages 2–3).	**L.4.4c:** Consult reference materials (e.g., dictionaries…)…to… determine or clarify the precise meaning of key words… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 2	
Project **Evidence of Decomposition** (Visual Aid #1). While showing the image of the carcass, ask students, "Which of the vocabulary words you have just learned describes what this picture shows?" (*"Nutrient" because nutrients are released as the organism decomposes; "waste" because this is what other organisms, like humans, might throw away.*) Ask students to share what they think is happening in each picture. (*Decomposers are feeding on the item. Scavengers may already have eaten part of it.*) Ask students what a picture of this same item would show if taken a month later. (*The photograph would show less of the item—less matter—and might show more decomposers.*)	**L.4.6:** Acquire and use accurately grade-appropriate… domain-specific words and phrases… ***Suggestion:*** *On the board, list specific vocabulary from the previous lessons students should include in their sentences as they describe the process occurring in each photo.* **RI.4.3:** Explain…ideas, or concepts in a…scientific…text, including what happened and why… ***Suggestion:*** *Have students integrate information they read in previous lessons into their shared descriptions.*
Step 3	
Project **Evidence of Decomposition** (Visual Aid #2). With each image, ask students to describe what they see. (*Matter is being broken down—decomposed. There are decomposers or signs of decomposers and scavengers on the matter.*)	**L.4.6:** Acquire and use accurately grade-appropriate… domain-specific words and phrases… ***Suggestion:*** *On the board, list specific vocabulary from the previous lessons students should include in their sentences as they describe the process occurring in each photo.* **RI.4.3:** Explain…ideas, or concepts in a…scientific…text, including what happened and why… ***Suggestion:*** *Have students integrate information they read in previous lessons into their shared descriptions.*

Procedures	Common Core Standards and Applications
Step 4	
Explain to students that, when matter decomposes, it seems to "disappear." This occurs because decomposers break down the matter into its chemical parts. Some of these chemicals are the nutrients other things need to live and grow. When plants or animals die, their tissues contain these nutrients. When decomposers feed on those tissues, the nutrients are released back into the soil, air, and water in the ecosystem. Releasing nutrients back into the ecosystem is one important thing that decomposers do for the planet.	**SL.4.2:** Paraphrase…information presented…orally. ***Suggestion:*** *Have students paraphrase the presented information to partners.*
Step 5	
Ask students to guess what else scavengers and decomposers do that is important in an ecosystem. (*Students may mention that scavengers and decomposers are food for other animals.*) Explain that there are more scavengers and decomposers in ecosystems than all other living things combined. This is important because other animals eat them to get energy and nutrients. If there were no decomposers and scavengers, many food chains would fall apart.	**SL.4.2:** Paraphrase…information presented…orally. ***Suggestion:*** *Have students paraphrase the information to partners.*
Step 6	
Redistribute the students' individual **Student Workbooks**. Tell them that they will now read two stories about decomposition and that the stories take place in different ecosystems, the forest and the coast. As they read each story, students will label a diagram that shows what is happening in the story. To label their diagrams successfully, they will have to identify all the "characters" in the story and identify how each one fits into the decomposition process.	**RI.4.9:** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. ***Suggestion:*** *During the rest of the lesson, have students integrate the information from both texts in order to synthesize the knowledge gained from each.*
Step 7	
Have students turn to the story **Decomposition in the Forest** (Student Workbook, page 12). Have them look at page 13, **Breaking It Down—In the Forest**, with the diagram that they will be labeling after they read the story. Tell the students to read **Decomposition in the Forest**. After they have finished reading, tell them to label the events in the story on the diagram, **Breaking It Down—In the Forest**, on page 13. When the class has completed their labeling, project **Decomposition Diagram** (Visual Aid #4). Point out the different "characters" and events in the story that show how decomposers and scavengers fit into the forest food web. Ask students how the nutrients in the story got into the soil and air. (*As they break down matter, decomposers released the nutrients.*) Allow students to adjust the diagrams they made on **Breaking It Down—In the Forest**, using the information from the **Decomposition Diagram**.	**RI.4.7:** Interpret information presented visually…(e.g.,… diagrams…) and explain how the information contributes to an understanding of the text in which it appears. ***Suggestion:*** *After completing the diagram, have students explain how the text and the diagram work together to help the reader understand the process of decomposition.*

Procedures	Common Core Standards and Applications
Step 8	
Have students turn to the story **Decomposition at the Coast** (Student Workbook, page 14). Have them look at page 15 **Breaking It Down—At the Coast** with the diagram that they will be labeling after they read the story. Tell the students to read **Decomposition at the Coast**. After they have finished reading, tell them to label the events in the story on the diagram, **Breaking It Down—At the Coast**, on page 15. Collect **Student Workbooks** and use **Breaking It Down—In the Forest** and **Breaking It Down—At the Coast** for assessment.	**RI.4.7:** Interpret information presented visually…(e.g.,… diagrams…) and explain how the information contributes to an understanding of the text in which it appears. ***Suggestion:*** *After completing the diagram, have students explain how the text and the diagram work together to help the reader understand the process of decomposition.* **RI.4.9:** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. ***Suggestion:*** *After completing Steps 3 and 4, have students review both narratives, integrating the information from both texts. It may be helpful to write key details on chart paper, then have students work with a partner to use information from both texts to explain the process of decomposition.*

Lesson 4: Waste Not

Students interpret a diagram showing a wastewater management system. They discuss the presence of particular organisms that help decompose matter in the system. Students answer questions about the waste management system and humans' dependence on decomposers to make the system work.

Use this correlation in place of the **Procedures** on pages 80–81 of the Teacher's Edition.

Procedures	Common Core Standards and Applications
Vocabulary Development	
Use the **Dictionary** and the vocabulary **Word Wall Cards** to introduce new words to students as appropriate. These documents are provided separately.	**L.4.4c:** Consult reference materials (e.g., dictionaries…)…to…determine or clarify the precise meaning of key words… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 1	
Redistribute the students' individual **Student Workbooks**. Tell them to turn to **Breaking It Down—In the Forest** and **Breaking It Down—At the Coast** (Student Workbook, page 13 and page 15), where they described diagrams of food webs and decomposers in forest and marine ecosystems. Ask students, "Where do you see waste in your diagrams?" (*The earthworm castings in the forest; the bird waste on the rock by the tide pool; the dead fish in the tide pool; the fallen leaf on the forest floor.*) "Are these things really waste?" (*No, bacteria or other decomposers feed on the waste, so it is not really "waste."*) "Do you think all waste is useful to some other living thing?" (*Yes, since the waste still contains nutrients, a decomposer can feed on it.*)	**RI.4.7:** Interpret information presented visually…
Step 2	
Point out the term that has been added to the Word Wall (*waste management*). Have students use the **Dictionary** to add the definition of this term to **Decomposition Vocabulary** (Student Workbook, pages 2–3). Ask students to name parts of the waste management system that they know. (*Answers may include recyclables, recycling bins, green waste, yard waste, trash, trash cans, garbage collection, sewer, landfill, dump, and sewage treatment plant.*) Ask students if they think decomposers break down the "waste" in their community and recycle the nutrients back into the environment. (*Answers will vary.*) Tell students that the waste management system in their community works very hard to make sure that these nutrients are recycled; such systems rely on decomposers to help do this.	**L.4.4c:** Consult reference materials (e.g., dictionaries…)…to …determine…meaning… **RI.4.4:** Determine the meaning of…domain-specific words or phrases in a text…

Procedures	Common Core Standards and Applications
Step 3	
Project **Wastewater Treatment Plant** (Visual Aid #5). Tell students that their community has a place like this to help manage the safe decomposition of human waste and the cycling of nutrients. These places are "wastewater treatment plants." Explain that many people in their community work in the waste management system, and some work at the wastewater treatment plant. Tell students that decomposers work at these plants too, and that humans could not do their jobs without them.	n/a
Step 4	
Have students turn to **Our Wastewater Management System** (Student Workbook, pages 16–17) and examine the diagram. Project **Wastewater Management System** (Visual Aid #6) and walk students through the process using this sequence: ■ First, pipes called sewer lines carry away the wastewater created in your home. (*Have students find the sewer lines on their copy of the diagram.*) ■ The sewer lines from each house come together at certain points, and the pipes carrying the wastewater get bigger. These large pipes take the wastewater into the wastewater treatment plant. (*Have students locate where the sewer lines from the houses come together to form the community sewer line.*) ■ At the plant, the wastewater goes into a big tank, where it becomes very still. When this happens, anything that is solid sinks to the bottom of the tank. What goes to the bottom of the tank is taken out and put in a special container called a "sludge digester." (*Have students locate the settling tanks and the digester on the diagram.*) ■ The wastewater at the top of the settling tank is drained into big pools called "basins," where air is pumped through the wastewater and chemicals are sometimes added. (*Have students locate the aeration basins on the diagram.*) ■ Then, the wastewater is pumped out of the basins and into a lake, river, or the ocean. (*Have students locate the outlet that drains into the larger body of water on the diagram.*)	**RI.4.7:** Interpret information presented visually…(e.g.,… diagrams…)…and explain how the information contributes to an understanding of the text in which it appears. **SL.4.2:** Paraphrase…information presented…orally. ***Suggestion:*** *Have students paraphrase the information in chunks as they learn to interpret the diagram.*

Procedures	Common Core Standards and Applications
Step 5	
Ask students to think about where decomposers work in this system. Using a colored marker, mark the following places in the system shown on **Wastewater Management System**, while students do the same on the diagram on page 16 in their **Student Workbook**. Explain the following as you mark the diagram: ■ Bacteria are everywhere, so decomposers are already breaking down the waste in your home. They travel through the sewer lines in the wastewater, decomposing the waste on the way. (*Put a mark on the sewer line coming from the house.*) ■ In the stillness of the settling tanks at the wastewater treatment plant, the bacteria reproduce and grow, continuing to break down the matter in the water. (*Put a mark on the settling tank.*) ■ In the sludge digester, the people working at the plant help the bacteria to grow. They make the environment in the digester just right for the bacteria to grow and feed like crazy! (*Put a mark on the sludge digester.*) ■ The wastewater that goes into the pools and then into the lake, river, or ocean still has some living bacteria. These bacteria continue to feed on the matter that is contained in the water. Bacteria in the lakes and rivers, or bacteria and plankton in the ocean, release the rest of the nutrients back into the environment. (*Put a mark on the river.*) (*Note: An Answer Key and Sample Answers for **Wastewater Management System** are provided on page 82.)*	**RI.4.7:** Interpret information presented visually…(e.g.,… diagrams…)…and explain how the information contributes to an understanding of the text in which it appears. **SL.4.2:** Paraphrase…information presented…orally. ***Suggestion:*** *Have students paraphrase the information in chunks as they learn to interpret the diagram.*
Step 6	
Ask students, "What would happen if there were no decomposers in this system?" (*The "waste" would not get broken down and would pile up. Nutrients would not be released back into the environment.*) Point out that now they know what happens to the nutrients that made it to the lake, river, or ocean in the wastewater, but what do they think happens to the nutrients in the sludge digester? (*Answers may include the idea that the nutrients are probably used somewhere.*) Tell the class that they will learn about those nutrients in the next lesson.	**RI.4.9:** Integrate information from two texts on the same topic… ***Suggestion:*** *Ask students to consider the information represented in the diagram and consider the two narratives they read about decomposition in the forest and on the coast. Discuss the similarities and differences in Wastewater Management and nature's decomposition process.*

Procedures	Common Core Standards and Applications
Step 7	
Instruct students to answer the questions on **Our Wastewater Management System**. Collect **Student Workbooks** and use **Our Wastewater Management System** for assessment.	**W.4.2:** Write informative/explanatory texts to…convey ideas and information clearly. b) Develop the topic with facts…concrete details…or other information and examples… c) Link ideas…using words and phrases (e.g., *another, for example, also, because*). d) Use precise language and domain-specific vocabulary… ***Suggestion:*** *Review the types of information students should include in their answers. Review linking words students should use to connect ideas (see the standard for examples), as well as specific vocabulary terms students should include. Write the vocabulary terms on the board for easy student reference.*

Lesson 5: Down on the Farm

Students learn what humus is, and that decomposers form humus as they break down dead organisms. They investigate different soil types and observe the amount of humus in topsoil. They apply their observations to describing why decomposers and humus are essential to agriculture.


Lesson 5

Down on the Farm

Learning Objectives

Background

Key Vocabulary

Use this correlation in place of the **Procedures** on pages 92–93 of the Teacher's Edition.

Procedures	Common Core Standards and Applications
Vocabulary Development	
Use the **Dictionary** and the vocabulary **Word Wall Cards** to introduce new words to students as appropriate. These documents are provided separately.	**L.4.4c:** Consult reference materials (e.g., dictionaries…)…to… determine or clarify the precise meaning of key words… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 1	
Ask students, "From where does your food come?" Take answers from several students. (*Students should note that their food ultimately comes from plants.*) Ask another set of students, "What do plants need to grow?" (*Water, air [carbon dioxide], soil, and sunlight*) Ask a third set of students, "Of what is soil made?" (*Organic materials and minerals*) Draw the following diagram on the board: Our Food ⟷ Decomposers Ask students to think about how decomposers connect to growing the food we eat. (*Answers will vary.*) Remind students that they read about composting in Lesson 1 and how decomposers and scavengers help create healthy soil for farms, vineyards, orchards, and gardens. (*They help create nutrient-rich compost that can be added to the soil so plants have the nutrients they need to grow.*)	**RI.4.1:** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. **RI.4.3:** Explain…ideas, or concepts in a…scientific…text… ***Suggestion:*** *After students review the* ***California Connections*** *selection, ask them to identify and describe the ideas or concepts related to our food and decomposers.* **RI.4.10:** …read and comprehend informational texts, including…science…texts…proficiently… ***Suggestion:*** *After students propose answers, increase students' reliance on textual evidence by asking them to turn again to the* ***California Connections*** *article and seek out answers to how decomposers are connected to growing the food we eat.*
Step 2	
Redistribute students' individual **Student Workbooks**. Point out the new words on the Word Wall. Have students use the **Dictionary** to add the definitions of these terms to **Decomposition Vocabulary** (Student Workbook, pages 2–3).	**L.4.4c:** Consult reference materials (e.g., dictionaries…) …determine…meaning… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…

Procedures	Common Core Standards and Applications
Step 3	
Hold up the apple and tell students that it represents Earth. Cut the apple into quarters, hold up three quarters, and explain that this portion of the apple represents the part of Earth's surface that is covered by ocean water. Hold up the last quarter of the apple and explain that it represents the part of Earth that is not covered by ocean water. Tell students that, on this small part of Earth, humans live, work, and grow their food. Cut the quarter representing Earth's land area in half. Hold up one of the one-eighth pieces, explaining that half of Earth's land area not covered with ocean water has weather conditions so harsh that humans cannot live or grow food there. These places include the North and South Poles, large deserts, and big swamps. Hold up the other one-eighth portion of apple, telling students that this represents the part of Earth's surface where people can live, and where conditions make growing food possible. Cut the one-eighth piece into four thin slices. Hold up all four of them, and tell the class that people live on this much of the Earth's surface, but cannot grow food on all of it because: ■ Some of this area has mountains and hills; the land is too steep to grow food. (Set down one of the four pieces.) ■ Some of this area is already covered by our cities, houses, and roads; no room exists to grow food. (Set down another of the four pieces, leaving two.) ■ Some of this area does not have soil for growing crops; it is too rocky. (Set down another of the four pieces, leaving one piece held up for students to see.) Explain to students that this small piece of the whole apple shows how much of Earth's surface is available for growing the food we need. Carefully peel the skin off this thin slice of the apple, hold it up, and tell students that the tiny peel represents the topsoil available to farmers in which to grow crops.	**SL.4.2:** Paraphrase…information presented…orally. ***Suggestion:*** *Before starting the presentation, tell students to listen and watch carefully to determine what the point of the presentation is as it relates to what they have learned thus far.* *Have students summarize, paraphrase, and/or partner share the information throughout the apple presentation.* **SL.4.3:** Identify the reasons and evidence a speaker…provides to support particular points. ***Suggestion:*** *When finished with this step, have the class explain the main point of the presentation. Then have students explain why the use of the apple to demonstrate the concept added to understanding the presenter's point that there is comparatively very little soil available for growing food. Have students identify what parts of the explanation and demonstration provide evidence and support for the main point of the demonstration.*
Step 4	
Explain that topsoils are made of different materials including sand, clay, and humus. Tell students that topsoils containing lots of humus are very dark in color, smell earthy, and are crumbly. Good topsoil holds lots of water over a long period of time, so plants can use the water as they need it. It also is full of the nutrients that decomposers have released from dead animals and plants. Not all topsoil looks the same, but there are ways to tell what topsoil will help plants grow best. Tell students they will act as teams of soil scientists and examine two topsoil samples.	**RI.4.7:** Interpret information presented…orally… ***Suggestion:*** *In pairs, students should summarize the information presented in this step.*

Procedures	Common Core Standards and Applications
Step 5	
Pair students and have the pairs sit together. Distribute two soil samples (A and B), magnifying glasses, paper towels, and **Topsoil** Information Cards #9–10 to each pair of students. Tell students to turn to **Testing Topsoil** (Student Workbook, pages 18–19) and explain that this page provides instructions students will follow in their work as soil scientists. Have pairs work together to complete the questions on page 19 for each soil sample. Have each student student record individual responses to the questions in Part 1.	**W.4.2b:** Develop the topic with facts, definitions, concrete details…or other information and examples…
Step 6	
Call on students to share the properties of each soil they observed. Take notes on the board, in T-chart form. (*Sample A is light tan, has large particles, is sandy and rocky, and smells salty, dusty, or sandy. Sample B is light, reddish brown, has pieces that look like sticks and hairs, feels wet and warm, and smells like dirt. Sample B is darker and crumbly, and smells earthy.*) Have students think about what they observed and complete Part 2 on **Testing Topsoil**. Then tell the pairs to look carefully at the **Topsoil** information cards.	n/a
Step 7	
Project **Topsoil** (Visual Aid #7). Ask the pairs to hold up the information card with the topsoil that is best for growing crops. Tell students that this would be the soil with the most humus. Ask students, "Which of your soil samples would be best for farming?" (*Sample B*) "Why?" (*Because it has the most humus, which means it has more nutrients and can hold more water than Sample A.)* Ask students which soil sample would have the best food sources for earthworms. (*Sample B*) Ask students what this tells them about how decomposers and scavengers are connected to growing our food. [*Decomposers and scavengers, like earthworms, make humus. Humus in the soil makes topsoil better for growing plants (crops). We need good topsoil in which to grow our food. Without decomposers and scavengers, there would not be humus, which means that Earth's remaining agricultural topsoil (soil in which crops are grown) would not have the right nutrients, or hold enough water, for plants to thrive.*]	n/a

Procedures	Common Core Standards and Applications
Step 8	
Have students answer the last question in Part 3 on **Testing Topsoil**. Gather the soil samples, magnifying glasses, paper towels, and information cards. Collect **Student Workbooks** and use **Testing Topsoil** for assessment.	**W.4.2:** Write informative/explanatory texts to…convey ideas and information clearly. a) Introduce a topic clearly… b) Develop the topic with facts…concrete details…or other information and examples… c) Link ideas…using words and phrases (e.g., *another, for example, also, because*). d) Use precise language and domain-specific vocabulary… e) Provide a concluding statement… ***Suggestion:*** *Writing this paragraph prepares students for the multi-paragraph writing assignment in the next lesson.* *Before students write, review the expectations in the standard, including introducing the topic and supporting it with facts, details and examples.* *Review the types of information students should include in their answer. Review linking words students should use to connect ideas (see the standard for some examples), as well as specific vocabulary terms students should include in their paragraph. Remind them to end with a concluding statement.*

Lesson 6: The Benefits of Composting

Students revisit the composting lab, observing what has happened since they placed the materials in the bags. They reread parts of ***California Connections: Wonderful Compost***, and discuss how composting can help California communities manage waste and maintain the health of topsoil used to grow food.


Lesson 6

The Benefits of Composting

Learning Objectives

Use this correlation in place of the **Procedures** on pages 104–105 of the Teacher's Edition.

Procedures	Common Core Standards and Applications
Vocabulary Development	
Use the **Dictionary** and the vocabulary **Word Wall Cards** to introduce new words to students as appropriate. These documents are provided separately.	**L.4.4c:** Consult reference materials (e.g., dictionaries…)…to…determine or clarify the precise meaning of key words… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 1	
Organize students into their lab groups from Lesson 1. Redistribute the students' individual **Student Workbooks.** Point out the new words on the Word Wall. Have students use the **Dictionary** to add the definitions of these terms to **Decomposition Vocabulary** (Student Workbook, pages 2–3).	**L.4.4c:** Consult reference materials (e.g., dictionaries…)…to …determine…meaning… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 2	
Tell students to turn to **Banana Composting Lab Sheet** (Student Workbook, pages 9–10). Have a few students describe what took place in Lesson 1. (*They put a slice of banana in a bag with yeast [a decomposer] and a slice of banana in a bag by itself; then they predicted what would happen to the bananas in the bags. They drew pictures of what the bags and banana slices looked like. Finally, they stored the bags in a safe place.*) Tell students that today they are going to reexamine their samples to see what has happened over time. Point out the area where they are to record their observations today. Stress that students are not to open the bags when they get them back. They should also be careful that the bags do not open accidentally. Have the student who brought the bags to the storage area in Lesson 1 retrieve their group's samples from the storage area and take them back to the group. Have students draw what the bags and samples look like in Part 2, B of the **Banana Composting Lab Sheet.**	n/a

Procedures	Common Core Standards and Applications
Step 3	
Ask students if the samples in the bags have changed. (*Yes*) Ask students what they think has caused the change. (*The bananas have decomposed.*) Ask students if the change is the same in both bags. (*No, the sample with the yeast is different, and the bag is full of air* [*gas*].) Ask, "What caused the bananas to decompose differently?" (*Yeast, because yeast is a decomposer.*) Tell students that the air (gas) in the bag with the yeast is carbon dioxide, which was released when the yeast broke down the matter of the banana. Students may also see what looks like water in the bag. Water was released during the process. (*Note: The bag without yeast will contain bacteria and the non-yeast bag may show some evidence that the banana has decomposed as well. Realizing this, ask students why they think the banana without yeast shows signs of decomposing as well. What could be in the bag* [*or what might have already been present on the banana*] *that would have caused the banana to decompose?*)	n/a
Step 4	
Tell students to turn to ***California Connections: Wonderful Compost*** (Student Workbook, pages 4–8) and reread the "Composting at Home" section on pages 7 and 8, as a class. Ask students what would have happened to the food scraps in the article if there were no decomposers in the compost bin. (*The food scraps would not have decomposed and would have piled up.*) Ask students what they think would have happened to the banana slices in their lab if decomposers did not exist. (*They wouldn't have decomposed.*) Have students explain what the decomposers in the story and in the banana lab both did for humans. (*They broke down waste left by humans.*) Ask students to think of another way the people in ***California Connections: Wonderful Compost*** story depended on the work of the decomposers. (*The decomposers created compost for the humans to use in their garden to help grow more food.*)	**RI.4.7:** Interpret information presented visually, orally, or quantitatively…and explain how the information contributes to an understanding of the text… **RI.4.10:** …read and comprehend informational texts, including…science…texts…proficiently… ***Suggestion:*** *Ask students to explain how the composting investigation information contributes to understanding the text and other information they have learned about composting.*
Step 5	
Tape **Topsoil** (Information Cards #9–10) and **Solid Waste Management** (Information Cards #11–12) side-by-side on the board. Explain that human communities in California produce a lot of solid waste, such as food scraps and yard trimmings, and that some cities dump this waste in landfills while others compost it. Like the people in the article, California cities that compost find that composting can reduce the amount of garbage in the landfill. Composting also produces humus (sometimes called "compost") that can be used to improve soil for farming.	n/a

Procedures	Common Core Standards and Applications
Step 6	
Point to the photographs on the information cards taped on the board. Ask students to describe how decomposers and scavengers are important to the practices shown on the information cards. (*Agriculture and waste management*) Write student responses on the board next to the information cards. (*Decomposers and scavengers make humus that is needed in topsoil to grow crops. Decomposers and scavengers help compost garbage so that our landfills do not fill up and communities stay clean.*)	**L.4.6:** Acquire and use accurately grade-appropriate… domain-specific words and phrases… ***Suggestion:*** *Ensure students speak in complete sentences and use vocabulary terms learned in the unit.* **SL.4.2:** Paraphrase…information presented…orally.
Step 7	
Have students return to **Banana Composting Lab Sheet** and answer the second question in Part 3 with the help of their group members. While students are working, collect the plastic bags and composting samples carefully. Have students turn to **What Decomposers Do For Me** (Student Workbook, pages 20–21) and answer the question by writing a paragraph. Gather the plastic bags and composting samples. Collect **Student Workbooks** and use **What Decomposers Do For Me** for assessment.	**W.4.2:** Write informative/explanatory texts to…convey ideas and information clearly. a) Introduce a topic clearly… b) Develop the topic with facts…concrete details…or other information and examples… c) Link ideas…using words and phrases (e.g., *another, for example, also, because*). d) Use precise language and domain-specific vocabulary… e) Provide a concluding statement… ***Suggestion:*** *This can be a multi-paragraph essay. Assist students to consider how to group information for each paragraph.* *Before students write, review the expectations in the standard, including introducing the topic and supporting it with facts, details and examples.* *Review the types of information students should include in their essays. Review linking words students should use to connect ideas (see the standard for examples), as well as specific vocabulary terms students should include in their paragraph. It may be useful to list applicable vocabulary terms as well as linking words and phrases on the board. Remind them to end with a concluding statement.*

Unit Assessment

Refer to the introduction pages at the front of this document for information regarding the Traditional and Alternative Assessments for this unit and their Common Core correlations.

Common Core Reference Pages

California Common Core State Standards Descriptions

Language Standards

- **L.4.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grade 4 reading and content,* choosing flexibly from a range of strategies.
  - a) Use context (e.g., definitions, examples, or restatements in text) as a clue to the meaning of a word or phrase.
  - c) Consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation and determine or clarify the precise meaning of key words and phrases **and to identify alternate word choices *in all content areas*. CA**
- **L.4.6:** Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal precise actions, emotions, or states of being (e.g., *quizzed, whined, stammered*) and that are basic to a particular topic (e.g., *wildlife, conservation,* and *endangered* when discussing animal preservation).

Reading Standards for Informational Text

- **RI.4.1:** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.2:** Determine the main idea of a text and explain how it is supported by key details; summarize the text.
- **RI.4.3:** Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
- **RI.4.4** Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*. **(See grade 4 Language standards 4–6 for additional expectations.) CA**
- **RI.4.5:** Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.
- **RI.4.7:** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
- **RI.4.8:** Explain how an author uses reasons and evidence to support particular points in a text.
- **RI.4.9:** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.
- **RI.4.10:** By the end of year, read and comprehend informational texts, including history-social studies, science, and technical texts, in the grades 4–5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

Speaking and Listening Standards

- **SL.4.2:** Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **SL.4.3:** Identify the reasons and evidence a speaker **or media source** provides to support particular points. **CA**

Common Core Reference Pages

Writing Standards

- **W.4.2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
  a) Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.
  b) Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
  c) Link ideas within categories of information using words and phrases (e.g., *another, for example, also, because*).
  d) Use precise language and domain-specific vocabulary to inform about or explain the topic.
  e) Provide a concluding statement or section related to the information or explanation presented.
- **W.4.9:** Draw evidence from literary or informational texts to support analysis, reflection, and research.
  b) Apply *grade 4 Reading standards* to informational texts (e.g., "Explain how an author uses reasons and evidence to support particular points in a text").