

## Unit 9

Teacher Guide

Grade 5

### Chemical Matter

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Unit 9

# Chemical Matter

## Teacher Guide

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# Introduction

## CHEMICAL MATTER

This introduction includes the necessary background information to teach the Chemical Matter unit. This unit contains 15 daily lessons, plus four Pausing Point days that may be used for differentiated instruction. Lessons and activities address various aspects of a comprehensive language arts curriculum aligned to the Common Core State Standards—English Language Arts (CCSS-ELA): reading, writing, spelling, grammar, and morphology. Each entire lesson will require a total of 90 minutes. Lesson 15 is devoted to a unit assessment.

As noted, four days are intended to be used as Pausing Point days. You may choose to use all four days at the end of the unit, or you may use one day immediately after Lesson 6 and three days at the end of the unit. If you use one Pausing Point day after Lesson 6, review students' integration of material in Lessons 3 and 4 and writing task in Lesson 5, or you may use the day to focus on writing, spelling, grammar, or morphology skills covered in Lessons 1–6. It is recommended that you spend no more than 19 days total on this unit.

## WHY THE CHEMICAL MATTER UNIT IS IMPORTANT

This unit is important for two reasons.

The Big Idea of this unit is that matter can be transformed by physical and chemical changes, which result in the extraordinary diversity of our physical world. This unit introduces students to the concept of matter, physical and chemical changes, and elements and compounds. It is not presented as a standard informational text but written as a detective story. Chemical content is introduced gradually and through the context of the protagonist's experiences, giving students constant examples of the practical interest of these ideas.

The structure of the Reader is also important. This is a unit that combines literary and informational characteristics into a single text. It also asks students to look beyond the reader to additional sources to understand and explain the concepts introduced. This unit therefore asks students to *integrate* the skills they have learned in the rest of Grade 5: how to read and analyze informational and literary texts, how to use information to explain concepts and ideas, and how to write for different audiences and purposes. The unit is designed to be a culmination of the year, and a preparation for the kinds of skills expected in Grade 6 and beyond. It is also, as a detective story, designed to be a fun end to the year!

## Prior Knowledge from CKLA™

Most of the content in this unit is new to students, whether they have received Core Knowledge Language Arts (CKLA) instruction in K–4 or not. Much of the material presented here is built upon in the Core Knowledge Sequence in Grades 6 onwards.

Students studying CKLA, however, will have received introductory knowledge on the following:

### Plants (Kindergarten)

- Identify photosynthesis as the process where plants turn water, nutrients, air and light into food.

### Seasons and Weather (Grade 2)

- Describe the main stages of the Water Cycle.
- Identify that water exists in different states including frozen water (ice) and vapor.

### Ecology (Grade 3)

- Identify that decomposers recycle carbon dioxide and other materials.

### Geology (Grade 4)

- Describe how sedimentary rock is formed, including from once-living things.

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## READER

The Reader for this unit, *The Badlands Sleuth*, includes complex text and prepares students in Grade 5 for the increased vocabulary and syntax demands texts will present in later grades. *The Badlands Sleuth* tells the story of a fossil dig, in which a number of fossils go missing and the protagonist, Amy, must use the chemistry she is learning to solve the mystery. Through this, students are systematically exposed to chemical content.

The Reader also includes two selections that may be used for enrichment. Although the Teacher Guide does not include lessons for these enrichment selections, the Activity Book includes activity pages students may complete independently. Please use these selections at your discretion, considering students' needs and the time available in your school day.

## WRITING

As with other literary units in Grade 5, writing is integrated with the reading process in these lessons. Students use the insights they have gained from close reading and apply them to a variety of writing tasks. Because the unit is both literary and informational, writing tasks vary accordingly. The key skills that students build on in this unit are:

- appropriate organization of content for a range of purposes
- combining informational and literary details
- applying recently learned insights to convey information and understanding to others
- integrating information from multiple sources to explain concepts and ideas
- revising writing in response to peer feedback

Crucially, some of the activities are so integrated that they have been labeled as both reading and writing segments in the lesson.

The culminating writing task for this unit asks students to write Amy's next case: another detective story which uses scientific content to solve a mystery. This is a deliberately open ended task, asking students to apply the skills they have learned through Grade 5 (and before). It is also intended to be an enjoyable final task of the year.

During all classroom writing tasks, please encourage students to generate logical, defensible spellings based on code knowledge, rather than guessing. You will also find writing rubrics for the writing tasks in Lesson 2, 5, and 10 in the "Teacher Resources" in this Teacher Guide.

Earlier grades in the CKLA program include five steps in the writing process: planning, drafting, revising, editing, and publishing. Beginning in Grade 4, the CKLA writing process expands to include the following components: planning, drafting, sharing, evaluating, revising, and editing (and the optional component of publishing). In Grades 4 and 5, the writing process is no longer conceptualized as a series of scaffolded, linear steps (an important change from the Grade 3 writing process). Rather, students move among components of the writing process in a flexible manner similar to the process mature and experienced writers follow naturally (see Graham, Bollinger, Booth Olson, D'Aoust, MacArthur, McCutchen, and Olinghouse [2012] for additional research-based recommendations about writing in the elementary grades).

Writing lessons include multiple opportunities for peer collaboration and teacher scaffolding. Additionally, when students write, you should circulate around the room and check in with students to provide brief, targeted feedback.



In addition to specific writing lessons, the CKLA program provides numerous writing opportunities. For example, students regularly engage in writing short answers in response to text-based questions. In these writing opportunities, students will focus on the use of evidence from the text and on individual sentence construction.

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## **END-OF-YEAR (EOY) ASSESSMENT**

In this unit, an End-of-Year (EOY) Assessment is provided and should be administered at the end of the unit. You should spend no more than three days total on the End-of-Year Assessment. There are three main components of the assessment administered to all students: a written assessment of silent reading comprehension, a written assessment of grammar, and a written assessment of morphology. Two other components—the oral reading of words in isolation and the fluency assessments—are administered one-on-one with students.

The written assessment of silent reading comprehension is meant to be completed in one 90-minute block of time and will be administered on End-of-Year Assessment Day 1. The Grammar and Morphology Assessments are meant to be completed during two 45-minute blocks of time on End-of-Year Assessment Day 2 and Day 3.

In addition, you will pull students aside, one at a time, and administer the Word Reading in Isolation Assessment (to students who scored 11 or fewer on the Reading Comprehension Assessment, or between 12–14, as time allows). Administer the Fluency Assessment to all students.

After administering the End-of-Year Assessment, you will complete an analysis summary of individual student performance using the Grade 5 End-of-Year Summary Sheet, found in each individual student's Activity Book. This summary should be passed on, along with the completed assessments, to students' teachers for the following school year.

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## **FLUENCY SUPPLEMENT**

A separate component, the Fluency Supplement, is available for download on the Amplify website. This component was created to accompany Core Knowledge Language Arts (CKLA) materials for Grades 4 and 5. It consists of selections from a variety of genres, including poetry, folklore, fables, and other selections. These selections provide additional opportunities for students to practice reading with fluency and expression (prosody). There are sufficient selections so you may, if desired, use one selection per week. For more information on implementation, please consult the supplement.

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## TEACHER RESOURCES

At the back of this Teacher Guide, you will find a section titled “Teacher Resources.” In this section, information is included about the following:

- Glossary
- Pages from Geology Reader
- Changes in State Diagrams
- Four Sample Character Maps
- Periodic Table
- Sample Police Reports
- Articles on Investigations
- Fossil Image Poster
- Rubric: Presentation Lesson 5
- Rubric: Presentation Lesson 9
- Rubric: Presentation Lesson 11
- Plot Diagram
- Narrative Rubric
- Activity Book Answer Key

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## DIGITAL COMPONENTS

In the Advance Preparation section of each lesson, you will be instructed to create various posters, charts, or graphic organizers for use during the lesson. Many of these items, along with other images such as maps or diagrams, are also available as digital components at [coreknowledge.org/ckla-files](http://coreknowledge.org/ckla-files) and at [ckla.amplify.com](http://ckla.amplify.com).

## 1

# Entering the Badlands

## PRIMARY FOCUS OF LESSON

### Reading

Students will quote accurately from the text to explain its setting and scientific content. [RI.5.1, RL.5.1]

### Writing

Students will write detailed descriptions of the physical properties of objects. [W.5.2]

### Speaking and Listening

Students will discuss the presentation of content in three different texts. [SL.5.1]

## FORMATIVE ASSESSMENT

### Activity Pages 1.1 and 1.2

**Welcome to Fossil Camp; Vocabulary** Use textual evidence to identify literary and informational details, using multiple-choice answers, and a graphic organizer. [RI.5.1, RL.5.1]

### Activity Page 1.3

**Think of an object that qualifies as matter** Provide a clear written description of an object's physical properties. [W.5.2]

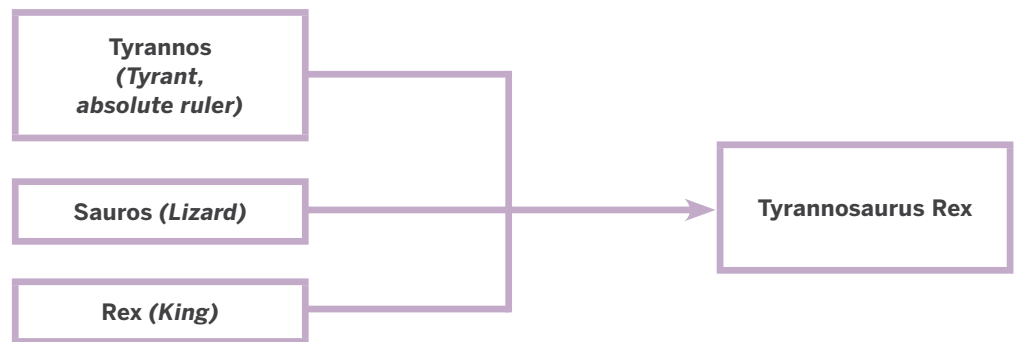
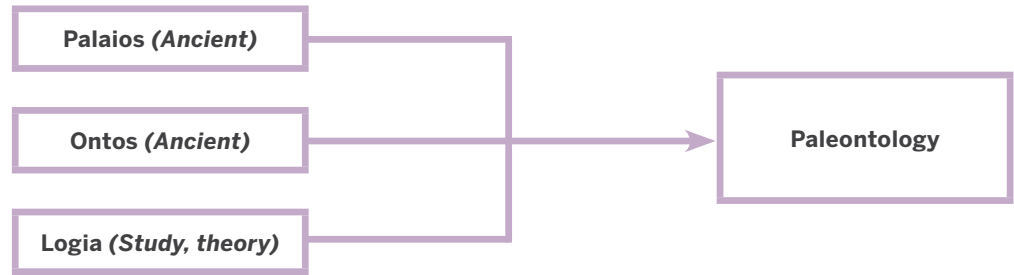
## LESSON AT A GLANCE

|                                  | Grouping                    | Time    | Materials   |
|----------------------------------|-----------------------------|---------|---|
| Reading (45 min.)                |                             |         |   |
| Read-Aloud: Chapter 1, Part 1    | Whole Group/<br>Independent | 20 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Pages 1.1, 1.2<br><input type="checkbox"/> Definition of Setting<br><input type="checkbox"/> Poster on Scientific Definition |
| Word Work: Scientific Terms      | Whole Group                 | 5 min.  |   |
| Read-Aloud: Chapter 1, Part 2    | Whole Group                 | 20 min. |   |
| Writing (20 min.)                |                             |         |   |
| Describe Physical Properties     | Independent/<br>Partner     | 20 min. | <input type="checkbox"/> Activity Page 1.3<br><input type="checkbox"/> Optional: Range of Objects<br>for Descriptions   |
| Speaking and Listening (25 min.) |                             |         |   |
| Analyze Geology Text             | Partner                     | 10 min. | <input type="checkbox"/> Activity Page 1.4  |
| Analyze Chemical Matter Text     | Partner/<br>Whole Group     | 15 min. |   |

## ADVANCE PREPARATION

### Reading

- Write a definition of *setting* on the board/chart paper: “The time and place of the story.” (where, when, and under what circumstances)
- Prepare the following poster on scientific definition. Alternatively, you may access a digital version of this in the digital components for this unit.



### Writing

- You may wish to provide some objects for students to describe (for example, ask them to pick objects out of a bag without showing their partners), instead of asking them to describe any object from their memory.
- This activity may be extended further into science lessons; for example, giving the opportunity to measure the mass of objects.

### Speaking and Listening

- Review the Geology content, which was taught in Grade 4 of CKLA and is found excerpted in student activity books. You may access a digital version of this in the digital components for this unit and in the Teacher Resources in this Teacher Guide.
- Ensure there is space on the board/chart paper to list literary and informational characteristics of texts. Please keep this on the board for the following lesson.

- This lesson contains Think-Pair-Share activities.
- You will need to record the results of a class vote.

## Universal Access

- For the reading segment, students needing support may find it helpful to spend a moment visualizing the setting before beginning Activity Page 1.1.
- You may also wish to reproduce the first paragraph of the Reader and underline descriptive words for the setting.
- For the writing segment, students needing substantial support should use the structure below for their descriptions.
  - The object I am describing is in a liquid/gas/solid state.
  - It looks like \_\_\_\_ and is the color \_\_\_\_.
  - If you touch it you can feel \_\_\_\_.
  - It smells like \_\_\_\_.
  - Other physical properties of the object include \_\_\_\_.
- For students needing moderate support in the writing segment, ask them to use the following prompts for their descriptions in the writing segment of this piece:
  - What state is the object in?
  - What are its physical properties? For example, what is its color? Does it smell? What texture does it have? Does it have a taste?
  - Are there any other facts about the object that are useful to describe?
- For the Speaking and Listening segment, use some of the following sentence starters to help students Think-Pair-Share:
  - I think this is an informational/literary characteristic of the text because \_\_\_\_.
  - I agree that this characteristic suggests the text is informational, and I also think this characteristic \_\_\_\_.
  - I agree that this characteristic suggests the text is informational, however, if you look at this characteristic \_\_\_\_.
  - I am not sure this is correct, because \_\_\_\_.
  - That is a good point, however, if you look at this characteristic of the text \_\_\_\_.



## ACADEMIC VOCABULARY

**characteristic, n.** a feature of something/someone

Start Lesson

### Lesson 1: Entering the Badlands

# Reading



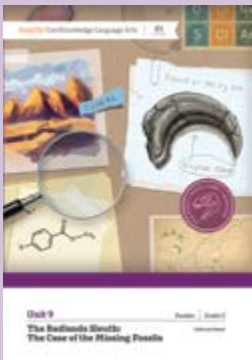
**Primary Focus:** Students will quote accurately from the text to explain its setting and scientific content. [RI.5.1, RL.5.1]

## READ-ALOUD: CHAPTER 1, PART 1 (20 MIN.)

### Introduce the Chapter: “Welcome to Fossil Camp”

- Ensure each student has a copy of the Reader, *The Badlands Sleuth*, and has located Chapter 1. As with previous units, preview the Reader by reading the title and giving students a chance to flip through and comment.
- Tell students they will read the first half of Chapter 1, “Welcome to Fossil Camp!”
- Have students turn to the table of contents, locate the chapter, and then turn to the first page of the chapter.
- Preview the core vocabulary words before reading the chapter.
- Begin by telling students the first vocabulary word they will encounter in this chapter is *mutter*.
- Have them find the word on page 1 of the Reader. Explain that each vocabulary word is bolded the first time it appears in the chapter.
- If required, have students refer to the glossary at the back of the Reader, locate *mutter*, and then have a student read the definition.
- If required, explain the following:
  - the part of speech
  - alternate forms of the word
- If required, have students reference Activity Page 1.2 while you read each word and its meaning.

### *The Badlands Sleuth*



# Vocabulary

**mutter, v.** to say something in a low or hard-to-hear voice, often with annoyance

**shimmer, v.** to shine with a light that seems to move a little

**barren, adj.** bleak and lifeless

**sandwich, v.** to be squashed between two things

**expert, n.** someone who has deep knowledge and skill in an area, usually from long experience and study

**lurch, v.** to make a sudden, unsteady movement

**paleontology, n.** the science of fossils

**chemistry, n.** the science of matter

**matter, n.** any substance that occupies space and has mass

**mass, n.** the amount of matter in a substance or object

| Vocabulary Chart for Chapter 1, “Welcome to Fossil Camp” |   |  |
|--|---|--|
| Vocabulary Type  | Tier 3<br>Domain-Specific Words             | Tier 2<br>General Academic Words               |
| Core Vocabulary  | paleontology<br>chemistry<br>matter<br>mass | mutter<br>shimmer<br>barren<br>expert<br>lurch |
| Multiple-Meaning Core<br>Vocabulary Words                |   | sandwich                                       |
|  |   |  |
| Sayings and Phrases                                      |   |  |

## Read “Welcome to Fossil Camp,” Part 1

- Read the chapter aloud from the beginning to the second paragraph on page 4 (“This is going to be so much fun!”), as students follow along in their Readers. As you read, stop to read and discuss the corresponding guided reading supports.

## Chapter 1

# Welcome to Fossil Camp!

**THE BIG QUESTION**  
What is the "stuff" that makes up the universe?

"It's got to be over a hundred degrees out there," Amy **muttered**, staring through the windshield of the pickup. The badlands of eastern Montana **shimmered** in the heat under a pale, cloudless sky. **Barren** ridges of weathered rock towered above dry gullies and patches of stiff prairie grass. Amy aimed the air conditioner vent so it blew directly on her face. "I really don't like being hot."

"I'm afraid it's even hotter out at the fossil site," said Tess, swerving to avoid a pothole in the narrow dirt track. "Lately it's been over ninety degrees in the shade."

'Great!' thought Amy. She fanned herself with a paperback book. It was her favorite kind of book: a mystery featuring a clever detective. She had read most of it on the flight from Chicago and then finished it while she and Matt waited for Tess to pick them up at the small airport in Billings, Montana.

Amy glanced back at her twin brother. He was **sandwiched** between their two backpacks in the back seat, with a big grin on his freckled face. Last month, when Matt had learned about Fossil Camp, he'd burst into her room, waving the camp brochure. "We can actually dig for dinosaur fossils," he'd whooped. Amy had planned to spend her summer vacation at home, reading mysteries out on the breezy screened porch and drinking tall glasses of icy lemonade. But Matt had talked their parents into Fossil Camp—and Amy into coming with him. Now, sweltering in the heat, she was having second thoughts.

"What's Dr. Forester like?" Amy asked. She'd read in the brochure that Dr. Pam Forester was the paleontologist in charge of Fossil Camp.

1

- Read the chapter title aloud. Point to the definition of setting on the board, and remind students of previous investigations of setting (such as in the Contemporary Fiction unit in Grade 4). You may wish to ask students to volunteer the settings of different texts they have read this year, in class or out of class.
- As you read, ask students to pay particular attention to details in the text that describe the setting.

**Literal.** What have we been told about Amy's environment?

- » The class should be able to list the following details:
  1. It's hot. (100 degrees)
  2. She's in Eastern Montana.
  3. There are "barren ridges of rock towering over gullies and patches of stiff prairie grass." (You may wish to expand on this to ensure students understand what is being described.)
  4. There are potholes in the road.

**Inferential.** Where would Amy like to be instead?

- » sitting on their porch drinking lemonade

**Support.** Matt, Amy's brother, is sandwiched between two backpacks. *Sandwich* in this context means "squashed between." Why do you think the word *sandwiched* is used for this?

- » Students should identify that a sandwich has a filling squashed between two pieces of bread, just as Matt is squashed between two backpacks.

**Inferential.** What in the text tells you she would rather be there?

- » "She was having second thoughts."

**Evaluative.** From the description of the landscape, which of these do you think is the most likely definition of *desolate*: (1) empty and lonely, (2) dangerous, or (3) crowded and uncomfortable?

- » empty and lonely

**Evaluative.** What in the description gave you your answer?

- » Students should point to the word *barren*.

**Literal.** Who are the people already at the camp when Amy arrives?

- » Dr. Forester, Felix, Julian, Daria, and Kristal

**Evaluative.** Amy has now arrived at camp. What does the text tell us about how the camp looks?

- » There's a cluster of tents under a high, barren ridge. There's a big canvas tent with an awning: the laboratory tent.

## Support

A cluster is a group of similar things close together. In this case, tents are close together.



### Check for Understanding

Point to the definition of *setting* on the board/chart paper. Ask students to identify the setting of the *The Badlands Sleuth*. Students may also identify the campsite.

"She's amazing," Tess replied, "and a world expert on Cretaceous dinosaurs."

"Like *Tyrannosaurus*?" Matt asked.

"Like *Tyrannosaurus*," Tess said, smiling at him in the rearview mirror.

"I hope we make an important **discovery**," Matt said, digging his water bottle out of his pack.

"Anything's possible," Tess said. "These dry badlands are among the best places in North America to look for fossils, especially dinosaur bones." She swerved again but failed to avoid a deep rut, and the pickup **lurched** hard to one side. "Sorry about the bumps," she said, "but the road washes out a little bit more every time it rains."

"Who are the other campers?" Amy asked.

"There are two other girls and two other boys," Tess replied. "Daria and Julian are your age. Felix and Kristal just finished sixth grade, so they're a year ahead of you in school."

Amy hoped the other kids would be nice, because together with Dr. Forester and Tess, they were all going to be camped out in this desolate landscape for ten days. She glanced back at her brother again. Matt made new friends easily and he also didn't mind heat. Or dirt. Or bugs. Or... Amy sat up suddenly as a new thought occurred to her. "Are there snakes out here?"

Tess nodded but kept her eyes on the track. "Plenty. But we rarely see them during the day because it's so hot and they stay curled up in holes or under rock ledges."

'*Double great!*' Amy thought, swallowing hard. Snakes made her sweat as much as hot weather. And what did Tess mean about not seeing snakes "during the day"? Did they come out at night? She was about to ask when they crested a low rise and Tess suddenly pointed.

"There's our camp!"

A cluster of tents stood in the shadow of a high, barren ridge. A slender woman with a deep tan waved as they pulled in. When they stopped, she strode over to the pickup, followed by four kids.

“Welcome to Fossil Camp, Amy and Matt! I’m Dr. Forester, and these are your fellow campers.” She quickly made the introductions. Felix was tall and very thin, with bony knees and elbows. Julian was about Matt’s height, with close-cropped hair and a friendly grin. Daria was average height with short, dark hair and watchful eyes that seemed to take in everything at a glance. Kristal was taller than Daria. Her blonde hair was swept to one side in a ponytail, and she wore big dark glasses.

“Why don’t you all help Amy and Matt get settled?” Dr. Forester suggested. “Then we’ll have orientation in our field laboratory. That’s the big canvas tent with the awning out front.”

A wave of hot, dry air hit Amy as she stepped into the tent she was going to share with Kristal and Daria. “It’s unbearable in here,” she choked. “How are we supposed to sleep?”

“Dr. Forester says it gets a lot cooler at night,” Daria said.

There were three cots inside, each with a sleeping bag and pillow. Kristal took off her sunglasses and used them to point at the cots, one by one. “I’m here and Daria’s there, which leaves you in the bed by the door. Sorry.”

Amy thought sleeping close to the tent flap might be the coolest spot at night, so she didn’t mind not having a choice. She dropped her backpack onto her cot.

“Did you bring your phone?” Daria asked.

Amy nodded. “But I haven’t gotten a signal since we left Billings.”

Daria sighed and looked disappointed. “I thought maybe it was just my phone. I’ve never been anywhere I couldn’t make a call. It’s like being in the middle of nowhere.”



## Activity Page 1.1



Reading  
Reading

### Entering/Emerging

With 1:1 support, read aloud each sentence in the first paragraph. Ask students to identify descriptions of setting.

### Transitioning/Expanding

With finger sweeping, ask students to read each sentence in the first paragraph. Then ask them to place a cross if any picture does not apply to the description.

### Bridging

Ask students to reread the first paragraph of the Reader, closing their eyes to visualize the setting before beginning Activity Page 1.1.

## Identifying the Setting

- Direct students to Activity Page 1.1 and review the instructions.

### WORD WORK: SCIENTIFIC TERMS (5 MIN.)

- Ask students to return to page 2 of the Reader and read the sentence aloud.  
“She’s amazing,” Tess replied, “and a world expert on Cretaceous dinosaurs.”  
“Like *Tyrannosaurus*?” Matt asked.
- Point to the poster you prepared earlier with the words *Tyrannosaurus rex* and *paleontology* and their origins.  
**Literal.** What country do scientists come from?
  - » Students should be able to identify that scientists can come from any country.
- Tell students that scientists from many different countries, speaking many different languages, make discoveries. They often use two common, ancient languages to name their discoveries: Ancient Greek and Latin.
  - You may wish to remind students of their study of the civilizations that spoke these languages.
- Using *paleontology* as the example, explain how three Greek words, (1) *palaio* meaning *ancient* and shortened to *paleo*, (2) *onto* meaning *being*, and (3) *logia* meaning *study*, have been combined to make the word *paleontology*. Paleontology is, therefore, “the study of ancient beings or things.”
- Tell students that although the words were complicated, because educated people often studied Greek and Latin, it meant that whatever country they came from, they could understand different scientific terms. It also avoided arguments about which modern language should be used!



### Check for Understanding

Ask students to use the same method with the poster to explain the meaning of *Tyrannosaurus rex*.

- » tyrant lizard king

"We *are* in the middle of nowhere," Kristal said. She reached under her pillow, grabbed what looked like a large sketchbook, and stuffed it under her arm. "Come on, I don't want to miss anything."

"Cool camp, huh?" Matt whispered to Amy as they joined the others in the lab. "This is going to be so much fun!"

Hoping her brother was right, Amy tried to put the heat and the possibility of snakes out of her mind as everyone gathered around Dr. Forester. She was standing next to a long table on which there were boxes, some instruments that Amy recognized from science class, and six, small, cloth bags.

"Over the next ten days you're going to get firsthand experience excavating fossils," Dr. Forester began. "You'll also learn about other things that paleontologists do."

Felix raised a lanky hand. "Um, when do we eat?"

"Breakfast is at six o'clock and we'll leave for the fossil dig site at seven o'clock, along with a packed lunch and a cooler full of cold drinks. We'll return to camp around five, have dinner at six, and then you'll have some time to relax around the campfire before bed."

Felix raised his hand again. "And what about snacks?"

Dr. Forester suppressed a smile. "Don't worry, Felix, there will be plenty of food." Then she **gestured** toward Tess. "And now Tess has something to show you I think you'll find pretty interesting. She's is one of my students, by the way, and is getting her degree in **paleontology**, with a minor in **chemistry**."

"Chemistry?" Julian raised an eyebrow. "What's chemistry got to do with fossils?"

"Actually, quite a lot," Tess replied. "Chemistry is the reason we have fossils out there to hunt for and collect." She reached into the pocket of her jeans and drew out something dark and curved that she held up for them all to see. "Fossils like this."

4

## READ ALOUD: CHAPTER 1, PART 2 (20 MIN.)

### Read "Welcome to Fossil Camp," Part 2

- Read the chapter aloud, as students follow along in their Readers. As you read, stop to read and discuss the corresponding guided reading supports.

**Inferential.** What do Felix's questions suggest about his interests?

- » that he likes food a lot

“Wow, a raptor claw!” Matt gasped.

“This claw belongs to *Velociraptor*, the type of dinosaur that certain movies made so famous,” Tess explained. “The dinosaur whose fossil bones you will be excavating was closely related to *Velociraptor*, so there’s a chance we might unearth a claw similar to this one.” Tess handed the fossil claw to Daria and asked her to pass it around.

When Amy took the claw from Daria, she was surprised at how heavy it was. “What is a fossil, exactly?”

“You’ll learn a lot about fossils and how they form while you’re here at camp,” Tess replied. “But for now, think of a fossil as **matter** that’s undergone a change.”

“Matter?” Julian asked, frowning.

“Matter is everything in and around you,” Tess explained, “all the ‘stuff’ on the earth, in our solar system, our galaxy, and the rest of the universe.”

“You mean the solid stuff, right?” Julian’s frown had deepened.

“Not just the solids. Matter exists in different forms, or states. Most matter on the earth exists as a solid, a liquid, or a gas. For instance, that fossil claw is matter in a solid state, water is matter in a liquid state, and the air we’re breathing is matter in a gaseous state.”

Tess took back the claw from Felix. “Most of the fossil bones we’ll be excavating, Dr. Forester and I will study back in our lab at the university. Some of the smaller ones, though, we’ll analyze right here. Part of analyzing fossils involves recording information about each one.”

“What kind of information?” Kristal asked, quietly flipping open the book she’d brought along. Amy saw that its pages were filled with drawings and realized it was indeed a sketchbook.

5

**Literal.** How does Tess first define matter?

- » all the stuff in the universe

**Evaluative.** How does she later expand on that definition?

- » anything that has mass and takes up space

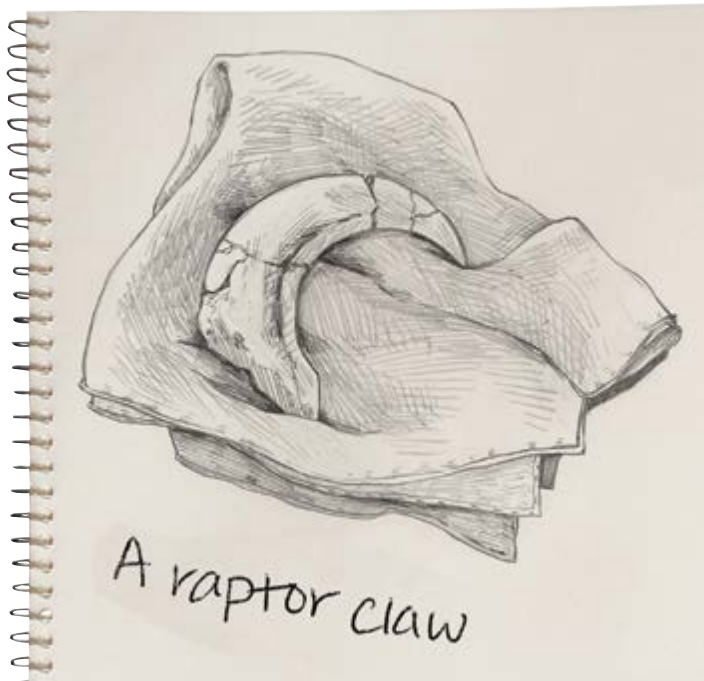
**Evaluative.** Based on that definition, is there anything we’ve encountered in the text that is *not* matter?

- » Answers will vary. Students may identify thoughts or feelings as things that do not have mass.

“We typically start by recording a fossil’s physical properties. We can use our senses to describe the physical properties of a given type of matter. For instance, how would you describe this fossil claw?”

Kristal began sketching the fossil in Tess’s hand. “It’s has a smooth, curved surface,” she said softly.

“Very good!” Tess said smiling. “Shape and texture—the roughness or smoothness of something—are physical properties of matter. Some fossils we find might be smooth like this claw, while others may be rough or pitted or have interesting marks on them.”



“Marks?” Daria looked puzzled.

“Grooves, dents, or possibly bite marks made by predators.”

“Awesome,” Matt murmured.

“If color is a physical property, then we could record that the claw is really dark brown,” Julian suggested.

Tess nodded. “Basically anything you can see, touch, taste, or smell is a physical property of matter.”

“You really want us to taste and smell the fossils?” Felix asked, wide-eyed.

Tess burst out laughing. “That won’t be necessary, Felix. But keep in mind that people see colors and describe textures differently. A fossil that looks dark brown to Julian might look different to someone else. Mass on the other hand,” she continued, “is a physical property of matter that can be measured. Mass is the amount of matter in a substance or object. In fact, a formal definition of matter is anything that has mass and takes up space.”

Tess stepped over to the table. “Mass is typically measured in metric units such as grams. We use a balance to measure the mass of small fossils such as this fossil claw.” She placed the claw on the flat pan of the balance and slid the weight along its arm. “As you can see, the claw has a mass of 113.4 grams. If you don’t know how to use a balance, I can show you later tonight.”

“That’s because right now,” Dr. Forester said, gathering up the cloth bags and handing them out, “we are going to head out to the dig site. These bags contain tools that paleontologists use to excavate fossils. So grab your hats and let’s go meet our dinosaur!”

Matt **nudged** Amy, and she saw the glow of excitement in his eyes. Amy wanted to feel excited too, but she wished she hadn’t let Matt talk her into coming to Fossil Camp. She wished she was back home in Chicago instead of being stuck out here in such a hot place—a hot place with snakes.

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## Support

Amy saw the “glow of excitement” in Matt’s eyes.

Is “glowing” a physical property of Matt’s eyes?

» Answers will vary but should lead to a reminder of “metaphor” as well as a reminder that emotions such as excitement are not matter.



## Check for Understanding

Ask students to list the different physical properties of the fossil that the group investigates. (shape, texture, color, mass)

## Identify Key Chemical Concepts

- Ask students to turn to Activity Page 1.2.
- Spend a couple of moments discussing with students how the table in the activity book is organized. In particular, point to (1) the use of rows and columns and (2) headings, as a way of organizing and dividing information.
- Model the completion of the table for the first term, *matter*. As you work, identify that you are using the more sophisticated definition that Tess provided.
- Once you have completed the example, ask different students, or volunteers, to suggest entries for the rest of the table. Ensure they point to the relevant portion of the text. Ask students to fill in the table in their activity books as the class works.



## Support

You may wish to write the following sentence on the board as a contrast: “Matter is anything that has mass or takes up space, and can be in different states. An example of matter is a fossil claw, and other examples are oranges and water.” Ask students to comment on the difference between reading the information in this form and in the table. This will start students thinking about information organization in preparation for the latter half of the lesson.



## Writing

### Entering/Emerging

Give students an object to describe and use sentence frames to support their writing. (e.g., The object looks like \_\_\_\_, and is the color \_\_\_\_.)

### Transitioning/Expanding

Give students an object to describe and use verbal prompts to support their writing. (e.g., Does it smell? What texture does it have?)

### Bridging

Ask students prompts only when they get stuck. Additionally, prompt them on the use of formal language. (e.g., “How might a scientist phrase that sentence?”)

## Lesson 1: Entering the Badlands

# Writing



**Primary Focus:** Students will write detailed descriptions of the physical properties of objects. [W.5.2]

## DESCRIBE PHYSICAL PROPERTIES (20 MIN.)

### Write Description of Object

- Ask students to pick an object. It can be in the classroom or from their imagination. It must qualify as “matter” according to the definition, and they must be able to describe its physical properties in sufficient detail for another to guess the object.
- If you have chosen objects in advance, ask students to pick them now, without showing or telling their partner what they have chosen.
- Tell students their task is to describe the matter just as a scientist would: by presenting factual information clearly and accurately. Point out that scientists only describe what they can observe or measure.



## Support

Model the observation of physical properties using a new object in the classroom. Focus on the use of precise language to describe what you *observe*. Use the examples from the table the class completed earlier (state of matter, texture, shape, color) to describe the object. As you model, explain how you are organizing information and why.

## Challenge

Ask students to describe at least four physical properties of the object

### Activity Page 1.3



### Activity Page 1.4



- Ask students to write silently on Activity Page 1.3 for 10 minutes. Tell them *not* to write down what the object is on the page, or it will ruin their partner's ability to guess.

## Partner Discussion

- Ask students to swap journals and guess the object. Students should discuss their guesses in pairs, and provide reasons from the description for their guess.



## Check for Understanding

Ask for pairs who guessed correctly to raise their hands. Pick volunteers and ask one of the partners to read their descriptions. As they read, ask the class to identify examples of precise description. Ask the reader to describe how they organized their description.

## Lesson 1: Entering the Badlands

# Speaking and Listening



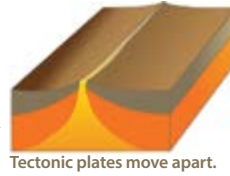
**Primary Focus:** Students will discuss the presentation of content in three different texts. [SL.5.1]

## ANALYZE GEOLOGY TEXT (10 MIN.)

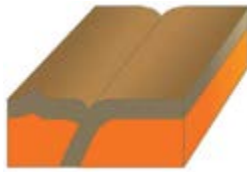
- Ask students to turn to Activity Page 1.4 and look at the reproduction of two pages from the Geology Reader. Ask students to read the material again and acquaint themselves with the content.
- Remind students that the Geology Reader was an informational text that provided information on geology.

### A Matter of Time

At some boundaries, tectonic plates are moving apart. As the plates separate, molten rock flows up from the mantle into the space between them, creating new crust. Mid-ocean ridges are an example of this type of plate interaction. Tectonic plates along the mid-ocean ridge in the Atlantic Ocean are moving apart at a rate of about 0.8 to 2 inches per year. That may not seem like much, but it adds up. Two hundred million years ago, the landmasses of North America and Europe were joined. So were South America and Africa. Thanks to separating plates, these continents now lie on opposite sides of a vast ocean.



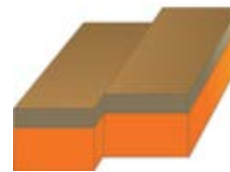
Tectonic plates move apart.



Tectonic plates collide.

At other plate boundaries, tectonic plates are **colliding**, or crashing together. In some places, colliding plates slowly crash into each other. The crust at their edges gradually crumples and is pushed higher and higher, creating mountains. In other places, one of the colliding plates slides under the other.

Two plates are colliding this way along the western coast of South America. A heavier oceanic plate is sliding under a lighter continental plate. Scientists call this process **subduction**. Subduction has created a deep ocean trench off the coast of Chile and Peru. It has also had a role in creating the towering Andes Mountains along the western edge of South America. Similar plate interactions have formed mountain ranges throughout Earth's long history.



Tectonic plates slide sideways past one another.

Finally, tectonic plates slide sideways past one another. It's never a smooth process. Plate edges press together hard. They often get stuck while the

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### Speaking and Listening

#### Entering/Emerging

For all three Think-Pair-Shares, offer students sentence starters to state their opinions. (e.g., I think this is an informational characteristic because \_\_\_\_.)

#### Transitioning/Expanding

For all three Think-Pair-Shares, offer students more complex sentence starters to respond to their partner's opinion. (e.g., I agree that this suggests the text is informational, and \_\_\_\_.)

#### Bridging

For all three Think-Pair-Shares, offer nuanced sentence starters students can adapt during partner discussions. (e.g., I am not sure that is correct, because \_\_\_\_.)

- Ask students to Think-Pair-Share and consider how the text is presented, and what characteristics of the text—both in content and organization—identify it as informational.
- Ask students to volunteer characteristics of the text that identify it as informational.
  - » Answers may vary, but could include: presentation of factual information, use of clear headings and subtitles to allow for the information to be presented clearly, and the use of diagrams. In the discussion, guide students to the conclusion that there is a clear purpose to the informational text: to convey information clearly and coherently.
- As the class discusses, list the characteristics of the Geology text on the left hand side of the board, under the heading “Informational.”

pressure keeps building. Eventually the pressure gets too great. The stuck edges break free, causing the plates to jerk past each other.

### Providing the Answers

The theory of plate tectonics answered many questions in geology. It explained how Wegener's Pangaea broke apart. It explained how the continents have been slowly rearranged over millions of years. The movement of the plates also explained mid-ocean ridges, deep ocean trenches, patterns in the locations of mountains, and many other features on Earth's surface. The theory has become the cornerstone of modern geology.

As plates move, interesting things happen. Most of the time, they happen incredibly slowly. Sometimes, though, the effects of plate movements are sudden and dramatic. Think earthquakes and volcanoes!



### Core Conclusions

You may never have heard of the Danish scientist Inge Lehmann. Among seismologists, however, she is famous. Around 1900, scientists thought the earth had just three layers: an outer crust, a solid mantle, and a liquid core. Lehmann studied seismograph records

of earthquakes. She analyzed how seismic waves changed as they traveled through Earth's interior. Lehmann collected thousands of records organized in boxes—there were no computers back then! She saw patterns in how seismic waves behaved as they moved through Earth. Lehmann concluded that Earth's core has two parts: a liquid outer core and a solid inner core. In 1936, she announced her findings and changed our view of Earth!

## ANALYZE CHEMICAL MATTER TEXT (15 MIN.)

- Now ask students to read again the first half of the text they read as a class today, “Welcome to Fossil Camp.”
- Ask students to Think-Pair-Share and consider how the text is presented and what characteristics of the text—both in content and organization—identify it as a fictional narrative text.
- Ask students to volunteer characteristics of the text that identify it as fictional and narrative.
  - » Answers may vary, but could include: continuous prose, fictional characters, use of descriptive language to create setting, a narrative plot, and the lack of explanatory diagrams, charts, tables, etc.
- As the class discusses, list the characteristics of the literary text on the right-hand side of the board, under the heading “Literary.”
- Finally, working in the same pairs, ask students to consider the second half of the text they read as a class, which explains chemical matter.
- Ask students to Think-Pair-Share and consider how the text is presented, as well as the characteristics of the text—both in content and organization.



### Check for Understanding

Ask students to volunteer characteristics of the chemical text, in turns, asking for an example of the content and an example of organization.

- Tell students they will continue to compare and contrast the Geology text and the two halves of the Chemical Matter text.
- To wrap up, ask students to vote on whether they think the last piece of text they read is informational or literary. Tell them they will vote again tomorrow.
- Record the results of the vote for the next lesson. Keep on the board the list of characteristics for informational and literary texts.

End Lesson

### Support

Students should look at the characteristics on the board. “Treasure hunt” to find an example in the chapter’s second half. Provide guidance starting with “presentation of factual information” (informational list) and “fictional characters” (literary list).

### Challenge

What effect does the way the Chemical Matter Reader is structured have on you, the reader?

### Support

You may choose to spend a moment on the author’s use of questions from the campers to elicit scientific information, modeling a dialogue between student and teacher.

## 2

# Scientific Stories

## PRIMARY FOCUS OF LESSON

### Reading

Students will compare and contrast the presentation of scientific content in two different texts. [RI.5.5]

### Writing

Students will present factual information in narrative form. [W.5.4, W.5.3]

### Grammar

Students will understand how to expand sentences. [L.5.3]

### Morphology

Students will understand how to use the suffix *-ment*. [RF.5.3; L.5.4]

### Reading

Students will apply their understanding of literary and informational details to analyze a new text. [RI.5.1]

## FORMATIVE ASSESSMENT

### Activity Page 2.1

**Reasons the Text is Literary Like the First Half of the Chapter** Analyze differences in content presentation in the Chemical Matter and Geology units. [RI.5.5]

### Activity Page 2.2

**Write a Narrative Containing Informational Content** Create narrative presentation of scientific content. [W.5.4, W.5.3]

### Activity Page 2.3

**Expand the Sentences** Expand sentences for meaning, interest, and style. [L.5.3]

### Activity Page 2.4

**-ment: Suffix Meaning a State of Being** Use the suffix *-ment* correctly. [RF.5.3; L.5.4]

### Activity Page 2.5

**Analyze Details** Identify whether details in *The Badlands Sleuth* are literary or informational. [RI.5.1]

## LESSON AT A GLANCE

|   | Grouping    | Time    | Materials   |
|---|-------------|---------|---|
| Reading (20 min.)                       |             |         |   |
| Compare and Contrast Two Texts          | Partner     | 20 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Page 1.3, 2.1<br><input type="checkbox"/> Optional: Geology Reader |
| Writing (25 min.)                       |             |         |   |
| Create Narrative for Scientific Content | Independent | 20 min. | <input type="checkbox"/> Activity Page 2.2  |
| Sharing Responses                       | Whole Group | 5 min.  |   |
| Language (30 min.)                      |             |         |   |
| Grammar: Expanding Sentences            | Whole Group | 15 min. | <input type="checkbox"/> Activity Page 2.3  |
| Morphology: Suffixes                    | Independent | 15 min. | <input type="checkbox"/> Poster: Suffixes<br><input type="checkbox"/> Activity Page 2.4   |
| Reading (15 min.)                       |             |         |   |
| Partner Read: Chapter 2, Part 1         | Partner     | 15 min. | <input type="checkbox"/> Activity Page 2.5  |

## ADVANCE PREPARATION

### Reading

- Students have a copy of two pages from the Geology Reader from Grade 4 in their journals/notebooks. You may wish to borrow some Readers from this unit to extend the examples.
- You should still have on the board the characteristics of literary and informational text you wrote the previous day.

### Writing

- This writing activity could be extended as a project for more than one lesson, with students creating a more complete version of a narrative or literary text. For this assignment, students should be able to show a rough draft of this work only.

### Grammar

- Write the following sentences on the board:

#### Example 1

1. The badlands of eastern Montana were hot.
2. The badlands of eastern Montana shimmered in the heat under a pale, cloudless sky.

#### Example 2

1. I ate some pizza.
2. I eagerly bit into some pizza, enjoying the sensation of hot cheese dripping down my chin.
3. I reluctantly bit into the cold, slimy pizza, choking it down.

### Morphology

- Prepare the poster below. Alternatively, access digital versions in the digital components for this unit.

A suffix is a syllable or syllables placed at the end of a root word to change the word's meaning.

Nouns are words that name people, places, or things (including ideas).

Verbs are words that describe an action.

## Universal Access

- Replicate the list of informational/narrative characteristics from the previous lesson. Insert a column with a checkbox next to each characteristic. As students analyze the chemical matter text, ask them to place a tick or a cross next to each characteristic.
- In the list of informational/narrative characteristics, circle two or three narrative elements you wish for students to focus on in their writing.
- Write a list of adjectives and adverbs on board/chart paper to help students expand the sentences in their activity books. Some examples are below:
  - Sentence 1 adjectives: rugged, barren, lonely, solitary
  - Sentence 1 adverbs: reluctantly, sadly, eagerly, happily.
- Provide additional sentences, using the suffix *-ment*, on familiar and unfamiliar topics to help students decipher unfamiliar words. Some examples are below:
  - Getting a good grade was an achievement.
  - I looked at the fireworks with amazement. They were a real surprise.
  - I worked hard to get the two cars into alignment with each other.
  - I waited for my friend with excitement—he had promised we were going somewhere really cool!

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## ACADEMIC VOCABULARY

**convey, v.** to communicate

**adapt, v.** to modify to be suitable for a new purpose

**perfect, v.** to make perfect

**analysis, n.** careful examination or study of something





## Support

Write on the board, “I believe this text is \_\_\_\_ because it has the following characteristics [list characteristics] which are commonly found in (literary/informational) texts. For example, in the (Geology Reader/literary text), you encounter \_\_\_\_.”

Reading  
Understanding Text  
Structure

## Entering/Emerging

Focus students on two narrative and two informational characteristics, i.e., sequential organization and the use of continuous prose vs. factual information and use of bullets.

## Transitioning/Expanding

Ask students to look at each informational and narrative characteristic on the chart/board paper and say in each case if it applies to the texts.

## Bridging

Ask students prompting questions, e.g., Which of the characteristics on the board can you see in this text?

## Lesson 2: Scientific Stories

## Reading



**Primary Focus:** Students will compare and contrast the presentation of scientific content in two different texts. [RI.5.5]

## COMPARE AND CONTRAST TWO TEXTS (20 MIN.)

## Compare Geology and Chemical Matter

- Remind students that in the previous lesson they read and discussed text from the Geology unit and also looked at the two halves of the first chapter of the chemical matter unit.
- Ask students to spend a moment reading the list on the board describing the characteristics of informational and literary texts, and consider whether the different texts they discussed in the previous lesson are literary, or informational, texts.
- Ask students to now return to the second half of the chapter on chemical matter, and work in pairs to complete worksheet Activity Page 2.1.
- Discuss student answers briefly as a class.

## Wrap-Up

- Wrap up with a second class vote on whether *The Badlands Sleuth* should be considered informational or literary. Remind students of the vote count from the previous day. If the numbers have changed, ask students for reasons why they have changed their mind.
- Finally, tell students that there is no right answer: this is a text that combines elements from informational and literary texts. Because they have studied literary and informational texts all year, they are now able to read and analyze a text that combines both elements.
- You may wish to point out that writing does not always have to fit clear rules, as long as it achieves its purpose.



### Check for Understanding

Ask students what purpose this text might have in combining both literary and informational characteristics.

## Lesson 2: Scientific Stories

# Writing



**Primary Focus:** Students will present factual information in narrative form.  
[W.5.4, W.5.3]

### PRESENTING IN NARRATIVE FORM (20 MIN.)

- Tell students they will apply their analysis by presenting information in different forms. Ask them to turn to and complete Activity Page 2.2.
- Students should not be expected to complete more than a rough first draft in the time available. As noted in the advance preparation, this writing activity can be extended to additional activities, continued at home, or used as written.
- However you choose to use this writing activity, students should demonstrate they understand and can use the characteristics of literary text (including continuous prose and use of character, plot, and setting).
- If students become stuck, encourage them to keep writing even if they think the content is not “right.”
- You may wish to ask students to continue this at home and revise their first draft.
- As students work, circulate and check in.

### SHARING RESPONSES (5 MIN.)

- If time allows, ask a couple of volunteers to share out their work. Remind the rest of the class how to listen and respond respectfully and constructively.



### Check for Understanding

Ask students to identify a literary detail used in the volunteer’s story.

### Challenge

Imagine that the same content was conveyed in the text without the existence of Tess or the Campers. What do you think would change about how you, the reader, thought about the text and the content?

### Activity Page 2.2



### Writing Writing

#### **Entering/Emerging**

Give students two narrative characteristics to include (i.e., continuous prose, characters) and one informational (factually correct information). Plan together how to incorporate them.

#### **Transitioning/Expanding**

Ask students to identify two narrative characteristics to include, and plan together how to incorporate them.

#### **Bridging**

Ask students to describe their plan for incorporating narrative/informational characteristics. Prompt them using the information on the board/chart paper.

## Support

Review the list on the board describing the elements of literary and informational texts with students. Ask them to identify which characteristics they are choosing to organize their writing, and how that might be applied.

## Support

Provide some example settings and plot lines to help the students.



Language  
Language

### Entering/Emerging

Offer students example adjectives and adverbs for their sentences, asking to choose two they think appropriate (e.g., *slowly* or *reluctantly* in front of *walked*).

### Transitioning/Expanding

Provide students with a sentence; ask to swap the adjectives and adverbs to turn sentence into a “weird” experience (e.g., *Driving around lunar rocks*).

### Bridging

Ask students to provide two alternative sentences with different descriptive details, asking to describe their different effect. Turn one sentence into a “weird” experience.

## Support

You may wish to remind students of what adjectives are and offer some examples.

## Lesson 2: Scientific Stories

# Language



### GRAMMAR: EXPANDING SENTENCES (15 MIN.)

**Primary Focus:** Students will understand how to expand sentences. [L.5.3]

### Model

- Tell students that they will explore how to adapt sentences to make their meaning clearer or more powerful. They will be looking at three methods for adapting:
  - expanding sentences
  - reducing sentences
  - combining sentences
- Tell students these are not methods you can “perfect.” Professional writers are always working on making their sentences more effective, and there is a huge range of styles within fiction and non-fiction writing.
- Tell students that writers often think of the following when they are constructing their sentences:
  - What is the purpose of my writing?
  - What do I want readers to understand or feel?
- Show students the following examples (adapted from the first paragraph of the Reader) on the board/chart paper:
  - The badlands of eastern Montana were hot.
  - The badlands of eastern Montana shimmered in the heat under a pale, cloudless sky.

1. What is the difference between the first sentence and the second sentence?
  - » Answers may vary but should identify additional verbs and adjectives.
2. Why do you think the extra detail might have been added?
  - » Answers will vary, but may include: to allow the reader to imagine or visualize the scene better; to make the reader feel they were there with the character; or to be more precise in the description of the setting.
- Tell students that writers often add in descriptive detail, particularly in narrative and other literary texts.

## Model 2

- Show students a second example.
    - I ate some pizza.
    - I eagerly bit into some pizza, enjoying the sensation of hot cheese dripping down my chin.
    - I reluctantly bit into the cold, slimy pizza, choking it down.
1. What is the same about the second and third sentences?
    - » In each case, the character ate some pizza.
  2. What is different about them?
    - » In the second sentence, the pizza is enjoyable. In the third, it is not.
- Ask students to identify words and phrases that allowed them to identify the differences.
  - Point out to students that in all three sentences, we are told that pizza was eaten. However, by expanding the sentence through the addition of details, the writer was able to convey more information and make the sentence more interesting.

## Practice

- Ask students to turn to Activity Page 2.3 and expand the sentences. Remind them they have a lot of freedom, but they should think about the precise words and details they wish to add, paying particular attention to adjectives.
- The sentences students are expanding are below:
  - Amy walked into her tent.
  - Matt listened to Tess's explanation.
  - I drove round the rocks.

## Support

You may wish to identify that the writer has added clauses to their sentences.

## Activity Page 2.3



- Discuss student answers briefly as a class.
- Remind students that they should still only have one sentence.
- You may wish to ask students to continue at home.



### Check for Understanding

Ask a volunteer to share one of their sentences. Ask other students to identify descriptive details used to expand the sentence.

### Support

Remind students that once a suffix has been added to the beginning of a root word, the word is affixed.



Language  
Reading/Viewing Closely

### Entering/Emerging

Provide additional sentences on familiar topics to allow students to decipher unfamiliar words, e.g., “getting a good grade was an achievement.”

### Transitioning/Expanding

Provide additional sentences on topics related to the reader to allow students to decipher unfamiliar words, e.g., “Amy cracking the case was an achievement.”

### Bridging

Provide additional sentences without the suffix on unfamiliar topics to allow students to decipher unfamiliar words, e.g., “I am enforcing the law laid down by this government.”

## MORPHOLOGY: SUFFIXES (15 MIN.)

**Primary Focus:** Students will understand how to use the suffix *-ment*.

[RF.5.3; L.5.4]

### Model

- Write the following words on the board:

- excite
- amaze
- disagree
- judge
- entertain

#### 1. What are suffixes?

- » Suffixes are letters that change the meaning of a root word when they are added to the end of that word.

- Tell students that the suffix *-ment* means “in the state of being \_\_\_\_.” For example, *excitement* means “in the state of being excited,” and *amazement* means “in the state of being amazed.”
- After writing *excite* and *amaze* on the board, write *-ment* in a different color.

#### 2. What part of speech are *excite* and *amaze*?

- » verb

#### 3. Is *excitement* a verb? If not, what part of speech is it?

- » No. It is a noun.
- Tell students that adding *-ment* will turn a verb into a noun.

## MODEL

- Ask students to start Activity Page 2.4 and complete it at home.

## Activity Page 2.4



### Check for Understanding

Take a few minutes, as a class, to brainstorm words that can have *-ment* added to the end of them.



## Lesson 2: Scientific Stories

# Reading



**Primary Focus:** Students will apply their understanding of literary and informational details to analyze a new text. **[RI.5.1]**

## PARTNER READ: CHAPTER 2, PART 1 (15 MIN.)

- Ensure each student has a copy of the Reader, *The Badlands Sleuth*, and has located Chapter 2. They will read the first half only.
- As with previous units, preview the relevant core vocabulary, identify the first core vocabulary word, and ask students to identify the word bolded in the chapter and in the glossary at the back of the book.

### Vocabulary

**gesture, n.** a movement, usually the hand or head, to express meaning or point to something; can also be a verb

**embed, v.** fixed deeply into the surrounding mass

**plateau, n.** an area of high, level (no slope) ground

**technique, n.** a way of doing something, usually with some skill

**devour, v.** to eat fast and hungrily



## Reading Reading/Viewing Closely

### Entering/Emerging

Work with students to complete the activity and provide criteria for informational and literary text, e.g., “Is this factual information? Are these imaginary characters?”

### Transitioning/Expanding

Work with students to complete the activity, discussing the list of informational and literary characteristics they used in this lesson and the previous lesson as you work.

### Bridging

Give students support as needed, and ask them to check through the list of informational and literary characteristics as they complete the activity.

## Activity Page 2.5



| Vocabulary Chart for Chapter 2, “A Bed of Bones” |                                 |   |
|--|---------------------------------|---|
| Vocabulary Type                                  | Tier 3<br>Domain-Specific Words | Tier 2<br>General Academic Words        |
| Core Vocabulary                                  | plateau                         | gesture<br>embed<br>technique<br>devour |
| Multiple-Meaning Core<br>Vocabulary Words        |                                 |   |
|  |                                 |   |
| Sayings and Phrases                              |                                 |   |

## Partner Read

- Tell students they will apply the analysis from the previous two lessons on informational and literary text, and how it is organized, to a new chapter.
- Ask students to read the chapter in pairs. As with previous units, you may pair students a number of ways. They will read up to “a good example of chemistry in action.” on page 11 of the Reader.
- Explain that both students will read the first page silently, and then one partner will read that page aloud. Next, they will both read the second page silently, and then the other partner will read that page aloud, and so on. Students can ask their partner for help with sounding out or defining words as necessary.
- As students read, they should complete Activity Page 2.5, taking home to complete if necessary.



## Check for Understanding

Ask students to identify the clue that Amy is still uncomfortably hot (she “edges towards” the one square of shade.) Ask students if this is a literary detail of the text, or an informational detail of the text. Students should be able to identify that this clue gives information about Amy’s character and experience and is therefore a literary detail.

## Chapter 2

# A Bed of Bones

### THE BIG QUESTION

How can water, ice, and vapor be the same thing?

“Meet *Acheroraptor temertyorum*,” Dr. Forester said, gesturing down at the dark fossils **embedded** in the pale rock at their feet. “He lived in this part of North America about 66 million years ago, along with other dinosaurs such as *Tyrannosaurus* and *Triceratops*. Tess and I call him Achy-Breaky for short: Achy for the first part of his scientific name, *Acheroraptor*, and Breaky because some of his fossil bones are broken up into pieces.”

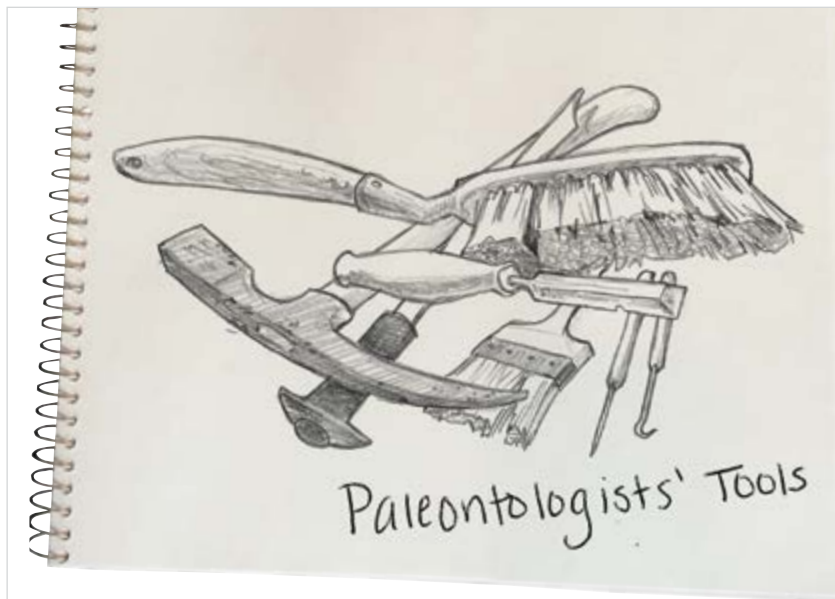
‘No kidding!’ thought Amy. She had expected the dinosaur skeleton to be nicely laid out like those she’d seen in museums. Instead, different fossil bones were angled this way and that, like a jumble of large and small puzzle pieces. She edged further into the square of shade cast by the blue plastic tarp that had been strung over the dig site. It was situated on a narrow **plateau** about halfway up a rocky ridge, completely **exposed** to the **blazing** afternoon sun.

Julian pulled out a rock hammer and a small chisel from his cloth bag. “So, do we use these to chip the fossils out of the rock?”

Dr. Forester shook her head. “Paleontologists use a hammer and chisel to break apart big chunks of rock or in places where there’s no chance of damaging fossil bones. Once fossils are partially exposed, like they are here, we switch to smaller tools designed for more delicate work.” She held up a slim metal pick and a small paintbrush. “In your tool bags, you’ll find a pick like this for scraping away rock and a brush to whisk the rock dust away.”

“Dr. Forester and I will demonstrate how to use these tools correctly on this leg bone we’re working on,” Tess explained, kneeling beside a long, narrow fossil. “Please listen and watch closely.” She and Dr. Forester used their picks to scrape and scratch at the rock where it met the fossil.





“This rock is a type of sandstone and quite soft and crumbly. Excavating fossils like this is time-consuming, but not particularly difficult. It just takes patience,” Dr. Forester said. She used her brush to gently clean the area where she’d been working. “Every few minutes, use your brush like this to clear away the rock dust so you can see what you’re doing,” she added.

Amy and the other campers watched intently for a few minutes. Then it was their turn.

“Working with a partner,” Dr. Forester instructed, “Tess and I want you to choose a bone that you’d like to excavate together. Tess and I will work with you to make sure you’re getting the hang of it.”

Amy followed Matt, who made a beeline for the dinosaur’s jawbone at the far edge of the dig site. Julian and Kristal chose bones that Dr. Forester said were part of a foot, while Felix and Daria settled on a short chain of bones that were unmistakably part of the dinosaur’s backbone.

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## Support

From the context, what do you think *excavate* might mean?

- » Students should be able to point to the actions being taken and infer that *excavate* means “removing rock (or earth) carefully to expose something buried.”

## Challenge

What prefix is used to show that Felix and Daria’s bones were definitely backbones?

- » –*un* before *mistakably* to make *unmistakably*

Matt began using his pick to very carefully scrape away the rock around one of the teeth that were embedded in the jawbone. “These teeth still look sharp!” he exclaimed.

Amy ran a finger around the bony edge at the back of the jawbone. It seemed as good a place to start as any, so she got out her tools and set to work.

Dr. Forester and Tess came around every so often and checked how everyone was doing. When they were confident that all the campers had the **technique** down, they worked together on the leg bone. For more than two hours, the only sounds were the scratch of picks and the swish of brushes, the buzz of flies, and the wind sighing through the dry grasses that grew along the edge of the plateau.

Julian broke the silence by asking what Amy thought was a strange question. “Dr. Forester, if I wanted to be a famous paleontologist, what would I need to do?”

She considered the question for a minute. “Well, finding a new type, or species, of dinosaur might make you famous—at least among other paleontologists. But there’s a lot of luck involved in fossil discoveries, Julian, and really important discoveries are few and far between. I’m afraid you can’t just set out to become famous and expect it to happen.”

Julian frowned. “My dad’s famous. He owns four restaurants in Dallas. And my brother is famous, too, because he plays football for a big university team. If we discover something new, I sure hope I’m the one to find it.”

Dr. Forester didn’t seem to know what to say. But Felix had perked up at the mention of restaurants. “Speaking of food,” he said, “is there anything to eat? Excavating fossils is hungry work.”

“Let’s take a break,” Tess offered, and led them to the far end of the plateau where the ridge formed a wall high enough to create a patch of shade. Everyone sat with their backs against the rock wall and stretched their legs out in front of them as Tess passed out bottles of water and energy bars from the cooler. Felix **devoured** one bar and started on another before anyone else had taken a bite. Amy wondered if he was always so hungry.

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Munching slowly, Daria pulled out her phone and then frowned down at the screen. “No signal here, either.”

“The cell coverage is pretty spotty,” Dr. Forester explained, “so I’m afraid cell phones are fairly useless out here.”

“It’s no big deal,” Daria said quickly. “I just miss my mom—I mean, I was just wondering what my friends are doing right now, that’s all.” She slipped her phone back into her pocket.

Julian helped himself to another bottle of water from the cooler. “The ice is melting fast in this heat.”

“A good example of chemistry in action,” Tess said.

“Chemistry?” Felix mumbled, swallowing the last bite of his third energy bar. “What does melting ice have to do with chemistry?”

“Remember that chemistry is the study of matter and how it changes,” Tess said. “Solid ice melting to liquid water is an example of a physical change in matter in which matter changes from one state to another. Ice is water in its solid state. When ice melts, water undergoes a physical change, going from a solid state to a liquid state.” Tess gestured toward the ice chest. “Suppose we poured that water out on the ground here. What do you think would happen to it?”

Kristal raised her hand hesitantly. “The water would gradually dry up and disappear, like rain on the pavement does when the sun comes out.”

“Well, it might seem like it is disappearing,” Tess replied. “But matter can’t be created or destroyed. The water would slowly change states again, this time changing from a liquid to an invisible gas called water vapor that floats up into the air.”

“You mean it **evaporates**,” Amy offered.

“Yes, that’s the term,” Tess replied. “A similar change in state from liquid to gas takes place when water boils.”

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~~~~~End Lesson~~~~~



## 3

# Scientists and Detectives, Part 1

## PRIMARY FOCUS OF LESSON

### Reading

Students will integrate multiple sources to explain the concept of chemical states. [RI.5.7; RI.5.9]

### Writing

Students will appropriately organize information to track character development. [W.5.2, W.5.4]

## FORMATIVE ASSESSMENT

### Activity Page 3.2

**The Water Cycle** Use information from Reader and additional chemical content to explain changes in state. [RI.5.7; RI.5.9]

### Activity Page 3.3

**Character Maps** Organize and populate character maps to show character development. [W.5.2, W.5.4]

## LESSON AT A GLANCE

|                               | Grouping    | Time    | Materials                                                                                                                                            |
|-------------------------------|-------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reading (45 min.)             |             |         |                                                                                                                                                      |
| Word Work: <i>Achy Breaky</i> | Partner     | 5 min.  | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Pages 3.1, 3.2                                              |
| Read Chapter 2, Part 2        | Whole Group | 15 min. |                                                                                                                                                      |
| Integrate Information         | Small Group | 25 min. |                                                                                                                                                      |
| Writing (45 min.)             |             |         |                                                                                                                                                      |
| Organization of Content       | Whole Group | 15 min. | <input type="checkbox"/> Activity Pages 3.3, 3.4<br><input type="checkbox"/> sample character maps<br><input type="checkbox"/> rules for observation |
| Creation of Character Maps    | Small Group | 20 min. |                                                                                                                                                      |
| Discussion                    | Small Group | 10 min. |                                                                                                                                                      |

## ADVANCE PREPARATION

### Reading

- You may wish to print out additional copies of the “changes in state” page found in the Teacher Resources section of this Teacher Guide. Alternatively, you may access digital versions of this in the digital components for this unit. It is also in student activity books.
- The annotation activity can be extended by asking students to use additional resources from the library, the Internet, or science class. If you do this, review the use of appropriate and reliable sources first.

### Writing

- This lesson contains a Think-Aloud activity. During a Think-Aloud, make your thinking visible to students by modeling the steps to solving a problem or completing a task. As you “think aloud” while working through an activity, students observe your approach to finding information, drawing conclusions, considering questions, and testing ideas.
- Display or copy the four sample character maps for Max in the Teacher Resources section of this Teacher Guide. Alternatively, access digital versions of these in the digital components for this unit.
- Please note that students will be building on Kristal and Julian’s character maps in Lesson 6, so each student should complete a map for at least one of these characters. You may wish to assign more advanced students to Julian.
- Review “Tess’s Rules for Observation” and “Inspector Ellis’s Rules for Detection” found on Activity Page 3.4 and below. Alternatively, access digital versions of these in the digital components for this unit.

#### ➤ Tess’s Rules for Observation

##### Tess’s Rules for Observation

When I started studying chemistry, the first thing I had to learn was how to notice things properly. My rules for observation are:

1. Look carefully at everything.
2. Record what you can: mass, color, texture, state.
3. Look at how things change. If you heat it up, what happens? If you add another substance, what happens?

4. Ask, “Does what I observe match the theory?” Great scientific discoveries happen when scientists notice things not behaving the way they thought they would. Do you see anything strange?
5. If you have a theory, test it across as many examples as you can. The more evidence you have to back up your ideas, the better.

Try applying the rules to this example: if I wanted to understand the properties of salt, I would \_\_\_\_.

## ➤ **Inspector Ellis’s Rules for Detection**

### **Inspector Ellis’s Rules for Detection**

There’s a reason I’m Amy’s favorite detective. I am brilliant. No case goes unsolved if Inspector Ellis is called in. (Well, there was that one case with the umbrella and the penguin, but I don’t like to talk about it.)

Obviously, you can’t become as brilliant as I am (Did I mention I was brilliant?) overnight. But you can start down the long, lonely path of becoming a great detective by following my rules of observation.

1. Look at everything. Write down what you see.
2. Collect what you can and analyze it—fingerprints, lipstick stains, everything. (You can send it to the chemistry people in the lab.)
3. If you’ve seen the crime scene before, compare what you see now with what you saw before.
4. Does anything seem out of place or unusual?
5. Interview everyone. Do their stories match up? Does anything seem out of place?
6. Is anyone behaving strangely? You can’t arrest someone for being nervous, but it might give you an idea of what to look for and where.
7. Do you have a theory? Can you test it? For example, in my last case, I thought it was possible the thief had stolen out through an air vent. I tested if this was possible by sending my sidekick through the vent. I was wrong, and my sidekick became stuck—but I’d never have known this without testing my theory! (He quit later; some people can’t cope with the challenge of this job.)



## Universal Access

- Provide students needing substantial support with the following sentence frames for them to use as they annotate the water cycle:
  - “In evaporation, water goes from a \_\_\_\_ state to a \_\_\_\_ state. The diagram that shows a \_\_\_\_ state is \_\_\_\_, and the diagram that shows a \_\_\_\_ state is \_\_\_\_.”
  - “In condensation, water goes from a \_\_\_\_ state to a \_\_\_\_ state. The diagram that shows a \_\_\_\_ state is \_\_\_\_, and the diagram that shows a \_\_\_\_ state is \_\_\_\_.”
  - “In precipitation to snow, water goes from a \_\_\_\_ state to a \_\_\_\_ state. The diagram that shows a \_\_\_\_ state is \_\_\_\_, and the diagram that shows a \_\_\_\_ state is \_\_\_\_.”
  - “In melting, water goes from a \_\_\_\_ state to a \_\_\_\_ state. The diagram that shows a \_\_\_\_ state is \_\_\_\_, and the diagram that shows a \_\_\_\_ state is \_\_\_\_.”
- Copy the diagrams showing solid, liquid, and gaseous states and pair them to show solid to liquid, liquid to gas, and gas to solid. Provide these on pieces of paper with the correct titles (for example, “solid to liquid”) to allow students to place them on their annotated diagram.
- After the class discussion, and before students begin designing their maps, provide students who need substantial support with a bulleted list of advantages and disadvantages for each of the different organizations of the character map you have displayed. For students needing moderate support, provide them with the list for the first version, then prompt them as needed. Advantages and disadvantages are listed below:
  - **Version 1.** Advantages: (1) You can see information clearly through headers and bullets. (2) Information is clearly categorized. (3) You can add more information easily. Disadvantages: (1) You cannot see changes over time easily. (2) If there is another “category” it is not easy to add.
  - **Version 2.** Advantages: (1) You can see information clearly through headings and bullets. (2) Information is clearly categorized. (3) The character map allows you to add more information easily, including another category. (4) The character map allows you to see changes over time. Disadvantage: (1) It is hard to make connections between different ideas.

- **Version 3.** Advantages: (1) The character map allows you to easily see connections between characters. (2) The character map allows you to compare and contrast between characters. Disadvantages: (1) It is hard to keep adding information as you discover it. (2) The map doesn't allow you to categorize kinds of information easily.
- **Version 4.** Advantages: (1) The character map is easy to read. (2) You can see changes in the map over time. Disadvantages: (1) Information is not clearly categorized. (2) There are no organizational tools (for example, headers and bullets) to help you categorize. (3) It is not always easy to see links between ideas.

## ACADEMIC VOCABULARY

**integrate, v.** combine more than one thing to make a new whole

**concept, n.** idea

**device, n.** a literary device: method authors use to convey information

**annotate, v.** add notes to text or diagram to give an explanation

**perspective, n.** a way of looking at something

Start Lesson

### Lesson 3: Detectives and Scientists, Part 1

# Reading



**Primary Focus:** Students will integrate multiple sources to explain the concept of chemical states [RI.5.7, RI.5.9]

## WORD WORK: *ACHY BREAKY* (5 MIN.)

- Remind students that in the first lesson they discovered that Greek and Latin were often used to create new scientific names and terms.
- Ask students to return to Chapter 2, which they began to read and analyze in the previous lesson. Read aloud the first three words of the chapter, “Meet *Acheroraptor temertyorum*.”
- Ask students to turn to Activity Page 3.1, read the instructions, and complete the activity.

Activity Page 3.1



## READ CHAPTER 2, PART 2 (15 MIN.)

### Vocabulary

- Ensure that each student has a copy of the Reader, *The Badlands Sleuth*, and has located Chapter 2. They will read the remaining text from “A good example of Chemistry in action” on page 11 of the Reader.
- As with previous units, preview the relevant core vocabulary, identify the first core vocabulary word, and ask students to identify the word bolded in the chapter and in the glossary at the back of the book.

**gesture, n.** a movement, usually of the hand or head, to express meaning or point to something.

**evaporate, v.** turn from liquid into vapor

**portable, adj.** easy to carry

**mammal, n.** a type of animal (humans are mammals)

| Vocabulary Chart for Chapter 2, Part 2: “A Bed of Bones” |                                 |                                  |
|----------------------------------------------------------|---------------------------------|----------------------------------|
| Vocabulary Type                                          | Tier 3<br>Domain-Specific Words | Tier 2<br>General Academic Words |
| Core Vocabulary                                          | evaporate<br>mammal             | gesture<br>portable              |
| Multiple-Meaning Core<br>Vocabulary Words                |                                 |                                  |
|                                                          |                                 |                                  |
| Sayings and Phrases                                      |                                 |                                  |

Munching slowly, Daria pulled out her phone and then frowned down at the screen. “No signal here, either.”

“The cell coverage is pretty spotty,” Dr. Forester explained, “so I’m afraid cell phones are fairly useless out here.”

“It’s no big deal,” Daria said quickly. “I just miss my mom—I mean, I was just wondering what my friends are doing right now, that’s all.” She slipped her phone back into her pocket.

Julian helped himself to another bottle of water from the cooler. “The ice is melting fast in this heat.”

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“Chemistry?” Felix mumbled, swallowing the last bite of his third energy bar. “What does melting ice have to do with chemistry?”

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Kristal raised her hand hesitantly. “The water would gradually dry up and disappear, like rain on the pavement does when the sun comes out.”

“Well, it might seem like it is disappearing,” Tess replied. “But matter can’t be created or destroyed. The water would slowly change states again, this time changing from a liquid to an invisible gas called water vapor that floats up into the air.”

“You mean it **evaporates**,” Amy offered.

“Yes, that’s the term,” Tess replied. “A similar change in state from liquid to gas takes place when water boils.”

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## Whole Group Read

- Have students read page 11 silently.

**Literal.** What are the three states of water?

- » ice in solid state, water in liquid state, and water vapor in gas state

## Challenge

What event or plot device does the author use to introduce more chemical content? (Clue: what do the campers do just before Tess explains more chemistry to them?)

## Challenge

Ask students to name everyday examples of water in different states. In each case, ask about the temperature or environment (for example, it gets icy when it’s cold; the kettle heats water into steam).

“So if ice, water, and water vapor are all the same kind of matter, what explains the different states?” Matt asked.

“Excellent question, Matt,” Tess replied. “All matter is made up of small particles, so small that they can’t be seen with the naked eye. Whether a type of matter is in a solid, liquid, or gaseous state depends on how tightly packed these particles are, and how much energy they have. In a solid, such as an ice cube, the particles are crammed together. They can wiggle, but they don’t have enough energy to do much more than that. A solid keeps its shape because its particles are in such fixed positions.”

Tess took a sip of water from her bottle. “Matter in liquid form, like the water in this bottle, has particles that are farther apart than those in a solid. They have more energy, too, enough so they move freely, and slip and slide past each other. That’s why liquids flow. Matter in a liquid state doesn’t have a fixed shape. It takes the shape of whatever space it occupies.” She held up her bottle and tipped it from side to side.

“Matter in gaseous form,” Tess continued, “is made up of particles that are farther apart than those in a liquid and much farther apart than particles in a solid. And they have more energy, too. There is so much space between gas particles that they move very freely and rapidly in different directions. A gas spreads out to fill whatever space is available.” Tess spread her arms wide. “And here in Montana, we have lots of space!”

Julian scooped up a handful of the cold water in the bottom of the cooler and splashed it onto his face. “So my question is, how do we get more ice? I’m not too keen on drinking warm water.”

“Fortunately, physical changes in matter are reversible,” Dr. Forester chimed in. “Matter changes state when heat is added or taken away. For example, ice melts as it gets warm. Chill that water down by removing heat, and it turns back into ice. That’s what our **portable**, battery-powered refrigerator back at camp can do. It keeps our food cold and even makes ice.” She glanced at her watch. “How about we work for another half hour or so, and then head back to camp for dinner?”

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**Evaluative.** What does all matter have in common?

- » It is all made up of tiny particles. (Students might also cite the definition from yesterday—it occupies space and has mass.)

**Literal.** What two factors does Tess say decide whether matter is in a solid, a liquid, or a gas state?

- » how much energy the particles have and how tightly they’re packed together

“Dinner! Yes!” Felix cried, pumping his fist in the air.

“But you just ate three energy bars,” Daria said, looking amazed.

“That was nothing,” Felix replied, “because in a half hour I’ll most certainly be starving again. My mom says I burn calories really fast because I never sit still.” He leaped up and started doing a little dance along the edge of the plateau.

It seemed to Amy that what happened next unfolded in slow motion. Just as Dr. Forester called out for Felix to be careful, part of the rock ledge where he was dancing gave way. Felix swayed, trying to keep his balance. His eyes grew wide and, in the next instant, he was gone.

Everyone scrambled to the edge and looked down. Felix was sitting at the bottom of the gully about ten feet below, with a surprised expression on his face.

Dr. Forester’s face was dark with worry. “Felix, are you all right?”

Felix jumped to his feet and started dusting himself off. “I’m fine,” he called up, grinning. “I didn’t really fall; I just scooted down on my backside.” He started to climb the slope, but paused to pick something up from the gravelly bottom of the gully.

“What do you make of this, Dr. Forester?” he asked when he was back on the plateau. He held up what looked to Amy like a dark, oblong rock.

Dr. Forester gripped him by the shoulders. “Never do anything like that again,” she said sternly. “You could have been hurt.” Then she looked carefully at Felix’s find. “It’s definitely a piece of fossil bone,” she said slowly, turning it over and over in her hands. She nodded toward the gully. “I think I’ll hike down there and have a quick look around.”

Fifteen minutes later she was back with several more small fossil **fragments**. Everyone gathered around as she laid them out on the ground.

“What kind of animal are they from?” Kristal asked, pulling out her sketchbook and beginning to make drawings of the bones.

Dr. Forester shook her head. “I won’t really know until I’ve looked at them more closely. Let’s pack up our gear and head back.”

\*\*\*

Back at camp, Amy and Julian helped Tess make spaghetti in the tent that served as a kitchen. When dinner was ready, everyone gathered around a table set up outside. Tess went to the lab to get Dr. Forester, but she came back alone. “Dr. Forester says she’ll eat later after she’s done studying those little bones.”

The sun set while they were eating and a cool breeze sprang up. When they had finished dinner, Kristal and Matt did the dishes, and Tess built a huge campfire with thick chunks of wood. Everyone gathered around the fire, and Amy was surprised how good the heat from the flames felt as the temperature kept dropping.

Suddenly the fire popped and sparks shot up into the air.

“Whoa!” Daria said, scooting back a few feet. “I think a log just exploded!”

“It did, because water changed states,” Tess said quietly.

“What? Chemistry again?” Felix teased.

Tess just smiled. “Logs often have small pockets of water and sap in them. As the logs start to burn, the liquid gets hot enough to boil and changes states to become a gas. But the gas is trapped inside the log. Pressure builds as the gas gets hotter until at some point the wood gives way with a *pop* and the hot gas escapes.”

Just then they heard footsteps, and Dr. Forester appeared in the firelight. “Those little fossil bones are very interesting,” she said. “I’m thinking they might belong to a small dinosaur, rather than an ancient **mammal** or bird, but unfortunately I don’t have enough pieces yet to be sure.”

"I want to look at them!" Julian said, jumping up from his chair and heading for the lab.

Dr. Forester caught him by the shoulder. "If you don't mind, Julian, let's wait until morning. It's really time for everyone to head for bed."

Julian shrugged and **reluctantly** said, "Okay."

As Amy walked with Kristal and Daria to their tent, she suddenly remembered the snakes. Were snakes coming out of their daylight hiding places now that it was cooler? With one eye peeled for anything slithery, Amy brushed her teeth with water in a cup and spat the minty foam onto a rock beside the tent. Then she checked to make sure there was nothing in her sleeping bag before crawling inside.

Daria and Kristal were quickly asleep, but Amy lay stiffly on her cot, listening for rustling sounds. Finally, she got up and shone her flashlight into every corner of the tent, under all the cots, and then zipped up the tent flap. She was pretty sure there was no other way for snakes to get in.

Even then, though, sleep refused to come. Amy flicked on her flashlight and pulled out one of the books she had brought along: *The Mystery of the Old Masters*. She had read the book many times, but she never tired of reading how Inspector Ellis figured out who'd stolen the priceless paintings. She thought it was clever the way the Inspector kept track of clues on a small notepad and consulted this list often. After finishing the first chapter, Amy felt better. She just wished that instead of Fossil Camp she could have gone to Detective Camp, if there was such a thing.

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**Inferential.** If you took a block of ice out of a bottle and put it in a different shape bottle, would you expect the shape of the ice to change? Why or why not?

- » No—ice is a solid. Its particles are tightly packed together and can't move, so it keeps the same shape.

**Inferential.** Tess says that, as the water in the logs becomes a gas, "pressure builds" until at some point the wood gives way. What have we been told about gas particles that might help explain what causes the wood to give way?

- » Students should reference the gas "filling in whatever space is available" and moving very freely and rapidly to suggest exerting pressure on the log.



## INTEGRATE INFORMATION (25 MIN.)

### Activity Page 3.2



### Support

Model the first example by asking (1) What state is water in the sea? (2) What state is it turning into? (3) Which diagrams describe each state? (4) What does the text say happens when the water changes state?



### Reading Reading/Viewing Closely

#### Entering/Emerging

Use sentence frames to describe changes in state (e.g., In evaporation, water goes from a \_\_\_\_ to a \_\_\_\_.)

#### Transitioning/Expanding

Provide students with paired diagrams on different states, and ask them to apply them to the water cycle.

#### Bridging

Prompt students as necessary (e.g., “which state does this start and end in?”).

### Changes in State

- Remind students that, in the previous two lessons, they analyzed different presentations of scientific content. Today they will use scientific information presented differently, but on the same topic, to explain changes in state.
- Divide students into small groups. Ask them to turn to Activity Page 3.2 and review the two sets of diagrams: the water cycle and the “chemistry textbook” showing images of solids, liquids, and gases.
- Ask students, in turn, to comment on what they see in the diagrams for solids, liquids, and gases. Ask students to describe the difference in how the particles look, and ask them to point to the information in *The Badlands Sleuth* that describes the image.

### Annotating Water Cycle

- In their small groups, ask students to complete the exercise described on Activity Page 3.2. You may wish to ask one member of each group to complete part of the diagram (*evaporation*, *condensation*, *precipitation*, and *melting*, respectively) and then discuss and combine their answers.
- Tell students that often they will not find all the information they need from a single source. By *integrating* the information from different sources, they come to a better understanding of the content and ideas conveyed.
- Discuss student answers briefly as a class.



### Check for Understanding

Ask students to comment on what the text, the diagram, and the water cycle each add to their understanding of changes in state.

- » Answers will vary but should reference the value of visual aids and real-life examples.

## Lesson 3: Detectives and Scientists, Part 1

# Writing



**Primary Focus:** Students will appropriately organize information to track character information and development. [W.5.2, W.5.4]

### ORGANIZATION OF CONTENT (15 MIN.)

#### Introduction

- Read aloud the beginning of Chapter 3 (up to “today there’s a mystery to be solved”) to introduce the mystery.
  - You may wish to spend a couple of minutes discussing Amy’s actions in looking at Kristal’s drawings.
1. **Evaluative.** How does Kristal’s sketch corroborate Dr. Forester’s story that there were six fossils?
    - » Kristal had drawn the fossils the day before, and she showed six different ones.

#### Organizing Character Maps

- Remind students that Amy wants to be a detective, not a scientist. Now it looks as though there might be a case. Tell students that they will be acting as detectives as well as scientists as they figure out if there is a mystery to be solved—and if so, the culprit!
2. **Evaluative.** What is the possible case?
    - » whether a fossil was stolen
  - Tell students that their first act as detectives is to track the characters (and possible suspects).
  - Tell students that they need to organize the information so that they can easily track the information later and use it.
3. **Evaluative.** Why do detectives need to track the characters, and why do they need to think through how to organize their information?
    - » Answers will vary but could include to look for clues, to understand the motive of characters, and to easily locate and use evidence later in the case.

#### Support

Explain that *corroborate* means “support, or give evidence for, an idea.” It is a word frequently used in detective investigations.

#### Support

Being *scrupulous* is being very careful about doing something correctly or honestly.

## Challenge

Show only one character map sample, and allow students to brainstorm new forms of organization.



### Writing Understanding Text Structure

#### Entering/Emerging

Provide students with advantages and disadvantages for the four model character maps. Through discussion, help students choose one model for their maps.

#### Transitioning/Expanding

Provide students with advantages and disadvantages for the first of the four model maps. Ask students to refer back to your previous discussion to suggest advantages/disadvantages for the others.

#### Bridging

Ask students to refer back to your previous discussion and provide advantages for their choice.

### Activity Page 3.3



- Tell students that, as detectives, they have to be scrupulous about when they are recording factual information and when they are making inferences about the characters. While the inferences are important in analyzing characters (or suspects), they wouldn't be accepted by a police officer or judge.
- Remind students that they are tracking characters as a precaution—we don't know yet if there's been a crime.
- Using a Think-Aloud activity, discuss the four sample character maps for Max you displayed earlier. In the first three cases, discuss with the class why you might organize your character map this way and its advantages and disadvantages.
- Make clear to students that not everything has been copied from the text. For example, there are many quotes from the text that make it clear that Max likes the idea of fossil camp, but this does not need to be listed several times under each category.



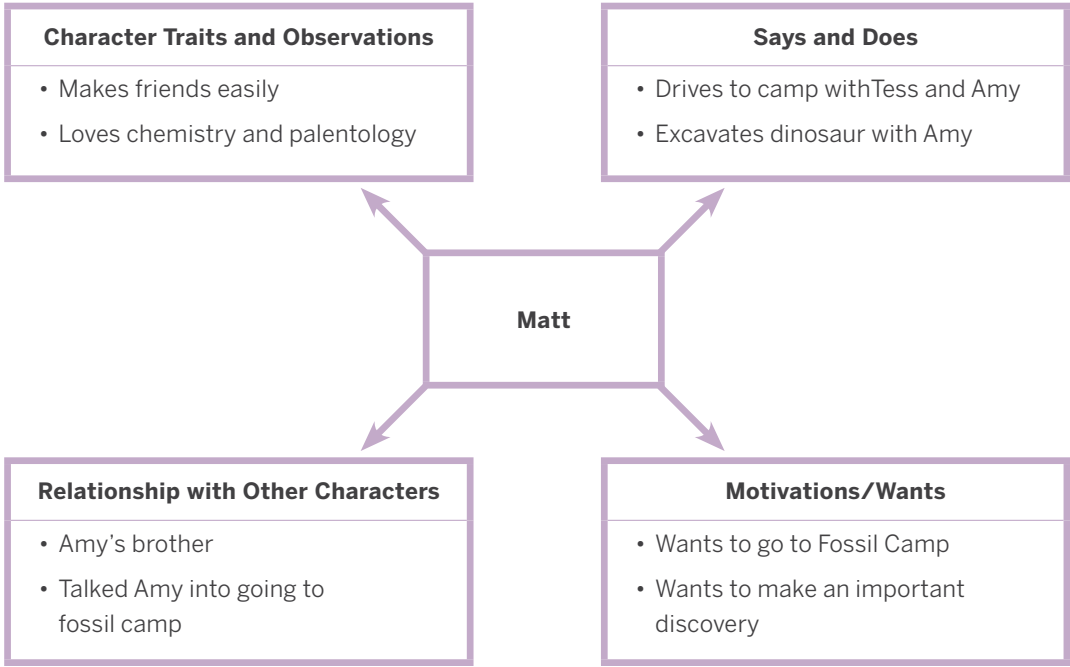
### Check for Understanding

For the last character map (continuous prose), ask students to name some advantages and disadvantages of this organization.

## CREATION OF CHARACTER MAPS (20 MIN.)

- In the same small groups as the previous activities, ask students to complete character maps for Amy.
- Ask students to begin by deciding how they will organize their character maps: using either one of the four samples or a new method. Ask volunteers for reasons for their decisions, and discuss these as a class.
- Now ask students to complete their character map. As students work, circulate and check in.
- When students have finished, review their answers as a class.
- Ask students to continue completing their character maps for the remaining characters. Ask different members of groups to choose different characters so that one completes for Julian and Daria while another completes Felix and Kristal, respectively. They should complete their maps at home. (These will be built upon in Lesson 6, so completing them is important.)
- Direct students to Activity Page 3.3.

# Character Map 1



# Character Map 2

|           | What He Says or Does                                                                                                        | What We Learn About His 'Wants'                                                                                             | What We Learn About His Character                                                                           | What Else We Learn                                                                                                                                            |
|-----------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chapter 1 | <ul style="list-style-type: none"><li>• Drives to fossil camp</li><li>• Arrives at camp and joins everyone in lab</li></ul> | <ul style="list-style-type: none"><li>• Wants to be at fossil camp</li><li>• Wants to make an important discovery</li></ul> | <ul style="list-style-type: none"><li>• Makes friends easily</li><li>• Doesnt mind heat/bugs dirt</li></ul> | <ul style="list-style-type: none"><li>• Amy's brother</li><li>• He talked Amy and parents into going to fossil camp</li><li>• Thinks camp is 'cool'</li></ul> |
| Chapter 2 | <ul style="list-style-type: none"><li>• Excavates jawbone with Amy</li><li>• Does dishes later that eveningv</li></ul>      |                                                                                                                             |                                                                                                             | <ul style="list-style-type: none"><li>• Asks 'excellent question' about chemistry</li></ul>                                                                   |
| Chapter 3 |                                                                                                                             |                                                                                                                             |                                                                                                             |                                                                                                                                                               |

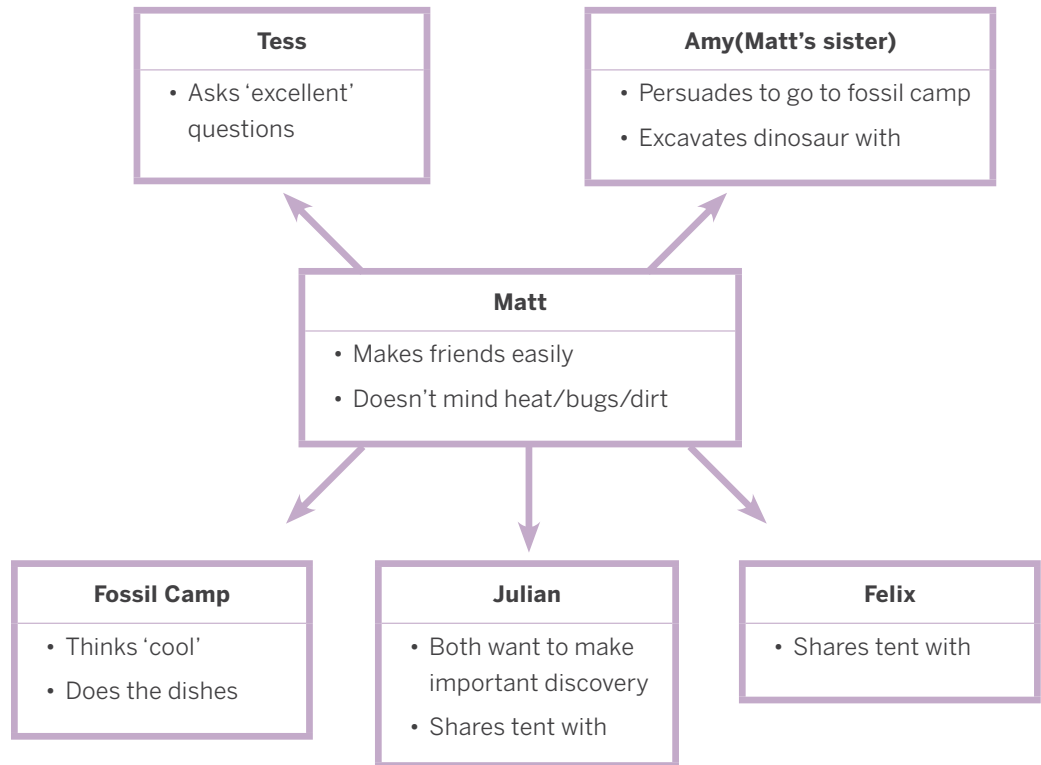
## Support

Help students choose how to organize and select before they begin to ensure they are categorizing information in a helpful way.

## Challenge

Assign characters to individual students and call them up to “interview” them on their character and their wants.

### Character Map 3



### Character Map 4

#### Matt

Matt is Amy's brother. He persuaded Amy to go to fossil camp and his parents to allow them to go. He hopes to make an important discovery. He makes friends easily and doesn't mind heat, dirt, or bugs. He thinks the camp is "cool." He has a "glow of excitement" about going to the dig site.

At the dig site, Matt excavates a jawbone with Amy. When they take a break, he asks 'excellent' questions of Tess about states of matter. Later that night he does the dishes.

## DISCUSSION (10 MIN.)

- Remind students that, in the first two lessons and for the first half of today's lesson, they concentrated on the scientific content in *The Badlands Sleuth* and how it was presented.
- Today, for the first time, they were introduced to the possibility of a detective mystery.
- Tell students that for the rest of the unit they will be playing two roles—detective and scientist.
- Tell students that, to do this successfully, they need to analyze text from both perspectives: detective and scientist. Just as they considered how to present information differently, they will now think about how to read different kinds of information and analyze it differently.
- Ask students to turn to Activity Page 3.4. Ask half of the class to read “Tess’s Rules for Observation” and the remaining half to read “Inspector Ellis’s Rules for Detection.”
- Facilitate a class discussion on the similarities and differences between the two modes. First ask someone from the “scientist” half to read one of the sentences from Tess’s rules. Then ask someone from the “detective” side to comment on a similarity or difference with one of their rules. Then swap sides.

## Activity Page 3.4



## Support

Remind students that one difference between scientists and detectives is the *kind* of content they're reading. Contrast the differences in content with the differences/similarities with the way in which the text is read.



## Check for Understanding

Ask students whether they believe reading like a scientist and reading like a detective are fundamentally similar or fundamentally different. Ask for reasons.

End Lesson

## 4

# Finding Evidence

## PRIMARY FOCUS OF LESSON

### Reading

Students will use information from different sources to classify objects as metals or nonmetals. [RI.5.7]

### Grammar

Students will understand how to reduce and combine sentences. [L.5.3]

### Writing

Using a graphic organizer, students will summarize information from the Reader. [RI.5.1, W.5.8]

## FORMATIVE ASSESSMENT

### Activity Page 4.2

#### **Categorizing Information Using Textual Evidence**

**Part 1; Part 2; Part 3** Use information from a range of sources to assign elements to the right category. [RI.5.7]

### Activity Page 4.3

**Combine Sentences** Reduce and combine sentences for meaning, interest, and style. [L.5.3]

### Activity Page 4.4

**Summarizing Events** Summarize events in the Reader using a graphic organizer. [RI.5.1; W.5.8]

## LESSON AT A GLANCE

|                                              | Grouping    | Time    | Materials                |
|----------------------------------------------|-------------|---------|--------------------------|
| Reading (45 min.)                            |             |         |                          |
| Partner Read: Chapter 3                      | Partners    | 20 min. | ☐ Activity Page 4.1, 4.2 |
| Word Work: <i>Elementary, My Dear Watson</i> | Whole Group | 5 min.  |                          |
| Categorizing Evidence                        | Small Group | 20 min. |                          |
| Language (15 min.)                           |             |         |                          |
| Grammar                                      | Whole Group | 15 min. | ☐ Activity Page 4.3      |
| Reading/Writing (30 min.)                    |             |         |                          |
| Summarizing Events                           | Partners    | 30 min. | ☐ Activity Page 4.4      |



## ADVANCE PREPARATION

### Reading

- You may wish to extend this activity with the use of materials in the classroom, or by creating more examples for students to identify as metals or nonmetals.
- Display the Periodic Table poster found in the Teacher Resources section of this Teacher Guide. Alternatively, access digital versions of these in the digital components for this unit.

### Grammar

- Write the following sentences on the board/chart paper. Alternatively, access digital versions of these in the digital components for this unit.

#### Combining

- 1a. The badlands were dry. Dust puffed up where they walked.
- 1b. The badlands were dry and dust puffed up where they walked.
- 2a. Amy didn't like sleeping by the door. Snakes were nearby.
- 2b. Amy didn't like sleeping by the door because snakes were nearby.

#### Reducing

- 1a. Amy, who was bored, wandered over to the rock, which was striped, and stared at it.
- 1b. Amy was bored and wandered over to stare at the striped rock.
- 2a. Amy liked books that involved mysteries more than romance, or science, or any other kind of genre.
- 2b. Amy's favorite books involved mysteries.

### Writing

- This lesson contains a Think-Aloud activity. During a Think-Aloud, make your thinking visible to students by modeling the steps to solving a problem or completing a task. As you “think aloud” while working through an activity students observe your approach to finding information, drawing conclusions, considering questions, and testing ideas.

### Universal Access

- For grammar, help students identify appropriate simple conjunctions by explaining their purpose (for example, we use *and* for adding information, or for giving alternatives, *but* for unexpected information, etc.)

## ACADEMIC VOCABULARY

**classify, v.** arrange into categories according to a definition

**element, n.** essential part of something

Start Lesson

### Lesson 4: Finding Evidence

# Reading



**Primary Focus:** Students will use information from different sources to classify objects as metals or nonmetals. [RI.5.7]

## PARTNER READ: CHAPTER 3 (20 MIN.)

### Introduce the Chapter

- Ensure that each student has a copy of the Reader, *The Badlands Sleuth*, and has located Chapter 3.
- As with previous units, preview the relevant core vocabulary, identify the first core vocabulary word, and ask students to identify the word bolded in the chapter and in the glossary at the back of the book.

### Vocabulary

**slather, v.** spread on thickly

**furnace, n.** a very hot oven

**plateau, n.** an area of high, level (no slope) ground

**atom, n.** the basic unit of an element

**Periodic Table, n.** a way of organizing chemical elements

**resonance, n.** a quality of sound: clear, deep, long lasting

**conductor, n** a good channel for something (like electricity)

### Vocabulary Chart for Chapter 5, “What Is at the Center of the Universe?”

| Vocabulary Type                           | Tier 3<br>Domain-Specific Words   | Tier 2<br>General Academic Words |
|-------------------------------------------|-----------------------------------|----------------------------------|
| Core Vocabulary                           | plateau<br>atom<br>Periodic Table | slather<br>furnace<br>resonance  |
| Multiple-Meaning Core<br>Vocabulary Words | conductor                         |                                  |
| Sayings and Phrases                       |                                   |                                  |

#### Activity Page 4.1



#### Support

When completing the detective questions, ask students (1) What are we told is happening? (2) Are there any other details we are given? (3) What evidence does this give us?

#### Support

*Indicate* means “suggest.”

#### Challenge

Is this a similar introduction to previous chemical content in this Reader?

- » Students should be able to identify a consistent thread of questions from campers leading to explanations from Tess.

### Read “A Fossil Goes Missing”

- Ask students to read the chapter in pairs. As with previous units, you may pair students in a number of ways. They will read up to “All the known elements are arranged on something called the Periodic Table of the Elements” on page 18 of the Reader.
- Explain that both students will read the first page silently, and then one partner will read that page aloud. Next, they will both read the second page silently, and then the other partner will read that page aloud, and so on. Students can ask their partner for help with sounding out or defining words as necessary.
- As they read, ask students to complete the questions in Activity Page 4.1. One of each pair should complete the detective questions, and one should complete the science questions. Students should then explain their questions and answers to their partner.



### Check for Understanding

Ask students to identify how the author introduced chemical content in this chapter.

- » Answers will vary, but through class discussion should include (1) Julian asking a question, and (2) the question arose from the activity that the campers were engaged in (excavating rock).

## Chapter 3

# A Fossil Goes Missing

**THE BIG QUESTION**  
How do we keep track  
of all the elements?

“Dr. Forester doesn’t look very happy this morning,” said Felix as he poured milk on his instant oatmeal and passed the carton to Amy. She followed Felix’s gaze. Dr. Forester was standing outside the lab with Tess, gesturing and shaking her head.

Matt **slathered** butter on a piece of toast. Julian had made himself a peanut butter sandwich, and Daria was munching an apple. The only one who wasn’t eating was Kristal. Wearing her dark glasses, she silently sipped a cup of hot tea. Before breakfast, Kristal had been sitting on her cot, working on a sketch. When Amy had asked to see what she’d drawn, Kristal had pulled her sketchbook tight to her chest. Amy had wondered why Kristal would be so secretive about her drawings.

Dr. Forester finally came over, poured herself a mug of coffee, and joined them at the table. “One of the little fossils from the gully seems to be missing.” She lifted the cup but set it down again without taking a swallow. “I could have sworn there were six fossils, but this morning there were just five on the table in the lab.”

“Did you search the tent?” Julian asked.

Dr. Forester nodded. “And now Tess is searching again. The thing is, I could be mistaken about the number of fossils. There might have just been five to start with. Still, it’s a bit of a mystery.”

At the word *mystery*, Amy started to tingle all over. A missing fossil? Now *that* was something she could get interested in! Amy thought about Inspector Ellis and his notepad. She suddenly remembered she’d tucked a



small notebook inside the front pocket of her backpack just before she and Matt had left home. It would be perfect for recording any clues she might uncover regarding the missing fossil.

"Excuse me," she said, pushing her chair away from the table. "I need to get something from the tent, but I'll be right back."

Amy sprinted to the tent and retrieved the notebook from her backpack along with a mechanical pencil. As she turned to leave, she spotted Kristal's sketchbook lying on her cot. Before Amy realized what she was doing, she opened the sketchbook and quickly flipped through the pages until she came to one full of detailed drawings of the little fossils from the gully. There were drawings of six different fossils, not five. So there *was* a fossil missing! Amy put Kristal's sketchbook back where she had found it, and hurried back to join the others.

On the drive out to the dig site, Amy clutched her notebook, lost in thought. How had the fossil gone missing? Had someone taken it? And why hadn't Kristal mentioned her drawings to Dr. Forester?

"You look better today, Sis," Matt said, interrupting the stream of questions running through Amy's head. "Yesterday you seemed pretty unhappy."

Amy smiled at her brother. *'Today is different,'* she thought. *'Today there's a mystery to be solved.'*

\*\*\*

When they arrived at the dig site, Dr. Forester suggested they spend the morning continuing their excavations. After lunch, when the afternoon sun was turning the narrow plateau into a **furnace**, they'd scour the gully. "Maybe we'll be lucky and find more small fossil bones," she explained.

Amy noticed that this plan seemed to please everyone, especially Julian. He pulled out his pick and brush and set to work before anyone else. After a while, he paused and looked over at Tess. "Yesterday you were talking about how matter can change states. But what makes one kind of matter different from another? What makes this pick different from, say, the rock or the fossil bones?"

Tess rocked back on her heels, wiping the sweat from her brow. "Before I can explain that, we need to fill in a few background details. Remember when I said that matter was made up of small particles? Those particles are called atoms, which are so small they are invisible to the naked eye. There are more than a hundred different kinds of atoms, and each kind is called an element."

"But aren't **atoms** composed of even smaller particles called protons, neutrons, and electrons?" Daria asked.

"Indeed they are," Tess agreed, "but an atom is the smallest amount of any element that still has the properties of that element. Elements, then, are the basic substances that make up all matter—think of them as the basic ingredients of matter. All the known elements are arranged on something called the **Periodic Table** of the Elements."

### WORD WORK: ELEMENTARY, MY DEAR WATSON. (5 MIN.)

- Tell students that scientific communication can be confusing, because words that mean something different in everyday language have a very specific meaning to scientists.
1. **Literal.** Ask students to define from the text the word *element*.
    - » The basic substance that makes up all matter. Different kinds of atoms are different elements.
  - Tell students that there are different definitions of *element*. Read the following two phrases and ask students to guess what *element* means in each case:

“Elementary, my dear Watson” said Sherlock Holmes, shaking his head at his friend’s simplicity.

    - » *Element* means the simplest ideas or principles of something.

“I only just bought it, and the element in my toaster is already damaged!” wailed Max.

    - » *Element* means a small part of an electrical device, containing a wire that conducts electricity.
  2. Can you see any similarities between these definitions?
    - » Answers will vary, but may understand that the definitions of *element* relate to it being a simple part of something. You may wish to tell students that similarly chemical elements often combine to form more complex substances.
  - Remind students that when they inhabit their roles as scientists, they have to be very careful about the definitions of the words they use, because being precise is very important in scientific communication.

### Activity Page 4.2



### Support

You may wish to support small groups by reading the descriptions aloud. Ask students to put their thumbs up whenever they hear something that is in the table they completed. Make sure they identify synonyms.

### CATEGORIZING EVIDENCE (20 MIN.)

- Assign students to small groups.
- Ensure that the periodic table poster is displayed.
- Ask students to return to the Reader and use the information to complete the activity page.

“We have one of those hanging on the wall of our science classroom this year,” Kristal said.

“Excellent!” exclaimed Tess. “Then you may have noticed that each element has a name and a symbol made up of one or two letters. For example, oxygen is an element and its symbol is O. The element nitrogen’s symbol is N, and the element aluminum’s symbol is Al. The elements are arranged on the Periodic Table based on their properties and certain patterns in their atoms.” Tess grabbed her rock hammer and held it up. “And that brings me back to your question, Julian. The elements are often divided into two basic groups: metals and nonmetals. The head of this hammer is mostly made up of the element iron.” She flipped the hammer upside down. “The wooden handle is made up mostly of nonmetal elements, such as carbon, nitrogen, sulfur, and phosphorus.”

Felix suddenly pulled out all his digging tools and arranged them in a line on the ground. “Ever notice how metal objects make a nice sound?” he asked with a mischievous look on his face. He began tapping his chisel against all the other metal objects, like he was playing the drums. Each one gave out a *clang* when he struck it.

“If paleontology doesn’t work out for you, Felix, you might have a future as a musician,” Matt joked. “Then again, maybe not.”

Felix made a face at him.

“Felix is right, though,” Tess broke in. “That ringing sound—scientists call it **resonance**—is a property of metals. Being shiny is another. So is being malleable and ductile, which means that you can hammer metals into shapes and stretch them out into long, thin wires. And, if you’ve ever seen the inside of electrical cord, you’ve probably noticed the metal wires inside. Another property of metals is that they are good **conductors** of electricity and heat.”

Tess picked up a piece of sandstone and set it out on a flat space beside her. “Nonmetals, on the other hand, have very different properties. They tend to break or crumble, not bend.” She hit the rock with her hammer and it shattered into pieces. “They also don’t conduct electricity, they are usually dull rather than shiny, and they lack that lovely resonance.” She tapped her hammer on her water bottle and it made a dull *thunk*.

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**Evaluative.** How are elements divided according to Tess?

- » By metal and nonmetal

## Support

You may wish to ask a member of the small group to answer one question each in part 3 of the activity.



Amy noticed that Dr. Forester had been listening to Tess, but she'd suddenly walked over to the far end of the plateau. Now she was returning—in a hurry.

"Change in plans, everybody," she said, breathlessly. "There's a storm coming." She turned and pointed toward the northwest, where a line of dark clouds hugged the **horizon**. Even as Amy watched, the clouds seemed to expand and move closer.

"I'm afraid it's moving directly toward us," Dr. Forester said, untying the lines that held the tarp over the dig site. "And when it hits, we don't want to be standing up here, exposed on this plateau."

"Why is that a problem?" Kristal asked.

Tess summed it up in one word. "Lightning."

Kristal's eyes grew wide. "So we're going to back camp, where we'll be safe in the tents?"

"Weren't you listening to the chemistry lesson?" Felix called out as he ran over to help Dr. Forester with the tarp. "The tents have metal poles, and metals conduct electricity."

"At home we go into the basement when a bad storm is coming," Daria said in a **tense** voice.

"And in a way," said Dr. Forester, stuffing the folded tarp into her backpack, "that's exactly what we are going to do. Everyone, grab your gear and follow me." She led them to the spot where Felix had slid down into the gully. The wind was blowing much harder, and the storm now covered half the sky like a huge, black curtain sweeping toward them.

"Yesterday when I was walking along the gully, I spotted a shallow cave near the end of this ridge." Dr. Forester had to shout to be heard above the rising wind. "Climb down carefully; it's slippery."

"You can say that again!" yelled Felix.

Amy kept her eye on the storm as they hurried along the dry gully. Bright chains of lightning zigzagged through the steely gray clouds that were quickly approaching, and she could hear the deep rumble of thunder.

By the time they reached the cave, the storm had blotted out the sun. They scrambled up the rocky hillside and stepped beneath the cave's sheltering overhang just as the first raindrops began to fall.

"Move to the back," Dr. Forester shouted above the booming thunder. They huddled together in the deepest corner as the storm struck. Rain fell in great, swirling sheets. Bolts of lightning flashed and thunder crashed so loudly that Amy had to cover her ears.

Gradually, the rain began to let up. The rumble of thunder grew more and more distant as the storm slowly moved off. Dr. Forester stepped to the front of the cave and the others followed.

"Everything looks so much more colorful," Kristal said, as the sun came out, "like the rain washed it clean."

"It might have done a lot more than that," Dr. Forester mused. "Rain erodes these rocky ridges and loosens fossils hidden inside them. Sometimes," she paused and looked thoughtfully at the gully below, "it washes fossils down off the ridges into low spots."

Felix was the first to understand. "You mean—we might find more of those strange little fossil bones in the gully below the dig site?"

Dr. Forester gave a quick nod. "Exactly! So, if you all don't mind getting your boots a little muddy, let's go on a fossil hunt!"



## Language

### Entering/Emerging

For combination, focus students on the second and third sentences.

Offer students options as they combine sentences.

For condensing, help students create single clause sentences.

### Transitioning/Expanding

For the first sentence in the combination exercise, help students discuss the appropriate word *while* and ask them to identify causality in the sentence.

### Bridging

For combination, ask students to justify their choice of words by explaining the connection between sentences, including cause and effect.

## Support

Use alternative conjunctions and ask students to comment on how it changes meaning



### Check for Understanding

Review the final answer (for sulfur) as a class. Students should be able to identify Sulfur as the element, and identify it as a non-malleable substance that does not resonate, and therefore as nonmetal.

## Lesson 4: Finding Evidence

# Language



### GRAMMAR (15 MIN.)

**Primary Focus:** Students will understand how to reduce and combine sentences [L.5.3]

### Model

- Remind students that they looked in Lesson 2 at expanding sentence by adding detail and description. Tell students that they will now look at combining and reducing sentences.
- Show students the sentences you prepared:
  - 1a. The badlands were dry. Dust puffed up where they walked.
  - 1b. The badlands were dry and dust puffed up where they walked.
  - 2a. Amy didn't like sleeping by the door. Snakes were nearby.
  - 2b. Amy didn't like sleeping by the door because snakes were nearby.
- Point out that in both cases, the sentences had been combined into a single sentence. Tell students that reading can get very boring if all sentences are the same length. Combining sentences also allows you to add meaning. For example, in the second sentence, adding the word *because* shows that the reason Amy didn't like sleeping by the door was directly related to the snakes nearby.



### Check for Understanding

Ask students to identify the conjunction added in the first sentence

- Tell students that sometimes you want to combine and expand sentences, but sometimes you want to make sentences less complicated. Sometimes sentences are more powerful when they are short and punchy. Details can also sometimes get in the way of understanding, particularly with an informational text.
- Show students the second set of sentences you prepared:
  - 1a. Amy, who was bored, wandered over to the rock, which was striped, and stared at it.
  - 1b. Amy was bored and wandered over to stare at the striped rock.
  - 2a. Amy liked the books that involved mysteries more than romance, or science, or any other kind of genre.
  - 2b. Amy's favorite books involved mysteries.
- Point out that in both cases, the sentences convey the same meaning. However, the second sentence has been shortened to be more concise.

### Practice

- Ask students to start Activity Page 4.3 and complete it at home.

Activity Pages  
4.3 and 4.4



## Lesson 4: Finding Evidence

# Writing



**Primary Focus:** Using a graphic organizer, students will summarize information from the Reader. [RI.5.1, W.5.8]

### SUMMARIZING EVENTS (30 MIN.)

#### Modeling Summarization

- Ask students to turn to Activity Page 4.4. Ask a student to read aloud the introduction to the Activity Page.
- Using the completed table as a guide, model summarizing the events in Chapter 1 (you may create an alternative organization if you prefer).
- On the board/chart paper, draw the table in the guide below. As you create the table, discuss with students the information you are taking from the Reader and how you are presenting it in the Reader (note form, *not* complete sentences.)

## Support

Ask students why it might be more difficult to use the information if it were written in continuous prose.



### Reading Understanding Text Structure

#### Entering/Emerging

Work with students as they complete their tables. Read the relevant text with them and ask them to first orally summarize the most important idea. Support them to turn this into note form.

#### Transitioning/Expanding

Work with students as they complete their tables. Ask them to read the relevant paragraphs and then prompt them before they summarize. Review their notes.

#### Bridging

Ask students to explain why they chose particular pieces of information.

- As you fill in the table for this part of the Reader, ask students to copy it into their activity books.
- Direct students to Activity Page 4.4.
- Ask students to offer ways in which the notes were organized:
  - » Answers will vary, but may include the use of headings, and the division between the characters, their location, additional details, and events. Spend a moment discussing why the information has been divided in this way, and how it maps to the purpose of the summary (to create a police report).

| When                          | Who                                                                      | Where                  | Description                                                                                               | Incidents?                                   |
|-------------------------------|--------------------------------------------------------------------------|------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------|
| <b>Day 1 – on way to camp</b> | Max, Amy, Tess                                                           | In car driving to camp | Hot environment: badlands of eastern Montana. Pot holes in road                                           |                                              |
|                               |                                                                          | Arrive at campsite     | Cluster of tents in shadow of high, barren ridge                                                          | Met by other campers and Dr Forester         |
| <b>Day 1 – at the camp</b>    | Amy, Darla, Krista                                                       | Move to tent           | One tent. Amy in bed near the door.                                                                       | (Krista has notebook – relevant?)            |
| <b>Day 1 – at the camp</b>    | Everyone: Max, Amy, Tess, Amy, Darla, Krista, Felix, Julian, Dr Forester | Move to lab tent       | Big canvas tent with awning outside. Inside is a long table with instruments, boxes, and small cloth bags | Introduced to fossils. Krista sketches them. |
| <b>Day 1 – at the digsite</b> | Everyone                                                                 | Move to dig site       |                                                                                                           |                                              |



### Check for Understanding

Ask students to name a detail they noticed in summarizing that they didn't notice the first time they read the text.

## Completing Summarization

- Ask students to work in pairs. One of each pair should complete the table for the first half of Chapter 2 (up to the return to the campsite) and the other complete the table for the remainder of the chapter.
- Remind students to read the text closely and identify different characters' movements. Tell students they may not have information in every box for every row.



### Reading Understanding Text Structure

#### Entering/Emerging

In preparation for the police report, work with students to turn their first note into a simple complete sentence. Compare with them the completed sentence with the original text.

#### Transitioning/Expanding

In preparation for the police report, ask students to turn their first note into a complete sentence.

#### Bridging

In preparation for the police report, ask students to summarize their first notes as complete sentences. Ask them how the sentences link to form a coherent picture.

#### Support

Choose one or more pairs to work with as they complete their tables.



### Check for Understanding

Once students have finished, ask pairs round the class to read out events in sequence. In each case, ask students “Did you include those details? If not, what would you add?” Ask the rest of the class to amend or add to their notes as they listen.

End Lesson

## 5

# Call in the Sheriff?

## PRIMARY FOCUS OF LESSON

### Writing

Organize and create a police report, which they then revise in response to peer feedback. [W.5.4; W.5.5; W.5.8]

### Speaking and Listening

Debate whether the sheriff should investigate the missing fossil, using evidence from multiple sources. [SL.5.4]

## FORMATIVE ASSESSMENT

### Activity Page 5.1

**Police Report** Report on events in the text, with notes for revision from peer feedback. [W.5.4; W.5.5; W.5.8]

### Activity Page 5.4

**Debate on the Sheriff** Rubric to judge class debate. [SL.5.4]

## LESSON AT A GLANCE

|                                  | Grouping    | Time    | Materials                                                                                                                                           |
|----------------------------------|-------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Writing (45 min.)                |             |         |                                                                                                                                                     |
| Create Police Report             | Individual  | 25 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Page 5.1<br><input type="checkbox"/> Sample Police Reports |
| Peer Feedback and Revision       | Pairs       | 20 min. |                                                                                                                                                     |
| Speaking and Listening (45 min.) |             |         |                                                                                                                                                     |
| Prepare Arguments for Debate     | Pairs       | 25 min. | <input type="checkbox"/> Activity Pages 5.2, 5.3, 5.4                                                                                               |
| Hold Debate                      | Small Group | 20 min. |                                                                                                                                                     |



## ADVANCE PREPARATION

- In this lesson students will integrate information from multiple sources, as they did in Lessons 3 and 4. You may wish to collect student activity books at the end of class and review student work in these activities to prepare for tomorrow's lesson.

### Writing

- There are two sample police reports found in the Teacher Resources section of this Teacher Guide. Alternatively, you can access digital versions in the digital components for this unit. Place copies of the two sample reports around the room so students can use them as examples and guides. There should be enough copies for students to comfortably read them. If you prefer, prepare copies and place them on students' desks.
- You may wish to organize partners so that peer feedback will be collaborative and supportive.
- You may create your own sample police report to model peer feedback.
- You may have students write a second draft of their report at home.

### Speaking and Listening

- You may wish to review with students the rules for debate, including the use of opening statements.
- There is a rubric for students to use during the debate. You may use this rubric to assess selected students as they conduct their debates.
- The articles students read can be found in the Teacher Resources for this unit. Alternatively, you can access a digital version in the digital components for this unit.

### Universal Access

- Provide models of how the sample police reports could have been converted from notes to summary form, for example:
  - "Fingerprints on counter" to "We found fingerprints on the counter of the grocery store."

- Provide students with written support to help them receive and give feedback with their peers:
  - “I thought that the point you made here was very interesting, and/however \_\_\_\_.”
  - “Although I understood what had happened, I was less clear when you described \_\_\_\_\_. Perhaps we could work together to summarize the events?”
  - “This seemed an important piece of information and it might be possible to make it more concise by \_\_\_\_.”
  - “I wasn’t sure that this was an objective fact, because \_\_\_\_.”
- As students create their own opening statements, provide them with small stickers or labels for them to place next to text they wish to refer to (in the Reader or the additional articles provided).
- Before students create their opening statements, work with select groups to identify links between the rubric and the statement they have chosen. For example:
  - “I have met the requirements in part 2 of the rubric by providing the following evidence from the text: \_\_\_\_.”

## ACADEMIC VOCABULARY

**investigation, n.** formal observation or study of something. For police, an investigation is done to find out whether a crime was committed and who committed it.

## Lesson 5: Call in the Sheriff?

## Writing



## Support

Prompt students by asking questions. Is there a difference in how the information is organized?

How are headings, subheadings, and numbers used? Any difference in how *formal* the writing is? Why does that matter?

## Support

You may wish to ask students to choose one of the sample reports from around the room to model their writing.

## Support

If you would like students to spend more time working on their police reports, omit the peer feedback part of this lesson.

Activity Pages  
4.3 and 5.1

**Primary Focus:** Organize and create a police report, which they students then revise in response to peer feedback. [W.5.4; W.5.5; W.5.8]

## CREATE POLICE REPORT (25 MIN.)

## Review Summaries

- Ask students to spend a few moments reviewing the summaries they completed in their pairs the previous day.
- Tell students that they will use the information in the summaries to complete a police report—a report of the possible crime. The report will be submitted to the sheriff who will decide if there is enough evidence to warrant an investigation.

1. **Evaluative.** What might the purpose of a police report be?

- » Answers will vary but should include the need for it to be factual and accurate, to give all the most relevant details for the police to investigate, and to assess whether this is a crime that should be investigated or not.

## Review Sample Police Reports

- Before they begin writing, ask students to spend a few moments looking at the sample police reports around the room. Tell them to discuss with their peers the differences and similarities between the reports.

## Write a First Draft

- Tell students they will now take the information they summarized in the previous lesson, found on Activity Page 4.3, and convert it into a written police report. They should decide how to organize their information.
- When they are ready they should turn to Activity Page 5.1 and begin writing.
- As students work, circulate and check in. Ask them why they are organizing their writing in a particular way, and what choices they made about information to include.

## PEER FEEDBACK AND REVISION (20 MIN.)

### Model Peer Feedback

- Tell students they will now strengthen their police reports by getting advice and feedback from their peers.
- Model this by asking for a volunteer to read their piece aloud to the class. (Or, read an example you created.) Praise the strengths of the work, focusing particularly on organization, concise summaries of events, using facts rather than opinions and evidence from the text. Model asking respectful questions of the volunteer and making concrete suggestions for revision.

### Peer Feedback

- Ask students to return to their pairs from the previous lesson (when they completed the summaries). Ask students to either read or listen to the draft reports, and offer feedback.
- Remind them to listen attentively and respectfully, and offer constructive suggestions. Ask students to look at the guidance in their activity books for how to draft a report and for ideas on how to focus their feedback.
- After five minutes, ask students to swap roles. Before they swap, ask the recipient of the feedback to thank their partners and give an example of a helpful comment. When the other member of the pair has received feedback, repeat the exercise.



#### Check for Understanding

Ask students to volunteer a constructive suggestion their partner made.

### Notes for Revision

- Ask students to write three notes below their draft about how they would revise and strengthen their work. Remind students their changes could be organizational or focus on the specific content.



#### Check for Understanding

Ask students to provide examples of revisions they wish to make.



## Writing

### Entering/Emerging

With 1:1 support, create simple sentences from the notes in the previous lesson. Point students to sentences in the model police reports that are good examples.

### Transitioning/Expanding

Create sentences from the previous lesson's notes. Have students identify a good model from the police reports they read. Challenge them to make their sentences more concise.

### Bridging

Have students explain how they'll make their writing *coherent*. Ask them what they chose and why.

## Support

Model changes you would make to your work based on the peer feedback conversation you previously modeled.

## Challenge

Ask students to identify an area of their draft that needs revision. Have them suggest two possible ways to revise this section, then consider which one is better. Have students give a reason for their choice.

## Lesson 5: Call in the Sheriff?

# Speaking and Listening



**Primary Focus:** Debate whether the sheriff should investigate the missing fossil, using evidence from multiple sources. [SL.5.4]

### PREPARE ARGUMENTS FOR DEBATE (25 MIN.)

#### Review Additional Resources

- Remind students that in previous lessons they practiced using information from multiple sources to explain chemical content. Tell students that today they will use some of the same techniques in their work as detectives.
- Assign one of each pair to be a police officer who wants to convince the sheriff to investigate. The other should be a police officer who wants to convince the sheriff *not* to investigate.
- Ask students to read the two articles on Activity Page 5.2. These articles can be found in the Teacher Resources for this unit.
- Ask students to evaluate each article for evidence either supporting investigation or supporting not investigating and answer the question below each article.

#### Activity Pages 5.2 and 5.3



#### Support

Discuss the two articles. In the first article, ask students what decides whether a crime is investigated. Ask students if they think the "missing fossil" counts.

#### Support

Ask students whether the second article is arguing for investigation before or after a crime is committed.

#### Support

Model an opening statement for each side of the debate.



#### Check for Understanding

Ask students to compare the arguments of the two articles. Students should be able to identify that the first suggests you need a lot of evidence before acting, where as the second suggests you should be investigating to "prevent" a possible crime.

#### Prepare Opening Statement

- Ask students to complete Activity Page 5.3.

## HOLD DEBATE (20 MIN.)

- Assign students to small groups. In each small group, one student should play police officer 1 (for investigation) and another play police officer 2 (against investigation). The remaining members should play the sheriff. You can assign these roles or ask students to choose for themselves.
- Ask all students to read the rubric on Activity Page 5.4 before beginning their debate.
- Ask each police officer to make an opening statement.
- Now ask each police officer to respond to the other's opening statement and offer a reason why their opponent's argument is wrong. Remind them of the rules of respectful debate.
- As they debate, ask the students playing the sheriff to fill in the rubric in their Activity Book.
- Once the debate is concluded, ask the sheriffs to compare notes and declare a winner.



### Check for Understanding

Take a poll of the winner—for investigation or against investigation. Ask groups to provide an effective argument their winner made. Ask students to identify which of the sources (the reader or the two articles, or both) the argument came from.

End Lesson



## Speaking and Listening Supporting Opinions

### Entering/Emerging

Help students label evidence from the previous lesson and the articles they have written.

### Transitioning/Expanding

Help students explain how their opening statement maps to the rubric in their Activity Pages.

### Bridging

Prompt students on how opening statement meets requirements of the rubric in their Activity Pages.

## Activity Page 5.4



## Support

Pick one or two small groups to work with, helping students judge as sheriffs and fill in the rubrics appropriately.

## 6

# Scientists and Detectives, Part 2

## PRIMARY FOCUS OF LESSON

### Reading

Students will track character development. [RL.5.3]

Students will integrate multiple sources to explain compounds and elements. [RI.5.7, RI.5.9]

### Grammar

Students will understand how to use commas in a range of contexts. [L.5.2b]

### Morphology

Students will understand how to use the root *mit/mis*. [L.5.4b]

## FORMATIVE ASSESSMENT

### Activity Page 3.3

**Character Maps** Use character maps to track character development. [RI.5.3]

### Activity Page 6.4

**Integrate information** Use information from the Reader and other sources to correctly identify elements and compounds. [RI.5.7, RI.5.9]

### Activity Page 6.5

**Grammar** Use commas correctly. [L.5.2b]

## LESSON AT A GLANCE

|                                 | Grouping    | Time    | Materials                                                                                                                                            |
|---------------------------------|-------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reading (25 min.)               |             |         |                                                                                                                                                      |
| Partner Read: Chapter 4         | Partner     | 15 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Pages 6.1, 3.3                                              |
| Create Character Maps           | Partner     | 10 min. |                                                                                                                                                      |
| Reading (35 min.)               |             |         |                                                                                                                                                      |
| Analyze Chemical Content        | Partner     | 10 min. | <input type="checkbox"/> Activity Pages 6.2, 6.3, 6.4, 4.2<br><input type="checkbox"/> Periodic table (Lesson 4 Digital Resources/Teacher Resources) |
| Word Work: <i>Eureka</i>        | Whole Group | 5 min.  |                                                                                                                                                      |
| Elements and Compounds          | Partner     | 20 min. |                                                                                                                                                      |
| Language (30 min.)              |             |         |                                                                                                                                                      |
| Grammar:<br>Use of Commas       | Whole Group | 15 min. | <input type="checkbox"/> Activity Page 6.5                                                                                                           |
| Morphology: Root <i>mis/mit</i> | Whole Group | 15 min. | <input type="checkbox"/> Roots Poster                                                                                                                |



## ADVANCE PREPARATION

### Reading

- This activity uses the character maps students created in Lesson 3. Students can locate these on Activity Page 3.3. You can locate the sample character maps used in the lesson in the Teacher Resources for Lesson 3.
- Each pair completes questions for Julian and Kristal respectively. Students will have already completed for either Julian or Kristal in Lesson 3, and should be given the same character again.
- Either in the lesson or at home, students should copy their partner's character maps for the other characters, to allow them to solve the mystery in later lessons.
- It is possible students will need more space for their character maps. There are blank pages in the back of the activity book for this purpose. Alternatively, you can give them blank worksheets.

### Reading

- This activity continues to build on the skills practiced in Lessons 3 and 4. Students should be increasingly comfortable combining sources. You may wish to briefly review the activities in Lessons 3 and 4. If you have provided feedback on those activities, you may wish to review this feedback before beginning the activity in this lesson.
- This lesson contains a Think Aloud activity. During a Think Aloud, make your thinking visible to students by modeling the steps to solving a problem or completing a task. As you “think aloud” while working through an activity, students observe your approach to finding information, drawing conclusions, considering questions, and testing ideas.

### Morphology

- Ensure the Roots Poster is displayed. You may access a digital version in the digital components for this unit.

#### ➤ Roots Poster

#### Roots

A root is the main element of a word that forms the base of its meaning. A prefix or suffix added to the root can change the meaning.

## Universal Access

- Prepare excerpts of Chapter 4 that describe Julian and Kristal, to help students identify relevant information.
- Provide sentence starters to help students identify evidence for their character maps. For example:
  - “My first piece of information about Julian is this quote: \_\_\_\_.”
- Provide sentence frames to help students justify use of evidence for their character maps. For example:
  - I have chosen this piece of information because in the text \_\_\_\_, which is relevant because \_\_\_\_.”
- Provide multiple choice and sentence starters to help students identify the correct molecules:
  - This diagram has one/more than one element.
  - Because it has one/more than one element it is an element/compound.
  - I know this because the text says “compounds have \_\_\_\_.”
- Provide sentence frames to help students formulate their answers:
  - The texts says the main difference between elements and compounds is \_\_\_\_, and therefore this diagram is a \_\_\_\_, because it shows \_\_\_\_.
  - Because this diagram is a \_\_\_\_ and has the elements \_\_\_\_, and because the description says that \_\_\_\_ has \_\_\_\_, I know that this diagram represents \_\_\_\_.
- In the Morphology segment, provide additional sentences on familiar and unfamiliar topics to help students decipher brainstormed words. Some examples are in the supports in the lesson.

## Lesson 6: Scientists and Detectives, Part 2

## Reading



**Primary Focus:** Students will track character development [RL.5.3]

**PARTNER READ: CHAPTER 4 (15 MIN.)****Introduce the Chapter**

- Ensure each student has a copy of the Reader, *The Badlands Sleuth*, and has located Chapter 4.
- Have students turn to the table of contents, locate the chapter, and then turn to the first page of the chapter.
- As with previous units, preview the relevant core vocabulary, identify the first core vocabulary word, and ask students to identify the word bolded in the chapter and in the glossary at the back of the book.

**Vocabulary**

**prod, v.** to poke someone or something

**condense, v.** to change from a gas to a liquid

**eureka, exclamation.** ancient Greek word meaning “I have found it!”

**discovery, n.** the act of finding something new or unexpected.

**nudge, v.** to gently touch or push

**bond, v.** an attraction between atoms that allows chemical substances to be formed

**molecule, n.** a group of atoms bonded together

**precisely, adv.** exactly; with complete accuracy

**visible, adj.** able to be seen

**Vocabulary Chart for Chapter 4, “Who’s Hiding What?”**

| <b>Vocabulary Type</b>                    | <b>Tier 3<br/>Domain-Specific Words</b> | <b>Tier 2<br/>General Academic Words</b> |
|-------------------------------------------|-----------------------------------------|------------------------------------------|
| Core Vocabulary                           | eureka<br>bond                          | prod<br>nudge<br>precisely<br>visible    |
| Multiple-Meaning Core<br>Vocabulary Words | condense                                | discovery                                |
|                                           |                                         |                                          |
| Sayings and Phrases                       |                                         |                                          |

### Analyze the Text “Who’s Hiding What?”

- Ask students to read the first half of the chapter in pairs. As with previous units, you may pair students a number of ways. They will read up to “There’s no evidence someone took it, and why would they?” on page 25 of the Reader.
- Explain that both students will read the first page silently, and then one partner will read that page aloud. Next they will both read the second page silently, and then the other partner will read that page aloud, and so on. Students can ask their partner for help with sounding out or defining words as necessary.
- As they read, ask students to complete the questions in Activity Page 6.1. One of each pair should complete the questions for Julian, and the other should complete the questions for Kristal. Students should then explain their questions and answers to their partner.
- If time allows, ask students to also complete the language challenge questions in their Activity Books and discuss answers as a class.

### Support

Students may need support understanding Julian’s disappointment. Point them to the relevant text in chapter 2 [e.g.] ‘My dad’s famous. He owns four restaurants in Dallas. And my brother is famous to... If we discover something new, I sure hope I’m the one to find it.’”

### Support

A question on Julian is “Whom in the text are we learning about Julian’s emotions from?” Discuss with the class that this is one character’s perception (Amy’s) of another (Julian). Make a distinction between this and objective scientific information imparted in the chapter.

### Activity Page 6.1



## Chapter 4

# Who's Hiding What?

### THE BIG QUESTION

What is the difference between gold and fool's gold?

"Let's all spread out," Dr. Forester suggested as they reached the stretch of the gully below the dig site. "Keep your eyes peeled for anything that looks like the small fossil bones we found yesterday."

Everyone fanned out across the width of the gully, and with heads bowed, began scanning the rocky ground. Daria picked up something, frowned, and dropped it again. Then she **prodded** the rocky soil with the tip of her finger. "Wow, everything is sure drying out quickly," she said. "What happened to all that rainwater?"

"Some of it soaked into the ground," Tess replied. "But some of it evaporated and changed to water vapor that has mixed with the air. Remember, though, that physical changes are reversible. High above the earth's surface, the air is much colder. When water vapor encounters cold air, it loses heat and **condenses**. It changes states from a gas back to a liquid, forming tiny droplets of liquid water. Those tiny droplets in the air form clouds. If the droplets are big enough, they'll fall back to earth as rain."

"You mean we might get another thunderstorm?" Kristal eyed the sky warily.

"It's possible, but I'm guessing it won't rain again for quite a while," Tess replied. "I think the excitement is over for today."

Just then, Julian let out a shout. "Don't be so sure, because I just found gold! **Eureka!**"

Everyone rushed over to see the gleaming, dark, yellow rock that Julian held in the palm of his hand.

"I'm not only going to be famous," Julian said, triumphantly, "I'm going to be rich. Just look at the size of that nugget. My dad is going to be so proud of me!"

Dr. Forester examined Julian's find carefully. "Sorry to disappoint you, Julian. I'm afraid what you have there isn't gold but a very common type of rock called iron pyrite."

Julian's face fell. "You're absolutely sure?"

Tess laid a comforting hand on his shoulder. "You're not the first person to make that mistake, Julian. In fact, iron pyrite is often called fool's gold for that very reason."

Amy could tell Julian was very disappointed that his great discovery turned out to be nothing. He didn't say anything as he took the rock back from Tess and shoved it deep into his pocket.



A few minutes later, Matt stopped and nudged something with the toe of his shoe. “Hey, what about these?” Everyone rushed over and watched as Dr. Forester knelt down and then picked three more fossils out of the gravel.

“Maybe these will help me figure out just what kind of animal we have,” she said excitedly.

“Can we get back to the dig site now?” Julian blurted out in a loud, impatient voice. It was clear he didn’t want to look for small fossils anymore.

“It is almost noon,” Tess acknowledged, “so let’s break for lunch.”

They climbed up the slope to the dig site and retreated to the far end of the plateau again to eat sandwiches and fruit. Amy made a point of sitting next to Kristal. She unwrapped her sandwich but then laid it aside as she leaned in to ask the question she’d wanted to ask all morning. “Why haven’t you shown Dr. Forester your drawings of the little fossils yet?” Amy whispered. “If you did, she’d know there really is one missing.”

Kristal’s eyes went wide with surprise. “How did you know about my drawings?”

“I admit I peeked at your sketchbook,” Amy confessed, “but you can’t keep this information quiet. You need to let Dr. Forester know.”

Kristal was silent for a while. “Okay, I promise I will, but only—only if there is no one else around. Otherwise, people will make fun of my drawings.”

“No, they won’t!” Amy gasped. “You draw really well.”

Kristal suddenly looked past Amy with a surprised look on her face. “Hey, your sandwich!”

Amy turned just in time to see a small animal with narrow stripes making off with part of her sandwich. “You little stinker,” she said, laughing as the animal disappeared into a crack in the rocks far above them.



"Those little ground squirrels are all over these badlands," said Tess, chuckling. "They are very good at stealing food. I've known them to make off with other small objects they think might be food, too."

After lunch, they returned to excavating Achy-Breaky's bones. Matt had already exposed three of the dinosaur's fossil teeth. Amy was making much slower progress because her mind kept wandering back to the missing fossil bone.

"We're never going to get this jawbone excavated if you keep staring off into space," Matt said quietly, glancing up at his sister.

"I know, I know," Amy said, hurriedly picking up her brush to sweep away the bits of rock dust she'd created. "But I can't stop thinking about that missing bone." She told him about Kristal's drawings.

"Maybe Dr. Forester simply mislaid it," Matt suggested, "like Dad does with his car keys all the time. There's no evidence someone took it, and why would they?"



## Activity Page 3.3



Reading  
Reading/Viewing Closely

### Entering/Emerging

With 1:1 support, identify the quotes from the text that support answers to Activity Page 6.1, using excerpts as necessary. Use sentence starters as appropriate.

### Transitioning/Expanding

With finger sweeping, ask students to identify the quotes from the text that support answers to Activity Page 6.1. Use sentence frames as appropriate.

### Bridging

Ask students to show the link between the information in their character maps and the text they identified to answer Activity Page 6.1. Prompt them when necessary.

## CREATE CHARACTER MAPS (10 MIN.)

- Ask students to return to the character maps they created in Lesson 3, on Activity Page 3.3.
- Ask students to use their analysis of Julian and Kristal to continue to fill in the character maps.
- As students work, circulate and check in.



### Check for Understanding

Ask pairs to explain their maps to their partners so that both students can complete maps for both Julian and Kristal: listen to partner discussions and answers.

## Lesson 6: Scientists and Detectives, Part 2

# Reading



**Primary Focus:** Students will integrate multiple sources to explain compounds and elements. [RI.5.7, RI.5.9]

### ANALYZE CHEMICAL CONTENT (10 MIN.)

- Ask students to return to the beginning of Chapter 4. Tell students they will now be switching from detectives to scientists—analyzing the chemical content in the chapter.
  - Read aloud the two paragraphs from “Daria picked up something, frowned” to “they’ll fall back to earth as rain.”
1. **Evaluative.** What two reasons does Tess give for the earth’s drying out so fast?
- » 1. water sinking into the ground
  - » 2. water evaporating into the air
- Ask students to turn to Activity Page 6.2. In their pairs they should read the paragraphs from Chapter 4 on molecules and compounds, and answer the corresponding questions.

### Challenge

How does this information link with the water cycle you annotated in Lesson 3?

- » Students should link evaporation and the movement of water underground to parts of the cycle they annotated.

### Activity Page 6.2



### Support

Ask questions orally and facilitate class discussion.

Amy had to admit that Matt's question was a good one. She glanced around at the group. Everyone was hard at work—except Felix, who just at that moment took something out of his pocket and popped it into his mouth! Felix noticed Amy staring and swallowed hard, gulping down whatever it was. He cleared his throat and suddenly turned to Tess. “I was wondering, Tess, just what is the difference between gold and fool's gold?”

Amy thought Felix just asked the question to turn her attention away from him.

Tess didn't notice, though, and was happy to answer it. “Remember that atoms are the smallest particles of matter. The thing is, you don't find many atoms all by themselves in nature. Atoms typically join together, or **bond** into groups of two or more to form **molecules**. Some molecules are made up of atoms of just a single element. A lump of gold, for example, would be made up of many gold atoms bonded together.

“Most molecules, though, are combinations of two or more different elements. A molecule of iron pyrite, for example, has two atoms of the element sulfur bonded to an atom of the element iron. Molecules that contain atoms of two or more different elements are called compounds. Water is another example of a compound. A water molecule is made up of two atoms of the element hydrogen and one atom of the element oxygen.”

“Is that why people sometimes call water *H-two-O*?” Daria asked.

“**Precisely**,” Tess replied. “There are millions of molecules that are compounds, and you can find them everywhere and in everything. This sandstone rock we're scratching away is made of molecules that are compounds. So are these dinosaur fossils, and the tools we're using. Each one of you is a walking, talking collection of different compounds that make up your bones, muscles, nerves, and everything else in your bodies.”

Dr. Forester suddenly spoke up. “Okay, here's a riddle: why are all compounds molecules, but all molecules are not compounds?”

“Because some molecules are made up of atoms of only one element!” Matt exclaimed proudly.

“Exactly right,” Dr. Forester said.

Tess was about to continue her chemistry lesson, when Daria pointed at something off in the distance, “Sorry to interrupt, but I think someone’s coming.”

Far off in the distance a black SUV was slowly approaching, bumping along on a barely visible track that wound among the ridges.

“I thought no one lived out here,” Amy said.

“No one does,” Dr. Forester replied, “but maybe these people are lost.” She dug a pair of binoculars out of her backpack and trained them on the distant vehicle.

As they all watched, the vehicle stopped, then quickly turned around and headed back in the direction from which it had come.

“That was strange,” Julian said. “It’s like they suddenly saw us and turned around.”

Amy thought it was strange, too. What was even stranger, though, was the look Dr. Forester and Tess exchanged as the black SUV drove away.

Nothing else disturbed their work for the rest of the day, and Dr. Forester was very pleased with their progress. As the sun started to sink in the western sky, they packed up their gear and said good-bye to Achy-Breaky for another day. Back at camp, Tess grilled hamburgers over the open campfire and heated baked beans in a cast iron pot.

After dinner, Dr. Forester put them all to work in the lab, helping her measure the little fossils from the gully and use the balance to determine their mass. Amy kept giving Kristal encouraging looks, hoping she would show Dr. Forester her sketches, but Kristal just kept shaking her head.

“Can you tell what kind of animal it was yet?” Julian asked, as they were putting all the instruments away.

“Well, this is a part of a leg bone,” Dr. Forester said, pointing at one of the fossils. “And this one looks to be part of a vertebra, or a piece of the backbone. But I’m still not sure what we have. It’s never a good idea to jump to conclusions.”

And then it was time for bed. Amy caught up to Kristal as she was heading to the tent.

“I know, I know,” Kristal whispered. “I promise I’ll show my sketches to Dr. Forester tomorrow. I need to get my courage up.”

Kristal fell asleep within minutes, but Amy decided to read until Daria came in. She finished one chapter and then another, but Daria still hadn’t come. Amy peered out through the tent flap and looked around at the silent camp. Everyone else was asleep as nearly as she could tell. Amy sat on her cot and began to worry. What if something had happened to Daria? What if she’d been bitten by a snake? Just as Amy was about to tug on her sweatshirt and shoes and go in search of her, Daria came bouncing into the tent with a huge smile on her face.

“Where have you been?” Amy hissed. “I was starting to worry.”

“Um! Ah—I went for a long walk!” Daria whispered back, sounding strangely excited.

“In the dark?” Amy asked.

“Oh—um—I used the flashlight on my phone,” Daria said quickly. “Good night!” She spun on her heel and headed for her cot.

Amy lay awake, thinking about Daria’s strange behavior, Felix’s secretive snacking, and the odd look Tess and Dr. Forester exchanged when the black SUV appeared. Perhaps they were clues to the missing fossil. She pulled out her notebook and by the light of her flashlight, listed them one by one. No matter how many times she read through the list, however, she couldn’t make sense of any of them, and finally decided, like Dr. Forester had with the small fossils, that there wasn’t enough evidence to draw any conclusions. But from now on she was going to keep a closer eye on Daria—and Felix.

## WORD WORK: EUREKA (5 MIN.)

- Choose one of the following two Word Work activities. The first further expands on Latin and Greek roots. The second expands on the different meanings of words in scientific and other contexts.
  - Word Work Activity 1: Remind students they previously looked at scientific words with Latin and Greek roots, and that this helps create a “universal language” for scientific communication.
  - Tell students *eureka* is another Greek word used by scientists and inventors when they discover or understand something new. It means, “I have found it.”
  - Tell students that the ancient Greeks were great scientists, and one of the most famous—Archimedes—discovered how to use water to find the exact weight of a gold crown. He was so excited by his discovery—made in the bath—that he jumped out of the bath and ran down the street with no clothes on, shouting “Eureka!” at the top of his lungs.
  - Word Work Activity 2: Remind students that sometimes terms have a precise meaning in science and another meaning in everyday English. Remind students they investigated the word *element*.
1. **Evaluative.** Tess uses the word *condenses*. In chemistry this means to turn from a gas into a liquid. We also use the word *condense* in our writing, when we wish to make it shorter by removing unnecessary words and details. Why do you think the same word is used for both meanings?
- » When a gas turns into a liquid it takes up less space.

## ELEMENTS AND COMPOUNDS (20 MIN.)

### Summarizing Information from the Reader

- Tell students they are going to use information from the Reader and from diagrams to identify different elements and compounds.
- Tell students that before they do this they will summarize the content they have learned from the Reader.
- Ask students to return to the four paragraphs on Activity Page 6.2. Tell them they will summarize the first two paragraphs.

### Support

Ask students to think about the differences in the diagrams showing a gas and a liquid.

### Challenge

Ask students to reduce the second paragraph to two sentences.

- » “Molecules are more commonly made up atoms of more than one element. They are called *compounds*, and examples include iron pyrite and water.”

### Support

Continue to model the second and if necessary the third paragraph.

## Activity Page 6.4



### Reading Reading/Viewing Closely

#### Entering/Emerging

Use a combination of multiple choice and sentence starters to help identify the correct molecules.

#### Transitioning/Expanding

Use sentence frames to ask students to identify the main difference between elements and compounds in the text, and apply this to their diagrams.

#### Bridging

Ask students to link their identification of the molecule (a) to key words and phrases in the descriptions and (b) from this to evidence in the text.

### Support

Review the subject of a sentence.

### Challenge

Ask students to come up with their own sentences with introductory elements.

- Using a Think Aloud model, summarizing the first paragraph. Remind students that summarizing means using only the most important information. As you work, describe how you have selected parts of the text and made them as concise (or as condensed!) as possible. For example, explain that you have removed all of the following text because it does not contain chemical content: "He cleared his throat and suddenly turned to Tess. 'I was wondering, Tess, just what is the difference between gold and fool's gold?' Amy thought Felix just asked the question to turn her attention away from him. Tess didn't notice, though, and was happy to answer it."
- Ask students to copy your summary into their Activity Books as you work. An example is below.

"Atoms, the smallest particles of matter, are usually found as molecules. Molecules are groups of bonded atoms, sometimes of a single element."

- Ask students, in their pairs, to summarize the second and third paragraph.

### Integrating Information

- Ask students to turn to Activity Page 6.4 and combine the information in the reader with the additional diagrams and clues there.



### Check for Understanding

Ask students to volunteer their answers and point to the information in the text and in the clues that led to their answer.

## Lesson 6: Scientists and Detectives, Part 2

# Language



### GRAMMAR: USE OF COMMAS (15 MIN.)

**Primary Focus:** Students will understand how to use commas in a range of contexts. [L.5.2b]

- Tell students that they will be investigating different uses of commas. One way to use commas is to separate introductory elements from the rest of the sentence.
- Tell students that introductory elements are words that come before the subject of a sentence. Ask students to define the subject of a sentence.

- Write the sentence below.

“Underneath the shifting sands the dinosaur waited to be discovered.”

- Ask students to identify the subject of the sentence. (*the dinosaur*)

Place a comma before *the dinosaur* to show the separation of an introductory element.

- Ask students to complete the practice sentences on Activity Page 6.5.

## Activity Page 6.5



### Check for Understanding

Ask students to explain why the following sentence needs no comma:  
*Amy was very excited about the day ahead.*

## MORPHOLOGY: ROOT *MIS/MIT* (15 MIN.)

**Primary Focus:** Students will understand how to use the root *mit/mis* [L.5.4b]

- Refer to the Roots Poster you displayed in the classroom and read with students.
- Tell students that they will study the root *mit/mis*. Explain the origin of *mit/mis* is Latin and that it means “to send.”
- Write the root *mit/mis* and its meaning on the board/chart paper.
- Explain that prefixes and suffixes can be added to change the part of speech of the root.
- Read out the following two sentences from Chapter 4 of the reader. Ask students to raise their hands when they hear words with the root *mit/mis* (these have been bolded for you). Briefly discuss the meaning of each word. Write the word and its meaning on the board, and the sentences from the Reader.

“Maybe Dr. Forester simply **mis**laid it,” Matt suggested, “like Dad does with his car keys all the time. There’s no evidence someone took it, and why would they?”

“I **admit** I peeked at your notebook,” Amy shot back, “but you can’t keep this information quiet. You need to let Dr. Forester know.”

- As a class, brainstorm words containing the root *mit/mis*. Write the words on

## Support

Review affixes.





## Language Reading/Viewing Closely

### Entering/Emerging

Provide additional sentences on familiar topics for the brainstormed words to allow students to decipher and apply the meaning.

### Transitioning/Expanding

Provide additional sentences on topics related to the Reader to allow students to decipher the meaning of brainstormed words.

### Bridging

As necessary, give students additional examples of the words used in context.

### Challenge

Ask students to infer why *missile* might have a root from the Latin meaning "to send."

the board. An example table is below.

| Affixed Word | Meaning                                    | Sentence                                                                                                                                                                 |
|--------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mislaide     | lost something unintentionally             | "Maybe Dr. Forester simply <b>mislaide</b> it," Matt suggested, "like Dad does with his car keys all the time. There's no evidence someone took it, and why would they?" |
| admit        | allow to enter; confess to be true         | "I <b>admit</b> I peeked at your notebook," Amy shot back "but you can't keep this information quiet. You need to let Dr. Forester know."                                |
| commit       | promise something                          |                                                                                                                                                                          |
| permit       | allow something                            |                                                                                                                                                                          |
| missile      | an object thrown or projected at something |                                                                                                                                                                          |



### Check for Understanding

Take a few minutes, as a class, to brainstorm words that can have *mis/mit* added to the end of them.



### Check for Understanding

Ask students to provide sentences using the words in the table above. Students struggling should be placed in a small group for a quick re-teach.

End Lesson



## 7

# Solutions

## PRIMARY FOCUS OF LESSON

### Reading/Writing

Students will use textual evidence to distinguish between mixtures, solutions, and compounds, and then organize their writing to allow others to make the same distinctions. [RI.5.1; W.5.2, W.5.4]

### Speaking and Listening

Students will report on fossil creation, summarizing and synthesizing a written text with other sources. [SL.5.2, SL.5.4, SL.5.5]

## FORMATIVE ASSESSMENT

### Activity Page 7.2

**Tess's Rules** Create rules to distinguish between mixtures, solutions, and compounds. [RI.5.1; W.5.2, W.5.4]

### Activity Page 7.4

**How Fossils Are Formed** Use a rubric for presentations. [SL.5.2, SL.5.4, SL.5.5]

## LESSON AT A GLANCE

|                                  | Grouping    | Time    | Materials                                                                                                                                                                                                |
|----------------------------------|-------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reading/Writing (30 min.)        |             |         |                                                                                                                                                                                                          |
| Small Group: Chapter 5           | Small Group | 10 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Pages 7.1, 7.2<br><input type="checkbox"/> Activity Page 6.4 (optional)                                         |
| Create Tess’s Rules              | Independent | 20 min. |                                                                                                                                                                                                          |
| Speaking and Listening (60 min.) |             |         |                                                                                                                                                                                                          |
| Identifying Steps                | Whole Group | 15 min. | <input type="checkbox"/> Activity Pages 7.3, 7.4<br><input type="checkbox"/> Supplementary materials (optional)<br><input type="checkbox"/> PowerPoint or other application for presentations (optional) |
| Find Supplementary Information   | Small Group | 15 min. |                                                                                                                                                                                                          |
| Preparing Presentation           | Small Group | 15 min. |                                                                                                                                                                                                          |
| Giving Presentation              | Small Group | 15 min. |                                                                                                                                                                                                          |

## ADVANCE PREPARATION

### Reading/Writing

- The writing activity asks students to combine their understanding of compounds from the previous lesson with the information on solutions and mixtures in Chapter 5. You may wish to review Activity Page 6.4 to ensure students understood the material in the previous lesson. If not, you should begin the lesson with a quick review of the content using Activity Page 6.4 to guide you.

### Speaking and Listening

- This activity can be extended substantially through the following:
  - Ask students to include graphics and other multimedia components, and use programs such as PowerPoint to expand on their presentation.
  - Provide additional resources from the library on dinosaurs and fossils for students to integrate into their presentations.
  - Provide large pieces of cardboard for students to paste diagrams and create a flow chart to show the creation of fossils.
- Although a Speaking and Listening activity, be aware this continues to ask students to integrate information from diagrams and multiple places in the text.
- You may also wish to create an in-class or out-of-class opportunity for students to present more extensively.
- Prepare to display the diagram on fossil creation. This can be found in Teacher Resources or in the digital components for this unit. You should make sufficient copies of the diagram for students to use in their presentations if they and you wish.

### Universal Access

- Provide text excerpts to help students identify relevant information on mixtures, compounds, and solutions.
- Provide students with sentence frames to help them generate yes/no questions for Tess's rules:
  - "Does it \_\_\_\_?"
  - "Can it \_\_\_\_?"
  - "When you \_\_\_\_, does it \_\_\_\_?"

- Make sure you have copies of the fossil diagram for students who require additional support. This can be used to provide a structure and visual aid for their presentation and a visual aid.

### Academic Vocabulary

**precise, adj.** exact and accurate

**distinguish, v.** to recognize differences between ideas, things, or people

---

Start Lesson

### Lesson 7: Solutions

# Reading/Writing



**Primary Focus:** Students will use textual evidence to distinguish between mixtures, solutions, and compounds, and then organize their writing to allow others to make the same distinctions. [RI.5.1; W.5.2; W.5.4]

#### SMALL GROUP: CHAPTER 5 (10 MIN.)

As with previous units, preview the relevant core vocabulary, identify the first core vocabulary word, and ask students to identify the word bolded in the chapter and in the glossary at the back of the book.

### Vocabulary

**horizon, n.** where the earth seems to meet the sky

**mixture, n.** two or more substances that are combined without changing their chemical composition

**dissolve, v.** to turn into a solution

**suspicious, adj.** giving the impression of dishonest behavior

**decompose, n.** decay

| Vocabulary Chart for Chapter 1, “Welcome to Fossil Camp!” |                                 |                                  |
|-----------------------------------------------------------|---------------------------------|----------------------------------|
| Vocabulary Type                                           | Tier 3<br>Domain-Specific Words | Tier 2<br>General Academic Words |
| Core Vocabulary                                           | mixture<br>dissolve             | suspicious<br>decompose          |
| Multiple-Meaning Core<br>Vocabulary Words                 |                                 |                                  |
|                                                           |                                 |                                  |
| Sayings and Phrases                                       |                                 |                                  |

**Small Group Read Chapter 5, “Sketches and Secrets”**

- Divide students into two small groups. Work with Small Group 1 as students complete the questions below. Ask Small Group 2 to complete the Activity Page in pairs as they read the text.
- Ask students to read from the beginning of Chapter 5, “Sketches and Secrets,” to “Matt smiled and mussed Amy’s hair. ‘When you figure that one out, sis, let me know.’”
- Ask students to turn to Activity Page 7.1 and complete the questions.

Activity Page 7.1



## Chapter 5

# Sketches and Secrets

### THE BIG QUESTION

What do the sea and sweet tea have in common?

The sun looked like an angry red ball on the horizon when Amy got up. It was going to be another scorching hot day.

Tess had put out boxes of different kinds of cereal on the table, along with fresh and dried fruits and nuts. Amy sprinkled a few blueberries on her wheat flakes.

“Could you pass those, please?” Felix asked. Amy did and then stared as Felix dumped a handful of blueberries on top of all the things he had already heaped onto his cereal: raisins, sliced bananas, almonds, dried cranberries, peanuts, grapes, and flakes of dried coconut.

Felix noticed Amy staring. “What?” he asked, looking down at his bowl. “I always do this with cereal. It makes it more interesting and better tasting, too.” He began stirring all the ingredients together with his spoon.

Tess tried to hide her smile. “Well, all I can say is that is quite a **mixture** you’ve got going there, Felix, at least in the chemical sense of the word.”

“What do you mean?” Matt asked.

“In chemistry,” Tess replied, “a mixture is made from two or more substances that are physically mixed together but can still be separated.”

“You mean that I could pick out all the raisins,” Felix said, plucking a raisin from the bowl and popping it in his mouth, “and all the nuts and all the banana slices and cereal pieces and so forth.”



Tess nodded. “And no matter how much you stirred the—er—mixture in your cereal bowl, all the different types of matter wouldn’t change. They would still have the same properties that they had before you mixed them together.”

Kristal had added a spoonful of sugar to her tea and was stirring it in. “But mixing sugar into tea is different, right?”

“Not really,” Tess said, “because what you are making there is a solution, which is actually a special type of mixture. Solutions are formed when one substance is mixed into another and **dissolves**. It might look like the sugar disappears, but it really just turns into particles so small you can’t see them in the liquid.”

“But if sweet tea is a mixture, you should be able to separate the tea from the sugar, and I don’t see how you could do that,” Matt said.

“Actually you could,” Tess replied. “It wouldn’t be as easy as picking raisins out of cereal. But if you let all the liquid evaporate, the sugar would be left behind as tiny crystals.”

“That’s like what happens when you go swimming in the ocean and don’t rinse off afterwards,” Daria added. “The seawater evaporates, leaving little crystals of salt on your skin.”

“Seawater is a solution that has lots of things dissolved in it,” Tess agreed, “but especially a lot of salt!”

“Here comes Dr. Forester,” Julian said. Amy got the impression he had been waiting for her, and when she sat down, he asked again if she’d had any luck figuring out what kind of animal the small gully fossils had belonged to.

Dr. Forester shook her head, but she was smiling. “The more I look at those little bones, though, the more excited I become. One of the three new pieces we found yesterday was especially interesting. From its shape and texture, I am quite sure it’s from a small dinosaur.”

Amy shot a hard glance at Kristal, who started to shake her head but then nodded and coughed softly. “Um, Dr. Forester,” she said, producing

the sketchbook she'd been holding on her lap, "I wanted to show you some drawings I made of the first little bones found in the gully." She flipped open to the drawings Amy had seen, and turned the book around so Dr. Forester and everyone else could see.

"These are very professional!" Dr. Forester exclaimed. "Kristal, you've captured the details well!"

"Thanks," Kristal said, embarrassed but obviously pleased. "But I wanted you to see them for another reason. You and Felix found six fossils that first day, not five, and my drawings prove it."

Dr. Forester studied Kristal's sketches for a long moment. "So one of them *is* missing," she said softly. "I'm hoping it will turn up, but until it does, I'd like to use your drawings, Kristal, when I study the fossils tonight."

As they were packing up to head out to the dig site, Matt pulled Amy aside. "So, what do you think happened to the missing fossil? Have you uncovered any clues as to where it might be?"

"I really have no idea, at least not yet. But it's not the only odd thing that's happened around here." She told her brother about Daria being gone for such a long time the previous night.

"Hmmm," Matt mused, "that does sound a little **suspicious**. Something strange happened in our tent last night, too. Felix has a huge backpack that's absolutely stuffed. Last night I was scooting it under his cot to make more room in the tent and he said he didn't like anyone touching his things. And now this morning," Matt's voice fell to a whisper, "there's a lock on it. Who puts a lock on a backpack?"

"Someone with something to hide?" Amy arched one eyebrow. "But why would Felix steal a fossil?"

Matt smiled and mussed Amy's hair. "When you figure that one out, let me know."

It was day three of their paleontology adventure. Felix and Daria had removed nearly all the rock from around the cluster of backbones. Kristal and

## Activity Page 7.2



### Support

You may need to facilitate class discussion for the last question to help students understand how sugar in a solution could be left as a solid when water evaporates.

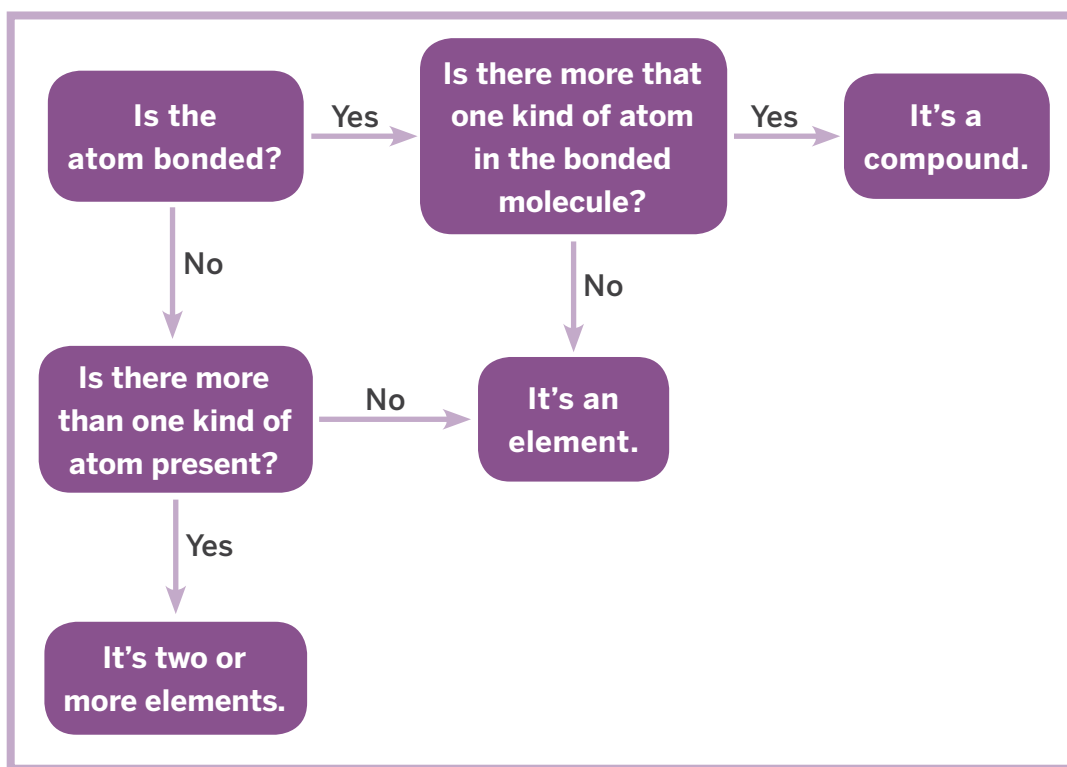
### Challenge

Ask students to expand their final answers by referring to the states of sugar and water.

## CREATE TESS'S RULES (20 MIN.)

### Review Tess's rules

- Ask students to turn to Activity Page 7.2 and read the example of Tess's rules provided.
- Working as a class, use Tess's rules in the example to identify whether gold and water are compounds or elements. Tell students that gold is bonded to other gold atoms, and that the chemical composition of water is  $\text{H}_2\text{O}$ .
- Discuss with students how Tess's rules are organized. Read aloud the three bullets in the introduction to the rules. In each case, discuss with students whether her rules about compounds meet the criteria in the bullets:
  - Can people use this to answer the question (is something an element or a compound?)
  - Is it possible to decide the answer to the question I ask in each case?
  - Is it organized in a way that is easy to understand and use?
- Tell students that this organization is usually called a flow diagram and is used to answer multiple questions to decide on an outcome (in this case "do I have an element or a compound?").



## Create Tess's Rules

- Ask students to return to Activity Page 7.2 to create “Tess’s rules” for distinguishing between whether you have created a solution, a mixture or a compound. An example is provided as follows.



### Check for Understanding

Ask students to evaluate whether the new flow diagram meets Tess’s criteria (the three bullet points in the beginning of Activity Page 7.2).

## Support

Create “Tess’s Rules” together as a class.



### Writing Understanding Text Structure

#### Entering/Emerging

Model turning the sentence “They would still have the same properties . . .” into a yes/no question: “Does it still have the same properties as before?”

#### Transitioning/Expanding

Provide students with sentence frames to help them generate yes/no questions (e.g., “Does it \_\_\_\_?”).

#### Bridging

Discuss the difference between the way the text is presented in the Reader and the yes/no questions they are generating.

## Lesson 7: Solutions

# Speaking and Listening



**Primary Focus:** Students will report on fossil creation, summarizing and synthesizing a written text with other sources. [SL.5.2, SL.5.4, SL.5.5]

- The instructions below assume that you have not supplemented with additional resources, multimedia, or software such as PowerPoint. Please adapt accordingly.

### Challenge

Ask students to use the flow diagram to evaluate saltwater and sugar-water

### Activity Page 7.3



### Support

Review the quotes that have been placed onto the diagram as examples:

- “His body was covered beneath a thick layer of muddy sand.”
- “It was preserved for a long time, sealed beneath tons of sand.”

### IDENTIFYING STEPS (15 MIN.)

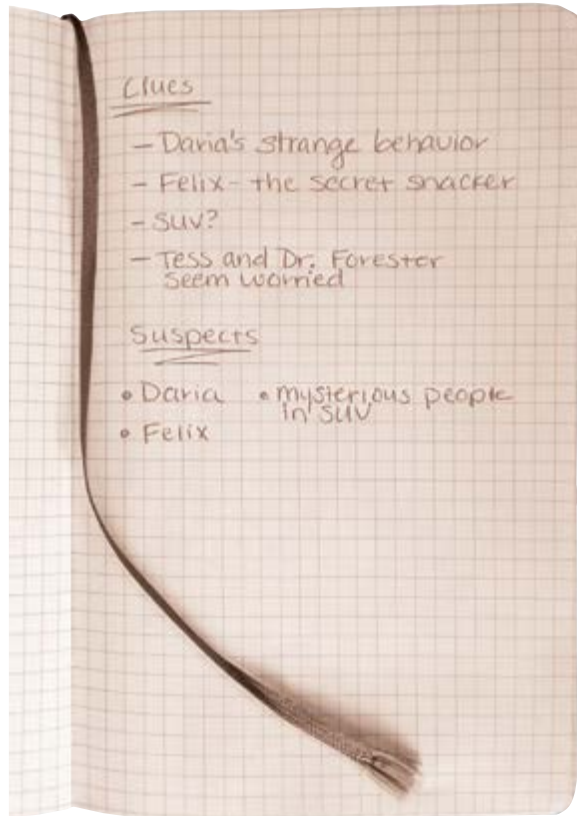
- Ask students to return to Chapter 5 and resume reading (from “It was day 3 of their paleontology adventure”).
- Work with Small Group 1 to complete Activity Page 7.3. Divide the remaining students into groups of four and ask them to complete the material together.



### Check for Understanding

How did new compounds get to Achy Breaky when he was covered in sand that became rock?

- » Water oozed through the rock and carried the compounds dissolved as a solution.



Julian were making good progress on excavating the bones of the dinosaur's foot. Amy could see that Matt would have the rock cleared away from his half of the jawbone by the end of the day. If she didn't work faster on her half, she'd be holding things up. Amy tried to put the mystery of the missing fossil out of her mind and concentrate on scraping and sweeping the crumbly rock away.

As more and more of the dark, gleaming fossil was revealed, Amy remembered something Tess had said when they first arrived at Fossil Camp.

“Tess, remember when I asked you what a fossil was?”

“Ah, yes, so you did.” Tess said, straightening up. “Now that you all understand a little chemistry, I’ll give you a more complete answer.”

Everyone put down their tools and stretched, happy for a break.

“Different kinds of fossils form in different ways,” Tess began, “but these dinosaur fossils formed as the original compounds in Achy-Breaky’s bones were replaced by other compounds, thanks to the powerful effects of a solution at work.”

“Like sugar in tea?” Kristal asked.

“In a way,” Tess replied. “When Achy-Breaky died millions of years ago, his body was quickly covered beneath a thick layer of muddy sand. As a result, it didn’t break down, or **decompose**, in the way most dead things usually do. It was preserved for a long time, sealed beneath tons of sand that gradually turned to rock.”

“As time passed, water oozed down through the rock and picked up different mineral compounds along the way. These compounds dissolved in the water, creating a solution. As more and more minerals dissolved in the water, they began to come out of the solution as solids again. Little by little, those mineral compounds settled in tiny spaces in Achy’s bones and teeth. They replaced his original compounds so that what was left at the end of this process were fossilized bones and teeth. And that’s what you are excavating right now.”

“You sure were right, Tess,” said Felix, “when you said that chemistry has a lot to do with paleontology.”

Amy went back to work thinking about the fossils in the rock beneath her hands in a very different way. They weren't just old bones, but the result of amazing changes in matter that had taken place over an incredibly long period of time. They were pieces of ancient history, very real clues to the past. Thinking about fossils in this new way made Amy glad she'd let Matt talk her into coming to Fossil Camp. Even if she didn't solve the mystery of the missing fossil, she was glad they were here.

Hours later, they returned to camp, hot, sweaty, and tired. Tess warmed a big pot of water and set out a basin and towels. "Does anyone want to clean up before dinner?" she called out.

Amy was first in line. Tess poured some warm water into the basin and handed her a bar of soap. As she washed her face and arms, the water in the basin turned cloudy and light brown—the same color as the sandstone ridges. There was a layer of sandy grit at the bottom of the basin. "Wow, was I ever dirty," she said, patting her skin dry with the towel. Amy picked up the basin to toss away the dirty water and exclaimed, "I created a mixture, didn't I?" Tess nodded and laughed as she rinsed and refilled the basin for the next person in line.

After dinner, everyone gathered in the lab. Dr. Forester had laid out all eight of the fossil bones from the gully on a piece of cloth on the big table. "Tonight I want to show you how paleontologists help preserve fossils that are rather fragile, as these tiny bone fragments are." She held up a small brown glass bottle. "This is a special solution, a sort of glue called a consolidant, that we paint onto delicate fossils. Let me show you how it's done." A brush was built into the bottle's lid, and Dr. Forester used it to carefully apply a thin coat of consolidant onto each of the fossils. She explained that the consolidant soaked deep into the fossils, and as it dried and hardened, it would make them stronger and less likely to break.

"These will be dry by morning. Then I'll go back to work analyzing them. If I could just find a matching edge for even just two of them, I might have a large enough piece to say for sure what type of dinosaur this is." She sighed and screwed the lid back on the bottle. "We'll just have to wait and see."



### Challenge

“You sure were right. . . when you said chemistry has a lot to do with paleontology.” What does this mean?

- » Answers should reference how chemical concepts have been used to explain the existence of fossils.

### Activity Pages 1.2 and 3.2



### Support

Continue to work with students to complete this activity, or continue to model as a class.

## FIND SUPPLEMENTARY INFORMATION (15 MIN.)

- Tell students that they will now treasure hunt for information from previous chapters to supplement their understanding of fossil creation.
- Remind students that they have been practicing integrating information from different sources, and that they have already started doing this by using the diagram in their Activity Books and adding information from the text.
- As a class, return to Activity Page 1.2 from Lesson 1. Point to the definition of *matter* (“anything that has mass or takes up space”) and states (“matter can be in different states: solid, liquid or gas”).
- Now ask students to turn to Activity Page 3.2. Point to the information about water changing state, and in particular point to water moving underground.

**Evaluative.** How does understanding that matter can move between different states help you understand fossil creation?

- » “You need this to understand how the solution that trickles into Achy Breaky’s bones can then have the liquid evaporate into gas to leave solid compounds forming a fossil.”
- Ask students to turn to Activity Page 7.3 and, with guidance, complete the information from this text in the table.
- Ask students in their small groups to now look at the material from Chapter 4 and in their Activity Pages from Lesson 6, and use the information they learned to add in additional information to help them understand fossil creation.
- Finally, ask students to use the information they learned about solutions earlier in the lesson to add in additional information to help them understand fossil creation. An example of a completed table follows.

| Lesson and Activity Page | What you learned                                                                             | How it helps you understand fossil creation                                                                                                                           |
|--------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.2, 3.2                 | That matter can be in different states: liquid, solid, and gas.                              | When water evaporates from liquid to gas, it leaves behind compounds that become the Achy Breaky fossil. Water moves underground in the water cycle, then evaporates. |
| 6.2                      | <i>Most atoms are found bonded to other atoms of different elements to create compounds.</i> | <i>The fossil is made up of compounds that replace the dinosaur bones.</i>                                                                                            |
| 7.1                      | <i>Solids dissolve in liquids to form a solution of two compounds.</i>                       | <i>Water carry compounds in solution to Achy Breaky’s bones, leading to fossil creation.</i>                                                                          |

## PREPARING PRESENTATION (15 MIN.)

- Tell students that, in their small groups, they will prepare a presentation on the creation of a fossil using the information they have gathered.
- Remind students that a presentation gives the listener the most important information in the most engaging way. The purpose is to ensure the listener understands the material and is interested by it. Remind students they can use stories, examples, and other tools to keep the listener engaged. You may wish to model an example.
- Ask students to work in their small group to tell a story about the creation of a fossil. Tell them they may use the diagram of fossil creation you have prepared, or create their own drawings to accompany the presentation.
- Ask students to spend five minutes first brainstorming the order in which they wish to present their information, and the *context* (the story) for their information. Ask students to decide which member of their group will present each part of the information.
- Ask students to look at the rubric in Activity Page 7.4 as they work to help them prepare.
- As students work, circulate and check in.

## GIVING PRESENTATION (15 MIN.)

- Pair two small groups together. Ask groups to listen to each others' presentations and complete the rubric in Activity Page 7.4 as they listen.
- Remind students to listen carefully and respectfully.
- Choose a couple of presentations to attend.



### Check for Understanding

Ask students to provide examples of ways in which the group they listened to engaged them in the material.

End Lesson

## Support

Provide models of presentations to the class. Work intensively with one or two small groups as they prepare their presentations.



### Speaking and Listening Presenting

#### Entering/Emerging

Use the diagram in the Activity Book to help students structure a simple presentation, then help them add in information from the text for some of the steps.

#### Transitioning/Expanding

Have students use the Activity Book diagram as a structure for the presentation, then place the additional information from their treasure hunt on it.

#### Bridging

Work with students to integrate presentation techniques such as storytelling into the structure provided by the Activity Book diagram.

## Activity Page 7.4



## 8

# Leaving Tracks?

## PRIMARY FOCUS OF LESSON

### Reading

Students will use explicit evidence from the text to track character development. [RL.5.1, RL.5.3]

### Reading/Writing

Students will analyze how Amy's point of view influences character description, offering opinions on how this affects evidence of the character. [RL.5.6; W.5.1, W.5.9]

## FORMATIVE ASSESSMENT

### Activity Page 3.3

**Character Maps** Use character maps to track character development. [RL.5.3]

### Activity Page 3.3

**Character Maps** Distinguish between fact and opinion in the character maps with asterisks/underlining. [RL.5.6]

### Activity Page 8.2

**Opinion Writing on Character** Describe how the protagonist's point of view affects evidence on the character. [RL.5.6; W.5.1, W.5.9]

## LESSON AT A GLANCE

|                                 | Grouping    | Time    | Materials                                                                                               |
|---------------------------------|-------------|---------|---------------------------------------------------------------------------------------------------------|
| Reading (55 min.)               |             |         |                                                                                                         |
| Close Reading: Chapter 6 Part 1 | Whole Group | 15 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Pages 8.1, 3.3 |
| Detective’s Inferences          | Partner     | 10 min. |                                                                                                         |
| Create Character Maps           | Small Group | 30 min. |                                                                                                         |
| Reading/Writing (35 min.)       |             |         |                                                                                                         |
| Reviewing Point of View         | Whole Class | 10 min. | <input type="checkbox"/> Activity Pages 3.3, 8.2                                                        |
| Identifying Opinions            | Partner     | 25 min. |                                                                                                         |

## ADVANCE PREPARATION

### Reading

- **Note:** Only the first part of this chapter is read in this lesson.
- This activity uses the character maps students created in Lesson 3. Students can locate these in Activity Page 3.3. You can locate the sample character maps used in the lesson in the Teacher Resources for Lesson 3.
- By this lesson students should have filled in information for both Julian and Kristal from Lesson 6.
- It is possible students will need more space for their character maps. There are blank pages in the back of the activity book for this purpose. You can also give them blank worksheets.
- As written, this lesson contains peer review and revision. You may remove this if time does not allow.
- Between this lesson and Lesson 12, ensure students have an opportunity to copy other character maps for characters they did not focus on in this lesson.

### Reading/Writing

- This lesson contains a Think Aloud activity.
- Write the following sentences on the board or chart paper:
  - “He looked at me shiftily. I was sure he was up to no good.”
  - “The thief glanced both ways, snuck into the shop and took the trainer.”
  - “My puppy looked at me sadly, as though the food I was eating was the only thing that could save him from starvation.”
  - “She hurriedly put something back into her bag.”
- Students will need to underline or asterisk their work. It may be helpful to provide them with colored pens or pencils.

## Universal Access

- Prepare excerpts of the reader that describe the different characters to help students identify information.
- Provide sentence starters to help students identify evidence for their character maps.
  - “My first piece of information about Felix is this quote \_\_\_\_.”
- Provide sentence frames to help students justify use of evidence for their character maps.
  - “I have chosen this piece of information because in the text \_\_\_\_ which is relevant because \_\_\_\_.”
- For the writing segment, prompt students to identify subjective information.
  - Is the author only describing what happened or interpreting?
  - Is Amy describing feelings she has about the character? Is Amy describing feelings she thinks the character has? How do we know those are true?
  - Are there any actions Amy is describing? Can we be sure they are actions that occurred?
- Support students in constructing their answer to the writing prompt with outline structures.
  - “Amy made \_\_\_\_ assumptions about the character. They are \_\_\_\_, \_\_\_\_, and \_\_\_\_.
  - \_\_\_\_ matters because Amy assumed that \_\_\_\_ was \_\_\_\_ when we don't know this is true. This could make us believe that \_\_\_\_ when we don't know if this is the case.”

## Lesson 8: Leaving Tracks?

## Reading



**Primary Focus:** Use explicit evidence from the text to track character development.  
[RL.5.1, RL.5.3]

## CLOSE READING: CHAPTER 6, PART 1 (15 MIN.)

- Ensure each student has a copy of the Reader, *The Badlands Sleuth*, and has located Chapter 6. They will read the first half only.
- As with previous units, preview the relevant core vocabulary, identify the first core vocabulary word, and ask students to identify the word bolded in the chapter and in the glossary at the back of the book.

## Vocabulary

**tense, adj.** nervous, tightly wound

**flushed, adj.** with a reddish color (usually the face)

**genuinely, adv.** honestly, authentically

**incredulous, adj.** disbelieving

**unscrupulous, adj.** not caring about the right thing to do

**weaving, v.** moving back and forth

**slithering, v.** sliding along

Vocabulary Chart for Chapter 1, "Welcome to Fossil Camp!"

| Vocabulary Type                           | Tier 3<br>Domain-Specific Words | Tier 2<br>General Academic Words                                           |
|-------------------------------------------|---------------------------------|----------------------------------------------------------------------------|
| Core Vocabulary                           |                                 | tense<br>flushed<br>genuinely<br>incredulous<br>unscrupulous<br>slithering |
| Multiple-Meaning Core<br>Vocabulary Words |                                 | weaving                                                                    |
|                                           |                                 |                                                                            |
| Sayings and Phrases                       |                                 |                                                                            |

## Chapter 6

# The Quest for Clues

### THE BIG QUESTION

What are chemical reactions?

When Amy arrived at the breakfast table the next morning, it was obvious that something was wrong. Tess and Dr. Forester both looked tense, and no one at the breakfast table was talking. For once, even Felix was quiet.

Amy slipped into the chair beside Matt and asked softly, “What’s going on?”

“Not sure,” Matt whispered back. “They said they have something important to tell us but wanted to wait until everyone was here.”

Julian was still missing. They all waited in silence until he finally came running up, **flushed** and breathless. “Sorry,” he said, taking the last chair, “I overslept.”

Dr. Forester clasped her hands on the table in front of her. “I’m afraid that Tess and I have some disturbing news. This morning when I went into the lab to see if the consolidant I applied to the gully fossils last night was dry, I discovered that they were gone.”

“Gone?” Amy exclaimed, her heart suddenly pounding.

“All of them?” Felix asked, wide-eyed.

“Yes, every single one. We’ve looked everywhere, of course, but haven’t found any **trace** of them. I can only conclude that someone took them during the night.” She paused, and looked hard at each person at the table, one by one. “Did any of you see or hear anything strange last night?”

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## Close Read: Chapter 6, Part 1

- Ask students to turn to Chapter 6 in their readers up to “Well,” Amy said, watching him closely, “it’s a good thing you did.” Read portions of the chapter and pause at each point indicated.



Amy shook her head and shot a glance at her fellow campers. They all seemed **genuinely** upset and denied seeing or hearing anything other than the rhythmic creaking sounds of crickets and the soft sigh of the wind.

“Then I can only conclude,” Dr. Forester said with a heavy sigh, “we were the victims of very clever fossil thieves.”

“People steal fossils?” Matt was **incredulous**. “Who’d want to make off with dinosaur bones?”

“Oh, you’d be surprised,” Dr. Forester said grimly. “Fossil hunters supply museums and private collectors all over the world. Most are honest people who obey the laws about where and how they can collect fossils. But unfortunately there are also some unscrupulous characters who dig up fossils on protected land without permission, or”—she paused—“steal them from paleontologists’ dig sites.”

“Since none of us heard anything,” Dr. Forester continued, “I’m guessing the thieves parked their vehicle some distance from camp and then slipped in and out of camp on foot.”

“That SUV we saw yesterday,” Felix mused. “That was pretty suspicious. Do you suppose the thieves were in the SUV? Maybe they were spying on us?”

Dr. Forester shrugged. “It’s possible, Felix, but it’s just as likely that what we saw was nothing more than a car turning around.”

“What if the thieves come back?” Daria asked, nervously.

For the first time that morning, Dr. Forester smiled. “That is the good news. I doubt very much that they will because they took the only fossils we have here at camp right now. I can’t imagine they’ll return.”

“Shouldn’t we call the police or something?” Matt asked.

“Well, there aren’t really police out here,” Tess said, “at least not like there are in a city. But Dr. Forester and I are discussing what to do.”

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**Inferential.** From the text, can you use context clues to determine the meaning of the word unscrupulous?

- » Students should be able to identify that unscrupulous people do things they shouldn’t. Tell students that unscrupulous people are those who do not care about the right thing to do.

Tess served eggs and bacon, which put everyone in a better mood. But while the other campers chatted excitedly about fossil thieves and stolen bones, Amy was trying to think like Inspector Ellis. She guessed that the big thunderstorm that had washed the little fossils into the gully had also smoothed away any old tracks and footprints on the ground around camp. If fossil thieves had parked a vehicle nearby and walked into camp during the night, there should be clear sets of new tire tracks and boot prints to be found. She added this possibility, followed by a question mark, to the list in her notebook.

Amy slipped out of camp while the others were busy making lunches and packing up the excavation gear. She circled the cluster of tents at a distance, scanning the ground in open areas and dry gullies wide enough for a vehicle to drive along. Wherever she looked, the sandy soil was rain-flattened and smooth. Except for tiny footprints she'd guessed were made by ground squirrels and rabbits, there were no signs that anyone had approached their camp from the outside the night before.

Finding no clues is a clue in itself, Amy thought.

Convinced she'd made a thorough search, Amy headed back to camp. She was **weaving** around several clumps of tall grass when someone suddenly shouted, "STOP!"

Amy froze as Julian appeared off to her left, hurrying toward her. "Don't take another step, Amy!" he called out. "Stay absolutely still!"

She was about to ask why when she saw the snake emerge from a big clump of grass not five feet ahead and start **slithering** toward her. Amy's mouth went dry, and cold sweat beaded her skin.

Out of the corner of her eye, Amy saw Julian pick up a rock the size of a baseball. "I'm going to toss this rock so it lands between you and the snake," he said worriedly. "Hopefully, the snake will go in the opposite direction and head away from you."

*Hopefully?* Amy thought, as her heart thumped harder.

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**Evaluative.** Amy's mouth went dry and cold sweat beaded her skin. What do these details tell you?

- » Students should be able to identify these as physical reactions that show Amy is afraid. They should identify from earlier in the text that Amy is afraid of text.

“Are you ready?”

Amy wasn’t sure she was, but she took a deep breath and said “Ready!” in a tight, squeaky voice.

Julian chucked the rock and it landed exactly where he’d said it would. The snake stopped, tensed, and then turned and wriggled away, leaving a thin, S-shaped track in the sand.

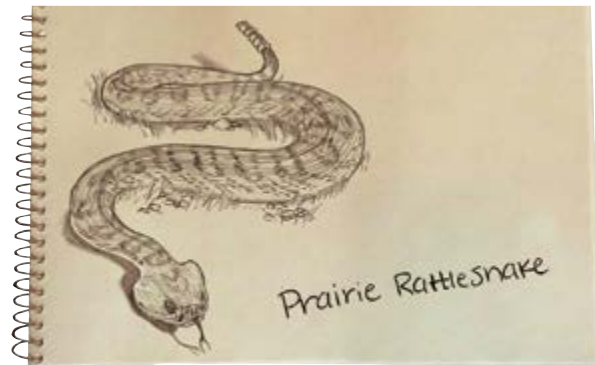
Amy’s breath went out of her in a huge rush as Julian came running up. “That was too close,” she said in a hoarse voice. “If you hadn’t stopped me right then—anyway, thanks.”

“You’re welcome.” He looked around and then back at Amy. “What are you doing way out here?”

“I was looking for tire tracks and footprints,” Amy admitted, “to see if I could spot where the fossil thieves had parked their vehicle and where they’d walked into camp.”

“Oh,” Julian said, looking at her and then quickly glancing away. “Did you find any?”

Amy said she hadn’t, and then something occurred to her. “So, Julian, what are you doing out here?”



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"It was—it was getting time to leave and—I spotted you out here so I thought I'd come and get you." The words tumbled out of his mouth in a sudden rush.

"Well," Amy said, watching him closely, "it's a good thing you did."

\*\*\*

"Where did you disappear to this morning?" Matt asked later that day, as he twirled his rock pick between his dusty hands.

"I was looking around the camp for evidence of fossil thieves," Amy murmured.

"What did you find?"

"Not a single boot or tire print, and that can only mean one thing."

"Which is—?" Matt looked at Amy questioningly.

She leaned closer and dropped her voice to a whisper. "That the thief is one of us!"

Just then, Tess clapped her hands to get their attention. "You're almost ready for the next stage of the excavation process, which is removing the bones you've exposed from the rocks beneath them. This morning, Dr. Forester and I are going to show you how that's done."

They gathered around Dr. Forester, where she knelt by the leg bone she and Tess had been excavating. "The challenge in removing fossil bones from the underlying rock is to make sure we collect them without breaking them. If we tried to **pry** or chisel them out from underneath, we'd almost certainly break them. Instead, we use a clever technique called trenching. Take a look," she said, gesturing to the leg bone.

"After the entire bone was exposed on top, we started carefully chipping away the rock all around, about six inches out from the fossil. We chiseled down for several inches—well below where we think the underside of the leg

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**Literal.** How does Julian respond to Amy?

- » Words "tumbled" out of his mouth.

**Evaluative.** What kind of literary device is this?

- » Metaphor

**Inferential.** What does this detail indicate?

- » Answers will vary but may include that Julian is nervous, or desperate to finish speaking.

## Support

Review figurative language, including synonyms and metaphors.

## Challenge

Ask students to come up with a simile to describe how Julian speaks.

### Activity Page 8.1



#### Support

Model the exercise.

#### Challenge

Are there theories about the missing fossils that the lack of tracks does support?

» Answers will vary but could include a) someone internal taking the fossils and b) the squirrels taking them (students may point to the squirrels the previous day).

### Activity Page 3.3



## DETECTIVE'S INFERENCES (10 MIN.)

- In pairs, ask students to turn to Activity Page 8.1 and complete the exercise from Inspector Ellis.
- As students work, circulate and check in.

## CREATE CHARACTER MAPS (30 MIN.)

### Add New Suspects

- Ask students to turn to the character maps they have been filling in on Activity Page 3.3. Ask them to briefly review the maps for Julian, Kristal, Felix, and Darla and remind them they added information for Julian and Kristal in Lesson 6.
- Ask students if there are any suspects they would like to add character maps for. Through class discussion, students should identify the fossil thieves in the SUV and also the squirrels who stole Amy's lunch (and whose footprints are outside the camp) as possible suspects. Ask students to recreate the outline of their character maps, with the same organization as they used in Lesson 3, for those two new suspects.

### Create Character Maps

- Divide students into small groups. Ask students to turn back to the beginning of Chapter 4 in their readers.
- Ask each member of the small group to take one of the following sets of characters: Julian *and* Kristal (both for one student), Felix *and* the squirrels, Darla *and* the SUV. Remind students that if they have been assigned Julian and Kristal, they have already found the information in Chapter 4 and added it to their character maps and should therefore begin at Chapter 5. Ask students to continue reading to "That the thief is one of us!"
- Ask students to read through the chapters in the reader and add relevant information for their characters. As students work, circulate and check in. Please see below for the points about each character for Chapters 4, 5, and 6 (or in the case of Julian and Kristal, Chapters 5 and 6). The way these points are represented depends on the students' organization of their character maps as you decided in Lesson 3. The asterisks represent opinions that will be explored in the final activity of this lesson.

| Julian                                                                                                                                                                                                                         | Kristal                                                                                                   | Felix                                                                                                                                                                                                                                                                          | The Squirrels                                                                                                                                  | Darla                                                                                                                                                                    | The SUV                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Seems to have been waiting for Dr. Forester and asks about the fossils.<br><br>Late for breakfast: "overslept"<br><br>Appears outside the camp and scares away the snake. Hurries to answer Amy when she asks why he is there. | Shows the bones drawings to Dr. Forester. Seems "embarrassed but pleased" when Dr. Forester praises them. | 1. Popped something in his mouth and when Amy noticed, swallowed hard. Suddenly turns to Tess to ask question. Just to distract?<br><br>Eats a lot of different cereals for breakfast<br><br>Says he doesn't like people touching his things then puts a lock on his backpack. | 1. Steal food<br><br>2. Also steal other objects they think might be food<br><br>3. Tracks found near the campsite after the fossils disappear | Out late then bounces back smiling. Says she went for a long walk but sounds "strangely excited." Says "quickly" she used a flashlight on her phone to walk in the dark. | Slowly approaches campers then seems to turn back when they see the campers.<br><br>Felix wonders if they were thieves. |

- Once students have finished, ask them to review their maps with their small group, giving other students the opportunity to ask questions, and add the information to their own maps.
- If time allows, combine two small groups and ask them to compare the content of their maps for the same character. Ask students to identify information that is different, or phrased differently, from their own maps.
- Give students a few moments to revise their maps in light of their discussions.



### Check for Understanding

Ask students to name something useful they learned from a member of their small group (about a different character), or someone from a different group (about the same character).

## Support

Work with one or two small groups as they complete their character maps.



## Reading

### Reading/Viewing Closely

#### Entering/Emerging

Students should only complete one character. With 1:1 support, identify quotes that give information for character maps. Provide excerpts as necessary.

#### Transitioning/Expanding

With finger sweeping, ask students to identify the quotes from the text that support completing maps. Ask them to identify the key words and phrases that they should provide in their character maps.

#### Bridging

Ask students to show the link between the information in their character maps and the text they identified.

## Lesson 8: Leaving Tracks?

# Reading/Writing



**Primary Focus:** Describe how Amy's point of view influences how characters are described. [RL.5.6; W.5.1, W.5.9]

### REVIEWING POINT OF VIEW (10 MIN.)

#### Support

Review the term *protagonist*

#### Challenge

Ask students to come up with two sentences which describe the same action, one with only facts and one including opinions.

1. **Evaluative.** Who is the protagonist of the story?

» Amy

2. **Evaluative.** Has the author described anything that happens when Amy is not there?

» No. It is always in Amy's presence and through her eyes.

- Remind students that they must always distinguish between facts, or objective information, and opinion. If necessary, review the difference between fact and opinion with students.
- Review the sentences you wrote on the board/chart paper. In each case, ask the class to discuss whether the sentence reflects the protagonist's opinion, or fact.

"He looked at me shiftily. I was sure he was up to no good"

» Opinion. You cannot know that someone is up to no good because of the way they look at you.

"The thief glanced both ways, snuck into the shop and took the tennis shoe"

» Fact. This describes actions that can be observed.

"My puppy looked at me sadly, as though the food I was eating was the only thing that could save him from starvation"

» Opinion. You cannot know how the puppy feels from his look.

"She hurriedly put something back into her bag"

» Both! Putting something in her bag is fact. "Hurriedly" could be opinion, since it implies she is moving too fast.

## IDENTIFYING OPINIONS (25 MIN.)

### Finding Textual Evidence

- Ask students to return to the character maps they completed. With the same characters they worked on previously, ask them to underline or asterisk information they think represents Amy's opinion, rather than fact. Please refer to the previous answer key for possible answers.
- As students work, circulate and check in.
- Tell students they will use the work they have done on character maps today in future lessons as they try and figure out the mystery.

### Opinion Piece on Amy's Point of View

- Ask students to turn to Activity Page 8.2 and complete the written prompt. Tell students that in the following lesson they will use this analysis to present to the Sheriff.



### Check for Understanding

Ask students to point to an opinion they have asterisked or underlined for each of Julian, Felix, and Darla, and explain why it is opinion not fact.

End Lesson

## Activity Page 8.2



### Writing

#### Entering/Emerging

Write collaboratively with students. Identify information in their character maps and prompt whether this is objective or subjective. Work with students to turn the information into simple descriptive sentences about subjective evidence.

#### Transitioning/Expanding

Ask students to place information in a table according to whether it is subjective or objective. Review and help them construct a paragraph describing the subjective evidence using outline structures.

#### Bridging

Ask students to construct a paragraph describing the subjective evidence.

### Support

Work intensively with a few students as they write.



## 9

# Reactions

## PRIMARY FOCUS OF THE LESSON

### Speaking and Listening

Students will summarize the evidence on a character and offer opinions about its validity. [SL.5.2, SL.5.4]

### Reading/Writing

Students will use textual evidence to distinguish between physical and chemical reactions, and organize writing to allow others to make the same distinctions. [RI.5.1; W.5.2, W.5.4]

## FORMATIVE ASSESSMENT

**Activity Page 9.2**     **Presentation to Sheriff** Create rubric on presentation. [SL.5.2, SL.5.4]

**Activity Page 9.4**     **Tess's Rules** Create rules to distinguish between physical and chemical changes. [RI.5.1; W.5.2, W.5.4]

## LESSON AT A GLANCE

|                                  | Grouping    | Time    | Materials                                                                                                         |
|----------------------------------|-------------|---------|-------------------------------------------------------------------------------------------------------------------|
| Speaking and Listening (45 min.) |             |         |                                                                                                                   |
| Preparing Presentation           | Small Group | 20 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Pages 9.1, 3.3, 8.2, 9.2 |
| Giving Presentation              | Small Group | 20 min. |                                                                                                                   |
| Class Discussion                 | Whole Group | 5 min.  |                                                                                                                   |
| Reading/Writing (45 min.)        |             |         |                                                                                                                   |
| Small Group: Chapter 6 Part 2    | Small Group | 25 min. | <input type="checkbox"/> Activity Pages 3.3, 8.2                                                                  |
| Create Tess’s Rules              | Partner     | 20 min. |                                                                                                                   |

## ADVANCE PREPARATION

### Speaking and Listening

- There are two ways that you can organize groups for this lesson:
  1. Students present on a set of characters individually, while students who assessed other characters evaluate the presentation in their rubric.
  2. Students who worked on a given set of characters (for example, Felix and the Squirrels) work together to prepare their presentations, then present to students working on a different set of characters.
- However you organize your groups, students should be in a position to listen to at least one presentation on the characters they did not prepare so they can fill in the rubric. If students need a lot of support, they can listen to other students present on the same character they prepared and only fill in the rubric for presentations on those characters. You may also wish to have one set of presentations from volunteers that the whole class watches and fills in the rubric for.
- You may also wish to add additional role playing elements (as you play the Sheriff). You could rearrange the class to look more like a sheriff's office, for example.
- The rubric students use can be found in the Teacher Resources section of this Teacher Guide. Alternatively, access digital versions of this in the digital components for this unit. You may wish to use the rubric to assess groups of students.

### Reading/Writing

- The writing activity asks students to combine their understanding of physical changes from previous lessons with the information on chemical reactions in Chapter 6. You may wish to review the material at the beginning of the lesson, particularly if there are areas students seem to have struggled with. The table the class filled out in Lesson 1 may be helpful.
- In the course of this lesson, you create a table on board/chart paper through class discussion. You should keep this table displayed for the next lesson if possible.

## Universal Access

- Provide the graphic organizer below to help students organize their presentations to the Sheriff.

| My character is called ____   |                                                       |                              |                                                      |                                                 |
|-------------------------------|-------------------------------------------------------|------------------------------|------------------------------------------------------|-------------------------------------------------|
| <b>Subjective Information</b> | <b>My conclusion about the subjective information</b> | <b>Objective Information</b> | <b>My conclusion about the objective information</b> | <b>Further evidence I would like to collect</b> |
|                               |                                                       |                              |                                                      |                                                 |
|                               |                                                       |                              |                                                      |                                                 |
|                               |                                                       |                              |                                                      |                                                 |

- Provide guidance in presenting according to the rubric, for example:
  - I would like to talk to you about \_\_\_\_\_. They are \_\_\_\_\_.
  - We know objectively that \_\_\_\_\_ and I think this means that \_\_\_\_\_.
  - We also have been given the impression that \_\_\_\_\_ and I think this means that \_\_\_\_\_.
  - I think this means that \_\_\_\_\_ and we should be doing \_\_\_\_\_ and \_\_\_\_\_ to find out more information.
- For the reading/writing segment, provide text excerpts to help students identify relevant information on chemical and physical changes.
- Provide students with sentence frames to help them generate yes/no questions for Tess's rules:
  - "Does it \_\_\_\_\_?"
  - "Can it \_\_\_\_\_?"
  - "When you \_\_\_\_\_, does it \_\_\_\_\_?"



## Support

Discuss compelling and clear introductions to the presentation, modeling a few examples.



## Presenting

## Entering/Emerging

Provide a graphic organizer to help students organize information. Use the information to form an introduction, description, and conclusion about a single character. Provide options for additional investigation.

## Transitioning/Expanding

Provide a graphic organizer to help students organize information. Work with them to compare the rubric to the information they are providing.

## Bridging

Ask students prompting questions from the rubric to help them define their conclusions and suggested next steps.

## Lesson 9: Reactions

## Speaking and Listening



**Primary Focus:** Students will summarize the evidence on a character and give their opinion on its validity [SL.5.2, SL.5.4]

## PREPARING PRESENTATION (20 MIN.)

- Ask students to return to the character maps they developed in the previous lesson and review the evidence they gathered on their characters (either Julian and Kristal, Felix and the Squirrels, or Darla and the SUV). Remind them that in the previous lesson they first gathered information on the characters, then assessed the information for its objectivity.
- Tell students they will use the evidence they have gathered to present on their characters to the Sheriff. Their task is to evaluate the characters as potential suspects.
- Tell students they will use their analysis on subjective and objective evidence in their presentation, making a recommendation to the Sheriff on (1) Whether there is good objective evidence that the character is a suspect; (2) Whether there is subjective evidence the character is a suspect; and (3) What further investigation they think is necessary to establish the character's innocence or guilt. Finally, they should (4) Compare the strength of the evidence on the two characters they will be presenting on.
- Ask students to turn to Activity Page 9.1 as they prepare their presentations.
- As students prepare, circulate and check in. Point students to the rubric on Activity Page 9.2 to help them prepare.

## GIVING PRESENTATION (20 MIN.)

- Ask students to present on their characters in their small groups (see Advance Preparation for organization). Alternatively, ask volunteers to present to you as the Sheriff.
- As students present, ask the rest of the class to fill in their rubrics in Activity Page 9.2. Remind students to listen respectfully and attentively.



### Check for Understanding

When the presentations are finished, take a class poll on the suspect that students would most like to investigate further. Ask volunteers to identify what in the presentations led them to choose this suspect.

### CLASS DISCUSSION (5 MIN.)

- Finish by discussing with the class whether the use of subjective evidence is ever valid in assessing a character.
- You should make a distinction between:
  - The use of evidence as a scientist or when accusing someone in court (where objective evidence is the only valid use of evidence).
  - The use of subjective evidence in analyzing characters in literary texts and in giving detectives clues about where to look for more objective evidence.

### Lesson 9: Reactions

# Reading/Writing



**Primary Focus:** Students will use textual evidence to distinguish between physical and chemical reactions. Organize their writing to allow others to make the same distinctions. [RI.5.1; W.5.2, W.5.4]

### SMALL GROUP: CHAPTER 6, PART 2 (25 MIN.)

### Vocabulary

- Ensure each student has a copy of the Reader, *The Badlands Sleuth*, and has located Chapter 6. They will read the second half.
- As with previous units, preview the relevant core vocabulary, identify the first core vocabulary word, and ask students to identify the word bolded in the chapter and in the glossary at the back of the book.

### Support

If students need more time, ask them to present on only one character they investigated in the previous lesson. (If they looked at Felix and the Squirrels, they would choose either Felix or the Squirrels.)

### Challenge

Ask students to role-play as police officers as they present. Discuss how they might stand, and how they might address the Sheriff.

**expose, v.** make something visible by uncovering it

**pry, v.** use force to open

**undergoing, v.** experiencing

**encased, v.** completely surrounded

| Vocabulary Chart for Chapter 1, “Welcome to Fossil Camp!” |                                 |                                  |
|-----------------------------------------------------------|---------------------------------|----------------------------------|
| Vocabulary Type                                           | Tier 3<br>Domain-Specific Words | Tier 2<br>General Academic Words |
| Core Vocabulary                                           |                                 | expose<br>undergoing<br>encased  |
| Multiple-Meaning Core<br>Vocabulary Words                 |                                 | pry                              |
|                                                           |                                 |                                  |
| Sayings and Phrases                                       |                                 |                                  |

**Small Group Read Chapter 6, “The Quest for Clues”**

- Ask students to return to Chapter 6 and begin where they left off in the previous lesson.
- Tell students that they are once again switching from detective to scientist mode, but they should pay special attention because the two modes may be merging soon!
- Divide students into two small groups. Work with Small Group 1 as students complete the questions below. Ask Small Group 2 to complete the Activity Page in pairs as they read the text.
- Ask students to read from “Where did you disappear to this morning, sis?” to the end of the chapter.
- Ask students to turn to Activity Page 9.3 and complete the questions.

Activity Page 9.3



"It was—it was getting time to leave and—I spotted you out here so I thought I'd come and get you." The words tumbled out of his mouth in a sudden rush.

"Well," Amy said, watching him closely, "it's a good thing you did."

\*\*\*

"Where did you disappear to this morning?" Matt asked later that day, as he twirled his rock pick between his dusty hands.

"I was looking around the camp for evidence of fossil thieves," Amy murmured.

"What did you find?"

"Not a single boot or tire print, and that can only mean one thing."

"Which is—?" Matt looked at Amy questioningly.

She leaned closer and dropped her voice to a whisper. "That the thief is one of us!"

Just then, Tess clapped her hands to get their attention. "You're almost ready for the next stage of the excavation process, which is removing the bones you've exposed from the rocks beneath them. This morning, Dr. Forester and I are going to show you how that's done."

They gathered around Dr. Forester, where she knelt by the leg bone she and Tess had been excavating. "The challenge in removing fossil bones from the underlying rock is to make sure we collect them without breaking them. If we tried to **pry** or chisel them out from underneath, we'd almost certainly break them. Instead, we use a clever technique called trenching. Take a look," she said, gesturing to the leg bone.

"After the entire bone was exposed on top, we started carefully chipping away the rock all around, about six inches out from the fossil. We chiseled down for several inches—well below where we think the underside of the leg



bone is—and then started chiseling inward. As you can see here, what we’ve ended up with is our leg bone fossil sitting atop a narrow rock pillar.”

“It looks like a mushroom,” Kristal said.

“That’s a very good description,” Dr. Forester said. “Once we have this mushroom shape, we put what’s called a plaster jacket around the mushroom cap.”

Tess continued, pulling on a pair of thin, latex gloves. “I’m going to demonstrate how paleontologists make a plaster jacket. It’s a little like a doctor putting a plaster cast on someone’s broken arm.”

“I broke my arm and had a cast once,” Daria said.

“Then you’ll know what this leg bone is going to feel like,” Tess joked. She had set out a bucket, a jug of water, a roll of paper towels, a wooden spoon, long strips of a rough fabric, and a bag labeled plaster of paris. “First, I’m going cover the fossil with damp paper towels,” Tess explained, laying several wet towels on the exposed bone. “That will keep the plaster from sticking directly to our fossil.”

“Next, I’ll mix a white, powdery compound called plaster of paris with enough water to make a thin paste.” Tess added water to the plaster in the bucket and used the wooden spoon to stir the two ingredients together.

“It looks like runny, white frosting,” said Felix, leaning over to peer into the bucket.

Tess held up a strip of the rough fabric. “Now I’ll soak strips of this burlap in the wet plaster and then lay them onto the fossil!” She fitted and wrapped the mushroom cap with plaster-soaked strips until the fossil was completely **encased**, except for the place on the underside where it was still connected to the little pillar of rock. “Now we wait for the plaster to harden.”

“But won’t it take a long time for all the water to evaporate so it dries?” Amy asked.

“Actually the water isn’t evaporating, Amy. Evaporation is a physical change in matter—a change in states. Here, the powdery plaster and the water I added to it are undergoing what’s called a chemical change in matter. Remember that a physical change may alter some properties or the appearance of a substance, but it doesn’t change what the substance is actually made of—its chemical composition. When matter undergoes a chemical change, however, its chemical composition does change. Typically, molecules of the starting substances break apart, and the atoms rearrange themselves to form new molecules of different substances.

“After a chemical change takes place, you end up with new types of matter, often new compounds, with different properties than those you started with. In this case, the plaster dust and the water are combining in a chemical change to produce a new type of matter: solid, hardened plaster.”

Tess set the bucket of wet plaster in the middle of the group. “Unlike physical changes in matter, many chemical changes are not reversible. In other words, they can’t be undone. Another clue that a chemical change is taking place is that energy is used up or given off in the process, often in the form of heat or light. With that in mind, I want you all to put your hands on the outside of this bucket and tell me what you feel.”

Everyone leaned in and did just that. “It’s warm!” Kristal marveled.

“When a mixture of plaster of paris and water undergo a chemical change, heat is given off,” Tess explained, “enough heat to make the plaster quite toasty as it hardens!” She stood and peeled off her latex gloves.

Tess suggested they all eat lunch while the plaster jacket finished hardening. When they returned, Dr. Forester knocked on the jacket with her knuckles. “Good and solid. Now, Tess and I will break the cap off the mushroom, so to speak, and plaster over the hole on the bottom, just like we did the top.”

While Tess gripped the jacket firmly, Dr. Forester used a hammer and chisel to break it free from the rock pillar. They flipped the jacket over and then applied more strips of plaster-soaked burlap to the bottom. When they

were finished, the fossil was completely enclosed and looked like a huge, white egg.

"When it's dry," Tess explained, "we'll use permanent marker to write a fossil number, the date, and the location of the dig site on the jacket. Then we'll take it back to camp."

"Actually, I'd like us to stop working a little early today," Dr. Forester said. "Tess and I have been talking about our missing fossils, and I've decided to drive over to Dry Creek and tell the sheriff what happened. It's a long drive, so I'll stay overnight. I'll ask the sheriff to come back with me tomorrow morning and take a look around."

"Wow, a sheriff!" Felix exclaimed. "Just like the Old West. Those fossil thieves had better watch out!"

Tess asked Julian and Amy to help her carry the jacketed fossil bone down to where the two pickups were parked. As they set it gently into the back of one, Amy realized that Julian had hardly said a word since the snake incident that morning. When Tess headed back up to the dig site, he just stood by the pickup and kicked at one of the tires.

"Thanks again for saving me from the snake," she said. "I don't know what would have happened if you hadn't shouted at me."

Julian was silent for a long moment and then asked, "What do you think the sheriff will do to the fossil thieves if he catches them?"

Amy shrugged. "I suppose he'll arrest them."

Julian didn't say anything at all.



### Check for Understanding

Ask the following questions of students and take a class poll each time

**Literal.** I put two substances together in a test tube, and the tube became warm in my hands. Is it a physical or a chemical change? Why?

- » Chemical change. They often lead to heat being given off.

**Literal.** I left some water in a glass outside on a hot day. When I went to fetch it, half of the water had gone. Is that a physical or a chemical change?

- » Physical change. The water had evaporated but hadn't become a new form of matter. No other substance was used to mix with the water.

**Literal.** I used a new substance and recorded its color (purple). When I placed it in a bowl of water, it became green. Is it a physical change or a chemical change?

- » Chemical change. The physical properties of the substance have changed.

### CREATE TESS'S RULES (20 MIN.)

#### Review Tess's Rules

- Ask students to turn back to Tess's rules that they created in Lesson 7 on Activity Page 7.2 and review how Tess created her rules and the rules they created.
- Read through Tess's criteria from Activity Page 7.2:
  - Can people use this to answer the question?
  - Is it possible to decide the answer to the question I ask in each case?
  - Is it organized in a way that is easy to understand and use?

### Challenge

I used a different substance (also purple) and placed it in water again. This time, the water became purple and the substance disappeared. No heat was given off. Is it a physical or chemical change?

- » It was probably a physical change; it sounds like the substance dissolved and formed a solution.

### Activity Page 7.2



## Support

You should highlight the “often” and make sure students understand that this means it isn’t always the case.



## Writing Understanding Text Structure

### Entering/Emerging

Read, “When matter undergoes a chemical change, however, its chemical composition does change.” Turn this into a yes/no question.

Help students identify other sentences describing mixtures and turn them into yes/no questions.

### Transitioning/Expanding

Point students to relevant portions of the text and provide sentence frames to help them generate yes/no questions.

### Bridging

Ask students to use an oral example to explain their flow diagram. Discuss the differences between the way the text is presented and their yes/no questions.

## Differences between Physical and Chemical Changes

- Tell students they will create a version of Tess’s rules for Physical and Chemical changes.
- Before they begin writing, create through class discussion a table on the board/chart paper on the differences between Physical and Chemical changes as below.

|                      | Physical Changes                                                    | Chemical Changes                     |
|----------------------|---------------------------------------------------------------------|--------------------------------------|
| Chemical Composition | Chemical composition remains the same                               | Chemical composition changes         |
| Physical Properties  | Physical properties of matter (mass, color, etc.) remain the same   | Physical properties of matter change |
| Heat or Light        | You don’t usually get heat or light as a result of changes in state | Often heat or light given off        |
| Reversible?          | Reversible                                                          | Not reversible                       |

## Creating Tess's Rules

- Ask students to turn to Activity Page 9.4 and, using the rules they created in Activity Page 7.2 as a guide, create new rules for chemical and physical changes.
1. Does the chemical composition remain the same? (Y/N/Don't know).
    - a. If Y, physical change.
    - b. If N, chemical change.
    - c. If don't know, go to question 2.
  2. Does the mass and color of the substance remain the same? (Y/N/Don't know).
    - a. If Y, physical change.
    - b. If N, chemical change.
    - c. If don't know, go to question 3.
  3. Did the substance give off heat or light? (Y/N/Don't know).
    - a. If Y, chemical change.
    - b. If N, probably physical change.
    - c. If don't know, go to question 4.
  4. Can you reverse the reaction (for example, by cooling down the substances if you heated them)? (Y/N).
    - a. If Y, physical change.
    - b. If N, chemical change.



### Check for Understanding

Ask students to evaluate whether the new flow diagram meets Tess's criteria (the three bullet points in the beginning of Activity Page 7.2). Ask them to evaluate how a flow diagram helps readers distinguish between chemical and physical changes.

End Lesson

## Activity Page 9.4



### Support

Create "Tess's rules" together as a class.

### Challenge

Ask students to use the flow diagram to evaluate plaster of Paris and cereal in milk.

# To Catch A Thief

## PRIMARY FOCUS OF LESSON

### Reading

Students will identify textual evidence used by the characters to support their claims. [RI.5.1, RI.5.8]

### Writing

Students will use their understanding of chemical changes to explain Amy's plan to the Sheriff. [W.5.2, W.5.4]

### Language

Students will understand how to use commas in a range of contexts and the roots *mit/mis*. [L.5.2b, L.5.4b]

## FORMATIVE ASSESSMENT

### Activity Page 10.1

**Identifying Evidence** Table of evidence on chemical changes. [RI.5.1, RI.5.8]

### Activity Page 10.2

**Letter to the Sheriff** Explanation of Amy's plan. [W.5.2, W.5.4]

### Activity Page 10.3

**Commas** Use of commas. [L.5.2b, L.5.2c]

### Activity Page 10.4

**Morphology** Practice sheet on use of *mit/mis*. [L.5.4b]

## LESSON AT A GLANCE

|                               | Grouping    | Time    | Materials                                                                                           |
|-------------------------------|-------------|---------|-----------------------------------------------------------------------------------------------------|
| Reading (30 min.)             |             |         |                                                                                                     |
| Partner Read: Chapter 7       | Partner     | 20 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Pages 10.1 |
| Evaluate Use of Evidence      | Whole Group | 10 min. |                                                                                                     |
| Writing (30 min.)             |             |         |                                                                                                     |
| Identify Amy’s Plan           | Whole Group | 10 min. | <input type="checkbox"/> Activity Page 10.2                                                         |
| Letter to Sheriff             | Independent | 20 min. |                                                                                                     |
| Language (30 min.)            |             |         |                                                                                                     |
| Grammar                       | Whole Group | 15 min. | <input type="checkbox"/> Activity Page 10.3                                                         |
| Morphology                    | Whole Group | 15 min. | <input type="checkbox"/> Chart with examples                                                        |
| Take-Home Materials           |             |         |                                                                                                     |
| Practice Roots <i>mit/mis</i> |             |         | <input type="checkbox"/> Activity Page 10.4                                                         |



## ADVANCE PREPARATION

### Reading

- Ensure that the table you created in the previous lesson is still displayed as below. This has also been placed in the digital components for this unit.

|                             | Physical Changes                                                    | Chemical Changes                     |
|-----------------------------|---------------------------------------------------------------------|--------------------------------------|
| <b>Chemical Composition</b> | Chemical composition remains the same                               | Chemical composition changes         |
| <b>Physical Properties</b>  | Physical properties of matter (mass, color, etc.) remain the same   | Physical properties of matter change |
| <b>Heat or Light?</b>       | You don't usually get heat or light as a result of changes in state | Often heat or light given off        |
| <b>Reversible?</b>          | Reversible                                                          | Not reversible                       |

- As an extension, you may wish to create your own game of “spot the chemical change” with a scoreboard for students. This can be a writing activity or a speaking and listening activity. Students should point to the “Tess’s rules” they created to identify why their example is a chemical change.

## Writing

- As additional support, you may wish to help students fill out the graphic organizer below as they prepare their letter to the Sheriff.

|                                | Matter Amy uses          | What will happen to the matter?                            | Why is this a physical/chemical change (you may need to refer back to previous notes and chapters)?                                                                                  | Why does this help catch the thief?                                                                                                              | Why is this objective evidence?                                                                                                                                                      |
|--------------------------------|--------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Part 1: Physical Change</b> | <i>Bowl of ice cubes</i> | <i>Melt—meaning it changes state from solid to liquid</i>  | <i>Changes of state are physical changes: they are reversible, and the kind of matter remains the same (chemical composition doesn't change) (other explanations are acceptable)</i> | <i>The water will mean that the soles of the thief's shoes will get wet, so they stick to other things the thief steps in.</i>                   | <i>Only someone who walks into the lab will have plaster of paris on their shoes. There is no opinion on the person, just evidence of what action they took (where they walked).</i> |
| <b>Part 2: Chemical Change</b> | <i>Plaster of paris</i>  | <i>Undergo a chemical change when it encounters water.</i> | <i>It is not reversible, it gives off heat, and it turns into a different form of matter.</i>                                                                                        | <i>When the water on the shoes encounters the plaster of paris, a reaction will occur and hard plaster will stick to the bottom of the shoes</i> |                                                                                                                                                                                      |

## Language

### Grammar

- Write the following sentences on the board/chart paper for commas after *yes/no*. For the first two sentences, include the commas. For the second two, do not include commas

“Yes, I do think I want to be a paleontologist.”

“No, thank you, I don’t want another snack.”

“Yes I think I will solve this case.”

“No I’m not afraid of dinosaurs.”

- Write the following sentences on the board/chart paper for commas before tag questions. For the first two sentences, include the commas. For the second two, do not include commas.

“You think I’m the culprit, don’t you?”

“It’s very hot, isn’t it?”

“There are no footprints or tracks are there?”

“Paleontology is fun don’t you think?”

- Be ready to display the poster below which can be found in the Teacher Resources of this guide, or the digital components for the unit.

### ➤ Rules on Commas

#### Rules on Commas

You should place commas:

- after an introductory element (before the subject of the sentence)
- after the word *yes* or *no* when the sentence begins with that word
- before the use of a question when that question is at the end of the sentence (a tag question)

### Morphology

- Display the roots poster from Lesson 6, which is below. You may access a digital version in the digital components for this unit.

### ➤ Roots Poster

#### Roots

A root is the main element of a word that forms the base of its meaning.

A prefix or suffix added to the root can change the meaning.

- Write the following word choices on the board/chart paper corresponding to the sentences in the chart. Alternatively, you can access a digital version in the digital components for this unit.

| Word choices                            | Sentence                                                                                |
|-----------------------------------------|-----------------------------------------------------------------------------------------|
| misaid, admitted, omitted, dismissed    | Amy was ready to write down the final clue when she realized she had ____ her notebook! |
| missile, remit, mission, permission     | Amy’s ____ was clear: to find the culprit.                                              |
| emitted, omitted committed, permitted   | The police officer ____ the message across the radio to the Sheriff.                    |
| submitted, dismissed, committed, misaid | Matt ____ Amy’s suggestion with a shrug.                                                |

## Universal Access

- For the reading segment, provide students needing substantial support with the full guide below.
  - People providing strong evidence will usually provide more than one piece of evidence. The more the better.
  - People providing strong evidence will only report what they can observe (or see). They will provide facts, not opinions or guesses.
  - People providing strong evidence will be clear. They will not leave you to guess their meaning. They will use words and descriptions that are accurate.
- Provide students needing moderate support with the guide below and read aloud and explain as necessary.
  - You should consider how much evidence the campers provide.
  - You should consider whether the evidence is observable, or just thought to be happening.
  - You should consider how clear the explanation is. Is it easy to understand? Have they used precise words and descriptions?
- For the writing segment, provide a series of joining words (*because, and, therefore, this means*) to help students explain Amy's plan.
- Provide prompts on the audience for the text, for example:
  - The Sheriff knows a lot about crime, so he will want to know about whether this will provide objective evidence. Have you explained the objective evidence this plan will provide?
  - The Sheriff does not understand chemistry so you need to explain what a physical change is. Do you think someone who hasn't learned chemistry would understand this from your explanation?
- In the morphology segment, provide additional sentences on familiar and unfamiliar topics to help students decipher brainstormed words. Some examples are in the supports in the lesson.

## Lesson 10: To Catch A Thief

## Reading



**Primary Focus:** Students will identify textual evidence used by the characters to support their claims. [RI.5.1, RI.5.8]

## PARTNER READ: CHAPTER 7 (20 MIN.)

## Vocabulary

- Ensure that each student has a copy of the Reader and has located Chapter 7.
- As with previous units, preview the core vocabulary, identify the first core vocabulary word, and ask students to identify the bolded word in the chapter and in the glossary at the back of the book.

**ramble, v.** walk without any obvious purpose

**boundaries, n.** the limits of an area

**cells, n.** the basic building blocks of living things

**tarnishing, v.** a process by which some metals become dull

**spangled, adj.** covered with small shiny objects

**sliver, n.** thin, narrow piece

**hunch, n.** a guess based on feelings, not facts

**irritation, n.** state of feeling annoyed

Vocabulary Chart for Chapter 1, "Welcome to Fossil Camp!"

| Vocabulary Type                           | Tier 3<br>Domain-Specific Words | Tier 2<br>General Academic Words                      |
|-------------------------------------------|---------------------------------|-------------------------------------------------------|
| Core Vocabulary                           | tarnishing                      | ramble<br>boundaries<br>sliver<br>hunch<br>irritation |
| Multiple-Meaning Core<br>Vocabulary Words | cells                           |                                                       |
| Sayings and Phrases                       |                                 |                                                       |

## Partner Read Chapter 7, “The Clues Add Up”

- Ask students to read the chapter in pairs. As with previous units, you may pair students a number of ways.
- Explain that both students will read the first page silently, and then one partner will read that page aloud. Next, they will both read the second page silently, and then the other partner will read that page aloud, and so on. Students can ask their partner for help with sounding out or defining words as necessary.
- Ask students to read until “fallen asleep.”
- As they read, ask students to complete the table in Activity Page 10.1. Ask them to stop before they complete the second question.

### Activity Page 10.1



### Support

Discuss the following statement from Kristal: “And you can’t un-toast marshmallows any more than you can un-burn wood.” Identify with students why this is evidence for a chemical change.

### Support

Work with a few pairs as they complete the questions.

### Challenge

Ask students to use the Tess’s rules they created in the previous lesson for each example the campers identify. Ask them to discuss whether their rules were appropriate for identifying chemical changes.

## Chapter 7

# The Clues Add Up

### THE BIG QUESTION

How do you use chemistry to catch a thief?

“There is nothing like a great dinner after a long, hard day in the field.” Felix patted his flat stomach as he lounged in a camp chair beside the fire. “I’m stuffed.”

They were all sitting around the campfire again, listening to the wood crackle and pop, and watching sparks rise up toward the night sky. It was perfectly clear, and the moon had not yet risen, so the stars were incredibly bright. Amy had never seen so many stars before, but now she could easily see the pale streak of the Milky Way as it rambled across the heavens.

“Too stuffed to eat roasted marshmallows?” Tess asked, walking up with a bag of marshmallows and enough roasting sticks for everyone.

“Wait a minute! I think my appetite just came back,” Felix said. He pushed two marshmallows onto the end of a stick and held them out near the flames.

Tess pulled up a chair and glanced around. “I know it feels a little strange without Dr. Forester here tonight. How about we play a little game to liven things up?”

“You mean like Charades or Twenty Questions?” Daria asked.

“Well, you guys should know me pretty well by now,” Tess said, grinning at them. “I was thinking more along the lines of a good, rousing game of Spot the Chemical Changes!”

“Rules, please!” Amy said, giggling.

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"You must identify a chemical change that's taking place within the **boundaries** of the camp, and explain why it's a chemical change," Tess explained. "For every correct answer you get one point."

"And the person with the most points wins!" said Felix, popping his first toasted marshmallow into his mouth.

Matt's hand shot up. "The wood in the campfire is undergoing a chemical change, isn't it? And it's giving off both heat and light in the process."

"A point for Matt!" Tess cried. "Yes, when wood burns it is undergoing a very dramatic chemical change."

"And it's not reversible, either," Daria chimed in. "You can't turn the ashes into wood again."

"Excellent!" Tess agreed. "Who's next?"

"As my marshmallows are toasting," Felix murmured, "they're turning a delicious golden brown on the outside and they smell heavenly, too. That's got to be because a chemical reaction is taking place as they're heating up."

"A point for Felix!" Tess said. "The sugary substance of the marshmallow is undergoing a chemical change as it gets hot. It changes color and also gives off an odor, both signs that a chemical change is taking place."

"And you can't un-toast marshmallows any more than you can un-burn wood," Kristal said, gently pulling a perfectly roasted marshmallow off her stick and admiring it before taking a bite.

"Digesting marshmallows and other food has got to be a chemical reaction, too," Amy offered. "And we know the changes take place because our bodies grow and we get energy from the food we eat."

"A point for Amy, who is absolutely correct that all sorts of chemical changes take place in our digestive tracts," Tess said. "As we eat these marshmallows, for example, compounds in them are broken down in our stomach and intestines. During this process, atoms are rearranged to form



entirely different molecules that our bodies use as building blocks for making substances, carrying out tasks, repairing **cells** and structures, and much more. Certain chemical changes that take place in cells are responsible for capturing energy released when compounds from food are broken down even further, and then converting that energy into a form that cells can use.” Tess pulled a marshmallow off her roasting stick, letting it cool slightly. “Just think—there are trillions of cells in our bodies, and at any given moment, countless chemical changes are taking place in each one.”

“I’ve got one,” Kristal said, slipping a ring off her little finger. “My mom gave me this silver ring. She’ll shine it up for me now and then with a special cloth, but within a couple of weeks it gets a little dull, like there is dirt on it. **Tarnishing**—that’s what she called it. Is tarnishing a chemical change?”

“It certainly is,” Tess said, “and it typically happens when molecules on the surface of a silver object interact with sulfur-containing compounds in the air. Unlike wood burning or food cooking, chemical changes such as tarnishing take place quite slowly. Definitely a point for Daria!”

As the game continued, Amy noticed that Julian was lost in thought, but he’d been like that all day. Daria, on the other hand, seemed nervous. Every few minutes she turned and looked out into the darkness, in the direction Dr. Forester had driven away before dinner.

Amy thought of Inspector Ellis. In every book, he listed all the clues in his notebook to help him see the case more clearly, just as she had been doing. Amy didn’t have her notebook handy, so she picked up a stick and made a sort of list in the sandy soil. She drew symbols that stood for backpacks and disappearances, cell phones and snakes, discoveries and appearances and things people had said.

Inside her head, several clues fell together—click, click, click.

There was a pause in the game, and Amy took advantage of it. She leaned back in her camp chair and let out a huge yawn. “Sorry, everybody,” she said. “I’m tired and I’m going to bed. I want to be wide awake and alert tomorrow morning when Dr. Forester comes back—*with the sheriff*,” she

added, emphasizing the three words. As she stepped past Matt's chair she tugged on his shirt, a signal that he should follow her.

"What's up?" Matt asked, as he joined her where she stood beyond the reach of the firelight.

"I'm doing what any good detective would do. I've put the clues together and come up with a plan."

"A plan for what?"

"A plan to solve the Case of the Missing Fossils," she said softly. "Meet me outside the kitchen tent after Julian and Felix have fallen asleep."

\*\*\*

Amy picked her way slowly across the clearing toward the kitchen tent, trying not to make a sound. The moon had risen in the star-**spangled** sky as a silver **sliver** that gave off just enough light so she could see the shapes of all the tents. She paused and listened outside Tess' tent, but she heard nothing and hoped Tess was sound asleep. As Amy neared the kitchen, a familiar shape detached from the larger shape of the canvas structure.

"What took you so long?" Matt said in a loud whisper. "I've been waiting here for half an hour."

Amy placed a finger gently on her brother's lips. "Not so much noise. I'm late because Daria was tossing and turning and it took forever for her to fall asleep."

"Julian was asleep in record time, but Felix kept fiddling with his backpack for quite a while." Matt swatted at an insect. "So what are we doing here?"

"We're setting a trap for our fossil thief," Amy replied.

"Do you know who it is?"

Amy answered thoughtfully. "A good detective suspects everyone until she has the evidence to prove who did what—and why."



### Reading Evaluating Language Choices

#### Entering/Emerging

Provide students with a guide to help them identify and evaluate strong and weak use of evidence, for example, “How many pieces of evidence are there? More is better than fewer.”

#### Transitioning/Expanding

Provide students with a limited guide to help them identify and evaluate strong and weak use of evidence, for example, “How many pieces of evidence are there?”

#### Bridging

Ask students to explain why they think the evidence is strong or weak.

#### Support

You may wish to discuss with students the example of the tarnished ring. In this case, while Tess agrees it is a chemical change, there is no clear evidence offered for why.

### EVALUATE USE OF EVIDENCE (10 MIN.)

- Before students complete the second question in their activity books, discuss with them what makes strong evidence. In particular, discuss
  - the amount of evidence offered (for example, if a camper says a change is nonreversible and identifies physical properties changing that is two pieces of evidence)
  - the quality of the evidence: is it observable (in other words, can you see the change the camper is identifying)?
- Ask students to complete the second question in Activity Page 10.1.



### Check for Understanding

Ask students to contrast the evidence provided in the first two examples (wood burning and marshmallows), which had multiple pieces of clear evidence, and the later examples (food being digested and the silver tarnishing) where the evidence is less clearly presented and there are fewer pieces of evidence offered.

### Lesson 10: To Catch A Thief

## Writing



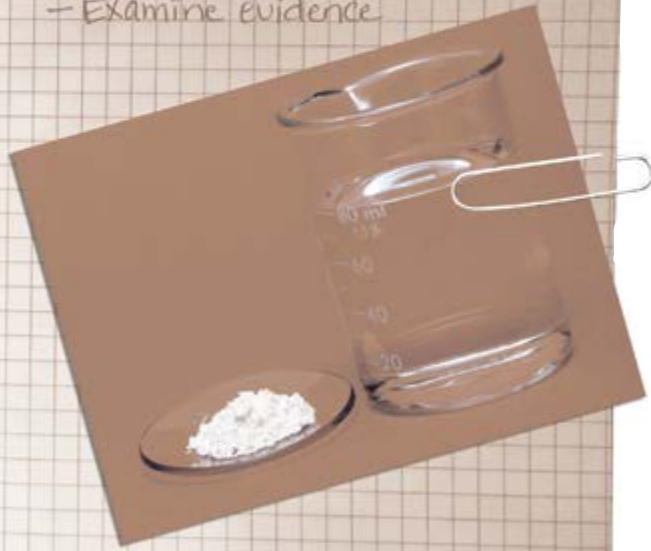
**Primary Focus:** Students will use their understanding of chemical changes to explain Amy’s plan to the Sheriff. [W.5.2, W.5.4]

### IDENTIFY AMY’S PLAN (10 MIN.)

- Ask students to continue to partner read until the end of the chapter (from “Amy picked her way . . .”).

### The Plan

- Set a trap
- Use science:  
ice cubes / water  
plaster of paris
- Suspect(s) may leave  
footprints behind
- Examine evidence



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“Okay, Miss Good Detective—how exactly are we going to do that?”

“Well, I’m guessing that whoever took the fossils is feeling pretty scared right now, because of the sheriff coming tomorrow. It’s just a **hunch**, but I think he or she might try to return the fossils to the lab tent tonight.”

“You mean we have to stand guard here all night and keep watch?” Matt hissed. “Sis, I’m so tired I can hardly keep my eyes open.”

Amy shushed her brother again. “We’re not going to stand guard. We’re going to use chemistry to identify the culprit instead.”

“Chemistry?” Matt asked, in a tone that made it sound like he thought his sister was crazy. “What do we know about chemistry that could help solve a crime?”

“Quite a bit, actually, if you’ve been paying attention over the past few days.” Amy lifted the flap of the kitchen tent. “Follow me.”

She slipped inside and flicked on her flashlight. After grabbing a big bowl and a dishtowel from a shelf, she headed over to the little refrigerator. “First, we need ice,” she said, handing Matt the bowl and laying the towel in the bottom of it. As she emptied the ice cubes from two trays into the bowl, the towel muffled their clatter. She listened for a minute, straining to hear any sounds that might indicate someone else was awake. Except for the crickets, there was silence. “Now, let’s head for the lab,” she instructed.

Amy stopped outside the lab tent and took the bowl of ice cubes from Matt. One by one she placed the ice cubes on the ground directly in front of the tent’s entrance.

“Amy, what on earth are you doing?” Matt asked impatiently.

“I’m exploiting a physical change in matter as the first step in solving the case,” Amy replied. “The ice cubes will slowly melt over the next few hours. They’ll change states from a solid to a liquid, making the ground wet here right in front of the tent. Anyone who enters the lab will get the soles of his or her shoes nice and damp.”

“So what good do wet shoes do us?” The irritation in Matt’s voice was growing.

“Trust me.” Amy stepped inside the lab, flicked on her flashlight, and shone it where boxes and supplies were stacked in one corner. “Help me find the plaster of paris.”

Matt quickly found the bag of white powder and dragged it into the center of the tent. “Okay, now what?”

Amy handed her brother a pair of latex gloves from a box on a shelf, and put on a pair herself. “Help me scatter plaster dust on the floor of the tent. Let’s start in the far corner and work back toward the entrance.”

“Amy, this is not just crazy,” Matt said, starting to scatter the plaster dust, “but Dr. Forester is going to be very annoyed when she sees this mess.”

“The plaster is the second part of my plan and makes use of a chemical change,” Amy said. “Remember what happened when Tess mixed water and plaster of paris at the dig site today?”

“It underwent a chemical change and the wet plaster hardened.”

“Exactly. So if someone comes into the lab tent tonight, he or she will step in the water from the melting ice cubes just before entering. The soles of this person’s shoes will be wet as he or she starts to walk around—”

“—and the plaster dust will stick to them.” A grin started to spread across Matt’s face. “The plaster and water will undergo a chemical change—”

“—and harden into plaster,” Amy finished. “We saw today how well plaster sticks to things. It should stick to shoe bottoms at least as well. Then, tomorrow morning at breakfast, we’ll check everyone’s shoes, and whoever is sporting plaster in the treads will have a lot of explaining to do.”

Matt was quiet for a long moment. “Amy, you are a good detective. That’s brilliant.”

Amy beamed.



## Writing

### Entering/Emerging

With 1:1 support, help students create simple sentences from the notes taken in the graphic organizer. Prompt them to use joining words where appropriate.

### Transitioning/Expanding

In pairs or small groups, with prompting, have students create short paragraphs to describe each phase in Amy's plan, reminding them of the audience (the Sheriff).

### Bridging

Ask students to explain their plan and how their audience (the Sheriff) and his knowledge on chemical matter will affect their writing.

**Evaluative.** There is a physical change followed by a chemical change in Amy's plan. Can you identify them?

» physical: ice turning to water; chemical: plaster of paris and water reacting

• **Support.** As necessary read the following excerpts aloud to students to help them identify the correct steps in the plan:

- **Excerpt 1:** "I'm exploiting a physical change in matter as the first step in solving the case," Amy replied. "The ice cubes will slowly melt over the next few hours. They'll change state from a solid to a liquid, making the ground wet here right in front of the tent. Anyone who enters the lab will get the soles of his or her shoes nice and damp."
- **Excerpt 2:** "The plaster is the second part of my plan and makes use of a chemical change," Amy said. "Remember what happened when Tess mixed water and Plaster of Paris at the dig site today?"
- "It underwent a chemical change and the wet plaster hardened."
- "Exactly. So if someone comes into the lab tent tonight, he or she will step in the water from the melting ice cubes just before entering. The soles of this person's shoes will be wet as he or she starts to walk around—"
- "—and the plaster dust will stick to them." A grin started to spread across Matt's face. "The plaster and water will undergo a chemical change—"
- "—and harden into plaster."

## LETTER TO SHERIFF (20 MIN.)

- Ask students to turn to Activity Page 10.2 and write a letter to the Sheriff explaining Amy's plan, and why it is a good way of identifying the culprit. Remind students that the Sheriff is not a chemistry expert so he will need help understanding the plan. There is an optional graphic organizer below to help students work.
- Either ask students to finish the letter at home, or collect Activity Books to review their letter.

## Activity Page 10.2



|                                | Matter Amy uses          | What will happen to the matter?                            | Why is this a physical/chemical change (you may need to refer back to previous notes and chapters)?                                                                                   | Why does this help catch the thief?                                                                                                             | Why is this objective evidence?                                                                                                                                                      |
|--------------------------------|--------------------------|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Part 1: Physical Change</b> | <i>Bowl of ice cubes</i> | <i>Melt—meaning it changes state from solid to liquid</i>  | <i>Changes of state are physical changes: they are reversible, and the kind of matter remains the same (chemical composition doesn't change) (other explanations are acceptable).</i> | <i>The water will mean that the soles of the thief's shoes will get wet, so they stick to other things the thief steps in.</i>                  | <i>Only someone who walks into the lab will have plaster of paris on their shoes. There is no opinion on the person, just evidence of what action they took (where they walked).</i> |
| <b>Part 2: Chemical Change</b> | <i>Plaster of paris</i>  | <i>Undergo a chemical change when it encounters water.</i> | <i>It is not reversible, it gives off heat, and it turns into a different form of matter.</i>                                                                                         | <i>When the water on the shoes encounters the plaster of paris, a reaction will take and hard plaster will stick to the bottom of the shoes</i> |                                                                                                                                                                                      |



### Check for Understanding

Ask students whether the plan will provide good objective evidence for who the thief is, and why.

### Support

With the class, fill in the optional graphic organizer in Activity Page 10.2, found in the Advance Preparation for this unit and above.



## Lesson 10: To Catch a Thief

# Language



### GRAMMAR (15 MIN.)

**Primary Focus:** Students will understand how to use commas in a range of contexts. [L.5.2a, b, c]

- Remind students that in Lesson 6 they practiced using commas to separate introductory elements.

Where should the comma be placed in the sentence “Underneath the shifting sands the dinosaur waited to be discovered”?

» before *the dinosaur*, which is the subject of the sentence

- Tell students that today they will look at the use of commas in two other contexts: to set off the words *yes* and *no*, and to set off a tag question from the rest of the sentence.
- Tell students they will first look at commas to set off the words *yes* and *no*. Point to the sentences on the board you prepared.

“Yes, I do think I want to be a paleontologist.”

“No, thank you, I don’t want another snack.”

“Yes I think I will solve this case.”

“No I’m not afraid of dinosaurs.”

- Ask students if they can identify where the commas are similarly placed in the first two sentences. Once students identify that it is after the *yes* or *no*, tell them that when you start a sentence with *yes* or *no*, you place a comma after it.
- With the class, place commas in the correct places for the remaining two sentences.
- Tell students that the second context in which they will investigate commas is when looking at a tag question. Tell students that a tag question is a question that is added at the end of the sentence.

- Point to the sentences on the board/chart paper.  
 “You think I’m the culprit, don’t you?”  
 “It’s very hot, isn’t it?”  
 “There are no footprints or tracks are there?”  
 “Paleontology is fun don’t you think?”
- Ask students if they can identify where the commas are similarly placed in the first two sentences. Once students identify that it is before the questions, tell them that when you finish a sentence with a question, you place a comma before it.
- With the class, place commas in the correct places for the remaining two sentences.
- Either in remaining time or at home, have students turn to Activity Page 10.3 and complete the practice questions.



### Check for Understanding

Ask students to identify why the following sentence does not need a comma: “I’m afraid my answer is no.”

## **MORPHOLOGY (15 MIN.)**

**Primary Focus:** Students will understand how to use the roots *mit/mis*.  
 [L.5.4b]

- Refer to the Roots Poster you displayed in the classroom and read with students.
- Remind students that in Lesson 6 they looked at the roots *mit* and *mis*, which mean “to send.”
- Tell students you will read a sentence aloud that is missing a word. Then, students must decide which word from the four options on the board best fits in the blank. Point out that the word choices are listed in the right column and the sentences are in the left column.
- Practice with the first sentence “Amy was ready to write down the final clue when she realized she had \_\_\_\_ her notebook!”

## Activity Page 10.3



### Support

Display the poster in the Teacher Resources or digital components to help students.

### Challenge

Ask students to come up with their own sentences with introductory elements, the words *yes* and *no*, or tag questions.

### Support

Provide additional sentences that use the words *mission*, *transmitted*, or *dismissed* to give further practice in the correct use of those words.



## Language Reading/Viewing Closely

### Entering/Emerging

Provide additional sentences on familiar topics for the optional words to allow students to decipher the meaning, e.g., "I bought a ticket for admission to the circus."

### Transitioning/Expanding

Provide additional sentences on topics related to the Reader to allow students to decipher the meaning of the optional words, e.g., "Dr. Forester permitted Julian to hold the fossil."

### Bridging

Provide additional examples of the words used in context, e.g., "The alarm emitted a piercing noise."

### Challenge

Ask students to infer why *transmitted* might have a root from the Latin meaning "to send."

## Activity Page 10.4



- Ask students if they know which word best fits in the blank from the choices given. If students are having trouble, ask which words they could eliminate from the list to narrow down the options.

- Continue in this manner with the remaining as time permits.

Amy's \_\_\_\_ was clear: to find the culprit. (*mission*)

The police officer \_\_\_\_ the message across the radio to the Sheriff. (*transmitted*)

Matt \_\_\_\_ Amy's suggestion with a shrug. (*dismissed*)

- Have students turn to Activity Page 10.4. Briefly review the directions and tell students to complete it for homework. Remind students to read the sentences carefully, as not all of the answers will be words with the root *mit/mis*.
- At a later date, make arrangements to check that students completed Activity Page 10.4 correctly.



### Check for Understanding

Ask students to suggest new sentences using the words in the table you displayed that were not correct for the sample sentences.

Lesson 10: To Catch A Thief

# Take-Home Materials

## PRACTICE ROOTS MIT/MIS

- Have students practice roots *mit/mis*.

## 11

# Connecting the Clues

**PRIMARY FOCUS OF LESSON****Writing/Reading**

Students will organize evidence boards to track evidence on characters, distinguishing between fact and opinion. [W.5.4, RL.5.6]

**Speaking and Listening**

Students will use the evidence they have collected to make an accusation. [SL.5.4]

**FORMATIVE ASSESSMENT****Evidence Boards**

**Evidence Boards** Create evidence boards to connect information. [W.5.4, RL.5.6]

**Activity Page 11.1**

**Accusation to the Sheriff** Complete rubric on presentation. [SL.5.4]

## LESSON AT A GLANCE

|                                  | Grouping    | Time    | Materials                                                                                                                                                                                                     |
|----------------------------------|-------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Writing/Reading (45 min.)        |             |         |                                                                                                                                                                                                               |
| Reviewing Evidence               | Whole Group | 10 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Evidence boards<br><input type="checkbox"/> Activity Page 3.3 (character maps)<br><input type="checkbox"/> Activity Page 11.1 |
| Creating Evidence Boards         | Small Group | 35 min. |                                                                                                                                                                                                               |
| Speaking and Listening (45 min.) |             |         |                                                                                                                                                                                                               |
| Decide on Culprit                | Small Group | 20 min. | <input type="checkbox"/> Motives, Means, and Opportunity poster<br><input type="checkbox"/> Activity Pages 11.1, 11.3, 11.4                                                                                   |
| Prepare Accusation               | Small Group | 10 min. |                                                                                                                                                                                                               |
| Deliver Accusation               | Small Group | 15 min. |                                                                                                                                                                                                               |

## ADVANCE PREPARATION

### Writing/Reading

- Students should create evidence boards for the same characters they investigated in Lessons 8 and 9. Students will therefore complete evidence boards for either (i) Julian and Kristal, (ii) Felix and the Squirrels, or (iii) Darla and the SUV.
- The best way to manage evidence boards is by having large boards around the room, as with evidence boards in detective shows. There are some pictures of evidence boards in the Teacher Resources section of this Teacher Guide. Alternatively, you can access digital versions of this in the digital components for this unit. You may wish to use these for your own reference or display them for students as examples.
- Ensure that each small group has a number of pieces of paper to write evidence on and place on the board.
- Please see Universal Access for some additional scaffolding on how to organize the evidence boards.
- Students will continue to use the boards in the next lesson: they should remain on the wall.

### Speaking and Listening

- Prepare the poster below, which can be found in the Teacher Resources or in the digital components for this unit.

#### **How to help identify the guilty party!**

Motive: Did the suspect have a reason to *want* to steal the fossils? What evidence do we have for that?

*Example: Someone who loses money because of a robbery probably does not have a motive.*

Means: Did the suspect have the practical ability to steal the fossils?

*Example: A little old lady probably did not have the strength to wrestle someone to the ground.*

Opportunity: Did the suspect have a chance to steal the fossils without being observed?

*Example: If someone was in a casino all night, and lots of people saw him or her there, he or she probably did not have the opportunity to steal something many miles away.*

- If you believe students have already read ahead and know who the culprit is, ask different groups to make an accusation against different suspects (using the evidence boards as a guide).
- This lesson builds on many of the skills students have practiced throughout this unit—including giving presentations. This is a good opportunity to work with students to implement feedback from their work in Lessons 9, 7, and 5, for example.
- As with previous lessons, you may wish to use the rubric to assess a small group of students.

### Universal Access

- Give some initial structure to the evidence boards by dividing the large cards as below. This is also in the digital components for this unit.



- Also be ready to display the model character maps from Lesson 3 again to discuss possible organization of evidence boards.
- If necessary, provide additional examples of subjective and objective information to help students distinguish between them.
- For the Speaking and Listening segment, provide students with stickers or labels for them to place against parts of the evidence board or Reader they wish to refer to.



- Before students create their accusations, work with select groups to identify links between the rubric and the statement they have chosen. For example:
  - “I have met the requirements in part 2 of the rubric by providing the following evidence from the text . . .”

Start Lesson

## Lesson 11: Connecting the Clues

# Writing/Reading



**Primary Focus:** Students will organize evidence boards to track evidence on characters, distinguishing between fact and opinion. [W.5.4, RL.5.6]

### REVIEWING EVIDENCE (10 MIN.)

- Tell students they will now use the information they have gathered over the unit to figure out who they believe the fossil thief is!
  - Remind students that, in previous lessons, they developed character maps for characters in the Reader and then considered whether the information reflected fact (objective information) or Amy’s point of view (subjective information).
  - Tell students that today they will decide how to organize the information they have collected so they can connect clues and decide whether their character is a likely suspect.
  - Tell students that detectives often use evidence boards for this purpose. Today they will be creating their own evidence boards on a character/suspect, then using the class’s evidence boards to find the culprit.
  - Remind students that, in this unit, they have created documents with a wide variety of organization—from prose, like the text, to flowcharts, lists, tables, and other devices.
  - Remind students that, when organizing information, the most important thing to bear in mind is “does this allow the reader to understand what I want them to understand?”
1. What were the purposes of the character map, and how did we evaluate how to organize it?
    - » Answers will vary but should recap the pros and cons of the different versions of the character map. It should reflect the need to record information about the character and the kind of information that is being recorded.

2. What does the reader of an evidence board want to understand? What is its purpose? How does this compare to the character maps?

- » Answers will vary but should include (1) the importance of seeing all the facts and being able to group the facts together to make connections; (2) being able to come to a conclusion; and (3) that while there are many similarities with the character maps, the need to create connections changes how you may wish to organize evidence boards.
- Tell students that when detectives make their final accusations about suspects, their evidence needs to be objective, or a court will not listen to it. Ask students how objective and subjective evidence could be reflected on the evidence boards.
- Finally, ask students whether they think the subjective evidence (Amy's point of view) is of any use to a detective. Through discussion, students should come to the understanding that while impressions of a character would not be "admissible evidence," they can still give clues about people and their motivations.
- You may wish to extend this discussion to consider how we judge others, including body language and appearance, and when this is and is not valid.

### CREATING EVIDENCE BOARDS (35 MIN.)

- Divide students into small groups according to the characters they investigated in Lessons 8 and 9. Either each small group should create boards for two characters (for example, Julian and Kristal), or each small group should have one character (for example, one group has Julian and another Kristal).
- Ask students to spend five minutes as a group discussing how to organize and plan their boards. Ask students to fill out the first rubric on Activity Page 11.1 to help them decide how to organize their boards.
- Ask students to use the information they gathered in their character maps and throughout the unit to place pieces of evidence on the board. Ask them to identify information they think is relevant for their evidence boards, write it on paper, and pin it to the board. They can move pieces of paper around as they work.
- Ask students to decide if each piece of evidence is *for* the character having taken the fossils or *against* them having taken the fossils, and whether it is objective or subjective evidence.

### Challenge

You may wish to ask students to spend 10 minutes adding to their character maps from the end of Chapters 6 and 7 for completeness. Although none of the evidence in these chapters is essential, students won't know that without actually analyzing it. Just like detectives or scientists, they must survey all available data in order to determine which pieces are essential and which are not.

### Activity Page 11.1



### Support

Work with small groups to plan their boards, or discuss as a class before students create their boards. You may wish to use the chart in the Universal Access section of Advance Preparation as a guide.

### Evidence Boards





## Writing Understanding Text Structure

### Entering/Emerging

Provide students with the example evidence board and ask them to use this board as the basis for their boards.

### Transitioning/Expanding

Provide students with the example evidence board and model character maps from Lesson 3. Have them choose one of the maps as the basis for their organization.

### Bridging

Provide students with the example evidence board and model character maps from Lesson 3. Have them describe how they will organize their own boards.

### Challenge

Ask students to create and add a map of the campsite and dig site to the board to help them keep track of the characters' movements.

### Support

Review the concept of "evidence."

### Support

Give students a shortlist of possible suspects (for example, Julian, Felix, Darla) so they have fewer characters to evaluate.



## Check for Understanding

Ask students to identify one piece of evidence on their board and explain why they have placed it in that position.

### Lesson 11: Connecting the Clues

# Speaking and Listening



**Primary Focus:** Students will use the evidence they have collected to make an accusation. [SL.5.4]

## DECIDE ON CULPRIT (20 MIN.)

- Display the Motives, Means, and Opportunity poster. Talk through each idea with students using the examples.



## Check for Understanding

Ask students to come up with an example where a suspect *would* have the motive, means, and opportunity to do something.

- Ask students, in their small groups, to rotate around the room and look at evidence boards for each character. Ask them to use the table in Activity Page 11.2 to evaluate whether they think the character is a likely culprit.
- When students have finished looking at the evidence boards, ask them to spend five minutes in their small groups deciding who they think the most likely suspect is. If students cannot agree, take a group vote.

### PREPARE ACCUSATION (10 MIN.)

- Ask students, in their small groups, to prepare a statement to the sheriff accusing one of the characters of being the fossil thief. Tell students they must decide which students will give the statement, or if they will rotate as they present.
- Ask students to turn to Activity Page 11.3 to help them as they create their statement.
- Suggest that, as they prepare their statements, students look at the rubric on Activity Page 11.4 that they will use during the statement.
- As students work, circulate and check in.

### Activity Pages 11.2–11.4



### Support

Nominate one student from each group to give the statement.

### Support

Does any of your evidence include subjective evidence? Make sure you note this.



### Speaking and Listening Supporting Opinions

#### Entering/Emerging

Provide 1:1 support to help students label evidence on their boards and to map the rubric in their activity pages to their accusation.

#### Transitioning/Expanding

Ask students to label pieces of evidence on the evidence boards and to explain how their opening statement maps to the rubric in their activity pages.

#### Bridging

Before presenting, ask students to show links from the Reader and evidence board to justify their arguments. Give feedback and support as appropriate.

## Support

Before finishing the lesson, ensure students understand that Amy created her plan because there was not enough evidence to accuse someone. While the students have made good inferences from the evidence, we can't be sure who the culprit is.

### DELIVER ACCUSATION (15 MIN.)

- Ask students, in their small groups, to make their accusations. Either do this with the whole class or pair small groups.
- As students present, ask the rest of the class to fill in their rubrics on Activity Page 11.4. Remind students to listen respectfully and attentively.



### Check for Understanding

When the presentations are finished, take a class poll on the culprit. Ask students to cite a piece of evidence they used to identify the suspect as guilty.

End Lesson



## 12

# Aftermath

## PRIMARY FOCUS OF LESSON

### Reading

Students explain how plot lines are resolved by tracking characters' desires and resolution. [RL.5.5]

### Grammar

Students form and use the perfect verb tense. [L.5.1]

### Morphology

Students use words with a range of affixes and roots as clues for word meaning. [L.5.4b]

## FORMATIVE ASSESSMENT

### Activity Page 12.3

**Resolution Table** Create table showing resolution for characters. [RL.5.5]

### Activity Page 12.4

**Grammar** Complete sentences using verbs in perfect tense. [L.5.1]

## LESSON AT A GLANCE

|                               | Grouping    | Time    | Materials                                                                                                                                                             |
|-------------------------------|-------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reading (60 min.)             |             |         |                                                                                                                                                                       |
| Small Group: Read Chapter 8   | Small Group | 30 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Pages 12.1, 12.2, 12.3<br><input type="checkbox"/> Resolution Table on board |
| Character Resolution          | Whole Group | 30 min. |                                                                                                                                                                       |
| Language (30 min.)            |             |         |                                                                                                                                                                       |
| Grammar: Perfect Verb Tense   | Whole Group | 15 min. | <input type="checkbox"/> Activity Page 12.4                                                                                                                           |
| Morphology: Affixes and Roots | Independent | 15 min. |                                                                                                                                                                       |



## ADVANCE PREPARATION

### Reading

- Students will continue to use their evidence boards in this lesson. Students who focused on Julian and Kristal should either be reassigned to one of the other characters, or should do the alternative activity during the small group read.
- You may wish to take additional time in class to discuss Dr. Forester's actions.
- This lesson contains a Think Aloud.
- On the board/chart paper create the following table:

|                        | Daria | Felix | Squirrels | SUV |
|------------------------|-------|-------|-----------|-----|
| Character's wants      |       |       |           |     |
| Character's behavior   |       |       |           |     |
| Character's resolution |       |       |           |     |

### Grammar

- Display the poster on perfect tenses. This can be found in the Teacher Resources for this unit and in the Digital Components.

#### ➤ Perfect Tenses Poster

##### Perfect Tense Verbs

###### 1. Past Perfect

An action that was completed in the past *before something else happened*: "I had lunch before I went to the cinema."

###### 2. Future Perfect

An action that will have been completed at some point in the future: "I will have solved four more cases by June."

###### 3. Present Perfect

Includes

- An action that was begun in the past and continues in the present: "I have already run three miles!"
- An action done several times in the past and continued in the present: "I have played the piano since I was four."

- On the board/chart paper write the following sentences:

“The police had interviewed the suspect before they cracked the case.”

“Yesterday when I arrived home I realized that someone had broken in!”

“Amy was disappointed at the bookstore because she had read all the detective novels.”

## Universal Access

- For the reading segment, provide a series of simple to complex connecting words on the board/chart paper to help students describe the links between information about the character, for example:
  - First we learned \_\_\_\_, then we found \_\_\_\_. Next we discovered \_\_\_\_. This means \_\_\_\_.
  - First we learned \_\_\_\_. We then saw the following \_\_\_\_. What we discovered about \_\_\_\_ links to this because \_\_\_\_.
  - We learned that \_\_\_\_\_. Consequently, her behavior, for example, \_\_\_\_\_, can be explained through \_\_\_\_\_, and specifically through \_\_\_\_\_.
- In the grammar segment, provide correct and incorrect sentences (one using past perfect, one not) and ask students to distinguish between them. Some examples are in the supports in the lesson.
- Provide lists of events and ask students to construct oral sentences linking them through the past perfect tense.
- In the morphology segment, provide additional sentences on familiar and unfamiliar topics to help students decipher brainstormed words. Some examples are in the supports in the lesson.

Start Lesson

## Lesson 12: Aftermath

# Reading



**Primary Focus:** Students explain how plot lines are resolved by tracking characters' desires and resolution. [RL.5.5]

### SMALL GROUP READ: CHAPTER 8 (30 MIN.)

## Vocabulary

- Ensure each student has a copy of the Reader, *The Badlands Sleuth*, and has located Chapter 8. They will read the first half only.

- As with previous units, preview the relevant core vocabulary, identify the first core vocabulary word, and ask students to identify the word bolded in the chapter and in the glossary at the back of the book.

**fluffy, adj.** light texture, filled with air

**trace, n.** a slight mark

**reluctant, adj.** unwilling

**intention, n.** aim or plan

**appreciate, v.** recognize the worth of

| Vocabulary Chart for Chapter 1, “Welcome to Fossil Camp!” |                                 |                                                 |
|-----------------------------------------------------------|---------------------------------|-------------------------------------------------|
| Vocabulary Type                                           | Tier 3<br>Domain-Specific Words | Tier 2<br>General Academic Words                |
| Core Vocabulary                                           |                                 | fluffy<br>reluctance<br>intention<br>appreciate |
| Multiple-Meaning Core Vocabulary Words                    |                                 | trace                                           |
|                                                           |                                 |                                                 |
| Sayings and Phrases                                       |                                 |                                                 |

### Support

Model the first answer for students.

### Challenge

Amy decides to support Julian. Would you do the same? Why?

### Activity Page 12.1



### Small Group Read Chapter 8, Part 1

- Ask students to read Chapter 8 in the same small groups as in the previous lesson. As with previous units, you should work with one small group intensively.
- As they read, ask students to complete the questions in Activity Page 12.1.

## Chapter 8

# Cracking the Case

### THE BIG QUESTION

Why are pancakes light and fluffy?

“Breakfast!” Tess called out from the kitchen tent. “Come and get it!”

Amy fell into step beside her brother. “Okay, once we’ve started to eat, I’ll pretend to drop something under the table, slip down there, and quickly check out the bottoms of everyone’s shoes.”

They sat down at the table with the others just as Tess came walking up with a huge platter of hot, **fluffy** pancakes and a bottle of maple syrup. “Good morning! This morning’s breakfast is brought to you by another amazing chemical change!”

Felix eyed the pancakes hungrily. “Um, do you think you could explain that statement *while* we eat, rather than before?”

“Absolutely,” Tess said, handing him the platter. “Last night after the campfire I was thinking about chemical changes that we encounter every day. Some of the most familiar ones have to do with food. When people cook or bake things, all sorts of chemical changes take place. For example, pancakes are light and fluffy thanks to a chemical change between two ingredients: baking soda and buttermilk. When these two substances are mixed together, atoms are rearranged and new types of molecules are produced. One of those new molecules is the gas carbon dioxide. Tiny bubbles of carbon dioxide gas form throughout the pancake batter and are trapped as the batter cooks and solidifies. The result is light and fluffy pancakes that are honeycombed with tiny air pockets.”

Kristal peered at the pancake on her plate. “So that’s why they look like they’re full of little holes. I always wondered about that.”

50

Amy took a bite of her pancake. It was wonderful and she wished she could concentrate on simply enjoying it. But she was focused on the results of another chemical change this morning, one that had hopefully left traces on someone's shoes. She waited until everyone was busy eating pancakes, and then casually let her fork slip through her fingers.

"Whoops, dropped my fork," she said easily, and ducking under the table she quickly scanned the bottoms of everyone's shoes. Her plan had worked! Amy sat up and stared at Matt as he raised his eyebrows questioningly. She thought for a moment how to communicate her discovery, and then picked up the bottle of maple syrup. "Matt, would you pass the syrup to Julian?" she said, trying to sound casual. "It looks like he needs more."

Matt's eyes widened in surprise.

Felix was already helping himself to seconds. "These pancakes are great, Tess. Too bad Dr. Forester missed them."

"She planned to be back before we headed up to the dig site," Tess replied, "so I'm guessing she and the sheriff will be here soon. I'll make more batter when they arrive."

Amy noticed that when Tess said this, Julian swallowed hard and put down his fork. He looked scared. Amy's mind raced as she tried to think of what to do next. "Since we're going to put plaster jackets on more fossils at the dig site today," she said, turning to Tess, "how about Matt and I load up the plaster of paris and the other things we'll need?"

"That would be great," Tess said, pouring herself some coffee. "I can sit here and relax."

"Actually, why don't you help us, Julian?" Amy added, as she got up from the table. "It'll go faster with three."

When Amy stepped inside the lab, she saw the shoe prints in the plaster dust on the floor. They led from the entrance to the table, where all the missing fossil fragments now lay in a neat row.

Julian stopped outside the tent entrance and then stepped inside reluctantly.

"I suspected that whoever took these fossils would bring them back," Amy said quietly, "what with the sheriff coming and all."

Julian looked about to deny it, but then stopped and let out a huge, unhappy sigh. "How did you know it was me?"

Amy explained about the ice, the plaster dust, and the shoes. Julian groaned and sat down heavily on a wooden crate full of tools. "I suppose you're going to tell Dr. Forester when she gets here—and the sheriff."



"How about you tell us why you took the fossils in the first place?" Amy said.

Julian hung his head and said, "I didn't mean to take them, really. Everything just went wrong." He paused and then plunged ahead. "Remember when Dr. Forester was so excited about the first set of fossils, but wanted us to wait until morning to see them? Well, I didn't want to wait. So I snuck in here later that night to see them for myself. I'd picked one up to look at it more closely. Then I thought I heard someone coming, and without thinking, I shoved the fossil into my pocket and slipped out the back of the tent."

“Why didn’t you just admit it the next morning when Dr. Forester found it missing, and give it back?” Matt asked. “It’s not like you meant to steal it. She would have believed you.”

“I didn’t think she would. I figured she’d be really angry, and send me home, and I didn’t want that to happen. I thought I’d just put the fossil back when no one was looking, and she’d just assume she had misplaced it. But every time I tried to do that, either Tess or Dr. Forester was here in the lab.” Julian poked at the tent floor with the tip of his shoe. “Then we found more fossils, and Dr. Forester started talking about how great it would be if she could get some of them to fit together. I thought since I had the missing piece, maybe I could use it to figure that out, and maybe it would turn out be an important new discovery, and I might be famous, and then my dad—,” Julian’s voice trailed off.

“What about your dad?” Matt asked quietly.

“Then my dad might be proud of me, like he is of my brother Jack.”

Amy and Matt exchanged a long look.

Julian hung his head again and picked at a seam on his jeans. “It was a silly idea, of course. Once I had the fossils, I couldn’t make any sense of them. I couldn’t even figure out a way to put them back in the lab without getting caught. So I put them in a sack and hid them under a bush.”

“And then Dr. Forester went off to get the sheriff, thinking we’d been robbed by fossil thieves,” Amy said.

Julian nodded. “So last night I brought the fossils back and put them there on the table. It seemed better than being caught with them red-handed or having to admit in front of everyone what I did. I didn’t think much further than that.”

No one spoke for a long moment. Julian looked from Amy to Matt and back to Amy again. “So, what are you going to do? Are you going to tell Dr. Forester I stole the fossils?”

“No, but you are,” Amy said quietly. “I think Dr. Forester will understand that it wasn’t stealing in the normal sense of the word, because your **intentions** were good.”

Julian looked doubtful, but he nodded, sighing. “You’re right. I’d feel better if I came clean, even if Dr. Forester decides to send me home.”

“I think your chances are pretty good, actually,” Matt said.

“We’ll be there to support you, too,” Amy added. “And I’ll be sure to mention that you saved me from that snake!”

Sudden shouts and the sound of a car horn interrupted her. “Dr. Forester must be back,” Amy said. “Let’s meet her together, okay?” Julian nodded and quietly followed Amy and Matt out of the tent.

Everyone gathered around the pickup. “Where’s the sheriff?” Felix asked, as Dr. Forester got out.

“He had something else he needed to do, but he’ll be here by mid-morning,” she replied. “And he did help explain the SUV we saw. It was a rancher the sheriff knows, out looking for lost cattle.”

“While we’re waiting, let’s pack up our gear,” Tess said. “We have a long day of excavating ahead.”

Amy, Matt, and Julian hung back, and the other campers followed Tess. “Dr. Forester?” Amy said, glancing quickly at Julian. “Would you mind coming into the lab with us? There’s something we need to show you.”

Dr. Forester looked quizzically from Amy to Matt and Julian and back to Amy again. “No problem,” she said. “Lead the way.”

It took Dr. Forester only a few seconds to spot the fossils all lined up on the table in the lab. “Now this is a surprise!” She picked up each fossil, examining it closely. “And they are all here, even the one that first went missing.” She crossed her arms and looked at them expectantly. “So, I assume someone is going to explain?”





### Check for Understanding

Refer to the class poll from the previous day. Ask students to name one piece of evidence they'd noticed that pointed to Julian, and one piece of evidence they'd missed that pointed to Julian.

## **Small Group Read Chapter 8, Part 2**

- Ask students to consider how the author gave clues about Julian's motives and actions in the chapters leading up to Chapter 8.
- Review the table students completed in their groups, along with their evidence boards. Ask students to review the information they were given about (a) Julian's motives and (b) Julian's means and opportunity in different parts of the Reader.
- Tell students that in the rest of the chapter, the author ties up loose ends about the other suspects: Felix, Daria, the SUV, and the squirrels.
- Ask students to continue reading Chapter 8 in their small groups. As they read, ask them to add the final information they learn about Daria, Felix, the squirrels, and the SUV to their evidence boards. Ask students to use the table on Activity Page 12.2 to help them.
- Students who completed boards for Julian and Kristal should either join other small groups or do one of the following alternative activities:
  - Add the information from Activity Page 12.1 to Julian's evidence board.
  - Write an answer to the following writing prompt: "Do you think that Julian's motives meant Dr. Forester was right not to punish him? Use evidence in the text in your answer."

### Activity Page 12.2



### Support

Review in each example whether this is subjective or objective information.

### Challenge

Introduce the concept of "red herrings" and ask students if there were any that led them to believe Daria was guilty. Ask if those red herrings were objective evidence or Amy's subjective point of view.

Julian cleared his throat. “Yes, ma’am, I am.” In a shaky voice, he proceeded to tell Dr. Forester the whole story. Amy chimed in about the snake, and Matt added that Julian felt really bad.

When they were finished, Dr. Forester was quiet for a long time. Then she nodded, as if deciding something. “I **appreciate** your honesty, Julian. And I hope you’ve learned that you should always tell the truth right away. Things just tend to get worse if you don’t.”

Julian nodded and stared at the ground. “When do I have to leave?”

Dr. Forester put her hand on his shoulder. “It took a lot of courage to confess what you did. And I think your worrying about all this has probably been punishment enough. You’re welcome to stay.”

Julian beamed a huge smile. “That’s fantastic. This camp is the most fun I’ve ever had!” Then his smile faded. “But how are we going to explain to the others that the fossils are back?”

Dr. Forester thought for a moment and then said, “Leave that to me.”

When they all joined Tess and the others, Dr. Forester held up her hand. “There has been an unexpected turn of events,” she said, gesturing toward the lab tent. “The missing fossils have been found. Let’s just say—” she paused as a hush fell over the group—“our prime suspect is a curious ground squirrel who decided to make off with the bones rather than food.”

For a moment, everyone was silent. The silence was followed by laughter and loud conversations. Suddenly Tess’s voice rose above all the others. “What about the sheriff?”

Dr. Forester frowned. “That’s a problem. He’s going to make the long drive out here for nothing, and I’ve got no way to reach him.”

“You could call him!” Daria offered. “I know a place where you can get a cell phone signal.”

Dr. Forester looked surprised. “You do?”

"I was pretty homesick the first couple days, so I tried my phone in lots of different places. The other night I found a spot not far from camp where I got two bars!"

Dr. Forester dug her cell phone out of her pocket. "Please show me that spot, Daria, so I can call the sheriff and save him the trip."

As they left, Amy nudged Matt and whispered, "That explains Daria's late-night walk."

When Dr. Forester and Daria returned, Felix arrived with his huge backpack and set it down on the table outside the kitchen tent.

"Gather around, everyone," Felix said. "I'm disappointed we won't get to meet a real western sheriff. But the return of the fossils calls for a celebration, and I've got just the thing." He unzipped the backpack's main compartment and started taking out candy bars and packets of beef jerky, peanuts, jelly beans, licorice, and all sorts of other yummy treats.

"Felix, what is all this?" Tess asked, staring at the growing pile of food.

"Survival rations!" he said gleefully. "I always carry this much food with me, just in case hunger strikes and the next meal is still hours away. And aren't you all just dying for a treat?" He smiled his mischievous grin.

Matt nudged Amy. "That explains a lot."

Amy nodded, pleased with how well things had turned out. The Case of the Missing Fossils was solved, and Julian was able to stay. Fossil Camp felt suddenly right and happy—and she had cracked the case!

## CHARACTER RESOLUTION (30 MIN.)

- Tell students they will explore, as a class, how Chapter 8 has provided *resolution* for the character.
- Remind students that they looked at a story's resolution in the Grade 4 Contemporary Fiction unit. The resolution explains what happens after the climax of the story (in this case Julian being caught) and often ties up loose ends of the plot.
- Using a Think Aloud, discuss the resolution for Daria. First review the following pieces of evidence (asking students to identify these on their evidence boards):
  - In Chapter 2, Daria says she missed her mom (then quickly pretends she wants to talk to her friends).
  - At the end of Chapter 4, Daria is out mysteriously late. She gives the following excuse "Um ... ah ... I went for a long walk" and sounds "strangely excited." She then quickly says good night.
  - She "seemed nervous" during Chapter 7.
  - At the end of Chapter 8 it is revealed that she has been looking for a cell phone signal to call home.
- Tell students that you can divide this evidence into three parts: Daria's *wants*, her *behavior*, and her *resolution*.
- Fill in the table you created on the board/chart paper for Daria as you speak (see below). Ask students to fill the table in Activity Page 12.3 as you work. You should keep this table for the following day.

|                               | Daria                                                                                                                                             | Felix | Squirrels | SUV |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------|-----|
| <b>Character's wants</b>      | She misses her mother                                                                                                                             |       |           |     |
| <b>Character's behavior</b>   | She disappears into the night (objective)<br>She seems "strangely excited" later (subjective)<br>She seems "nervous" at the campsite (subjective) |       |           |     |
| <b>Character's resolution</b> | She was out in the middle of the night (her behavior) because she found a signal to call her mother (her wants)                                   |       |           |     |

## Activity Page 12.3



### Reading Understanding Cohesion

#### Entering/Emerging

Provide a series of simple connecting words. Work through the text with students to help them describe what they learned about the character.

#### Transitioning/Expanding

Help students use nuanced connecting words in describing what they learned about the character in the text. Point students to relevant parts of the text.

#### Bridging

Have students use complex connecting words to describe how the character's resolution ties to their wants and behavior.

### Support

Students may need help with the “wants” of the squirrels and the SUV. The squirrels seek food and mistake other objects for food: hence the “excuse” resolution that they grabbed the fossils.

- Completing the table as a class, ask small groups in turn to volunteer information for the wants, behavior, and resolution of the remaining characters.
- **Challenge.** Tell students that in theater there is a concept called “Chekhov’s gun.” It means that if you see a gun on stage at some point in the play, it will be used. It will never be just a prop. Ask why the squirrels might be a case of “Chekhov’s squirrels”?



### Check for Understanding

Ask students which one of the four characters had “wants” that might have led them to take the fossils.

### Support

There is no information given about the SUV’s “wants” before this chapter: The people in the SUV were looking for lost cattle.

## Lesson 12: Aftermath

# Language



### GRAMMAR: PERFECT VERB TENSE (15 MIN.)

**Primary Focus:** Students form and use the perfect verb tense. [L.5.1]

### Introduce Perfect Tenses

- Tell students that they will be investigating the perfect tense. Display the poster from the Teacher Resources/Digital Components
- Explain the poster to students, and tell them they will look at each of these tenses in turn.

### Perfect Tense Verbs

#### 1. Past Perfect

- An action that was completed in the past *before something else happened*:  
“I had lunch before I went to the cinema.”

#### 2. Future Perfect

- An action that will have been completed at some point in the future: “I will have solved four more cases by June.”

### 3. Present Perfect

#### Includes:

- An action that was begun in the past and continues in the present: "I have already run three miles!"
- An action done several times in the past and continued in the present: "I have played the piano since I was four."

#### Practice Past Perfect

- Tell students they will begin by practicing the past perfect tense.
- Point again to the sentence that reads "An action that was completed in the past *before something else happened*: 'I had lunch before I went to the cinema.'"
- Ask students to explain why the example sentence meets the rules laid out in the definition.
- Ask students to look at the sentences you prepared earlier on the board/chart paper. Working as a class, identify the order of the actions.
- In each case ask students to identify the past perfect (highlighted) and make the connection that this was the action *preceding* a later action.
- "The police **had interviewed** the suspect before they cracked the case."
  - » *(first they interviewed the suspect, then cracked the case)*
- "Yesterday when I arrived home I realized that someone **had broken** in!"
  - » *(first they broke in, then I arrived in)*
- "I was disappointed at the bookstore because I **had read** all the detective novels."
  - » *(first I read the detective novels, then visited the bookstore)*
- Ask students to turn to Activity Page 12.4 and work on the practice questions. They may take them home to complete.



#### Check for Understanding

Ask students to create their own sentences using the past perfect tense.



#### Language Using Verbs and Verb Phrases

##### Entering/Emerging

Practice saying sentences aloud using the past perfect tense, and then say the sentence again incorrectly. Ask students to identify the correct use.

##### Transitioning/Expanding

Provide students with additional events and ask them to orally provide sentences using the past perfect tense.

##### Bridging

Ask students to describe two events they experienced this morning, linking them using the past perfect tense.

#### Activity Page 12.4



#### Support

Continue to model the practice questions as a class.

#### Challenge

Ask students to find examples of the past perfect tense in the Reader (they may wish to start reading Chapter 9).



## Language Reading/Viewing Closely

### Entering/Emerging

Provide sentences for the example words for students to decipher and apply the meaning. (“When I realize how much I achieved this year I feel amazement.”)

### Transitioning/Expanding

Provide additional sentences related to the Reader allowing students to decipher the meaning of brainstormed words. (“I transmitted the message to the Sheriff.”)

### Bridging

As necessary, give students additional examples of the words used in context. (“Don’t worry, the disease won’t transmit to humans.”)

### Support

Continue to practice with additional sentences using the words *emit*, *missile*, *commit*, *permit*, *admit*.

### Challenge

Ask students to come up with new sentences.

## MORPHOLOGY: AFFIXES AND ROOTS (15 MIN.)

**Primary Focus:** Students use words with a range of affixes and roots as clues for word meaning. [L.5.4]

- Remind students that in the past few units they have investigated a range of affixes and roots.
- Tell students they will review the affixes *-en*, *-ment* and the roots *mit/miss*.
- Remind students that a prefix is a syllable or syllables placed at the beginning of a root word to change the word’s meaning.
- Write the word *close* on the board.
- Ask students to read the word. Discuss its meaning and ask students to name the part of speech.
  - » to shut; verb
- Add the prefix *en-* to *trap* and have students read the new word.
- Ask students what the prefix *en-* means.
  - » in
- Ask students what *enclose* means and what part of speech it is.
  - » close in; verb
- Remind students that a suffix is a syllable or syllables placed at the end of a root word to change the word’s meaning.
- Write the word *amaze* on the board. Ask students to read the word. Discuss its meaning and ask students to name the part of speech.
  - » surprise; verb
- Ask students what the suffix *-ment* means.
  - » a state of being
- Add the suffix *-ment* to *amaze* and have students read the new word. Ask students what *amazement* means and what part of speech it is.
  - » state of being surprised; noun
- Remind students that a root is the main element of a word that forms the base of its meaning.
- Write the word *transmit* on the board. Ask students to read the word. Discuss its meaning and ask students to identify the root in the word.
  - » to send on; Latin root *mit* means to send



### Check for Understanding

Take a few minutes, as a class, to brainstorm words that can have *-ment* added to the end of them.

---



### Check for Understanding

Ask students to fill in the following sentence using the words they have investigated to date.

- I \_\_\_\_ a message to the Sheriff: "I have been \_\_\_\_ by a criminal!" The Sheriff replied, "I heard your message with \_\_\_\_\_. How could you have been so silly?"

---

End Lesson



## 13

# Round and Round

**PRIMARY FOCUS OF LESSON****Reading**

Students integrate information from multiple sources to explain recycling as a chemical process. [RI.5.7, RI.5.9]

**Language**

Students form and use the perfect verb tense. [L.5.1]

**Writing**

Students describe the plot resolution for two characters. [W.5.1, W.5.4]

**FORMATIVE ASSESSMENT**

**Activity Pages**  
13.1 and 13.2

**Chapter 13** Annotate diagrams showing plastic creation and photosynthesis. [RI.5.7, RI.5.9]

**Activity Page 13.3**

**Grammar** Verbs. [L.5.1]

**Activity Page 13.4**

**Resolutions** Opinion piece on character resolution. [W.5.1; W.5.4]

## LESSON AT A GLANCE

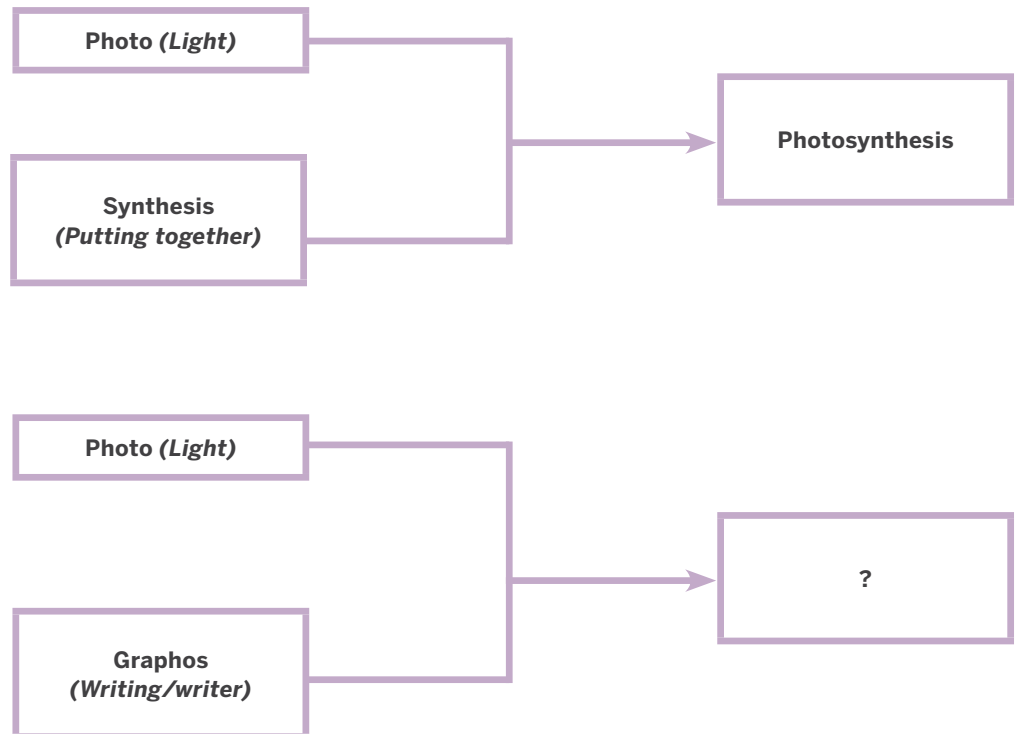
|                                           | Grouping    | Time    | Materials                                                                                                                                                              |
|-------------------------------------------|-------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reading (45 min.)                         |             |         |                                                                                                                                                                        |
| Read and Integrate Information: Chapter 9 | Partner     | 20 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Pages 13.1, 13.2<br><input type="checkbox"/> Poster on scientific definitions |
| Integrate Information                     | Partner     | 20 min. |                                                                                                                                                                        |
| Word Work: <i>Photosynthesis</i>          | Whole Group | 5 min.  |                                                                                                                                                                        |
| Language (15 min.)                        |             |         |                                                                                                                                                                        |
| Perfect Verb Tense                        | Whole Group | 15 min. | <input type="checkbox"/> Activity Page 13.3                                                                                                                            |
| Writing (30 min.)                         |             |         |                                                                                                                                                                        |
| Resolution                                | Whole Group | 15 min. | <input type="checkbox"/> Activity Page 13.4                                                                                                                            |
| Write Opinion Piece                       | Independent | 15 min. |                                                                                                                                                                        |

## ADVANCE PREPARATION

### Reading

- There are two activities in this segment. If students have excelled at combining information from different sources, ask them to complete both activities. Otherwise, ask students to only do the photosynthesis activity.
- The annotation activities can be extended by asking students to use additional resources from the library, the Internet, or science class. If you do this, review the use of appropriate and reliable sources first.
- Prepare the poster on scientific definition found in the Teacher Resources section of this Teacher Guide. Alternatively, you may access a digital version of this in the digital components for this unit.

#### ➤ Scientific Definition Poster



### Grammar

- Display the Perfect Tenses Poster from the previous lesson. This can be found in the Teacher Resources for this unit and in the Digital Components.
- On the board/chart paper write the following sentences:
  - “The culprit will have escaped by the time we arrive.”
  - “The mystery will be solved by tea time.”
  - “I will be old before you make up your mind!”

- “I have read that book a dozen times.”
- “I have known Matt my entire life.”
- “Matt has made a lot of new friends.”
- “I’ve been starving for hours!”

## Writing

- Ensure students have access to the wants and resolutions table you created in the previous lesson.
- Depending on time, you may wish students to write about both characters’ resolutions or just one.

## Universal Access

- Provide students needing substantial support with pieces of paper with the following quotes from the Reader:
  - “In photosynthesis, the atoms making up molecules of water and carbon dioxide are recombined, using energy from sunlight, to produce molecules of sugar and oxygen gas.”
  - “Plants release the oxygen into the air, and use the sugar molecules to grow and build their bodies, including the parts that animals and people eat for food.”
  - “The cells of all living things produce carbon dioxide as a waste product. We get rid of it by exhaling.”
  - “Some chemical changes that are part of decomposition return carbon to the air as carbon dioxide.”
  - “Perhaps, thanks to chemical changes, some of Achy-Breaky’s atoms are now part of compounds in the soil or the water or the air.”
- Also provide multiple copies of chemical formulae on pieces of paper, for example:
  - Carbon dioxide has the formula  $\text{CO}_2$ .
  - Water has the formula  $\text{H}_2\text{O}$ .
  - Oxygen has the formula  $\text{O}_2$ .
  - Sugar has the formula  $\text{C}_6\text{H}_{12}\text{O}_6$ , where “C” stands for carbon, “H” stands for hydrogen, and “O” stands for oxygen.
- Provide a way for students to stick the pieces of paper onto the diagram in Activity Page 13.2.

- Provide sentence frames to help students identify cause and effect before annotating their diagram, for example:
  - First the compounds \_\_\_\_ and \_\_\_\_ are combined to make \_\_\_\_\_. This happens on the \_\_\_\_\_.
  - Plants release \_\_\_\_\_, which is breathed in by \_\_\_\_\_.
  - \_\_\_\_\_ is released by \_\_\_\_\_.
- In the grammar segment, provide correct and incorrect sentences (one using the perfect tense, one not) and ask students to distinguish between them. Some examples are in the supports in the lesson.
- Provide lists of events and ask students to construct oral sentences linking them through the future and present perfect tense.
- For the writing segment, provide a series of simple to complex connecting words in sentence frames on the board/chart paper to help students describe the links between information on the character. For example:
  - First we learned \_\_\_\_\_, then we found \_\_\_\_\_. Next we discovered \_\_\_\_\_. This means \_\_\_\_\_.
  - First we learned \_\_\_\_\_, then we then saw the following \_\_\_\_\_; for example, \_\_\_\_\_. What we discovered about \_\_\_\_\_ links to this because \_\_\_\_\_.
  - We learned that \_\_\_\_\_. Consequently, her behavior, for example, \_\_\_\_\_ can be explained through \_\_\_\_\_, and specifically through \_\_\_\_\_.

Start Lesson

## Lesson 13: Round and Round Reading



**Primary Focus:** Students integrate information from multiple sources to explain recycling as a chemical process. [RI.5.7, RI.5.9]

### READ AND INTEGRATE INFORMATION: CHAPTER 9 (20 MIN.)

#### Introduce the Chapter

- Ensure each student has a copy of the Reader, *The Badlands Sleuth*, and has located Chapter 9.
- Have students turn to the table of contents, locate the chapter, and then turn to the first page of the chapter.

- As with previous units, preview the relevant core vocabulary, identify the first core vocabulary word, and ask students to identify the word bolded in the chapter and in the glossary at the back of the book.

### Vocabulary

**glossy, adj.** shiny and smooth

**blazing, adj.** very hot

**decompose, v** decay, break down

**photosynthesis, n.** process by which plants use sunlight to get food from water and carbon dioxide

**fragment, n.** small part broken off something

**juvenile, n.** a young creature or person

| Vocabulary Chart for Chapter 5, “What Is at the Center of the Universe?” |                                 |                                  |
|--------------------------------------------------------------------------|---------------------------------|----------------------------------|
| Vocabulary Type                                                          | Tier 3<br>Domain-Specific Words | Tier 2<br>General Academic Words |
| Core Vocabulary                                                          | decompose                       | glossy<br>blazing<br>fragment    |
| Multiple-Meaning Core Vocabulary Words                                   | photosynthesis                  | juvenile                         |
|                                                                          |                                 |                                  |
| Sayings and Phrases                                                      |                                 |                                  |

### Integrate Information: Plastics

- Ask students to read Chapter 9, “A New Day, A New Dinosaur” as individuals or in pairs. As with previous units, you may pair students a number of ways.
- Students should read up to “That’s absolutely amazing”.
- As they read, ask students to complete the questions in Activity Page 13.1 in pairs or individually.
- As students work, circulate and check in.

### Support

You may wish to create a timeline as a class to trace the creation of plastic bottles (300 million years ago, 1900s, today) and discuss what process happened between and in each period.

### Support

If time is a concern, students should concentrate on the photosynthesis activity to follow.

### Challenge

Ask students to compare the way Tess uses the word *recycling* with the way we use it in every day life.

### Activity Page 13.1



## Chapter 9

# A New Day, A New Dinosaur!

### THE BIG QUESTION

Why is chemical change  
the ultimate recycler?

Amy traced the entire edge of the dinosaur jawbone with the tip of her finger. She and Matt had finished excavating it, and she enjoyed the feel of the smooth, **glossy** fossil. A blazing sun hovered over the dig site, but after the success of the morning and the return of the missing fossils, for once the heat didn't bother her. Maybe she was getting used to it.

On the other side of the dig site, Tess was showing Felix and Daria how to use a rock hammer and chisel to carefully chip away the rock around several back bones they'd excavated in preparation for encasing them in a plaster jacket. Matt and Amy were next in line to learn this technique, and Amy couldn't wait to mix the plaster of paris and water. The chemical change that took place when that happened was one she'd really grown to appreciate.

Kristal was sitting on the ground, sketching Julian as he scraped away the last of the sandstone around the dinosaur foot bones that they had been working on. Amy was pleased to see that Julian was back to being his normal self. And Dr. Forester was sitting off in the shade at the far end of the plateau, happily studying the strange little bones with a magnifying glass. She'd announced that from now on, she wasn't letting them out of her sight and was even going to sleep with them next to her cot at night.

Tess stood up and tugged off her safety goggles. "I think it's already time for a water break, everyone, because the heat today is fierce." Matt retrieved bottles of cold water from the ice chest, and Amy was reminded of their first day of digging and the discussion of matter. It suddenly struck her how much chemistry they'd all learned since.

"You're pretty sneaky, Tess," she said with a laugh as they all sat down under the tarp at the edge of the dig site. "We came to Fossil Camp to learn about fossils, and you ended up teaching us chemistry, too."

Tess smiled. "So you haven't minded all my chemistry lessons?"

Amy shook her head. "It's been really interesting, especially learning about chemical changes. I like the idea that chemical changes can turn one type of matter into another by shuffling atoms around that go on to bond in new combinations."

"In a way, I supposed it's a bit like recycling," Felix said thoughtfully, staring at his water bottle. "What I mean is, when we recycle these plastic bottles, they'll be remade into something new."

"Actually, chemical changes are the ultimate recyclers," Tess replied, "because they recombine the same elements over and over again in different combinations to form new types of matter. A plastic water bottle already has a long history of recycling, Felix, from a chemical change point of view. Would you like to hear the story?"

Everyone said yes, so Tess drained the last of the water from her bottle and began. "Imagine you had a time machine and you set the dial for 300 million years ago. You stepped out into a warm, humid, green world full of forests and swamps teeming with tall trees, gigantic ferns, and all sorts of other ancient plants. Plants and plant-like organisms grew in the ancient oceans, too. All of those green, growing things, like all living things today, had bodies built mostly from compounds that contain atoms of the element carbon.

"Because there was so much plant life living and growing on the earth 300 million years ago, there was also a lot of plant life dying. Some of those dead organisms decomposed relatively quickly. Some were buried and fossilized like Achy-Breaky. But some underwent different kinds of chemical changes that transformed their carbon-rich remains into the carbon-rich substances we call oil and coal."



“So carbon atoms that were once in the bodies of ancient, green, growing things are now in oil and coal?” Julian asked.

“Not all of them, of course, but a lot of them,” Tess said. “Now zoom forward in your time machine to the 1900s, when chemists started playing around with the carbon-rich compounds in oil. They discovered chemical processes that could change some of those compounds into plastics.” She held up the empty water bottle. “In other words, carbon atoms that were once in the bodies of three-hundred-million-year-old lifeforms became part of oil deep in the ground and are now part of this plastic bottle in my hand.”

Matt whistled softly and shook his head. “That’s absolutely amazing.”

“Actually, everywhere you look in nature you see the recycling of elements thanks to chemical changes.” Tess reached over and plucked a blade of prairie grass from a nearby clump. “Like all plants, including plants that grew 300 million years ago, this grass carries out something called **photosynthesis**. That’s a process in which water and the gas carbon dioxide undergo a chemical change.”

“Carbon dioxide—that’s the same gas that makes pancakes fluffy, right?” Kristal asked.

“Yes, that’s the one,” Tess said. “In photosynthesis, the atoms making up molecules of water and carbon dioxide are recombined, using energy from sunlight, to produce molecules of sugar and oxygen gas. Plants release the oxygen into the air, and use the sugar molecules to grow and build their bodies, including the parts that animals and people eat for food.”

“So atoms of carbon, oxygen, and other elements that were once in the air or the water became part of plants, and then became part of us when we ate the plants,” Daria said.

“Exactly,” Tess said.

“But how did the carbon dioxide get into the air in the first place?” Felix asked.

## INTEGRATE INFORMATION (20 MIN.)

- Ask students to continue reading the chapter up to “‘Thanks, Achy-Breaky,’ he said, ‘I needed that.’”
- As students read, ask them to answer the questions and activity in Activity Page 13.2.
- As students work, circulate and check in.

## Activity Page 13.2



### Reading Reading/Viewing Closely

#### Entering/Emerging

Provide quotes from the Reader and multiple copies of the chemical compound formulas. Work with students to stick these onto their diagram at relevant points and explain their reasoning.

#### Transitioning/Expanding

Use sentence frames to explain cause and effect before writing relevant information on the diagram.

#### Bridging

Ask students to choose the relevant portion of the text. Provide support as they choose relevant key words from the text to describe what is happening.

#### Support

Students may struggle with the connection between the carbon dioxide animals exhale and the carbon dioxide plants use for photosynthesis. Ask them not to worry about compounds from Achy-Breaky's body and only describe this process.

“Excellent question, Felix.” Tess took a deep breath and let it out slowly. “The cells of all living things produce carbon dioxide as a waste product. We get rid of it by exhaling.” Then she gestured toward the fossils that lay in the rock beside them. “Whenever something dies, like good old Achy-Breaky, the compounds in its body are broken down and the atoms that formed them are recycled. Some chemical changes that are part of decomposition return carbon to the air as carbon dioxide.”

“You mean that when we take a breath, we’re breathing in carbon atoms from something that died?” Daria asked.

Tess burst out laughing. “Yes, I guess you are, but atoms are no different if they are in something dead or in something alive. They are just atoms.”

Tess glanced at her watch. “One last thing I’d like you to think about, and then we should get back to work. You’ve been working on Achy-Breaky for several days now. You’re getting to know him. But think about this as well: When this amazing dinosaur died, the compounds that made up his body were broken down by chemical changes. The atoms that were once part of those compounds moved on. Perhaps, thanks to chemical changes, some of Achy-Breaky’s atoms are now part of compounds in the soil or the water or the air that you are breathing.”

A hush fell over the group as they stared at Achy-Breaky’s bones, warm and shining in the bright sunlight. Amy knew she would never look at those bones in quite the same way.

Felix stood up and took a deep breath. “Thanks, Achy-Breaky,” he said. “I needed that.”

They all burst out laughing and picked up their tools to resume their work.

Before they could even get started, however, Dr. Forester came hurrying over. Her face was aglow with excitement, and she held a fossil in one hand and her magnifying glass in the other. “I found something,” she said, in a voice that made them stop everything they were doing. “I found unmistakable evidence that these strange little fossil bones are those of a small dinosaur. Come and look!”



### Check for Understanding

Ask students to orally describe how one element or compound: sugar, carbon dioxide or oxygen, is recycled through photosynthesis, pointing to their annotated diagram as they speak.

### Challenge

Ask students to link the information they annotated in the water cycle in Lesson 3 to describe how water becomes available to plants for photosynthesis?

### WORD WORK: PHOTOSYNTHESIS (5 MIN.)

- Remind students that in earlier lessons they looked at how Latin and Greek roots were used to create scientific terms.
  - Display the scientific definitions poster for this lesson. Point out that photosynthesis only occurs in direct sunlight.
1. **Evaluative.** Why do you think scientists used the roots *photo* and *synthesis* to describe the process we have been reading about?
    - » Answers will vary but should make the connection that in photosynthesis the plant is making things (synthesis) in the presence of light (*photo*).
  - Ask students to look at the roots in the second half of the poster—*photo* and *graph*. Ask a student to read what the root *graph* means (writer or writing).
  2. **Inferential.** What modern word do you think is made up of these roots?
    - » photograph
  3. **Evaluative.** Why do you think we use the roots *photo* and *graphos* to describe photographs?
    - » Answers will vary but should make the connection that photographs are taken in the light, and that the photograph “writes” (or draws) what is in the outside world onto photographic paper.



Language  
Using Verbs and  
Verb Phrases

### Entering/Emerging

Practice saying sentences aloud using the future perfect tense, and then say the sentence again incorrectly. Ask students to identify the correct use.

### Transitioning/Expanding

Provide students with additional events and ask them to orally provide sentences using the past perfect tense.

### Bridging

Ask students to describe two events they will experience later that day and linking them using the future perfect tense.

### Support

Continue to model the practice questions as a class.

### Challenge

What were the preceding and succeeding actions in this sentence from the Reader? "Then, tomorrow morning at breakfast, we'll check everyone's shoes and whoever is sporting plaster in the treads will have a lot of explaining to do."

## Lesson 13: Round and Round

# Language



**Primary Focus:** Students form and use the perfect verb tense. [L.5.1]

### PERFECT VERB TENSE (15 MIN.)

#### Practice Future Perfect

- Display the perfect tense poster.
- Remind students that in the previous lesson they began investigating the perfect tense and looked at the past perfect tense
- Ask a student to read out the description of the future perfect tense from the poster (an action that will have been completed at some point in the future: "I will have solved four more cases by June.").
- Ask students to explain why the example sentence meets the rules laid out in the definition.
- Ask students to look at the sentences you prepared earlier on the board/chart paper. Working as a class, identify the order of the actions.
- In each case, ask students to identify the future perfect (highlighted) and make the connection that this was the action *preceding* a later action.
  - "The culprit will have escaped by the time we arrive." (first the culprit will escape, then we will arrive)
  - "The mystery will have been solved by tea time." (first the mystery will be solved, then it will be tea time)
  - "I will have grown old before you make up your mind!" (first I will get old, then you will make up your mind)
- Ask students to turn to Activity Pages 13.3 and work on the practice questions. They may take these home and complete.

## Practice Present Perfect

- Ask a student to read out the description of the present perfect tense from the poster. (An action that was begun in the past and continues in the present: “I have already run three miles!” An action that was done several times in the past and continues in the present: “I have played the piano since I was four.”)
- Ask students to explain why the example sentences meet the rules laid out in the definitions.
- Ask students to look at the sentences you prepared earlier on the board/chart paper. Working as a class, identify which of the rules each sentence follows.
  - “I have read that book a dozen times.” (repeated action)
  - “I have known Matt my entire life.” (started in the past and continues)
  - “Matt has made a lot of new friends.” (repeated action).
  - “I’ve been starving for hours!” (started in the past and continues)
- Ask students to turn to Activity Pages 13.3 and work on the practice questions. They may take these home and complete.
- Highlight that these are not the only uses of the present perfect tense.



### Check for Understanding

Ask students to create their own sentences using the future perfect and present perfect tense.

## Support

Complete the table as a class.

## Activity Page 13.4



## Writing Understanding Cohesion

### Entering/Emerging

Provide a series of simple connecting words and work through the text with students to help them describe the character.

### Transitioning/Expanding

Help students use nuanced connecting words in describing how they learned about the character through the text. As necessary, point students to relevant portions of the text.

### Bridging

Ask students to describe, using complex connecting words, how the resolution of the character ties to their wants and behavior.

## Challenge

Does Tess have wants?  
Are they resolved?

## Lesson 13: Round and Round

# Writing



**Primary Focus:** Students describe the plot resolution for two characters.

[W.5.1; W.5.4]

### RESOLUTION (15 MIN.)

- Remind students that in the previous lesson they investigated how different characters' "wants" were resolved.
- Point students to the table they completed in the previous lesson on the board/chart paper and in Activity Page 12.3.
- Ask students, in pairs, to read the remainder of Chapter 9.
- As they read, ask them to consider Dr. Forester and Amy. Tell them they will be discussing the wants and resolution for these characters.
- As they read, ask them to fill in the table on Activity Page 13.4.

They gathered around her as she held up one of the fossils. “The key was this piece, the one that went missing right away.” She pointed to part of the fossil fragment. “This piece is definitely from a dinosaur skull. I can tell because there are telltale ridges in the bone that are places where muscles attached in a way unique to dinosaurs.”

“What kind of dinosaur was it?” Daria asked.

“That’s the really exciting part,” Dr. Forester replied. “Based on the curve of this piece, it’s from a very small dinosaur. At first I thought it might be from a baby dinosaur or a **juvenile**. But other features that I’ve identified this morning are only found in skulls of dinosaurs that are fully grown. That means that this dinosaur was an adult.” She stopped and looked at everyone. “But I’ve never seen an adult dinosaur with a skull this small, which means we might just have discovered a new species. I’m not absolutely positive at this point, but I am certain enough to be very excited.”

“Wow, a new species!” Felix exclaimed.

“That means you could be famous, Dr. Forester,” Julian said, smiling. “You told me so on our first day here.”

“That’s where you’re wrong, Julian,” Dr. Forester said softly. “A discovery like this could mean that you’ll all be famous. Whatever we discovered, you all helped discover it, and that means you get your names on the scientific paper that we will write about this little dinosaur.”

“It’ll need a name,” Amy said, taking the small piece of bone from Dr. Forester and cradling it in her hand. “It will need a scientific name like *Acheroraptor temertyorum*,” she said, sounding out the syllables slowly.

“How about *Fossilcampus fantasticum*?” said Felix gleefully.

When they’d stopped laughing, Tess glanced at her watch again. “Okay, fossil campers, let’s get back to work. Tonight we can sit around the fire and talk all you want to about this new discovery. But don’t forget, we have a bigger dinosaur to work on, with lovely bones that need to be excavated, jacketed, and transported back to camp.”





Amy watched as everyone picked up their tools and resumed tasks that just a few days ago had seemed strange and new. They had learned so much and gained so many skills. For Amy, Fossil Camp had turned out to be far better than she had ever anticipated. Who knew that digging up fossil bones under the hot sun—in a place with snakes—would turn out to be so much fun, or that she'd discover she could use physical and chemical changes to solve a real mystery?

*'Inspector Ellis,' she thought, 'here I come!'*

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## WRITE OPINION PIECE (15 MIN.)

- Ask students to complete the writing prompt on Activity Page 13.5 Think about Amy or Dr Forester. Do you think the reader provided a satisfying resolution for their character? Explain your answer using evidence from the text. Ask students to either choose one of the characters, direct them to write about one, or ask them to write about both.

Activity Page 13.5



### Check for Understanding

Ask student volunteers to read aloud their opinion pieces, and ask other students to make constructive comments about the volunteer's use of textual evidence.

End Lesson

## 14

# The Next Case

**PRIMARY FOCUS OF LESSON****Writing**

Using their analysis of literary and informational textual elements, students create a narrative and then revise it in response to peer feedback.

[W.5.3, W.5.5]

**FORMATIVE ASSESSMENT**

**Activity** Page 14.2

**Story** Draft the first chapter of a detective story.

[W.5.3, W.5.5]

## LESSON AT A GLANCE

|                          | Grouping    | Time    | Materials                                                                                                 |
|--------------------------|-------------|---------|-----------------------------------------------------------------------------------------------------------|
| <b>Writing (90 min.)</b> |             |         |                                                                                                           |
| Story Plan               | Independent | 45 min. | <input type="checkbox"/> <i>The Badlands Sleuth</i><br><input type="checkbox"/> Activity Pages 14.1, 14.2 |
| Writing a Narrative      | Independent | 45 min. | <input type="checkbox"/> Additional resources                                                             |

## ADVANCE PREPARATION

### Writing

- Other than assessments and Pausing Points, this is the final lesson of the year. This activity is designed to be a fun conclusion to fifth grade.
- While it is written as a single lesson, this activity can be expanded to many lessons, and include research from a number of sources. If you wish to include research, it may be helpful for students to spend some time researching interesting science topics before beginning their story plans.
- Given this extensibility, this lesson is written more flexibly than previous lessons in the CKLA.
- To aid this expansion, the Pausing Point lessons are dedicated to expanding this writing activity.
- Display the table on story plans. This can be found in the Teacher Resources for this unit. It is also found in the digital components for the unit.
- Use the diagram to talk through each of the components of story planning, which should all be familiar to the students. Brainstorm interesting words and plot details as a class.

|                                             | Details                                                                                                                                                                         | Description—words I plan to use |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>Setting</b>                              | <i>a space station in the year 3030</i>                                                                                                                                         | <i>alien, crowded, diverse</i>  |
| <b>Characters</b>                           | <i>Amy, a young chemical detective</i>                                                                                                                                          | <i>intrepid</i>                 |
| <b>My characters' "wants"</b>               | <i>Amy wants to figure out why she's there.<br/>The chief scientist on the space station wants to be famous.<br/>The apprentice wants to be noticed by the chief scientist.</i> |                                 |
| <b>How will my story begin?</b>             | <i>Amy wakes up to find herself in a pod, with no memory of how she got there.</i>                                                                                              |                                 |
| <b>How will my story end?</b>               | <i>Amy proves the space station is an elaborate hoax!</i>                                                                                                                       |                                 |
| <b>The plot (sequence of events)</b>        | <i>(see separate diagram)</i>                                                                                                                                                   |                                 |
| <b>What scientific content might I use?</b> | <i>Amy shows that the "scientists" who brought her there were using incorrect science: they must be actors!</i>                                                                 |                                 |

## Lesson 14: Amy's Next Case

## Writing



**Primary Focus:** Students create a narrative by using their analysis of literary and informational textual elements. [W.5.3, W.5.5]

## STORY PLAN (45 MIN.)

## Introduce Amy's Next Case

- Tell students that they will be spending today (and possibly subsequent lessons) developing their own detective stories.
- Tell students their task is to start writing a story about Amy's next case. Apart from two rules they must follow, students have complete freedom. Rule number 1: Amy must be the detective. Rule number 2: The case's resolution should include some kind of chemical component or other scientific content.
- Remind students that they have created narratives before, including in the Contemporary Fiction unit.

## Brainstorming Story Plans

- Display the story plan table below and use the categories and the example "plot" to discuss the components of story planning.
- During the discussion, brainstorm interesting plot details and ideas with students. Ask students to copy down ideas they find interesting. You may also wish to create a brainstorm diagram on the board/chart paper as you discuss.
- You can also brainstorm interesting adjectives and descriptive words they could use in their stories.

|                               | Details                                                                                                                                                                                     | Description words I plan to use |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>Setting</b>                | <i>a space station in the year 3030</i>                                                                                                                                                     | <i>alien, crowded, diverse</i>  |
| <b>Characters</b>             | <i>Amy, a young chemical detective</i>                                                                                                                                                      | <i>intrepid</i>                 |
| <b>My Characters' "Wants"</b> | <i>Amy wants to figure out why she's there.</i><br><i>The chief scientist on the space station wants to be famous.</i><br><i>The apprentice wants to be noticed by the chief scientist.</i> |                                 |

### Activity Page 14.1



### Support

Ask students to create their plots in small groups.

### Challenge

Ask students to create plots for each other to write stories about.

### Activity Page 14.2



|                                      | Details                                                                                                         | Description words I plan to use |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------|
| How will my story begin?             | <i>Amy wakes up to find herself in a pod, with no memory of how she got there</i>                               |                                 |
| How will my story end?               | <i>Amy proves the space station is an elaborate hoax!</i>                                                       |                                 |
| The plot (sequence of events)        | <i>(see separate diagram)</i>                                                                                   |                                 |
| What scientific content might I use? | <i>Amy shows that the “scientists” who brought her there were using incorrect science: they must be actors!</i> |                                 |

You may wish to spend some time on the scientific content, in two contexts. First, discuss how the scientific content might be introduced. Remind students that Tess answering campers’ questions was the device for the story they read. In the example you are discussing, Amy might find scientific content in the space station’s computer banks. Second, discuss what subjects might be interesting. You may wish to reference content in previous CKLA domains or from science class.

### Creating Story Plans

- Ask students to turn to Activity Page 14.1 and create their own story plans. Tell them that they can always change their mind later.
- As students work, circulate and check in.



### Check for Understanding

Ask students to volunteer their plot outlines. As a class, discuss the scientific content and how it links to the plot.

## WRITING A NARRATIVE (45 MIN.)

### First Draft

- Once students have finished their plans, ask them to begin writing their introductory chapters. Ask them to write for 20 minutes.
- At the end of 20 minutes, ask students to share their work with a peer and discuss.

- Model this by asking for a volunteer to read their piece aloud to the class (alternatively, read an example you created). Praise the strengths of the work, focusing particularly on (i) the use of elements in the table, (ii) the link between the setting and the scientific content, (iii) descriptive elements.
- After five minutes, ask the recipient of the feedback to thank their partners and give an example of a helpful comment. When the other member of the pair has received feedback, ask students to swap and repeat the exercise.
- If time permits, have students type their persuasive essay.



## Writing Modifying to Add Details

### Entering/Emerging

Provide adjectives and adverbs that students can use to enrich their first sentences. Then ask them to suggest some others for their second sentences.

### Transitioning/Expanding

Brainstorm with students on their first paragraphs by coming up with adjectives and adverbs they can choose from to enrich their writing.

### Bridging

Review students' first paragraphs. Challenge them to offer at least three new potential descriptive words (adjectives and adverbs) to enrich their writing.

### Support

Model changes you would make to your work based on the peer feedback conversation you previously modeled.



### Check for Understanding

Ask students to volunteer a constructive suggestion their partner made.

## Notes for Revision

- Ask students to write three notes below their drafts that explain how they would revise and strengthen their work. Remind students that their changes could be organizational or focus on specific content, characters, or language.
- If there is time, ask students to start their second drafts. Remind students that authors go through many drafts of their work before finishing. You may wish to let students know that you would like them to continue working on their stories at home and in future lessons.



### Check for Understanding

Ask students to provide examples of revisions they wish to make.

End Lesson



## 15

# Unit Assessment

## LESSON AT A GLANCE

|                                    | Grouping    | Time    | Materials            |
|------------------------------------|-------------|---------|----------------------|
| <b>Unit Assessment (75 min.)</b>   |             |         |                      |
| Unit Assessment                    | Independent | 75 min. | ☐ Activity Page 15.1 |
| <b>Optional: Writing (15 min.)</b> |             |         |                      |
| Narrative Building                 | Independent | 15 min. | ☐ Activity Page 14.2 |

## ADVANCE PREPARATION

### Grammar

- Collect Activity Page 12.4 to review and grade as there is no grammar lesson today.

Start Lesson

### Lesson 15: Unit Assessment

# Unit Assessment



## UNIT ASSESSMENT (75 MIN.)

- Make sure each student has a copy of Activity Page 15.1. You may have collected this activity page from students at the beginning of the unit.
- Tell students they will read two selections, answer questions about each, and respond to a writing prompt. In the next sections, they will answer grammar and morphology questions evaluating the skills they have practiced in this unit.
- Encourage students to do their best.
- Once students have finished the assessment, encourage them to review their papers quietly, rereading and checking their answers carefully.
- Circulate around the room as students complete the assessment to ensure everyone is working individually. Assist students as needed, but do not provide them with answers.

### Reading Comprehension

The reading comprehension section of the Unit Assessment contains two selections and accompanying questions. The first selection is an informational piece about the production of salt. The second selection is a literary piece that contains chemical content.

These texts are considered worthy of students' time and meet the expectations for text complexity at the Grade 5 level. The texts feature core content and domain vocabulary from the Chemical Matter unit that students can draw on in service of comprehending the text.

### Activity Page 15.1



## Analysis of the Text

The texts used in the reading comprehension assessment, “The Ancient Art of Making Salt” (informational text) and “The Atomic Ice Cream Shop” (literary text), have been profiled for text complexity using the quantitative measures described in the Common Core State Standards for English Language Arts, Supplement to Appendix A, “New Research on Text Complexity” (CoreStandards.org/resources). Both selections fall within the Common Core 4th–5th Grade Band.

## Reading Comprehension Item Annotations and Correct Answer

**Note:** To receive a point for a two-part question, students must correctly answer both parts of the question.

| Item          | Correct Answer(s)                                                                                                                           | Standards              |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| 1 Literal     | B                                                                                                                                           | RI.5.1                 |
| 2 Evaluative  | “the evaporation process may take many months or even years until all the water has changed state into water vapor”                         | RI.5.1; L.5.4          |
| 3 Literal     | Deposits underground<br>From seawater<br>From Great Lakes                                                                                   | RI.5.1                 |
| 4 Evaluative  | Students should link this text to the earlier explanation of evaporation                                                                    | RI.5.1, RI.5.3, RI.5.4 |
| 5 Inferential | A.<br>Students should reference her description of the lesson                                                                               | RI.5.1; L.5.4          |
| 6 Evaluative  | Figurative (metaphor)                                                                                                                       | RI.5.1; L.5.5          |
| 7 Inferential | B.<br>Answers will vary but should cite the text where Alice describes her lack of understanding of the material                            | RL.5.1; W.5.2, W.5.4   |
| 8 Evaluative  | First is informational, second is literary Answers should include objective facts (for first), use of characters and narrative (for second) | RI.5.5                 |
| 9 Evaluative  | Answers should include objective facts/chemical content                                                                                     | RI.5.1                 |

|               |                                                                                                                                                                                                                                                                                             |                                   |                    |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------|
| 10 Evaluative | Concept                                                                                                                                                                                                                                                                                     | How it links to ice cream         | RL.5.1, RL.5.3     |
|               | Periodic table of elements                                                                                                                                                                                                                                                                  | Chalkboard with ice cream flavors |                    |
|               | Element                                                                                                                                                                                                                                                                                     | Ice cream flavor                  |                    |
|               | Atom                                                                                                                                                                                                                                                                                        | Scoop                             |                    |
|               | Molecule                                                                                                                                                                                                                                                                                    | Two scoops                        |                    |
|               | Compound                                                                                                                                                                                                                                                                                    | Two scoops of different flavors   |                    |
| 10            | Answers should combine the information on the chemical formula of salt with the explanation of elements and compounds to identify why salt is a compound.                                                                                                                                   |                                   | W.5.3              |
| 11            | Answers should combine information from both texts and background knowledge to identify<br>An element containing only one kind of bonded atom<br>A compound containing more than one kind of bonded atom<br>A solution containing non-bonded elements or compounds mixed together/dissolved |                                   | RI.5.7, 5.9; W.5.2 |
| 12            | <b>SEE WRITING PROMPT SCORING</b>                                                                                                                                                                                                                                                           |                                   |                    |

## Writing Prompt Scoring

The writing prompt addresses [W.5.2, W.5.3, W.5.4, L.5.3, L.5.6].

| Score    | 4                                                                                                                                                   | 3                                                                                                                                                  | 2                                                                                            | 1                                                                        |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Criteria | Narrative contains two pieces of appropriate evidence from the text AND has clear narrative elements (e.g., fictional characters, setting and plot) | Narrative contains one piece of appropriate evidence from the text AND has clear narrative elements (e.g., fictional characters, setting and plot) | Narrative conveys information or conveys narrative but does not successfully combine the two | Narrative neither conveys information nor shows clear narrative elements |

**Please add an additional two points if students have correctly identified (i) facts and (ii) literary elements in the table provided.**

## Grammar Answer Key

1. Answers will vary but should include at least one adjective or adverb while maintaining the same meaning.
2. Answers are below:
  - I went into the ice cream parlor and the owner smiled at me.
  - I went into the ice cream parlor because I was hungry.
  - I went into the ice cream parlor but I walked right out again.
3. Answers will vary but examples are as follows:
  - Ice cream is soft and tingly on the tongue. I sigh with pleasure as I devour it.
  - Salt is a fascinating compound. It can be extracted in many ways. Some of these are from ancient times while some are more modern.
4. Answers are below with subject underlined and comma inserted:
  - To be first in line, Alice had to queue outside the parlor for a long time.
  - Realizing she was annoyed, Trevor let Alice finish her sentence.
  - Putting her hand in her pocket, Alice said "I'll buy this."
5. Answers are below:
  - You think I'm talking too much, don't you?
  - Yes, I suppose I do.
  - It wouldn't help if I taped my mouth shut, would it?
  - No, I don't think that's a good idea.
6. Answers are below:
  - I had been to the ice cream parlor before I learned about chemistry.
  - The seawater had evaporated before we extracted the salt.

## Morphology Answer Key

1. achievement
2. disagreement
3. permission
4. admitted
5. mission

Lesson 15: Unit Assessment

# Writing



## NARRATIVE BUILDING (15 MIN.)

- If students complete their assessment before the end of the lesson, ask them to continue to work on their narratives ("Amy's next case") in Activity Book 14.2
- If time permits, have students type their persuasive essay.

Activity Page 14.2



## End-of-Year Assessment

# Assessment Day 1

### LESSON AT A GLANCE

|                                  | Time    | Materials                 |
|----------------------------------|---------|---------------------------|
| <b>End-of-Year Assessment</b>    |         |                           |
| Reading Comprehension Assessment | 90 min. | ☐ Activity Pages A.1, A.2 |

### ADVANCE PREPARATION

#### End-of-Year (EOY) Assessment

- Prepare to distribute Activity Page A.1 that you collected from students at the beginning of the unit.
- Plan to have reading material available for students to select from and read independently as they finish the EOY Assessment.

### END-OF-YEAR ASSESSMENT

The primary purpose of the EOY Assessment is to determine students' preparedness for English language arts instruction in Grade 6.

During the first day of the three-day assessment, all students will complete the Reading Comprehension Assessment (Activity Page A.1) independently. It includes three passages and corresponding comprehension questions. After students complete this portion of the assessment, use the EOY Assessment Summary (Activity Page A.2), which you will have collected from students, to analyze each student's performance. Please score the Reading Comprehension Assessment prior to Day 2 of the EOY Assessment, as you will use the scores to determine which students should complete the Word Reading in Isolation Assessment.

Beginning on Day 2 of the EOY Assessment, all students will work independently on the Grammar Assessment.

In addition, you will pull students aside, one at a time, and administer the Word Reading in Isolation Assessment to students who scored 11 or fewer on the Reading Comprehension Assessment, and, as time permits, to those who scored between 12–14. Administer the Fluency Assessment to all students.

The Word Reading in Isolation Assessment uses Activity Page A.4 (Scoring Sheet for student responses), which you will have collected from students, as well as the Word Reading in Isolation Assessment located under EOY Assessment Day 2 in the Teacher Guide. A Word Reading in Isolation Analysis Chart and a Word Reading in Isolation Remediation Guide have also been included under EOY Assessment Day 2 of the Teacher Guide.

The Fluency Assessment uses Activity Pages A.2 and A.5 (which you will have collected from students), as well as the Fluency Assessment text, “Birds,” located under EOY Assessment Day 2 of the Teacher Guide. You will use Activity Page A.5 (End-of-Year Fluency Assessment Recording Copy) to create a running record while students read the fluency passage. Activity Page A.2 (End-of-Year Assessment Summary) includes a Fluency Assessment Scoring Sheet.

On Day 3 of the EOY Assessment, all students will complete the Morphology Assessment. You will continue to pull students individually to administer the Word Reading in Isolation Assessment and the Fluency Assessment.

### **READING COMPREHENSION ASSESSMENT (90 MIN.)**

- Have students work independently to complete the Reading Comprehension Assessment on Activity Page A.1. After you have scored the assessment, record individual scores on each student's EOY Assessment Summary (Activity Page A.2).

The texts used in the Reading Comprehension Assessment—“How the Turkey Buzzard Got His Suit” (literary text), “Titian” (informational text), and “Improvements in Transportation” (informational text)—have been profiled for text complexity using the quantitative measures described in the Common Core State Standards for English Language Arts, Supplement to Appendix A, “New Research on Text Complexity” ([www.corestandards.org/resources](http://www.corestandards.org/resources)). All selections fall within the Common Core 4th–5th Grade Band.

The reading comprehension questions pertaining to these texts are also aligned to the CCSS and are worthy of students' time to answer. Questions have been designed so they do not focus on minor points in the text, but rather, they require deep analysis. Thus, each item might address multiple standards. In general, the selected-response items address Reading standards and the constructed-responses items address Writing standards. To prepare students for CCSS-aligned assessments, such as those developed by the Partnership for Assessment of Readiness for College and Careers (PARCC) and the Smarter Balanced, some items replicate how technology may be incorporated in those assessments, using a paper and pencil format.



## Reading Comprehension Item Annotations and Correct Answers

**Note:** To receive a point for a two-part question, students must correctly answer both parts of the question.

| Item                          | Correct Answer(s)                                                                                                                                                                                                                                                                                                                            |                                                                                                     | Standards                              |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------|
| 1. <i>Inferential</i>         | C                                                                                                                                                                                                                                                                                                                                            |                                                                                                     | RL.5.1, RL.5.2, RL.5.10                |
| 2. <i>Inferential</i>         | A                                                                                                                                                                                                                                                                                                                                            |                                                                                                     | RL.5.1, RL.5.10                        |
| 3. <i>Inferential</i>         | D                                                                                                                                                                                                                                                                                                                                            |                                                                                                     | RL.5.4, L.5.4, L.5.5, L.5.5a           |
| 4. <i>Literal</i>             | Suit                                                                                                                                                                                                                                                                                                                                         | What was wrong with it?                                                                             | RL.5.1, RL.5.2, RL.5.5, RL.5.10, W.5.4 |
|                               | first suit                                                                                                                                                                                                                                                                                                                                   | <i>feathers were too long and trailed on the ground as he walked; he could not fly well in them</i> |                                        |
|                               | next suit                                                                                                                                                                                                                                                                                                                                    | <i>all the other birds would see him because he would shine like the face of the Great Spirit</i>   |                                        |
|                               | third suit                                                                                                                                                                                                                                                                                                                                   | <i>it would get dirty too soon</i>                                                                  |                                        |
|                               | fourth suit                                                                                                                                                                                                                                                                                                                                  | <i>not enough feathers</i>                                                                          |                                        |
|                               | fifth suit                                                                                                                                                                                                                                                                                                                                   | <i>too many feathers and too many pieces</i>                                                        |                                        |
| *5 Part A. <i>Inferential</i> | D                                                                                                                                                                                                                                                                                                                                            |                                                                                                     | RL.5.4, L.5.4, L.5.4a                  |
| *5 Part B. <i>Literal</i>     | “... it was not pretty. It was a plain, dull color and very short of feathers at the neck and head.”                                                                                                                                                                                                                                         |                                                                                                     | RL.5.4, L.5.4, L.5.4a                  |
| 6. <i>Evaluative</i>          | <i>Answers may vary, but could include that Turkey Buzzard decided to be proud of the suit he ended up choosing. He tried on all the other suits and found something wrong with each one. The suit he chose was the last suit available, but he kept it on and wore it proudly. He did not allow the other birds' teasing to bother him.</i> |                                                                                                     | RL.5.1, RL.5.2, RL.5.10                |
| 7. <i>Inferential</i>         | A                                                                                                                                                                                                                                                                                                                                            |                                                                                                     | RI.5.1, RI.5.10                        |
| *8 Part A. <i>Inferential</i> | D                                                                                                                                                                                                                                                                                                                                            |                                                                                                     | RI.5.1, RI.5.10                        |
| *8 Part B. <i>Inferential</i> | <i>Titian's work frescoing the walls of the Exchange above the Rialto bridge was highly praised, and it was thought to be better than Giorgione's work on the same project. In addition, he was invited to finish the frescoes in the Grand Council chamber and to paint the portraits of the Doges, Venice's rulers.</i>                    |                                                                                                     | RI.5.1, RI.5.3, RI.5.8, RI.5.10        |
| 9. <i>Inferential</i>         | B                                                                                                                                                                                                                                                                                                                                            |                                                                                                     | RI.5.1, RI.5.10                        |
| 10. <i>Evaluative</i>         | B                                                                                                                                                                                                                                                                                                                                            |                                                                                                     | RI.5.4, L.5.4                          |

| Item                           | Correct Answer(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Standards                                              |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| 11. <i>Literal</i>             | A, B, C, E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | RI.5.1, RI.5.10                                        |
| 12. <i>Literal</i>             | <i>People figured if they could build good roads, they could charge people for using them.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                | RI.5.1, RI.5.8, RI.5.10, W.5.4                         |
| 13. <i>Inferential</i>         | B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | RI.5.1, RI.5.2, RI.5.10                                |
| *14 Part A. <i>Inferential</i> | C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | RI.5.4, L.5.4, L.5.4a                                  |
| *14 Part B. <i>Literal</i>     | <i>"Others who saw this odd-looking boat laughed . . . "</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | RI.5.4, W.5.4, L.5.4, L.5.4a                           |
| 15. <i>Inferential</i>         | <i>Fulton's odd-looking boat, which people had laughed at and called a folly, was actually very successful and changed the way passengers and goods traveled up and down waterways.</i>                                                                                                                                                                                                                                                                                                                                       | RI.5.1, RI.5.10                                        |
| 16. <i>Evaluative</i>          | <i>The steamboat best addressed transportation issues because it changed the way travel occurred up and down waterways. While improved roads did allow for stagecoach travel, traveling in a stagecoach was uncomfortable, and stops along the way had bad food and poor sleeping conditions. Turnpikes were in better condition than other roads, but they were just as dusty and muddy as the older roads, travelers had to pay to use them, and they did not extend very far west, where the population was spreading.</i> | RI.5.1, RI.5.3, RI.5.5, RI.5.8, RI.5.10, W.5.4, W.5.9b |

## Reading Comprehension Assessment Analysis

Students who answered 11 or fewer questions correctly out of 16 total questions appear to have **minimal preparation** for Grade 6. Administer the Word Reading in Isolation Assessment and the Fluency Assessment to these students to gain further insight as to possible weaknesses. These students may have fairly significant skills deficits and may not be ready for Grade 6. Carefully analyze their performance on the Reading Comprehension Assessment, the Word Reading in Isolation Assessment, and the Fluency Assessment to determine whether students may need to be regrouped to an earlier point of instruction in the CKLA grade level materials when they reach Grade 6.

Students who answered 12–14 questions correctly out of 16 total questions appear to have **adequate preparation** for Grade 6. Administer the Word Reading in Isolation Assessment to these students, as time permits, and administer the Fluency Assessment. Use results from the Word Reading in Isolation Assessment to identify gaps in the mastery of specific letter-sound spellings that may require targeted remediation in Grade 6.

Students who answered 15–16 questions correctly out of 16 total questions appear to have **outstanding preparation** for Grade 6. You do not need to administer the Word Reading in Isolation Assessment to these students. However, please administer the Fluency Assessment to determine whether practice and progress monitoring in the area of fluency are warranted in Grade 6.

The following chart provides an overview of how to interpret students' scores.

| Reading Comprehension Assessment Analysis |                                                                                                                                                                                  |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Number of Questions Answered Correctly    | Interpretation                                                                                                                                                                   |
| 11 or fewer                               | Student appears to have minimal preparation for Grade 6; administer Word Reading in Isolation Assessment and Fluency Assessment on Day 2 or Day 3                                |
| 12–14                                     | Student appears to have adequate preparation for Grade 6; administer Word Reading in Isolation Assessment on Day 2 or Day 3, only as time permits; administer Fluency Assessment |
| 15–16                                     | Student appears to have outstanding preparation for Grade 6; do not administer Word Reading in Isolation Assessment; administer Fluency Assessment on Day 2 or Day 3             |

## End-of-Year Assessment

# Assessment Day 2

### LESSON AT A GLANCE

|                                                             | Time    | Materials                                                                                                                                                       |
|-------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>End-of-Year Assessment</b>                               |         |                                                                                                                                                                 |
| Grammar Assessment                                          | 45 min. | <input type="checkbox"/> Activity Pages A.3                                                                                                                     |
| Word Reading in Isolation Assessment;<br>Fluency Assessment | Ongoing | <input type="checkbox"/> Activity Pages A.2, A.4, A.5<br><input type="checkbox"/> Student Copy of Fluency Assessment text<br><input type="checkbox"/> stopwatch |

### ADVANCE PREPARATION

#### End-of-Year (EOY) Assessment

- Please plan to have reading material available for students to select from and read independently as they finish the EOY Assessment.

### END-OF-YEAR ASSESSMENT

During the second day of the three-day assessment, all students will complete the Grammar Assessment independently. It includes 55 items assessing knowledge of parts of speech, sentence elements (subject/predicate), verb tenses, subject-verb agreement, conjunctions, prepositions, interjections, and punctuation. After students complete this portion of the assessment, enter their scores on the Grammar Assessment Scoring Sheet, in this Teacher Guide, making additional copies if needed. Benchmark results for individual students are not included for the Grammar Assessment.

Begin to administer the Word Reading in Isolation Assessment, based on students' performance on the Reading Comprehension Assessment, and administer the Fluency Assessment to all students.

### GRAMMAR ASSESSMENT (45 MIN.)

- Have students work independently to complete the Grammar Assessment on Activity Page A.3. Enter all student scores onto the Grammar Assessment Scoring Sheet located on the next page.

[illegible]

### Grammar Assessment Scoring Sheet

[illegible]

[illegible]



## WORD READING IN ISOLATION ASSESSMENT (ONGOING)

Begin to administer the Word Reading in Isolation Assessment individually to all students who scored 11 or fewer on the Reading Comprehension Assessment and, as time permits, to students who scored between 12–14 in order to gain further insight as to possible weaknesses.

This section of the EOY Assessment assesses single-word reading to identify the specific letter-sound correspondences a student may have not yet mastered.

### Administration Instructions

- Locate the Word Reading in Isolation Assessment on the next page of this Teacher Guide. Students will read from this copy.
- Cover all of the words with a sheet of paper before calling a student to complete the assessment.
- Tell the student he or she will read words aloud to you and that it is important to do his or her best reading.
- Uncover the first row of words by moving the paper down.
- As the student reads a word, mark any incorrect letter-sound correspondences above the word on the Word Reading in Isolation Assessment Scoring Sheet (Activity Page A.4 that you collected from students). Also, note whether the student incorrectly chunks letters into syllables, leading to mispronunciation. If the student reads the word correctly, place a check mark above the word.
- If, after 10 seconds, the student is unable to read the word at all, simply tell the student the word and move on. Mark an X above the word on the scoring sheet.
- Administer the Fluency Assessment after completing this section, and continue administering these two individual assessments as time permits, throughout Day 2 and Day 3, to the remaining students.

## End-of-Year Assessment Materials

| Word Reading in Isolation Assessment |            |           |           |            |            |
|--------------------------------------|------------|-----------|-----------|------------|------------|
| 1.                                   | steady     | asphalt   | oxygen    | dovetail   | birthplace |
| 2.                                   | bravo      | washtub   | consume   | delight    | council    |
| 3.                                   | accuse     | riddle    | trolley   | scoreboard | cruise     |
| 4.                                   | marvelous  | betrayal  | freighter | floored    | guarantee  |
| 5.                                   | blizzard   | prairie   | concrete  | crescent   | bowlful    |
| 6.                                   | breakwater | peachy    | spiffier  | gherkin    | qualify    |
| 7.                                   | yearning   | exercise  | loathe    | ivory      | disprove   |
| 8.                                   | audit      | baboon    | continue  | taught     | overdue    |
| 9.                                   | chasm      | human     | pulled    | warning    | worthless  |
| 10.                                  | scowl      | avoidance | paperboy  | courses    | woodchuck  |
| 11.                                  | switch     | crumb     | whopper   | sprinkle   | knitting   |
| 12.                                  | calculate  | mustache  | partridge | singe      | assign     |
| 13.                                  | wriggle    | bizarre   | recommit  | youthful   | mistletoe  |

## WORD READING IN ISOLATION ANALYSIS

The more words a student is able to read and the farther the student is able to progress in the assessment, the stronger his or her preparation is for Grade 6. A Word Reading in Isolation Analysis chart and Remediation Guide are located in this lesson.

The number of words read correctly indicates the following:

- Students who read 49 or fewer words out of 65 correctly appear to have **minimal preparation** for Grade 6.
- Students who read 50–54 out of 65 words correctly appear to have **adequate preparation** for Grade 6.
- Students who read 55–65 out of 65 words correctly appear to have **strong to outstanding preparation** for Grade 6.

After scoring the assessment, you might find it helpful to determine which letter-sound correspondences students missed that caused them to score below the benchmark for word recognition. Note that one-syllable words are not included in the Syllabication Analysis.

| Score required to meet benchmark of 80%        |      |      |      |       |  |         |
|------------------------------------------------|------|------|------|-------|--|---------|
| Phonemes                                       |      |      |      |       |  |         |
| Consonants                                     |      |      |      |       |  | Totals  |
| /b/                                            | /d/  | /f/  | /g/  | /h/   |  | 166/208 |
| /j/                                            | /k/  | /l/  | /m/  | /n/   |  |         |
| /p/                                            | /r/  | /s/  | /t/  | /v/   |  |         |
| /w/                                            | /x/  | /y/  | /z/  | /ch/  |  |         |
| /sh/                                           | /th/ | /th/ | /ng/ | /qu/  |  |         |
|                                                |      |      |      |       |  |         |
| Vowels                                         |      |      |      |       |  | 108/136 |
| /a/                                            | /e/  | /i/  | /o/  | /u/   |  | 39/49   |
| /ae/                                           | /ee/ | /ie/ | /oe/ | /ue/  |  | 25/31   |
| /ə/                                            | /oo/ | /oo/ | /aw/ | /ou/  |  | 19/23   |
| /oi/                                           | /ar/ | /er/ | /or/ | /aer/ |  | 27/33   |
| Syllabication (words with 2 or more syllables) |      |      |      |       |  |         |
| Closed Syllable/short                          |      |      |      |       |  | 39/49   |
| Open Syllable/long                             |      |      |      |       |  | 13/17   |
| Magic E and Digraph Syllable                   |      |      |      |       |  | 21/26   |
| R-Controlled Syllable                          |      |      |      |       |  | 16/20   |
| ə Syllable                                     |      |      |      |       |  | 7/9     |
| -le Syllable                                   |      |      |      |       |  | 4/4     |

## WORD READING IN ISOLATION REMEDIATION GUIDE

Write the names of students who missed questions under each header. This will help you determine what kind of remediation may be needed in Grade 6.

Refer to the Table of Contents in the *Decoding and Encoding Remediation Supplement* to locate information about specific phonemes and syllabication for remediation purposes.

| Phonemes—Consonants (Item numbers in parentheses)                                                 |                                                                                                |                                                                               |
|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| /b/ (1e, 2a, 2b, 3d, 4b, 5a, 5e, 6a, 8b, 10c, 13b)                                                | /d/ (1a, 1d, 2d, 3b, 3d, 4d, 5a, 7e, 8a, 8e, 9c, 10b, 10e)                                     | /f/ (1b, 4c, 4d, 5e, 6c, 6e, 13d)                                             |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
| /g/ (4e, 6d, 13a)                                                                                 | /h/ (9b)                                                                                       | /j/ (1c, 12c, 12d)                                                            |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
| /k/ (2c, 2e, 3a, 3d, 3e, 5c, 5d, 6a, 6d, 8c, 9a, 10a, 10d, 10e, 11b, 11d, 12a, 13c)               | /l/ (1b, 1d, 1e, 2d, 3c, 4d, 5a, 5e, 6e, 7c, 9c, 9e, 10a, 12a)                                 | /m/ (2c, 4a, 9a, 9b, 11b, 12b, 13c, 13e)                                      |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
| /n/ (1c, 2c, 2e, 4e, 5c, 5d, 6d, 7a, 8b, 8c, 9b, 9d, 10b, 11e, 12d, 12e)                          | /p/ (1e, 5b, 6b, 6c, 7e, 9c, 10c, 11c, 11d, 12c)                                               | /r/ (2a, 3b, 3c, 3e, 4b, 4c, 5b, 5c, 5d, 6a, 7d, 7e, 11b, 11d, 12c, 13a, 13c) |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
| /s/ (1a, 1b, 1e, 2c, 2e, 3d, 4a, 5d, 6c, 7b, 7e, 9e, 10a, 10b, 10d, 11a, 11d, 12b, 12d, 12e, 13e) | /t/ (1a, 1b, 1d, 2b, 2d, 3c, 4b, 4c, 4e, 5c, 5d, 6a, 8a, 8c, 8d, 11e, 12a, 12b, 12c, 13c, 13e) | /v/ (1d, 2a, 4a, 7d, 7e, 8e, 10b)                                             |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
| /w/ (2b, 6a, 9d, 9e, 10e, 11a, 11c)                                                               | /x/ (1c, 7b)                                                                                   | /y/ (7a, 13d)                                                                 |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
| /z/ (3a, 3e, 5a, 7b, 9a, 10d, 13b)                                                                | /ch/ (6b, 10e, 11a)                                                                            | /sh/ (2b, 12b)                                                                |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
| /th/ (1e, 9e, 13d)                                                                                | /th/ (7c)                                                                                      | /ng/ (7a, 9d, 11d, 11e)                                                       |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
| /qu/ (6e)                                                                                         |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |
|                                                                                                   |                                                                                                |                                                                               |

| Phonemes—Vowels (Item numbers in parentheses) |                                              |                                                                                               |
|-----------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------------------------|
| /a/ (1b, 8b, 9a, 12a, 12b)                    | /e/ (1a, 5d, 7b, 9e, 10d)                    | /i/ (1c, 3b, 5a, 6c, 6d, 6e, 7a, 7e, 8a, 8c, 9d, 11a, 11d, 11e, 12c, 12d, 13a, 13b, 13c, 13e) |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
| /o/ (1c, 2a, 2b, 3c, 5c, 6a, 6e, 11c)         | /u/ (1d, 2b, 2c, 4a, 8c, 10e, 11b, 12b, 13c) | /ae/ (1d, 1e, 4b, 4c, 6a, 10c, 12a)                                                           |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
| /ee/ (1a, 3c, 4e, 5b, 5c, 6b, 6c, 7d, 13c)    | /ie/ (2d, 6e, 7b, 7d, 12e)                   | /oe/ (2a, 5e, 7c, 8e, 13e)                                                                    |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
| /ue/ (3a, 8c, 9b, 12a)                        | /ə/ (1c, 2d, 3a, 4b, 4e, 9a, 9b, 10b, 12e)   | /oo/ (2c, 3e, 7e, 8b, 8e, 13d)                                                                |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
| /oo/ (9c, 10e)                                | /aw/ (1b, 8a, 8d)                            | /ou/ (2e, 10a)                                                                                |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
| /oi/ (10b, 10c)                               | /ar/ (4a, 12c, 13b)                          | /er/ (1e, 4c, 5a, 6a, 6c, 6d, 7a, 7b, 8e, 9e, 10c, 11c)                                       |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
| /or/ (3d, 4d, 9d, 10d)                        | /aer/ (4e, 5b)                               | /ə/ + /l/ (2e, 3b, 4a, 4b, 5e, 11d, 13a, 13d, 13e)                                            |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |
|                                               |                                              |                                                                                               |

| Syllabication (words with 2 or more syllables; Item numbers in parentheses)                                                                                                                     |                                                                                         |                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Closed Syllable/short (1a, 1b, 1c, 2a, 2b, 2c, 3b, 3c, 4e, 5a, 5c, 5d, 6a, 6c, 6d, 6e, 7a, 7b, 7e, 8a, 8b, 8c, 9a, 9b, 9d, 9e, 10b, 10d, 10e, 11c, 11d, 11e, 12a, 12b, 12c, 13a, 13b, 13c, 13e) | Open Syllable/long (1a, 2a, 3c, 4e, 5b, 6b, 6c, 6e, 7d, 8c, 8e, 9b, 10c, 12a, 13c, 13e) | Magic E and Digraph Syllable (1b, 1d, 1e, 2c, 2d, 2e, 3a, 4a, 4b, 4c, 5c, 5e, 6a, 6b, 7b, 7e, 8a, 8b, 8e, 10b, 10c, 10e, 12a, 12e, 12d) |
|                                                                                                                                                                                                 |                                                                                         |                                                                                                                                         |
|                                                                                                                                                                                                 |                                                                                         |                                                                                                                                         |
|                                                                                                                                                                                                 |                                                                                         |                                                                                                                                         |
| R-Controlled Syllable (1e, 3d, 4a, 4c, 4e, 5a, 5b, 6a, 6c, 6d, 7a, 7b, 8e, 9d, 9e, 10c, 10d, 11c, 12c, 13b)                                                                                     | ə Syllable (1c, 2d, 2e, 3a, 4a, 4b, 5e, 9a, 12e, 13d)                                   | –le Syllable (3b, 11d, 13a, 13e)                                                                                                        |
|                                                                                                                                                                                                 |                                                                                         |                                                                                                                                         |
|                                                                                                                                                                                                 |                                                                                         |                                                                                                                                         |
|                                                                                                                                                                                                 |                                                                                         |                                                                                                                                         |

## FLUENCY ASSESSMENT (ONGOING)

Begin to administer the Fluency Assessment individually to all students.

This section of the EOY Assessment assesses students' fluency in reading, using the selection "Birds" (informational text) located on the next page of the Teacher Guide.

### Administration Instructions

- Turn to the student copy of "Birds" on the next page of this Teacher Guide. Students will read from this copy.
- Using the Recording Copy of "Birds" (from students' Activity Page A.5) for each student, you will create a running record as you listen to each student read orally.
- Explain that the student will read a selection aloud while you take some notes.
- Encourage the student not to rush and to read at his or her regular pace.
- Read the title of the selection aloud for the student, as the title is not part of the assessment.
- Begin timing when the student reads the first word of the selection. As the student reads aloud, make a running record on the Recording Copy of the text using the following guidelines:

|                               |                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>Words read correctly</b>   | No mark is required.                                                                                                  |
| <b>Omissions</b>              | Draw a long dash above the word omitted.                                                                              |
| <b>Insertions</b>             | Write a caret (^) at the point where the insertion was made. If you have time, write down the word that was inserted. |
| <b>Words read incorrectly</b> | Write an 'X' above the word.                                                                                          |
| <b>Substitutions</b>          | Write the substitution above the word.                                                                                |
| <b>Self-corrected errors</b>  | Replace original error mark with an 'SC'.                                                                             |
| <b>Teacher-supplied words</b> | Write a 'T' above the word (counts as an error).                                                                      |

- When one minute has elapsed, draw a vertical line on the Recording Copy to mark where the student was in the text at that point. Allow the student to finish reading the selection aloud.
- Assess the student's comprehension of the selection by asking him or her to respond orally to the following questions:



# End-of-Year Fluency Assessment

## Student Copy

### Birds

Birds have several characteristics that enable them to fly, but being warm-blooded is essential to flight. They have a very high metabolism as only warm-blooded animals do. Metabolism is the process which produces energy in most animals' bodies. The high metabolism of birds is a steady flow of energy that helps them maintain the high levels of activity required by flight. The higher the activity level of an animal, the higher its metabolism is likely to be. What this means when it comes to eating is that they need lots of food to maintain that energy.

Have you ever heard the saying *eats like a bird* for someone who eats very small amounts of food at one time? An important thing to remember about this expression is that it does not mean birds do not eat very much. In fact, birds need to eat two times their body weight in food every day. This is because they have such a high metabolism and burn lots more energy than most animals. There are lots of small meals a day for birds. So, someone who "eats like a bird" is usually someone who "picks" at his or her food and only eats small bits at a time.

Cold-blooded animals depend on their surroundings to regulate internal body temperatures. But warm-blooded animals are able to produce heat for energy within their own bodies. They can travel farther and live in more extreme conditions than cold-blooded animals. The only warm-blooded animals that are able to go without food for long periods of time are hibernating animals. That's because their metabolism slows way down when they are hibernating, and they require less energy to stay alive.

Wings are also essential to flight. The shape of a bird's wings determines how far and high a bird can fly, in addition to its lightweight bones.

What else helps all birds fly? Feathers are a great help, serving as lightweight coverings for their wings. They mesh together as their wings flap downward, parting again to let air through as their wings sweep upward again. Feathers also act as insulation. Insulation is an extra layer that protects birds' skin from the sun and traps in heat. The trapped heat provides energy and warmth in the winter months. The point of the feather where it is attached to a bird's body is called the quill. All birds have feathers. No other animals do, so if you spot a feathered friend, you may assume that it's a bird. Because their precious feathers take quite a beating, birds take good care of them. Birds often preen their feathers with their beaks to keep them clean, waterproof, and in the right position.

**Word Count:** 455

1. **Literal.** What characteristics of birds are essential to flight?
    - » being warm-blooded, wings
  2. **Inferential.** Why are people who pick at their food and only eat small bits at a time said to “eat like a bird”?
    - » Birds need to eat a lot each day because they burn so much energy. They eat many small meals a day due to their high metabolism and burning of lots of energy.
  3. **Literal.** What can you assume if you spot an animal with feathers?
    - » It is a bird.
  4. **Inferential.** What can warm-blooded animals do that cold-blooded animals can't?
    - » produce heat for energy within their own bodies
- Continue administering the Fluency Assessment as time permits, throughout Day 2 and Day 3.
  - You may score the assessment later, provided you have kept running records and marked the last word students read after one minute elapsed..

### **Guidelines for Fluency Assessment Scoring**

- Use one Fluency Assessment Scoring Sheet for each student taking the assessment. The Fluency Assessment Scoring Sheet appears in each student's EOY Assessment Summary (Activity Page A.2).

To calculate a student's Words Correct Per Minute (W.C.P.M.) score, use the information you wrote on the Recording Copy and follow these steps. You may wish to have a calculator available. Count Words Read in One Minute. This is the total number of words the student read or attempted to read in one minute. It includes words the student read correctly as well as words the student read incorrectly. Write the total in the box labeled Words Read in One Minute.

1. Count the Uncorrected Mistakes in One Minute. You noted these on the Recording Copy. They include words read incorrectly, omissions, substitutions, and words you had to supply. Write the total in the box labeled Uncorrected Mistakes in One Minute on the Fluency Scoring Sheet. (A mistake that the student self-corrects is not counted as a mistake.)
2. Subtract Uncorrected Mistakes in One Minute from Words Read in One Minute to get Words Correct. Write the number in the box labeled W.C.P.M. Although the analysis does not include any words the student read correctly (or incorrectly) after one minute, you may use this information from your Recording Copy for anecdotal purposes.

As you evaluate W.C.P.M. scores, here are some factors to consider.

It is normal for students to show a wide range in fluency and in W.C.P.M. scores. However, a major goal of Grade 5 is to read with sufficient fluency to ensure comprehension and independent reading of school assignments in this and subsequent grade levels. A student's W.C.P.M. score can be compared with the score of other students in the class (or grade level) and also with the national fluency norms obtained by Hasbrouck and Tindal (2006). Hasbrouck and Tindal suggest that a score falling within 10 words above or below the 50th percentile should be interpreted as within the normal, expected, and appropriate range for a student at that grade level at that time of year. For example, if you administered the assessment during the spring of Grade 5, and a student scored 130 W.C.P.M., you should interpret this as within the normal, expected, and appropriate range for that student.

**Oral Reading Fluency Norms from Hasbrouck and Tindal (2006)**

| Percentile | Spring Grade 5 W.C.P.M. | Fall Grade 6 W.C.P.M. |
|------------|-------------------------|-----------------------|
| 90         | 194                     | 177                   |
| 75         | 168                     | 153                   |
| 50         | 139                     | 127                   |
| 25         | 109                     | 98                    |
| 10         | 83                      | 68                    |

**Reference**

Hasbrouck, Jan and Tindal, Gerald A. "Oral reading fluency norms: A valuable assessment tool for reading teachers." *The Reading Teacher* 59 (2006): 636–644.

## End-of-Year Assessment

# Assessment Day 3

### LESSON AT A GLANCE

|                                                             | Time    | Materials                                                                                        |
|-------------------------------------------------------------|---------|--------------------------------------------------------------------------------------------------|
| <b>End-of-Year Assessment</b>                               |         |                                                                                                  |
| Morphology Assessment                                       | 45 min. | <input type="checkbox"/> Activity Pages A.2, A.4, A.5, A.6<br><input type="checkbox"/> Stopwatch |
| Word Reading in Isolation Assessment;<br>Fluency Assessment | Ongoing |                                                                                                  |

### ADVANCE PREPARATION

#### End-of-Year (EOY) Assessment

- Please plan to have reading material available for students to select from and read independently as they finish the EOY Assessment.

### END-OF-YEAR ASSESSMENT

During the third day of the three-day assessment, all students will complete the Morphology Assessment independently. It includes 18 items assessing knowledge of the prefixes *il-*, *ir-*, *inter-*, *im-*, *in-*, *ex-*, *en-*, *post-*, and *fore-*; suffixes *-ness*, *-ist*, *-tion*, and *-sion*; and roots *tract*, *vac*, *serv*, *cred*, and *mem*, all of which were taught in CKLA prior to the end of Grade 5. Have students work independently to complete the Morphology Assessment on Activity Page A.6. Enter all student scores into the Morphology Assessment Scoring Sheet.

Continue to administer the Word Reading in Isolation Assessment and the Fluency Assessments, as described on Day 2.

### **MORPHOLOGY ASSESSMENT (45 MIN.)**

- Make sure each student has a copy of Activity Page A.6. You may have collected this activity page from students at the beginning of the unit.
- Have students work independently to complete the Morphology Assessment on Activity Page A.6. Enter all student scores into the Morphology Assessment Scoring Sheet.

[illegible]

## INTERPRETING END-OF-YEAR ASSESSMENT SCORES

You should use the results of these three assessments to determine students' preparedness for Grade 6 English language arts instruction: the Reading Comprehension Assessment, the Word Reading in Isolation Assessment (if administered), and the Fluency Assessment. Please refer to the Grade 5 End-of-Year Assessment Summary (Activity Page A.2), and consider students' performance on these three assessments, in combination.

It can be challenging to analyze results for students with ambiguous or borderline scores. In particular, you may have some students who are right on the border between being strong enough readers to benefit from Grade 6 instruction and not having adequate preparation. This might include students who answered most questions correctly on one passage of the Reading Comprehension Assessment but not on other passages, or this might include students whose performance was uneven on the Word Reading in Isolation Assessment or on the Fluency Assessment.

In analyzing results from the Reading Comprehension Assessment, be aware that some students may not be strong test-takers. They may struggle to answer the questions even if they read the selection and understood it. You may wish to have students with borderline scores read the selection(s) aloud to you and then discuss it with you so you can better determine if their struggles are a result of comprehension difficulties or other factors.

In analyzing results from the Word Reading in Isolation Assessment, remember that not all poor scores are the same.

Students who have difficulty reading a significant number of one-syllable words likely need intensive remediation beyond what can likely be provided in a Grade 6 classroom.

Benchmark results for individual students are not included for the Grammar Assessment or the Morphology Assessment. You may want to add comments to the Grade 5 End-of-Year Assessment Summary (Activity Page A.2) regarding students who performed poorly on either or both assessments so the Grade 6 teacher can determine the extent to which a student may benefit from the additional practice of certain grammar and morphology skills taught in CKLA prior to beginning Grade 6 English language arts instruction.



# Pausing Point

## PAUSING POINT FOR DIFFERENTIATION OF INSTRUCTION

Please use the final four days of this unit to address results of the Unit Assessment (for reading comprehension, grammar and morphology). Use each student's scores on the Unit Assessment to determine which remediation and/or enrichment opportunities will benefit particular students. In assigning these remediation and/or enrichment activities, you may choose to have students work individually, in small groups, or as a whole class.

## REMEDIATION

For a detailed description of remediation strategies, which address lagging skills in Reading Comprehension, Fluency, Language, and Writing, refer to the Program Guide.

### Writing

Use time during the Pausing Point to revisit three sets of students' work. First, review students' integration of material for example in lessons 3,4,7, and 13. Second, review the student writing tasks in lesson 5 and lesson 10 (to the sheriff). Finally, review the work students have done so far on their narratives. (Lesson 14)

Pair students to share their work. Each student should give at least one compliment and ask at least one question. You may choose to work individually with students who would benefit from discussing areas in which improvement may be needed. You may wish to provide time for those students to revise and edit their work based on your discussion, and to publish their revised and edited draft onto a clean page.

You may wish to suggest that students needing more practice with their police reports or their letter to the sheriff write a new report or letter. Provide additional structure and guidance for students, making copies of the Rubrics found in the Teacher Resources of this Teacher Guide.

As a challenge, you may encourage students to write a new police report using the material in the second half of the reader.

## ENRICHMENT

If students have mastered the content and skills in the Chemical Matter unit, their experience with the domain concepts may be enriched by the following activities:

- Students may read the enrichment selections contained in the Reader. “A Pioneering Chemist” describes the life of Percy Lavon Julian, an African American chemist who was a pioneer and set up his own lab. “Abundant, Amazing Aluminum” describes the extraordinary history and uses of this element. The Activity Book contains activity pages students can complete as they read these selections.
- We suggest that otherwise students use the Pausing Point days to continue working on their narratives (“Amy’s Next Case”). As described in Lesson 14, students can supplement this by researching additional scientific material: some good choices may be the human body, geology, and space. There is material in the Core Knowledge sequence and in earlier grades to support this research.
- As students work on their narratives they should continue to use the plot diagram in Activity Page 14.1 to develop their story. They should also use the activity page provided in the Pausing Point section of their Activity Book to think about the characters’ wants and resolution (which they investigated in this unit).
- As students develop their narrative, they should systematically seek peer review and comment, as they did in Lesson 14. They should then revise their work.
- Development of the narrative can continue beyond the Pausing Point days provided.
- Students may share, either with a small group or with the class, their narrative. You may also wish them to publish it in some form.



# Teacher Resources

**In this section, you will find:**

- Glossary
- Pages from Geology Reader
- Changes in State Diagrams
- Four Sample Character Maps
- Periodic Table
- Sample Police Reports
- Articles on Investigations
- Fossil Image Poster
- Rubric: Presentation Lesson 5
- Rubric: Presentation Lesson 9
- Rubric: Presentation Lesson 11
- Plot Diagram
- Narrative Rubric
- Activity Book Answer Key

# Glossary

## A

**appreciate, v.** recognize the worth of

**atom, n.** the basic unit of an element

## B

**barren, adj.** bleak and lifeless

**blazing, adj.** very hot

**bond, v.** in chemistry, an attraction between atoms that allows chemical substances to be formed

**boundaries, n.** the limits of an area

## C

**cells, n.** the basic building blocks of living things

**chemistry, n.** the science of matter

**condense, v.** to change from a gas to a liquid

**conductor, n.** a good channel for something (like electricity)

## D

**decompose, n.** decay

**devour, v.** eat fast and hungrily

**discovery, n.** the act of finding something new or unexpected

**dissolve, v.** to turn into a solution

## E

**embed, v.** fixed deeply into the surrounding mass

**encased, v.** completely surrounded

**eureka, (exclamation)** Ancient Greek meaning “I have found it!”

**evaporate, v.** turn from liquid into vapor

**expert, n.** someone who has deep knowledge and skill in an area, usually from long experience and study

**expose, v.** make something visible by uncovering it

## F

**fluffy, adj.** light texture; filled with air

**flushed, adj.** with a reddish color (usually the face)

**fragment, n.** small part broken off something

**furnace, n.** a very hot oven

## G

**genuinely, adv.** honestly, authentically

**gesture, n.** a movement, usually of the hand or head, to express meaning or point to something.

**glossy, adj.** shiny and smooth

## H

**horizon, n.** where the earth seems to meet the sky

**hunch, n.** a guess based on feelings, not facts

## I

**incredulous, adj.** disbelieving

**intention, n.** aim or plan

## J

**juvenile, n.** a young creature or person

## L

**lurch, v.** to make a sudden, unsteady movement

## M

**mammal, n.** a type of animal (Humans are mammals.)

**mass, n.** the amount of matter in a substance or object

**matter, n.** any substance that occupies space and has mass

**mixture, n.** two or more substances that are combined without changing their chemical composition

**molecule, n.** a group of atoms bonded together

**mutter, v.** to say something in a low or hard-to-hear voice, often with annoyance

---

## N

**nudge, v.** to gently touch or push

---

## P

**paleontology, n.** the science of fossils

**periodic table, n.** a way of organizing chemical elements

**photosynthesis, n.** process by which plants use sunlight to get food from water and carbon dioxide

**plateau, n.** an area of high, level (no slope) ground

**portable, adj.** easy to carry

**precisely, adv.** exactly; with complete accuracy

**prod, v.** to poke someone or something

**pry, v.** use force to open

---

## R

**ramble, v.** walk without any obvious purpose

**reluctant, adj.** unwilling

**resonance, n.** a quality of sound: clear, deep, long lasting

---

## S

**sandwich, v.** to squash between two things

**shimmer, v.** to shine with a light that seems to move a little

**slather, v.** spread on thickly

**slithering, v.** sliding along

**sliver, n.** thin, narrow piece

**spangled, v.** covered with small, shiny objects

**suspicious, adj.** giving the impression of dishonest behavior

---

## T

**tarnishing, v.** a process by which some metals become dull

**technique, n.** a way of doing something, usually with some skill

**tense, adj.** nervous, tightly wound

**trace, n.** a slight mark

---

## U

**undergoing, v.** experiencing

**unscrupulous, adj.** not caring about the right thing to do

---

## V

**visible, adj.** able to be seen

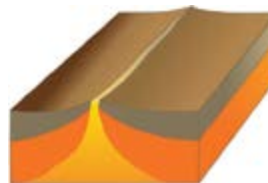
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## W

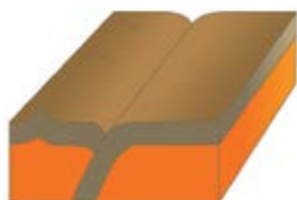
**weaving, v.** moving back and forth

### A Matter of Time

At some boundaries, tectonic plates are moving apart. As the plates separate, molten rock flows up from the mantle into the space between them, creating new crust. Mid-ocean ridges are an example of this type of plate interaction. Tectonic plates along the mid-ocean ridge in the Atlantic Ocean are moving apart at a rate of about 0.8 to 2 inches per year. That may not seem like much, but it adds up. Two hundred million years ago, the landmasses of North America and Europe were joined. So were South America and Africa. Thanks to separating plates, these continents now lie on opposite sides of a vast ocean.



Tectonic plates move apart.

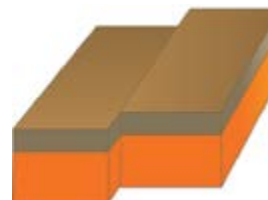


Tectonic plates collide.

At other plate boundaries, tectonic plates are **colliding**, or crashing together. In some places, colliding plates slowly crash into each other. The crust at their edges gradually crumples and is pushed higher and higher, creating mountains. In other places, one of the colliding plates slides under the other.

Two plates are colliding this way along the western coast of South America. A heavier oceanic plate is sliding under a lighter continental plate. Scientists call this process **subduction**. Subduction has created a deep ocean trench off the coast of Chile and Peru. It has also had a role in creating the towering Andes Mountains along the western edge of South America. Similar plate interactions have formed mountain ranges throughout Earth's long history.

Finally, tectonic plates slide sideways past one another. It's never a smooth process. Plate edges press together hard. They often get stuck while the




Tectonic plates slide sideways past one another.

pressure keeps building. Eventually the pressure gets too great. The stuck edges break free, causing the plates to jerk past each other.

### Providing the Answers

The theory of plate tectonics answered many questions in geology. It explained how Wegener's Pangaea broke apart. It explained how the continents have been slowly rearranged over millions of years. The movement of the plates also explained mid-ocean ridges, deep ocean trenches, patterns in the locations of mountains, and many other features on Earth's surface. The theory has become the cornerstone of modern geology.

As plates move, interesting things happen. Most of the time, they happen incredibly slowly. Sometimes, though, the effects of plate movements are sudden and dramatic. Think earthquakes and volcanoes!

A portrait of Inge Lehmann, a Danish seismologist. She is an elderly woman with short, light-colored hair, wearing glasses and a light-colored jacket over a white shirt. The background is a soft, out-of-focus grey.

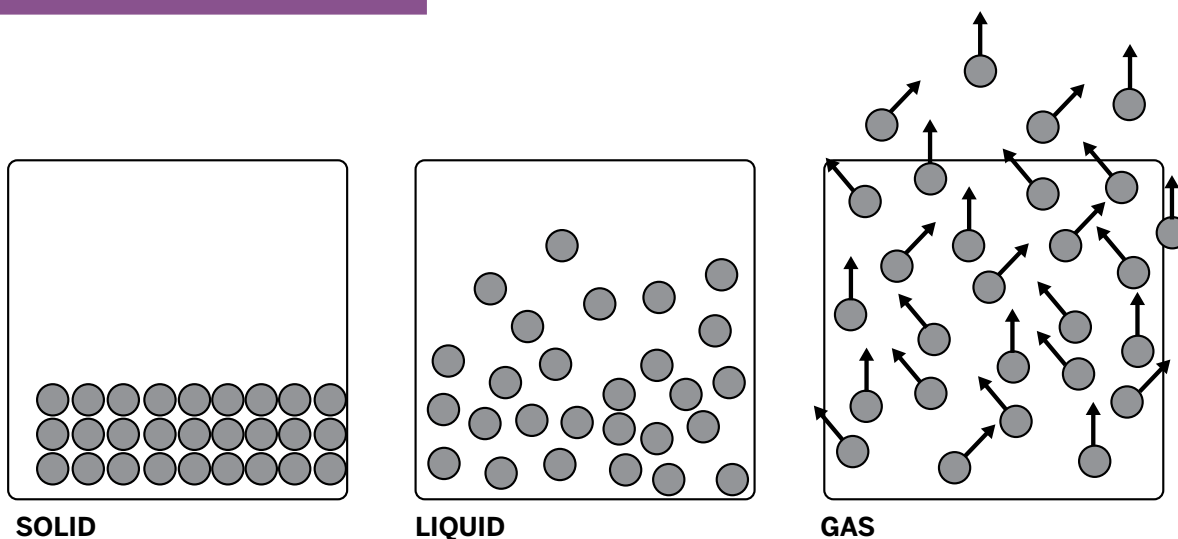
### Core Conclusions

You may never have heard of the Danish scientist Inge Lehmann. Among seismologists, however, she is famous. Around 1900, scientists thought the earth had just three layers: an outer crust, a solid mantle, and a liquid core. Lehmann studied seismograph records of earthquakes. She analyzed how seismic waves changed as they traveled through Earth's interior. Lehmann collected thousands of records organized in boxes—there were no computers back then! She saw patterns in how seismic waves behaved as they moved through Earth. Lehmann concluded that Earth's core has two parts: a liquid outer core and a solid inner core. In 1936, she announced her findings and changed our view of Earth!

21

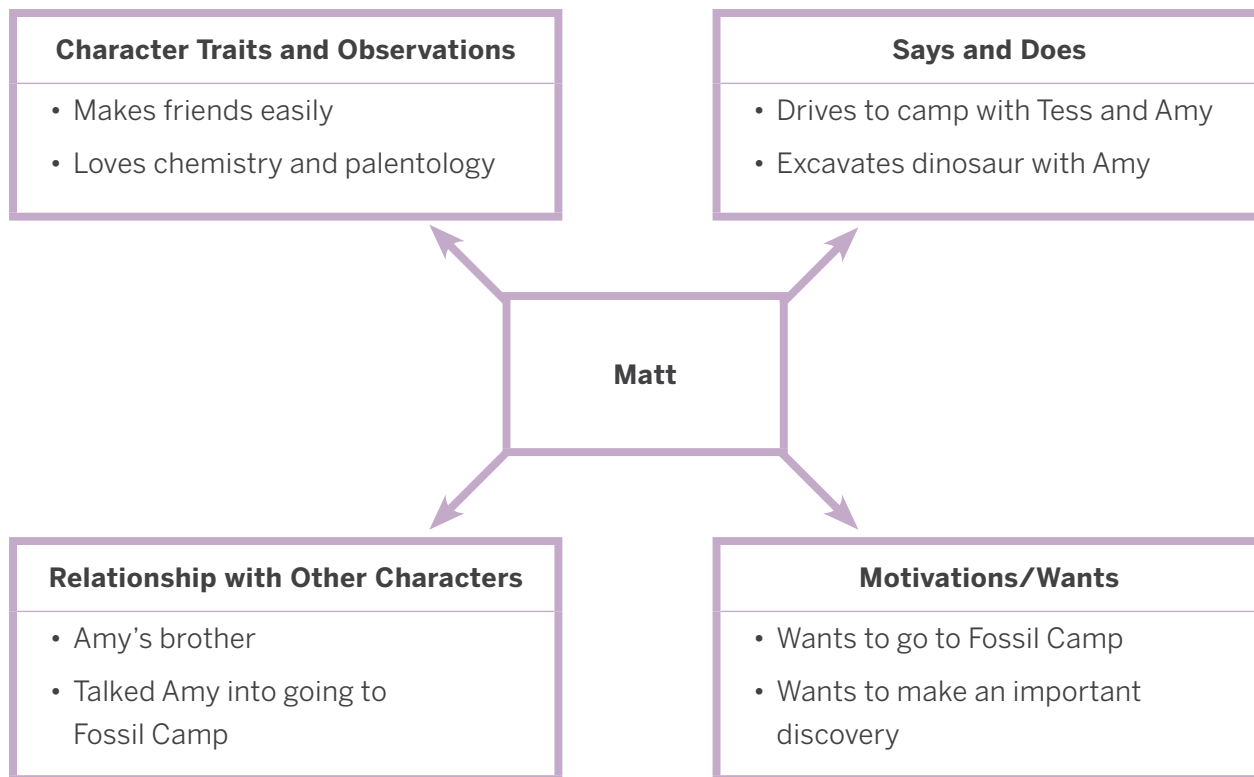


## CHANGES IN STATE DIAGRAM



## FOUR SAMPLE CHARACTER MAPS

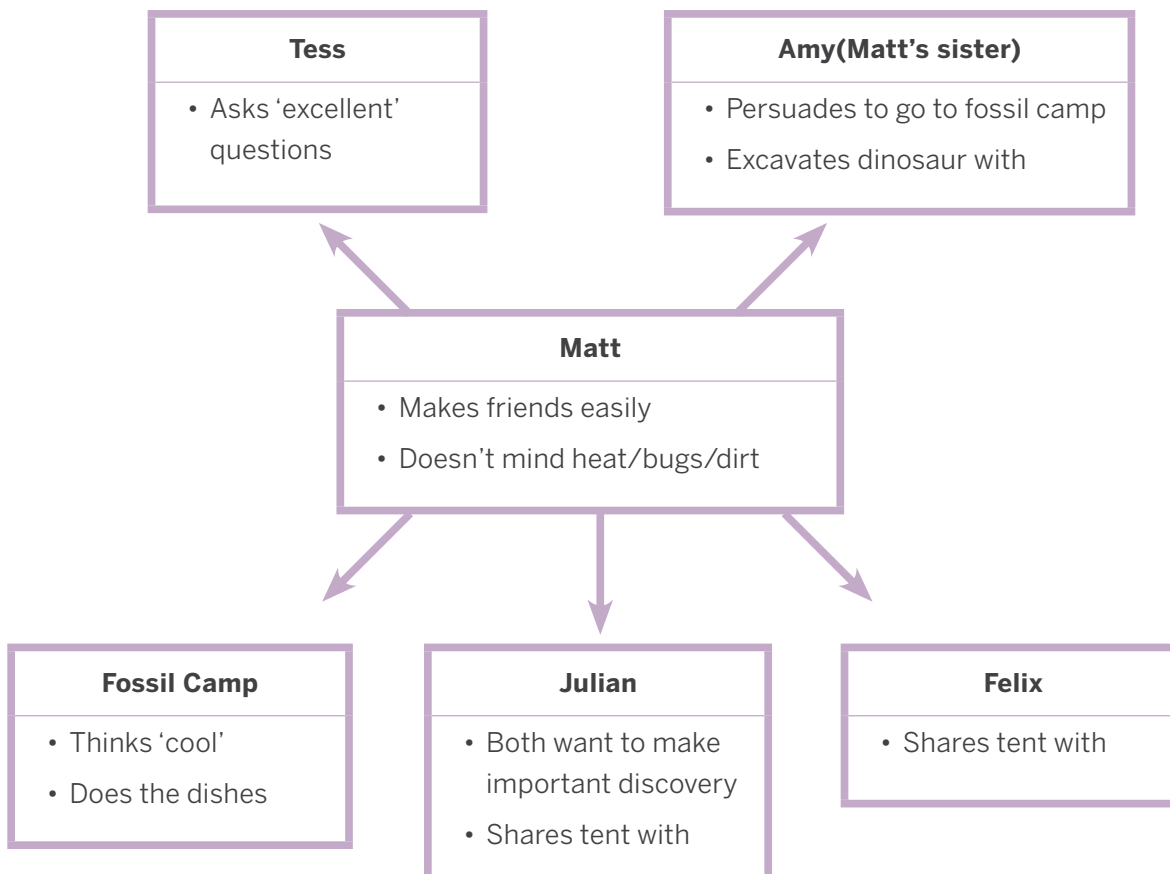
### Character Map 1



## Character Map 2

|           | What He Says or Does                                                                                                           | What We Learn About His 'Wants'                                                                                                | What We Learn About His Character                                                                               | What Else We Learn                                                                                                                                                |
|-----------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chapter 1 | <ul style="list-style-type: none"> <li>• Drives to fossil camp</li> <li>• Arrives at camp and joins everyone in lab</li> </ul> | <ul style="list-style-type: none"> <li>• Wants to be at fossil camp</li> <li>• Wants to make an important discovery</li> </ul> | <ul style="list-style-type: none"> <li>• Makes friends easily</li> <li>• Doesn't mind heat/bugs/dirt</li> </ul> | <ul style="list-style-type: none"> <li>• Amy's brother</li> <li>• He talked Amy and parents into going to fossil camp</li> <li>• Thinks camp is 'cool'</li> </ul> |
| Chapter 2 | <ul style="list-style-type: none"> <li>• Excavates jawbone with Amy</li> <li>• Does dishes later that evening</li> </ul>       |                                                                                                                                |                                                                                                                 | <ul style="list-style-type: none"> <li>• Asks 'excellent question' about chemistry</li> </ul>                                                                     |
| Chapter 3 |                                                                                                                                |                                                                                                                                |                                                                                                                 |                                                                                                                                                                   |

## Character Map 3



## Character Map 4

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### Matt

---

Matt is Amy's brother. He persuaded Amy to go to fossil camp and his parents to allow them to go. He hopes to make an important discovery. He makes friends easily and doesn't mind heat, dirt, or bugs. He thinks the camp is "cool." He has a "glow of excitement" about going to the dig site.

At the dig site, Matt excavates a jawbone with Amy. When they take a break, he asks 'excellent' questions of Tess about states of matter. Later that night he does the dishes.

---

# The Periodic Table of the Elements

|                               |                             |                                                                         |                                     |                               |                                  |                                |                               |                                  |                                    |                                   |                                                                                     |                             |                             |                             |                               |                               |                            |
|-------------------------------|-----------------------------|-------------------------------------------------------------------------|-------------------------------------|-------------------------------|----------------------------------|--------------------------------|-------------------------------|----------------------------------|------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|-------------------------------|----------------------------|
| 1                             | 2                           | Key                                                                     |                                     |                               |                                  |                                |                               |                                  |                                    |                                   |                                                                                     | 3                           | 4                           | 5                           | 6                             | 7                             | 0                          |
|                               |                             | relative atomic mass<br>atomic symbol<br>name<br>atomic (proton) number |                                     |                               |                                  |                                |                               |                                  |                                    |                                   |                                                                                     |                             |                             |                             |                               |                               |                            |
| 7<br>Li<br>lithium<br>3       | 9<br>Be<br>beryllium<br>4   |                                                                         |                                     |                               |                                  |                                |                               |                                  |                                    |                                   |                                                                                     | 11<br>B<br>boron<br>5       | 12<br>C<br>carbon<br>6      | 14<br>N<br>nitrogen<br>7    | 16<br>O<br>oxygen<br>8        | 19<br>F<br>fluorine<br>9      | 20<br>Ne<br>neon<br>10     |
| 23<br>Na<br>sodium<br>11      | 24<br>Mg<br>magnesium<br>12 |                                                                         |                                     |                               |                                  |                                |                               |                                  |                                    |                                   |                                                                                     | 27<br>Al<br>aluminum<br>13  | 28<br>Si<br>silicon<br>14   | 31<br>P<br>phosphorus<br>15 | 32<br>S<br>sulfur<br>16       | 35.5<br>Cl<br>chlorine<br>17  | 40<br>Ar<br>argon<br>18    |
| 39<br>K<br>potassium<br>19    | 40<br>Ca<br>calcium<br>20   | 45<br>Sc<br>scandium<br>21                                              | 48<br>Ti<br>titanium<br>22          | 51<br>V<br>vanadium<br>23     | 52<br>Cr<br>chromium<br>24       | 55<br>Mn<br>manganese<br>25    | 56<br>Fe<br>iron<br>26        | 59<br>Co<br>cobalt<br>27         | 59<br>Ni<br>nickel<br>28           | 63.5<br>Cu<br>copper<br>29        | 65<br>Zn<br>zinc<br>30                                                              | 70<br>Ga<br>gallium<br>31   | 73<br>Ge<br>germanium<br>32 | 75<br>As<br>arsenic<br>33   | 79<br>Se<br>selenium<br>34    | 80<br>Br<br>bromine<br>35     | 84<br>Kr<br>krypton<br>36  |
| 85<br>Rb<br>rubidium<br>37    | 88<br>Sr<br>strontium<br>38 | 89<br>Y<br>yttrium<br>39                                                | 91<br>Zr<br>zirconium<br>40         | 93<br>Nb<br>niobium<br>41     | 96<br>Mo<br>molybdenum<br>42     | [98]<br>Tc<br>technetium<br>43 | 101<br>Ru<br>ruthenium<br>44  | 103<br>Rh<br>rhodium<br>45       | 106<br>Pd<br>palladium<br>46       | 108<br>Ag<br>silver<br>47         | 112<br>Cd<br>cadmium<br>48                                                          | 115<br>In<br>indium<br>49   | 119<br>Sn<br>tin<br>50      | 122<br>Sb<br>antimony<br>51 | 128<br>Te<br>tellurium<br>52  | 127<br>I<br>iodine<br>53      | 131<br>Xe<br>xenon<br>54   |
| 133<br>Cs<br>caesium<br>55    | 137<br>Ba<br>barium<br>56   | 139<br>La*<br>lanthanum<br>57                                           | 178<br>Hf<br>hafnium<br>72          | 181<br>Ta<br>tantalum<br>73   | 184<br>W<br>tungsten<br>74       | 186<br>Re<br>rhenium<br>75     | 190<br>Os<br>osmium<br>76     | 192<br>Ir<br>iridium<br>77       | 195<br>Pt<br>platinum<br>78        | 197<br>Au<br>gold<br>79           | 201<br>Hg<br>mercury<br>80                                                          | 204<br>Tl<br>thallium<br>81 | 207<br>Pb<br>lead<br>82     | 209<br>Bi<br>bismuth<br>83  | [209]<br>Po<br>polonium<br>84 | [210]<br>At<br>astatine<br>85 | [222]<br>Rn<br>radon<br>86 |
| [223]<br>Fr<br>francium<br>87 | [226]<br>Ra<br>radium<br>88 | [227]<br>Ac*<br>actinium<br>89                                          | [261]<br>Rf<br>rutherfordium<br>104 | [262]<br>Db<br>dubnium<br>105 | [266]<br>Sg<br>seaborgium<br>106 | [264]<br>Bh<br>bohrium<br>107  | [277]<br>Hs<br>hassium<br>108 | [268]<br>Mt<br>meitnerium<br>109 | [271]<br>Ds<br>darmstadtium<br>110 | [272]<br>Rg<br>roentgenium<br>111 | Elements with atomic numbers 112-116 have been reported but not fully authenticated |                             |                             |                             |                               |                               |                            |

|                                |
|--------------------------------|
| 1<br><b>H</b><br>hydrogen<br>1 |
|--------------------------------|

Key

|                                                                         |
|-------------------------------------------------------------------------|
| relative atomic mass<br>atomic symbol<br>name<br>atomic (proton) number |
|-------------------------------------------------------------------------|

\* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

## SAMPLE POLICE REPORTS

### Sample 1

**Incident type:** reported robbery

**Address:** 433 Smith Street

**Witnesses:** Mrs. Elena Baria

**Evidence:** fingerprints (on counter)

This morning at 10 a.m. there was a reported robbery on the corner of Smith and Jones Street. Mrs. Baria, aged 53, called the police after seeing a man run out of the grocery store.

I arrived at the scene at 11:15 a.m. and spoke with Mrs. Baria. She told me:

1. There was glass all over the street when she turned the corner from the grocery store window. (I checked this and there was glass on the pavement.)
2. She saw a man who “looked suspicious” and was running fast out of the grocery store.
3. She could not describe the height or appearance of the suspect. She thought he was wearing a mask, but she could not be sure at that distance.

There was no CCTV footage of the event. We have found fingerprints on the counter of the grocery store. Further analysis is needed to determine if the fingerprints belong to the shopkeeper and his assistant or another.

The shopkeeper, Mr. Thompson, was not present, but we interviewed him later that day. He claimed that yesterday a large amount of money had been stolen. He also reported that his assistant was the only other person who was aware of the money. We have not been able to contact or locate the assistant and will continue to try.

Mr. Thompson reported that on the previous day:

1. He and his assistant arrived at the store with the money at 3 p.m. His assistant went into the back to compile inventory.
2. Mr. Thompson, at this time, put the money into the safe.
3. At 3:30 p.m. he and his assistant worked as usual in the store until 5:30 p.m. His assistant then left for the day.
4. Mr. Thompson left the store at 7 p.m. and went straight home. He locked the store as usual. His assistant does not have a key, he says.

## Sample 2

**Date:** 1/1/2015

**Day:** Monday

**Time:** 11:15 a.m.

**Officer on Duty:** Inspector Ravitz

**Location:** 42 Hubbard Avenue

**Nature of report:** police information

This officer was on duty and patrolling when he was alerted by radio to a missing person report in the nearby area. He drove straight to the named house, arriving at 11:15 a.m. There he met Melissa Mulan, who had filed the report and was worried about the disappearance of her boyfriend, Jesus. Melissa is 28 and works full time in retail, and has been with her boyfriend for two and a half years. He was last seen the previous evening and had been due to arrive at her apartment that morning and then go on a picnic.

I asked for their movements the previous day. Melissa had met her boyfriend for dinner with her parents at 7 p.m. the previous evening at the Italian restaurant Da Loca. They had dinner, and Melissa accompanied her parents back to their home. She stayed for one cup of coffee. Jesus, she believes, would have returned to his apartment. She said he sometimes picks up documents from work late to carry on working at home.

Initially Mulan told me she could think of no reason for his non-appearance this morning. On further conversation, however, it emerged that they had a serious argument the night before. It also emerged that on previous occasions her boyfriend had taken a day or two to “cool off” after an argument.

I will check with Jesus’s closest friends and family and then advise waiting several hours before further investigation.

---

## ARTICLES ON INVESTIGATIONS

### Article 1.

#### What is the investigation process? (The Metropolitan Police—the police force of London)

1. **Initial investigation**—This will involve a review of witnesses, scenes, and all other available evidence.

2. **Investigative assessment**—After the initial investigation, a decision will be made whether to transfer the crime to an investigating officer for further investigation or not. This assessment will take into account the following:

- Seriousness of the offence
- Likelihood of solvability (for example, availability of evidence)
- Level of resources required proportionate to the seriousness of the offence

There are two possible outcomes at this point:

- a) Investigation will be closed.
- b) Crime will be transferred for further investigation.

3. **Further investigation**—If the crime is transferred for further investigation, this will include:

- Taking statements from the victim and any witnesses
- Arresting and detaining any identified suspects and formally interviewing them at a police station
- At the end of the investigation there are three possible outcomes for the suspect(s).
  - a) **Charged**—The suspect is told that he or she will be sent to court and what law he or she is alleged to have broken.
  - b) **Cautioned**—An official warning is given in some circumstances.
  - c) **No further action**—If there is insufficient evidence to charge or caution a suspect, no further action will be taken.

## Article 2.

### Preventing crime better than catching offenders

([telegraph.co.uk/news/politics/10025018/Preventing-crime-better-than-catching-offenders-says-chief-inspector.html](http://telegraph.co.uk/news/politics/10025018/Preventing-crime-better-than-catching-offenders-says-chief-inspector.html))

Published: 29 April 2013

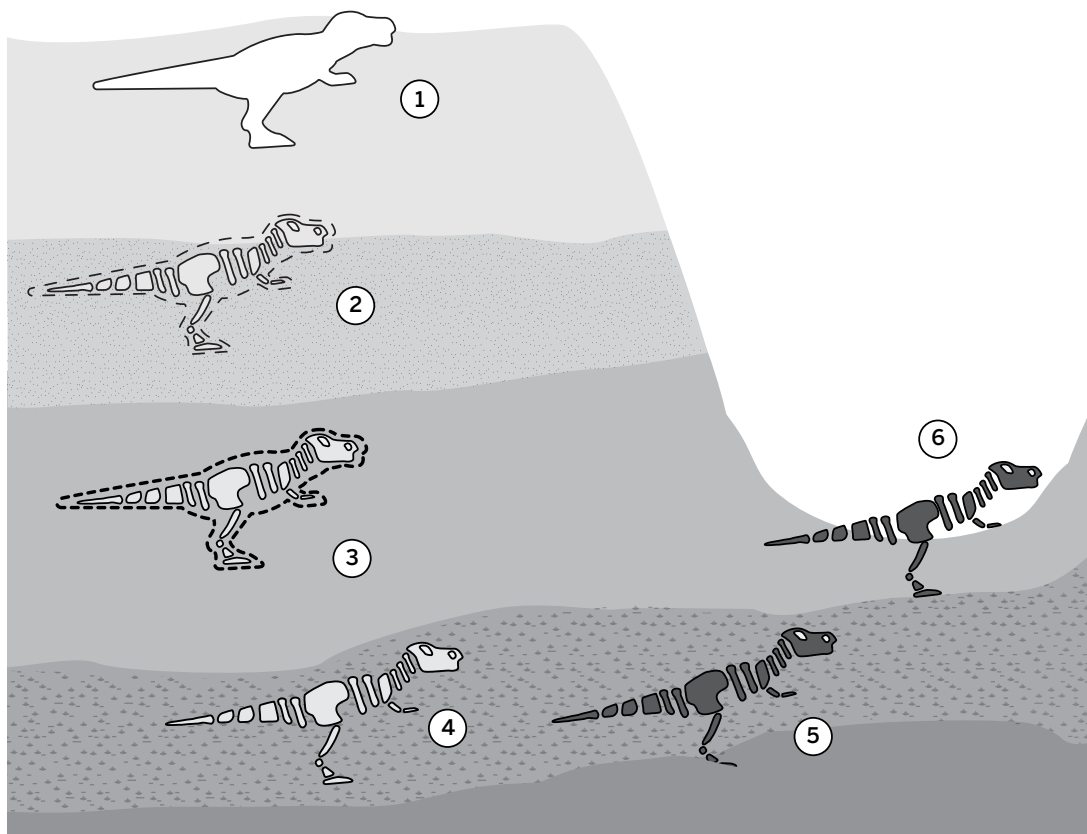
Tom Windsor, the chief inspector of constabulary for England and Wales, suggested police forces would get “more bang for their buck” if they focus on prevention rather than cure . . .

Mr Winsor . . . said the “primary purpose” of police is crime prevention.

“Sir Robert Peel, who founded the modern police service in 1829 said the primary test of police efficiency is the absence of crime and disorder,” he said.

“If we can prevent offences taking place and we prevent there being any victims, which is absolutely critical, and also if we save all of those costs.”

## FOSSIL IMAGE POSTER



## RUBRIC: PRESENTATION LESSON 5

|                                                                                                 | Police Officer 1 (Name: __)<br>Arguing for an Investigation | Police Officer 2 (Name: __)<br>Arguing against an Investigation |
|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------|
| Was the person speaking clearly and maintaining eye contact?                                    | (Y/N)                                                       | (Y/N)                                                           |
| Did he or she use evidence from the text in the argument? How many pieces?                      | (Y/N)<br>Number:                                            | (Y/N)<br>Number:                                                |
| Did he or she use evidence from the other articles in the other resources?                      | (Y/N)                                                       | (Y/N)                                                           |
| Did he or she use other techniques—stories, for example—that made the argument more compelling? | (Y/N)<br>Please give details:                               | (Y/N)<br>Please give details:                                   |



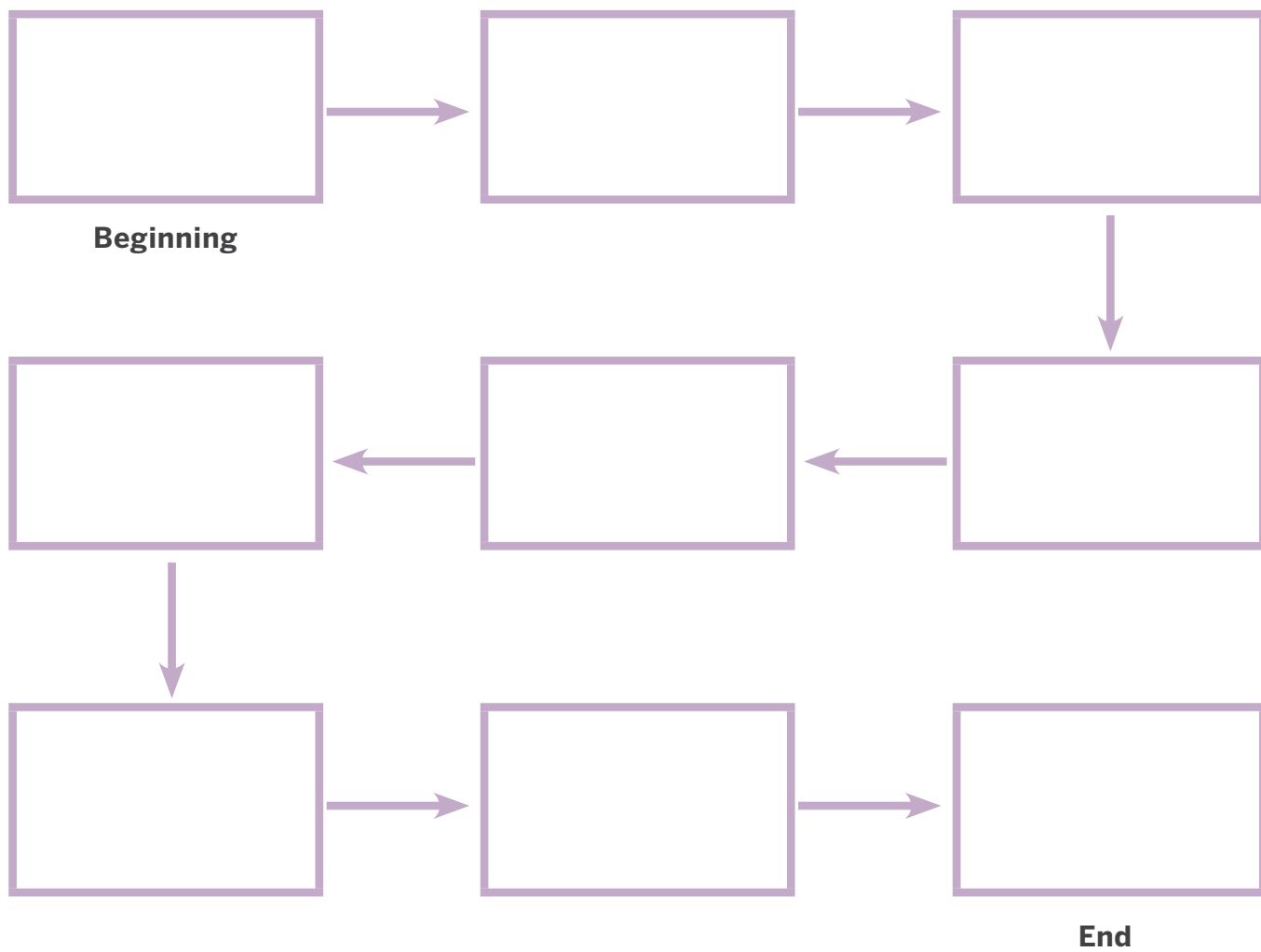
## RUBRIC: PRESENTATION LESSON 9

|                                                                                               | Characters being presented:<br>Name of student: | Characters being presented:<br>Name of student: | Characters being presented:<br>Name of student: |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| <b>Was the person speaking clearly and maintaining eye contact?</b>                           | (Y/N)                                           | (Y/N)                                           | (Y/N)                                           |
| <b>Did he or she introduce the character clearly, using information from the text?</b>        | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               |
| <b>Did he or she identify objective information about the character?</b>                      | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               |
| <b>Did he or she use that evidence to explain whether the character was a likely suspect?</b> | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               |
| <b>Did he or she identify subjective information about the character?</b>                     | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               |
| <b>Was it clear when evidence was subjective and when it was objective?</b>                   | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               |
| <b>Was it clear what the presenter would like to find out next about the character?</b>       | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               |
| <b>Did this link to his or her evidence?</b>                                                  | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               | (Y/N)<br>Details:                               |

## RUBRIC: PRESENTATION LESSON 11

|                                                                                                                |                                                             |
|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
|                                                                                                                | <b>Name of suspect accused:</b><br>Students in small group: |
| <b>Was the group speaking clearly and maintaining eye contact?</b>                                             | (Y/N)                                                       |
| <b>Did they clearly state who they were accusing?</b>                                                          | (Y/N)                                                       |
| <b>Did they identify a clear motive, using evidence from the text?</b>                                         | (Y/N)<br>Details:                                           |
| <b>Did they explain how the suspect had the means to commit the crime, using evidence from the text?</b>       | (Y/N)<br>Details:                                           |
| <b>Did they explain how the suspect had the opportunity to commit the crime, using evidence from the text?</b> | (Y/N)<br>Details:                                           |
| <b>Was it clear when evidence was subjective and when it was objective?</b>                                    | (Y/N)<br>Details:                                           |
| <b>Do you think the evidence was convincing? Why or why not?</b>                                               | (Y/N)<br>Details:                                           |

## PLOT DIAGRAM



## NARRATIVE RUBRIC

### Writing Rubric—Lesson 2

|                                      | <b>Exemplary</b>                                                                                                                 | <b>Strong</b>                                                                                                                 | <b>Developing</b>                                                                                                            | <b>Beginning</b>                                                                                       |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>Characteristics of Text</b>       | Student has clearly identified and used a range of literary characteristics and changed informational text into a literary text. | Student has changed text substantially, identifying and using literary characteristics and not informational characteristics. | Student has presented text with incomplete change and reflection of literary characteristics.                                | Student has presented informational text with little change or reflection of literary characteristics. |
| <b>Content</b>                       | Content is clearly expressed and accurate.                                                                                       | Content is mostly clearly expressed and accurate.                                                                             | Some content is clearly expressed, but there are inaccuracies or ambiguities.                                                | Little or no content is clearly expressed or accurate.                                                 |
| <b>Selection of Content</b>          | Clear discrimination about content to include.                                                                                   | Some discrimination about content to include.                                                                                 | Some discrimination but with some passages copied or poorly transferred.                                                     | Little to no discrimination about content to include.                                                  |
| <b>Setting, Characters, and Plot</b> | Clear setting, characters, and plot with descriptive details.                                                                    | Clear setting, characters, and plot with few or no descriptive details.                                                       | Some attempt to place story in setting or establish characters, but result is ambiguous or confused; no descriptive details. | Little to no attempt to establish setting, characters, plot.                                           |
| <b>Organization</b>                  | Content is clearly organized and linear.                                                                                         | Content is mostly clearly organized.                                                                                          | Some attempt at content organization has been made.                                                                          | Little or no attempt at content organization has been made.                                            |

## Writing Rubric—Lesson 5

### Police Report

|                          | <b>Exemplary</b>                                                                                                                     | <b>Strong</b>                                                                                                         | <b>Developing</b>                                                                                                             | <b>Beginning</b>                                                                                                                    |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Summary of Events</b> | Student has clearly mapped from information in the Reader and summary chart to report. He or she has selected pertinent information. | Student has clearly mapped from information in the Reader and summary chart to report. Some information is redundant. | Student has done some mapping from information in the Reader and summary chart to report. Choice of information is not clear. | Student has done little to no mapping from information in the Reader and summary chart to report. No obvious choice of information. |
| <b>Organization</b>      | Student has clearly used information from sample reports to decide how to organize text. Text is clear and coherent.                 | Student has used information from sample reports to decide how to organize text. Text is mostly clear and coherent.   | Student has made some attempt at organizing text, but result is not systematically clear or coherent.                         | Text is unclear with little obvious organization.                                                                                   |
| <b>Objectivity</b>       | Student has stated facts about characters.                                                                                           | Student has mostly stated facts about characters.                                                                     | There is some confusion between fact and opinion.                                                                             | Statements about characters, and their objectivity, are unclear.                                                                    |

## Writing Rubric—Lesson 10

### Letter to Sheriff

|                                 | <b>Exemplary</b>                                                                                                                           | <b>Strong</b>                                                                                                                                                     | <b>Developing</b>                                                         | <b>Beginning</b>                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>Understanding of Content</b> | Student has clearly understood plan and can distinguish between the phases.                                                                | Student has mostly understood plan and can distinguish between the phases.                                                                                        | Student shows some understanding of the chemical content in the plan.     | Student shows little or no understanding of the chemical content in the plan.     |
| <b>Tone</b>                     | Student has clearly considered the audience and explained content as if to a layperson. He or she has addressed the sheriff appropriately. | Student has considered the audience and explained content with some reflection of a layperson. He or she has made some attempt to show the sheriff appropriately. | Student has made some attempt to convey content to an audience.           | Student has made little or no attempt to convey content to an audience.           |
| <b>Objectivity</b>              | Student has made a clear distinction between subjective and objective information.                                                         | Student mostly shows understanding of subjective and objective information.                                                                                       | Student shows some understanding of subjective and objective information. | Student shows little or no understanding of subjective and objective information. |
| <b>Conclusion</b>               | Student has given a clear conclusion to the letter with an appropriate ending.                                                             | Student has given a clear conclusion to the letter.                                                                                                               | Student has given some indication that letter is concluding.              | Student has provided no clear conclusion to the letter.                           |

## ACTIVITY BOOK ANSWER KEY

### ACTIVITY 1.1

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

#### WELCOME TO FOSSIL CAMP

**Working individually,** answer the questions below in the space provided.

- Below are three images. Which of these is closest to the setting described in the text? Provide quotes from the text to support your answer.



This image is closest to setting in text. It shows "barren ridges of weathered rock" and "patches of stiff prairie grass". (The other images only show one of these.)

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Chemical Matter | Activity Book

### ACTIVITY 1.1

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

- Look at the sentences below. Circle those that you think describe the setting of this text. In each case, provide a word or term in the text that supports your answer.

"Lonely and empty"

"An extraordinary edifice made by man"

"Shaped by rain and storms"

"Chains of rocky hills that have almost no plants or life on them"

"Lush and green"

#### Challenge

- The badlands are the setting for this story. Does that mean the tents are not the setting? Give reasons for your answer.

Answers should recognize that both are the setting for the story, because a) different parts of the action happen in the two locations; and b) the tents are in the Badlands.

- Why do you think the text spends so much time describing the setting? What effect does that have on you, the reader?

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### ACTIVITY PAGE 1.2

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

#### VOCABULARY

Working as a class, complete the table below, using Chapter 1 of the *The Badlands Sleuth* for your answers.

| TERM OR IDEA      | DEFINITION OR EXPLANATION                                               |
|-------------------|-------------------------------------------------------------------------|
| Matter            | anything that has mass or takes up space                                |
| States of Matter  | Matter can be in different states: solid, liquid, or gas.               |
| Physical Property | anything you can see, touch, taste, or smell; something you can measure |
| Mass              | the amount of matter in a substance or object                           |

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### ACTIVITY PAGE 1.2

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

| EXAMPLES FROM TEXT                                                         | OTHER EXAMPLES                                          |
|----------------------------------------------------------------------------|---------------------------------------------------------|
| A fossil claw                                                              | (Answers may vary.)                                     |
| Solid: claw<br>Liquid: water<br>Gas: air                                   | (Answers may vary.)                                     |
| Texture: smooth<br>Shape: curved<br>Color: dark brown<br>Mass: 113.4 grams | (Students should explore the examples they used above.) |
| The mass of the fossil claw is 113.4 grams.                                | (Students should explore the examples they used above.) |

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### ACTIVITY PAGE 1.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

**Think of an object that qualifies as matter.** Using the table you created in Activity Page 1.2 as a guide, describe the properties of the object, just as a scientist would. But don't name or identify the object! As you write, think about how to organize your information.

**Answers will vary but should show a) precise description of the object; b) a recognition of physical properties (e.g. color, shape, texture). The answer may include the state of matter (liquid, gas, solid). Students should not identify the object by name.**

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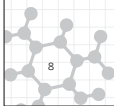
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### ACTIVITY PAGE 2.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Look again at the second half of Chapter 1 of *The Badlands Sleuth*. In your pairs, compare this text with the Geology text and provide reasons why you might consider *The Badlands Sleuth* text either informational or literary. Give specific examples in your answer.

#### Reasons the Text Is Informational Like the Geology Text

Like the Geology text, it: **Answers for both may include:**  
**presents factual content; presents information**  
**concisely without lots of descriptive language; intent is to explain and inform.**

For example: \_\_\_\_\_

---

---

Unlike the first half of Chapter 1 of *The Badlands Sleuth*, it:

**Answers for both may include: presents factual content; presents information concisely without lots of descriptive language; intent is to explain and inform.**

For example: \_\_\_\_\_

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### ACTIVITY PAGE 2.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

#### Reasons the Text Is Literary Like the First Half of the Chapter

Like the first half of the chapter, it: **Answers for both may include: has**  
**continuous prose; continues with imaginary characters and plot;**  
**does not have clear headings and diagrams to explain the material;**  
**uses questions from fictional characters to prompt the information.**

For example: \_\_\_\_\_

---

---

Unlike the Geology text, it: **Answers for both may include: has**

**continuous prose; continues with imaginary characters and plot;**  
**does not have clear headings and diagrams to explain the material;**  
**uses questions from fictional characters to prompt the information.**

For example: \_\_\_\_\_

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### ACTIVITY PAGE 2.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

#### Which Is It?

Do you think this text should be classed as narrative or informational? Use your examples above to provide an answer. (If you disagree with your partner, it is OK for you to write something different.)

**Answers will vary but should reflect characteristics of either informational or literary text.**

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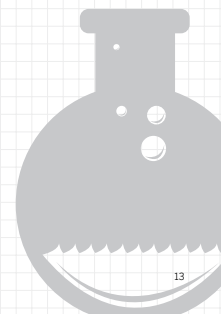
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## NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Activity for guidance.

Chemical Matter I Activity Book

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## NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Expand the sentences below. Think about descriptive details you can add, and what additional information they will provide the reader. You might want to brainstorm some adjectives first. Remember, you should still have only one sentence at the end.

1. Amy walked into her tent  
Answers will vary but should include uses of adjectives and adverbs, e.g., "Amy warily walked into her black and spooky tent."
2. Matt listened to Tess's explanation  
Answers will vary but should include uses of adjectives and adverbs, e.g., "Matt eagerly listened to Tess's fascinating explanation."
3. I drove round the rocks  
Answers will vary but should include uses of adjectives and adverbs, e.g., "I wearily drove round the barren, lonely rocks."

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Chemical Matter I Activity Book

## NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Choose the correct word and combine it with the suffix *-ment* to complete the sentence.

1. Winning the Nobel Prize was a great achievement.  
(amaze, achieve, align, excite)
2. The idea of finding a new fossil caused great excitement.  
(disagree, judge, entertain, excite)
3. After 45 years of work, Mr. Smith was looking forward to retirement.  
(pay, accomplish, move, retire)
4. I want to be a police officer because I'm interested in  
law enforcement.  
(endear, encourage, enforce, entertain)
5. With a glow of excitement in his eyes, Matt ran down the beach.  
(achieve, align, excite, entertain)

Write three sentences using a word with the suffix *-ment*. They can be about anything!

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Chemical Matter | Activity Book

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## NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

In pairs, answer the questions below. After answering each question, say whether you think the text detail is literary or informational, and why.

| Question                                                                 | Answer                                                                                                                                                                               | Is this a literary or informational detail? Give reasons for your answer.                    |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| What series of steps are required to excavate the bones?                 | 1. Use a hammer and chisel to break apart big chunks of rock. 2. Once the bones are exposed, use picks to scrape away more rock. 3. Use a brush every few minutes to clear the area. | Informational: it provides clear information on the steps necessary for a technical process. |
| What clue do you get about Julian's personality from his questions?      | He badly wants to be "famous" like his father and brother.                                                                                                                           | Literary: this gives details and clues about one of the literary characters.                 |
| Why does Daria say she wants her phone, and why does she really want it? | She says she wants it to call her friends, but really it's because she misses her mom.                                                                                               | Literary: this gives details and clues about one of the literary characters.                 |

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## ACTIVITY 3.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

### Can you be a dinosaur detective?

Read the clues below and see if you can decipher the origin of the dinosaur's name.

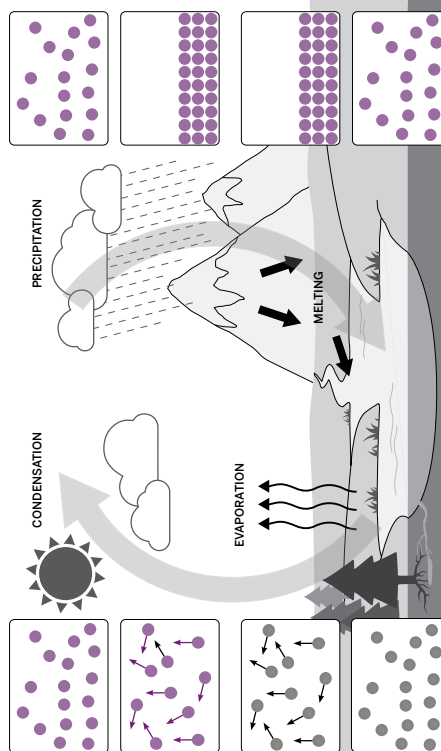
- Acheroraptor temertyorum was found in Hell's Creek in Montana.
- In Greek mythology, there is a river in the underworld called Acheron. The Greeks did not have hell—but they did have the underworld, where people were punished or rewarded depending on their lives.
- Raptor comes from the Latin word raptare, which means “to plunder or steal.”
- James and Louise Temerty have been major supporters of the University of Ontario, where the dinosaur is displayed.
- Sometimes paleontologists, or those who supported or funded their work, get new fossils named after them.

### My Theory

- They used the name **Acheroraptor** because  
Answers will vary but should reference the name  
Hell's Creek and the river in the underworld (Greek  
version of hell).
- They used the name **temertyorum** because  
Answers will vary but should reference the Temerty  
family and their support.

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## ACTIVITY 4.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

As you read Chapter 4 in your pairs, one of you should answer the Detective questions below, and the other the Scientist questions. When you have finished, explain and discuss your answers with your partner.

### Detective Questions:

- What are we told about Dr. Forester that indicates she isn't "very happy"?  
She is gesturing and shaking her head.
- What did Kristal do that indicated she was "secretive" about her drawings?  
She pulled her notepad against her chest so Amy  
couldn't see the drawings.
- What further evidence do we have that Dr. Forester is upset?  
She picks up her coffee but then doesn't drink from it.

### Challenge: Why does this suggest she is upset?

- What information have we been given about Amy that tell us why she "tingles" when she hears the word *mystery*?  
Answers will vary, but should reference her interest in  
detectives (and not fossils).

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## ACTIVITY PAGE 4.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

### SCIENTIST QUESTIONS:

- How was matter defined in earlier chapters?  
All the "stuff" of the universe: anything that has mass  
and takes up space.



### SUPPORT:

The answer is in the second half of Chapter 1.

- How has Tess added to the definition of matter?  
She says that all matter is made up of small particles  
called atoms.
- What are different kinds of atoms called?  
Elements
- How do scientists arrange the elements?  
Using the periodic table.

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# ACTIVITY PAGE 4.2

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

## PART 1

Working in your small groups, find each of the elements mentioned by Tess on page 26 of the Reader in the periodic table. Note down their chemical symbols and circle them in the periodic table below.

### Periodic Table of the Elements

|                               |                             |                                                                                       |                                     |                               |                                  |                                |                               |                                  |                                    |  |  |  |  |  |  |  |  |  |  |  |  |                                       |  |
|-------------------------------|-----------------------------|---------------------------------------------------------------------------------------|-------------------------------------|-------------------------------|----------------------------------|--------------------------------|-------------------------------|----------------------------------|------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|---------------------------------------|--|
| 1                             |                             | 2                                                                                     |                                     | <div>Key</div>                |                                  |                                |                               |                                  |                                    |  |  |  |  |  |  |  |  |  |  |  |  | <div>1<br/>H<br/>hydrogen<br/>1</div> |  |
| 7<br>Li<br>lithium<br>3       | 9<br>Be<br>beryllium<br>4   | <div>relative atomic mass<br/>atomic symbol<br/>name<br/>atomic (proton) number</div> |                                     |                               |                                  |                                |                               |                                  |                                    |  |  |  |  |  |  |  |  |  |  |  |  |                                       |  |
| 23<br>Na<br>sodium<br>11      | 24<br>Mg<br>magnesium<br>12 |                                                                                       |                                     |                               |                                  |                                |                               |                                  |                                    |  |  |  |  |  |  |  |  |  |  |  |  |                                       |  |
| 39<br>K<br>potassium<br>19    | 40<br>Ca<br>calcium<br>20   | 45<br>Sc<br>scandium<br>21                                                            | 48<br>Ti<br>titanium<br>22          | 51<br>V<br>vanadium<br>23     | 52<br>Cr<br>chromium<br>24       | 55<br>Mn<br>manganese<br>25    | 56<br>Fe<br>iron<br>26        | 59<br>Co<br>cobalt<br>27         | 59<br>Ni<br>nickel<br>28           |  |  |  |  |  |  |  |  |  |  |  |  |                                       |  |
| 85<br>Rb<br>rubidium<br>37    | 88<br>Sr<br>strontium<br>38 | 89<br>Y<br>yttrium<br>39                                                              | 91<br>Zr<br>zirconium<br>40         | 93<br>Nb<br>niobium<br>41     | 96<br>Mo<br>molybdenum<br>42     | [98]<br>Tc<br>technetium<br>43 | 101<br>Ru<br>ruthenium<br>44  | 103<br>Rh<br>rhodium<br>45       | 106<br>Pd<br>palladium<br>46       |  |  |  |  |  |  |  |  |  |  |  |  |                                       |  |
| 133<br>Cs<br>caesium<br>55    | 137<br>Ba<br>barium<br>56   | 139<br>La*<br>lanthanum<br>57                                                         | 178<br>Hf<br>hafnium<br>72          | 181<br>Ta<br>tantalum<br>73   | 184<br>W<br>tungsten<br>74       | 186<br>Re<br>rhenium<br>75     | 190<br>Os<br>osmium<br>76     | 192<br>Ir<br>iridium<br>77       | 195<br>Pt<br>platinum<br>78        |  |  |  |  |  |  |  |  |  |  |  |  |                                       |  |
| [223]<br>Fr<br>francium<br>87 | [226]<br>Ra<br>radium<br>88 | [227]<br>Ac*<br>actinium<br>89                                                        | [261]<br>Rf<br>rutherfordium<br>104 | [262]<br>Db<br>dubnium<br>105 | [266]<br>Sg<br>seaborgium<br>106 | [264]<br>Bh<br>bohrium<br>107  | [277]<br>Hs<br>hassium<br>108 | [268]<br>Mt<br>meitnerium<br>109 | [271]<br>Ds<br>darmstadtium<br>110 |  |  |  |  |  |  |  |  |  |  |  |  |                                       |  |

\* The lanthanoids (atomic numbers 58–71) and the actinoids (atomic numbers 90–103) have been omitted. The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

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# ACTIVITY PAGE 4.2

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

|                                                                                     |  |  |  |                            |  |  |  |                             |  |  |  |                             |  |  |  |                             |  |                            |  |                              |  |                             |  |                               |  |                              |  |                            |  |  |  |  |  |  |  |
|-------------------------------------------------------------------------------------|--|--|--|----------------------------|--|--|--|-----------------------------|--|--|--|-----------------------------|--|--|--|-----------------------------|--|----------------------------|--|------------------------------|--|-----------------------------|--|-------------------------------|--|------------------------------|--|----------------------------|--|--|--|--|--|--|--|
|                                                                                     |  |  |  |                            |  |  |  |                             |  |  |  |                             |  |  |  |                             |  | 0                          |  |                              |  |                             |  |                               |  |                              |  |                            |  |  |  |  |  |  |  |
|                                                                                     |  |  |  |                            |  |  |  |                             |  |  |  |                             |  |  |  |                             |  | 4<br>He<br>helium<br>2     |  |                              |  |                             |  |                               |  |                              |  |                            |  |  |  |  |  |  |  |
|                                                                                     |  |  |  |                            |  |  |  |                             |  |  |  |                             |  |  |  |                             |  | 3                          |  | 4                            |  | 5                           |  | 6                             |  | 7                            |  | 8                          |  |  |  |  |  |  |  |
|                                                                                     |  |  |  |                            |  |  |  |                             |  |  |  |                             |  |  |  |                             |  | 11<br>B<br>boron<br>5      |  | 12<br>C<br>carbon<br>6       |  | 14<br>N<br>nitrogen<br>7    |  | 16<br>O<br>oxygen<br>8        |  | 19<br>F<br>fluorine<br>9     |  | 20<br>Ne<br>neon<br>10     |  |  |  |  |  |  |  |
|                                                                                     |  |  |  |                            |  |  |  |                             |  |  |  |                             |  |  |  |                             |  | 27<br>Al<br>aluminum<br>13 |  | 28<br>Si<br>silicon<br>14    |  | 31<br>P<br>phosphorus<br>15 |  | 32<br>S<br>sulfur<br>16       |  | 35.5<br>Cl<br>chlorine<br>17 |  | 40<br>Ar<br>argon<br>18    |  |  |  |  |  |  |  |
| 63.5<br>Cu<br>copper<br>29                                                          |  |  |  | 65<br>Zn<br>zinc<br>30     |  |  |  | 70<br>Ga<br>gallium<br>31   |  |  |  | 73<br>Ge<br>germanium<br>32 |  |  |  | 75<br>As<br>arsenic<br>33   |  |                            |  | 79<br>Se<br>selenium<br>34   |  |                             |  | 80<br>Br<br>bromine<br>35     |  |                              |  | 84<br>Kr<br>krypton<br>36  |  |  |  |  |  |  |  |
| 108<br>Ag<br>silver<br>47                                                           |  |  |  | 112<br>Cd<br>cadmium<br>48 |  |  |  | 115<br>In<br>indium<br>49   |  |  |  | 119<br>Sn<br>tin<br>50      |  |  |  | 122<br>Sb<br>antimony<br>51 |  |                            |  | 128<br>Te<br>tellurium<br>52 |  |                             |  | 127<br>I<br>iodine<br>53      |  |                              |  | 131<br>Xe<br>xenon<br>54   |  |  |  |  |  |  |  |
| 197<br>Au<br>gold<br>79                                                             |  |  |  | 201<br>Hg<br>mercury<br>80 |  |  |  | 204<br>Tl<br>thallium<br>81 |  |  |  | 207<br>Pb<br>lead<br>82     |  |  |  | 209<br>Bi<br>bismuth<br>83  |  |                            |  | 209<br>Po<br>polonium<br>84  |  |                             |  | [210]<br>At<br>astatine<br>85 |  |                              |  | [222]<br>Rn<br>radon<br>86 |  |  |  |  |  |  |  |
| [272]<br>Rg<br>roentgenium<br>111                                                   |  |  |  |                            |  |  |  |                             |  |  |  |                             |  |  |  |                             |  |                            |  |                              |  |                             |  |                               |  |                              |  |                            |  |  |  |  |  |  |  |
| Elements with atomic numbers 112–116 have been reported but not fully authenticated |  |  |  |                            |  |  |  |                             |  |  |  |                             |  |  |  |                             |  |                            |  |                              |  |                             |  |                               |  |                              |  |                            |  |  |  |  |  |  |  |

## ACTIVITY PAGE 4.2

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

3. When you peel back the plastic, you can see the shiny brown wire underneath, glistening in the light. It's amazing that something so thin makes all of our lights, and the toaster, and other things in the house work. Apparently the wire is made of copper, which was discovered 11,000 years ago. I don't know why we don't make more jewelry out of it—it's so pretty.

Name of the element: copper

Characteristics described: shiny, ductile, good conductor

Metal or nonmetal? metal

4. Sulfur is not my favorite element. When it reacts it releases a horrible rotten-egg smell. As a solid, it's yellow and brittle. It doesn't make a nice sound when you hit it (in fact, it crumbles).

Name of the element: sulfur

Characteristics described: nonmalleable, nonresonant

Metal or nonmetal? nonmetal

### CHALLENGE:

Can you come up with your own examples from elements you recognize in the periodic table?

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## ACTIVITY 4.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

### COMBINE SENTENCES

#### Combine the following sentences:

- The dinosaur roared. It started running toward us.  
The dinosaur roared as/and it started running toward us.
- Amy was careful when lifting the egg from the dig. The egg was many thousands of years old.  
Amy was careful when lifting the egg from the dig because the egg was many thousands of years old.
- Amy might have looked bored. She was really excited.  
Amy might have looked bored, but/however she was really excited.

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## ACTIVITY 4.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

#### Reduce the following sentences:

- The fox, which was quick and colored brown, jumped over the dog, which was lazy and didn't bother to get up.  
The quick fox was brown. It jumped over the lazy dog, which didn't bother to get up.
- The pizza, cold and clammy to the touch, made Felix grimace when he ate it.  
The pizza was cold and clammy to the touch. It made Felix grimace when he ate it.

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## ACTIVITY 4.4

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

### SUMMARIZING EVENTS

The Sheriff has heard some tales of strange happenings at the dig site and asked one of his junior policemen to compile a report to see if there's anything worth investigating. Your job is to summarize the events that have befallen the campers so far, making particular note of who did what, and went where.

Your teacher will model taking notes to summarize the events for your police report from the first day for the campers. As she works, write notes with her in the space below.

| When                     | Who                                                                   | Where                  |
|--------------------------|-----------------------------------------------------------------------|------------------------|
| Day 1—on the way to camp | Max, Amy, Tess                                                        | in car driving to camp |
| Day 1—on the way to camp |                                                                       | arriving at campsite   |
| Day 1—at the camp        | Amy, Daria, Kristal                                                   | moving to tent         |
| Day 1—at the camp        | everyone: Max, Amy, Tess, Daria, Kristal, Felix, Julian, Dr. Forester | moving to lab tent     |
| Day 1—at the dig site    | everyone                                                              | moving to dig site     |

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## ACTIVITY 4.4

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

| Description                                                                                                | Incidents?                                    |
|------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| Hot environment: badlands of eastern Montana; Potholes in road.                                            |                                               |
| cluster of tents in shadow of high, barren ridge                                                           | met by other campers and Dr. Forester         |
| One tent; Amy in bed near the door.                                                                        | (Kristal has notebook—relevant?)              |
| Big canvas tent with awning outside; inside is a long table with instruments, boxes, and small cloth bags. | Introduced to fossils; Kristal sketches them. |
|                                                                                                            |                                               |

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## ACTIVITY 4.4

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

### EVENTS

Now complete the table for Chapter 2 in your pairs. One of you will complete the first half of the table, and the other the second half of the table.

#### Partner 1

| When                          | Who          | Where               |
|-------------------------------|--------------|---------------------|
| Chapter 2—<br>at the dig site | everyone     | dig site            |
|                               | everyone     | far end of dig site |
|                               | Felix        | gully               |
|                               | Dr. Forester | gully               |
|                               | Dr. Forester | lab tent            |

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## ACTIVITY 4.4

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

| Description                                                                                                | Incidents?                                                                                               |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Narrow plateau halfway up a ridge; exposed to the sun.                                                     | Partners excavate together, under Dr. Forester and Tess's supervision. Julian asks how to become famous. |
| Ridge forms a wall high enough to create a patch of shade.                                                 | Eat a snack. Discuss chemistry.                                                                          |
| One tent; Amy in bed near the door.                                                                        | Ledge gives way; Felix falls into gully, discovers fossil.                                               |
| Big canvas tent with awning outside; inside is a long table with instruments, boxes, and small cloth bags. | Dr. Forester discovers "several" more bones.                                                             |
|                                                                                                            | stays in lab looking at bones                                                                            |

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## ACTIVITY 4.4

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

#### Partner 2

| When | Who                     | Where         |
|------|-------------------------|---------------|
|      | Amy and Julian and Tess | kitchen tent  |
|      | Kristal and Matt        | kitchen tent? |
|      | Tess                    | campsite      |
|      | Everyone                | campsite      |
|      | Amy, Kristal, Daria     | tent          |

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## ACTIVITY 4.4

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

| Description | Incidents?                                                    |
|-------------|---------------------------------------------------------------|
|             | help make spaghetti                                           |
|             | do dishes after dinner                                        |
|             | builds fire                                                   |
|             | Discuss chemistry around bonfire. Julian asks to see fossils. |
|             | Go to sleep. Daria and Kristal sleep quickly. Amy reads.      |

### Challenge

See how well you remember the events. Ask your partner to name a character, and see if you can recount all of his or her movements without looking at your table.

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## ACTIVITY 5.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

### POLICE REPORT

In the space below, write a first draft of the police report to the sheriff.

Remember to:

- Concisely summarize the events.
- Make sure the sheriff can easily find the most important information.
- Be objective and state only facts.

Please see Writing Rubric in Teacher Resources for this Activity for guidance.

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## ACTIVITY 6.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

As you read Chapter 4 in your pairs, complete the questions below. One of you should complete the questions for Julian and the other for Kristal. You will then use the answers to these questions to continue to develop your character maps from Lesson 3 (Activity Page 3.3).

### JULIAN

How does Julian feel when he is told his discovery isn't gold? Quote from the text.

"Very disappointed"

Why does Julian feel this way? Can you point to clues about Julian's personality from other chapters to help you answer?

Students should be able to point to Julian's earlier remarks about wanting to be famous like his father.

### Challenge:

Why might Julian not wish to look for small fossils anymore?

Students should make the link between Julian's own disappointment and Matt's subsequent discovery.

They might make assumptions about envy.

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## ACTIVITY 6.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

### KRISTAL

Why did Kristal's eyes go "wide with surprise"?

Because she didn't think anyone had seen her drawings.

Why is Kristal worried about people seeing her drawings?

She thinks people "will make fun of [her] drawings."

What do you think Kristal's reluctance to show her drawings tells us about her character?

Answers will vary but may suggest a lack of confidence, or shyness.

### Language Challenge

Now answer the following questions in your pair.

The text says Amy's mind keeps "wandering." Wander is another word for walk. What kind of literary device is it to say that Amy's mind is wandering?

metaphor (figurative language)

What is the link between the literal and the metaphorical definition of something "wandering"?

Answers will vary but should relate to the idea of "walking" or "going on a journey" in one's mind.

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## ACTIVITY PAGE 6.2

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

In your pairs, read below the paragraphs from the Reader and answer the questions about the text.

1. He cleared his throat and suddenly turned to Tess. "I was wondering, Tess, just what is the difference between gold and fool's gold?"

Amy thought Felix just asked the question to turn her attention away from him.

Tess didn't notice, though, and was happy to answer it. "Remember that atoms are the smallest particles of matter. The thing is, you don't find many atoms all by themselves in nature. Atoms typically join together, or bond as chemists say, into groups of two or more to form molecules. Some molecules are made up of atoms of just a single element. A lump of gold, for example, would be made up of many gold atoms bonded together."

How are atoms usually found in nature?

**Bonded in groups of two or more as molecules.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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## ACTIVITY PAGE 6.2

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

2. "Most molecules, though, are combinations of two or more different elements. A molecule of iron pyrite, for example, has two atoms of the element sulfur bonded to an atom of the element iron. Molecules that contain atoms of two or more different elements are called compounds. Water is another example of a compound. A water molecule is made up of two atoms of the element hydrogen and one atom of the element oxygen."

Are molecules usually made up of one element or more than one? What are molecules made up of more than one element called?

**More than one; compounds.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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## ACTIVITY PAGE 6.2

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

3. "Is that why people sometimes call water 'H-2-O'?" Daria asked.

"Precisely," Tess replied. "There are millions of molecules that are compounds and you can find them everywhere and in everything. This sandstone rock we're scratching away is made of molecules that are compounds. So are these dinosaur fossils, and the tools we're using. Each one of you is a walking, talking collection of different compounds that make up your bones, muscles, nerves, and everything else in your bodies."

Why is Daria "precisely" right?

**The term H<sub>2</sub>O implies two hydrogen atoms and one oxygen atom, which is the atomic makeup of a water molecule.**

4. Dr. Forester suddenly spoke up. "Okay, here's a riddle: why are all compounds molecules, but all molecules are not compounds?"

"Because some molecules are made up of atoms of only one element!" Matt exclaimed triumphantly.

"Exactly right," Dr. Forester said.

Why is Matt "exactly right"?

**Molecules that are made up of atoms of only one element are not called compounds. But all compounds are made up of bonded atoms, and are therefore molecules.**

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## ACTIVITY PAGE 6.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

As your teacher summarizes the first paragraph in Activity Page 6.2, copy his or her summary below.

**Most atoms in nature are bonded into molecules. Elements are molecules with only a single element bonded together.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Now work in your pairs to summarize paragraphs 2 and 3 below.

Remember to think about:

- Whether the information is chemical content.
- Whether you really need the information to understand the content.
- **Hint:** Examples might be helpful, but it is not necessary when summarizing to include them all.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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# ACTIVITY PAGE 6.4

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## COMPOUNDS



This molecule is salt.

It is a(n) compound.



This molecule is sugar.

It is a(n) compound.



This molecule is copper.

It is a(n) element.



This molecule is water.

It is a(n) compound.

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# ACTIVITY 6.5

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

## COMMAS

With the sentences below, circle the subject of the sentence and then insert a comma after the introductory element.

- To find the clues, Amy had to get up very early in the morning.
- Sensing something was wrong, Matt decided to call his sister.
- With a gulp and a glance at Felix, Julian approached the snake.

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# ACTIVITY PAGE 7.1

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

Answer the questions below as you read the first half of Chapter 5.

1. What is a mixture?

Two or more substances that are physically mixed but can be separated

2. Tess says that however much you stir a mixture, the physical properties do not change. Name examples of physical properties that do not change. (Hint: Look back at the second half of Chapter 1 in the Reader.)

Answers should include mass, texture, and other physical properties named in Lesson 1.

3. Imagine a container with sugar dissolved in water. Can you use the information you learned about evaporation to explain how sugar crystals might be left behind if the container were left outside on a hot day? (Hint: Sugar does not change state until it is much hotter than a hot day would make it.)

Students should identify that the water would evaporate and that evaporation is the movement of water from liquid to gas. This would mean the water would no longer be confined to the container. Sugar would remain a solid, and be left behind.

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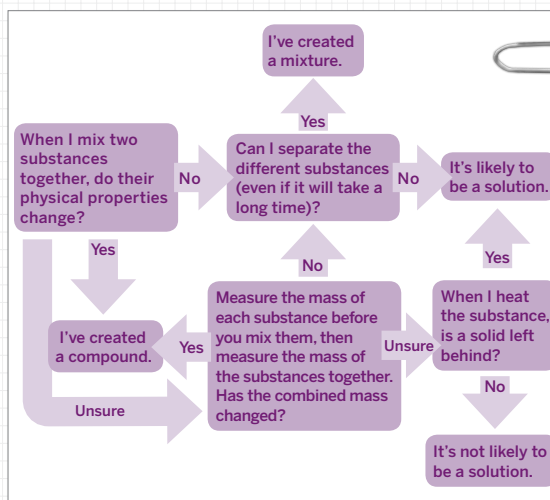
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# ACTIVITY PAGE 7.2

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

In the space below, create your own "Tess's Rules" for distinguishing between a mixture, a solution, and a compound.



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### ACTIVITY PAGE 7.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

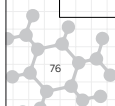
- The animal dies.
- The remains of the body start to rot and get covered with mud.  
*"His body was covered beneath a thick layer of muddy sand."*
- Over time, layers of sediments cover the bones.  
*"It was preserved for a long time, sealed beneath tons of sand."*
- The sediments encasing the bones harden into rock.  
**"sealed beneath tons of sand that gradually turned to rock."**
- As the bones slowly decay, minerals filter down into space and replace the chemicals in the bones.  
**"Little by little, those mineral compounds settled in tiny spaces in Achy's bones and teeth. They replaced his original compounds so that what was left at the end of this process were fossilized bones and teeth."**
- Layers of rock get worn away by wind and rain (erosion), and a fossil is discovered!

### ACTIVITY PAGE 7.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Now fill in the additional information from the Reader you have found in your "treasure hunt."

| LESSON AND ACTIVITY PAGE | WHAT YOU LEARNED                                                                      | HOW IT HELPS YOU UNDERSTAND FOSSIL CREATION                                                              |
|--------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| 1.2, 3.2                 | Matter can be in different states: liquid, solid, and gas.                            | When water evaporates from liquid to gas, it leaves behind compounds that become the Achy Breaky fossil. |
|                          | Most atoms are found bonded to other atoms of different elements to create compounds. | The fossil is made up of compounds that replace the dinosaur bones.                                      |
|                          | Solids dissolved in liquids form a solution of two compounds.                         | Water carries compounds in solution to Achy Breaky's bones, leading to fossil creation.                  |



## ACTIVITY 8.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

**Hi, everyone.** Your favorite detective is back (that's me, Inspector Ellis, if you were wondering) and here to help you solve the case. It's a pleasure to help when you have a devoted fan like Amy.

It seems pretty clear we have a case on our hands. So we are going to practice making deductions. Don't worry if you're slower than I am—I am brilliant (as I mentioned before). Plus, I've practiced. A lot. You don't become one of the best detectives in the world (probably the best) without investigating a lot of cases.

Amy, who is a brilliant detective in training, has decided that the thief must be "one of us." A dramatic accusation! Our task is to decide if her deductions are correct.

First, let's review Amy's actions in the text. Fill in the table below, starting to read from "Amy was trying to think like Inspector Ellis" (smart girl!) up to "the thief is one of us!" I've done the first example for you.

| What Amy did                        | What Amy saw or said/thought                                                                                                                                        |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Added a possibility in her notebook | Yesterday the soil would have been smoothed by the rain. So if fossil thieves had parked and walked to the camp, there should be clear tire tracks and boot prints. |
| Slipped out of camp                 | Only saw footprints of ground squirrels and rabbits<br>Finding no clue is a clue in itself.                                                                         |
| Returns to camp and talks to Matt   | The thief is one of us!                                                                                                                                             |

## ACTIVITY 8.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Now answer the questions to see if you have been paying attention.

- What was Amy looking for and what did she find?  
**She was looking for tire tracks and boot prints. She found ground squirrel and rabbit prints but nothing else.**
- Amy says "no clue is a clue in itself." What does she mean?  
**That the absence of tire tracks and boot prints is a clue.**
- Do you think the evidence supports the theory that there were fossil thieves arriving in an SUV or pickup truck?  
**No.**
- Do you think Amy's deduction was correct? Why?  
**Yes. Because if there had been a car, there would have been tracks, and she didn't find any.**

# ACTIVITY PAGE 9.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Use evidence from the text to answer the questions below.

- Below is a list of the stages of removing fossil bones. Number the stages in the correct order (so 1 would be the step described first in the text). Circle any steps in which a chemical change is happening.

3 Soaking strips of burlap in the plaster.

6 Applying more strips on the bottom to create an "egg."

2 Mixing plaster of paris with water in a bucket.

4 Covering the fossil with the strips of burlap.

5 Breaking the plaster with a chisel and hammer.

1 Covering fossil with damp paper towels (make sure rock pillar is seen).

Any of these steps could be considered a chemical change, because it is during these stages that the plaster of paris and water are reacting to form plaster

- How does Tess explain the difference between a physical change and a chemical change?

Physical changes do not change the chemical composition

of matter. Chemical changes do change the chemical composition of matter.

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# ACTIVITY PAGE 9.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

- What happens in a chemical change?

The molecules of the starting substance break apart, and the atoms rearrange themselves to form new molecules of different substances.

- If matter goes through a chemical change, are the physical properties likely to stay the same?

No. There will be new types of matter with new properties.

- Why does the warm bucket suggest a chemical change has taken place?

Chemical changes often lead to heat being given off.

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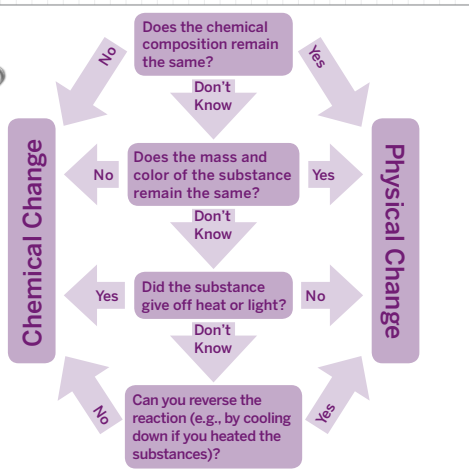
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# ACTIVITY PAGE 9.4

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

## TESS'S RULES

In the space below, create your own "Tess's Rules" for distinguishing between a chemical change and a physical change. Use the rules you created on Activity Page 7.2 to help you.



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# ACTIVITY PAGE 10.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

## IDENTIFYING EVIDENCE

As you read Chapter 7, note below the chemical changes the campers identify. In each case write down the chemical change and what evidence the camper or Tess offers to demonstrate it's a chemical change. The first one has been completed for you.

| CAMPER(S)         | CHEMICAL CHANGE       | EVIDENCE GIVEN BY CAMPER                                               |
|-------------------|-----------------------|------------------------------------------------------------------------|
| Matt and Daria    | wood burning          | giving off heat and light<br>not reversible (can't turn ash into wood) |
| Felix and Kristal | marshmallows toasting | changing color and odor (physical properties)<br>not reversible        |
| Amy and Tess      | digesting food        | our bodies changing atoms rearranging to form different molecules      |
| Kristal           | ring tarnishing       | ?<br>(color changes but Kristal doesn't identify this)                 |

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ACTIVITY PAGE 10.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

**Do you think** some of the campers identify better evidence than others? Who do you think made the best case, and who made the weakest? Why? Make sure you quote from the text in your answer.

Answers should reference evidence in previous table.

Students should recognize when evidence is observable and precise.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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[illegible]

# ACTIVITY 10.2

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

**Challenge:**  
Can you come up with other plans to catch the thief using chemical and physical changes? See if you can use the materials around the campsite (like ash, wood, and marshmallows) to come up with a new plan.

You may wish to use the graphic organizer below to help you with your letter.

|                                                                                                         | Part 1:<br>Physical Change                                                                                                                                                          | Part 2:<br>Chemical Change                                                                                                                  |
|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Matter Amy Uses                                                                                         | bowl of ice cubes                                                                                                                                                                   | plaster of paris                                                                                                                            |
| What will happen to the matter?                                                                         | melt—meaning it changes state from solid to liquid                                                                                                                                  | undergo a chemical change when it encounters water                                                                                          |
| Why is this a physical/chemical change?<br>(You may need to refer back to previous notes and chapters.) | Changes of state are physical changes; they are reversible, and the kind of matter remains the same (chemical composition doesn't change). [Other explanations are acceptable.]     | It is not reversible, it gives off heat, and it turns into a different form of matter.                                                      |
| Why does this help catch the thief?                                                                     | The water will mean that the soles of the thief's shoes will get wet, so they stick to other things the thief steps in.                                                             | When the water on the shoes encounters the plaster of paris, a reaction will occur and hard plaster will stick to the bottoms of the shoes. |
| Why is this objective evidence?                                                                         | Only someone who walks into the lab will have plaster of paris on their shoes. There is no opinion of the person, just evidence of what action the person took (where they walked). |                                                                                                                                             |

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# ACTIVITY 10.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

## COMMAS

Read the conversation below and place commas in the correct places.

"You're a bit grumpy today, aren't you," said Matt.

"No, I'm just bored," sighed Amy.

Realizing the solution, Matt went to the bookshelf and grabbed a detective novel.

"Try this," Matt said.

"Thanks!" responded Amy. "You know me pretty well, don't you?" she added.

"Yes, I guess I do," said Matt, grinning.

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## ACTIVITY 10.4

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### MORPHOLOGY

Write the correct word to complete each sentence.

- "I waited outside the sheriff's office for about half an hour before he gave me **permission** to enter."  
(admission, permission, remission, emission)
- "The squirrel **emitted** a loud chirruping sound before running away."  
(admitted, emitted, transmitted, permitted)
- "The man from the SUV **admitted** he was lost."  
(admitted, emitted, transmitted, permitted)
- "She was successful in her first **mission**."  
(missile, mission, remittance, committal)

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## ACTIVITY 12.1

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### Event: What happened?

"I snuck in here later that night to see them for myself. I'd picked one up to look at it more closely when I thought I heard someone coming, and without thinking I shoved the fossil into my pocket and slipped out the back of the tent."

### When did it happen?

at the end of Chapter 2 (the second night at camp)

"I thought I'd just put the fossil back when no one was looking, and she'd just assume she misplaced it. But every time I tried to do that, either Tess or Dr. Forester was here in the lab."

the following day (the third day at camp)

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## ACTIVITY 12.1

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### Why did it happen?

Julian "didn't want to wait" until the morning to see the fossils.

### Were there any clues this was happening?

"I want to look at them!" Julian said, jumping up from his chair and heading for the lab.

Dr. Forester caught him by the shoulder. "If you don't mind, Julian, let's wait until morning. It's really time for everyone to head for bed."

Julian shrugged and reluctantly said, "Okay."  
(quote from end of chapter 2)

He couldn't find the opportunity.

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## ACTIVITY 12.1

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

"Then we found more fossils and Dr. Forester started talking about how great it would be if she could get some of them to fit together. I thought since I had the missing piece that maybe I could use it to figure that out, and maybe it would turn out to be an important new discovery."

between Chapter 5 and Chapter 6

"Once I had the fossils, I couldn't make any sense of them. I couldn't even figure out a way to put them back in the lab without getting caught. So I put them in a sack and hid them under a bush."

Chapter 6

"So last night I brought the fossils back and put them there on the table. It seemed better than being caught with them red-handed or having to admit in front of everyone what I did. I didn't think much further than that."

between Chapters 7 and 8 (the previous night)

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## ACTIVITY 12.1

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

Julian wants to fit the fossils together so his dad will be proud of him.

"Here comes Dr. Forester," Julian said. Amy got the impression he had been waiting for her, and when she sat down, he asked her again if she'd had any luck figuring out what kind of animal the small gully fossils had belonged to.

Julian couldn't figure out how to solve the puzzle or how to put the fossils back.

Amy said she hadn't, and then something occurred to her. "So, Julian, what are you doing out here?"  
"It was ... it was getting time to leave and ... I spotted you out here so I thought I'd come and get you." The words tumbled out of his mouth in a sudden rush.  
"Well," Amy said, watching him closely, "it's a good thing you did."

Dr. Forester had gone to get the sheriff, so he had the opportunity.

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## ACTIVITY 12.3

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### ACCUSATION TO THE SHERIFF

As you work with the teacher, fill in the table below.

|           | Character's wants                                                    | Character's behavior                                                                                                                                                 | Character's resolution                                                                                           |
|-----------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Daria     | She misses her mother.                                               | She disappears into the night (objective).<br>She seems "strangely excited" later (subjective).<br>She seems "nervous" at the campsite (subjective).                 | She was out in the middle of the night (her behavior) because she found a signal to call her mother (her wants). |
| Felix     | He wants to eat.                                                     | Popped something into his mouth then asked a question (objective) to distract (subjective).<br>Puts lock on backpack (objective).<br>Any reference to Felix eating." | He was keeping "survival rations."                                                                               |
| Squirrels | They want to take food.                                              | Steal Amy's lunch (objective).<br>Footprints near campsite (objective).                                                                                              | Reason Dr. Forester gives for bones going missing.                                                               |
| SUV       | They are looking for lost cattle (we do not know this until the end) | Slowly approached (objective).<br>Looked like it turned around when it saw campers (subjective).                                                                     | See wants                                                                                                        |

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## ACTIVITY 12.4

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### GRAMMAR

1. Use the word in brackets to complete the sentence, turning the word into the past perfect tense.

They ate the snacks that Felix provided (provides)

Amy read the letter Inspector Ellis sent (send)

They talked about the case they solved (solve)

I edged away from the snake I spotted (spot)

We carefully removed the egg we excavated (excavate)

2. For two of the example sentences above, can you list the order of the actions in the space below?

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### ACTIVITY PAGE 13.1

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

### CHAPTER 13

Read Chapter 13 up to "That's absolutely amazing," and answer the questions below:

- Tess says chemical changes are the "ultimate" recyclers. Why do you think she used the word *ultimate*?  
because chemical changes can recombine elements in lots of different ways, and again and again
- Plants 300 million years ago had bodies built from compounds. What are compounds?  
molecules with more than one element in them
- What element existed in all of those compounds?  
carbon
- Name the chemical changes that converted the plants into a plastic bottle.  
1. Chemical changes from plants to coal or oil  
2. Chemical changes from coal/oil into the plastic bottle
- Which of those chemical changes happened without humans and which required humans?  
The first was natural and the second required humans.

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# ACTIVITY PAGE 13.2

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Continue reading Chapter 13 up to "Thanks, Achy-Breaky," he said, "I needed that." Answer the question below each paragraph:

"In photosynthesis, the atoms making up molecules of water and carbon dioxide are recombined, using energy from sunlight, to produce molecules of sugar and oxygen gas. Plants release the oxygen into the air, and use the sugar molecules to grow and build their bodies, including the parts that animals and people eat for food."

1. Three sets of chemical changes are mentioned. Can you describe them?

Hint: Two of them were described in the chemical changes game.

1. Water and carbon dioxide becoming sugar and oxygen

2. Sugar molecules transforming to build plant bodies.

3. Animals eating the plants and the compounds becoming "part of" them

"Excellent question, Felix." Tess took a deep breath and let it out slowly. "The cells of all living things produce carbon dioxide as a waste product. We get rid of it by exhaling." Then she gestured toward the fossils that lay in the rock beside them. "Whenever something dies, like good old Achy-Breaky, the compounds in its body are broken down and the atoms that formed them are recycled. Some chemical changes that are part of decomposition return carbon to the air as carbon dioxide."

2. Why did Tess take a deep breath and let it out slowly?

To show breathing in oxygen and exhaling carbon dioxide

3. Tess describes two ways carbon dioxide enters the air. Exhaling is one. What is the other?

Decomposition of dead animals

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# ACTIVITY PAGE 13.2

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

"When this amazing dinosaur died, the compounds that made up his body were broken down by chemical changes. The atoms that were once part of those compounds moved on. Perhaps, thanks to chemical changes, some of Achy-Breaky's atoms are now part of compounds in the soil or the water or the air. Perhaps"—Tess paused and her voice fell to a whisper—"the air that you're breathing right now contains atoms that were once part of this dinosaur."

4. Tess said before this paragraph that it doesn't matter if we are breathing in the atoms of dead bodies. Why?

Atoms are no different if they are in something dead or in something alive. They are just atoms.

Now look at the chemical formula descriptions below.

The chemical formula for plant sugar is  $C_6H_{12}O_6$ , where C stands for carbon, H stands for hydrogen, and O stands for oxygen. The numbers tell you how many atoms of each element are in the compound.

Carbon dioxide has the formula  $CO_2$ .

Water has the formula  $H_2O$ .

Oxygen has the formula  $O_2$ .

Using the chemical formulae and the diagram on the next page:

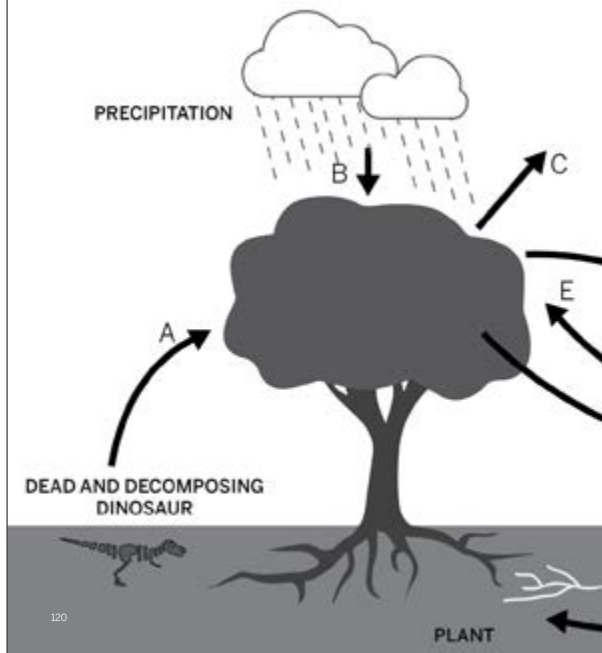
- Annotate the diagram by describing how chemical changes occur through photosynthesis and beyond.
- Draw the appropriate chemical formulae next to the appropriate parts of the diagram to explain how chemical matter is transformed through this process.

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# ACTIVITY PAGE 13.2

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

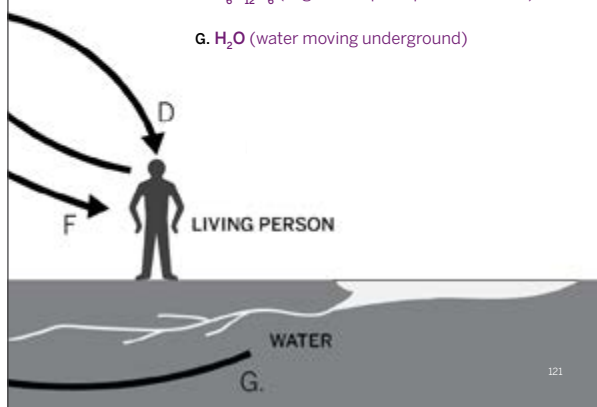


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# ACTIVITY PAGE 13.2

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

- $CO_2$
- $H_2O$  (water)
- $CO_2$  (carbon dioxide)
- $O_2$  (oxygen)
- $CO_2$
- $C_6H_{12}O_6$  (sugar from plant products eaten)
- $H_2O$  (water moving underground)



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### ACTIVITY 13.3

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

#### GRAMMAR

I. **Combine the pairs** below using the future perfect tense. The first has been completed for you.

Felix will eat cake (before he eats dinner).

"Felix will have eaten cake before he eats dinner."

Amy will go for a walk (before she goes to sleep).

Amy will have gone for a walk before she goes to sleep.

We will do the washing up (before going to bed).

We will have done the washing up before going to bed.

I will become a detective (before you become a paleontologist).

I will have become a detective before you become a paleontologist

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### ACTIVITY 13.4

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

#### RESOLUTIONS

As you read, complete the table below:

|              | Character's wants                          |
|--------------|--------------------------------------------|
| Amy          | To be a detective<br>Not to be at camp     |
| Dr. Forester | To solve the question posed by the fossils |

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### ACTIVITY 13.4

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

| Character's behavior                                                                                                                                  | Character's resolution                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Answers will vary but should point to at least one piece of evidence showing:<br>a. Amy not wanting to be at camp<br>b. Amy wanting to be a detective | Amy cracks a case.<br>Amy decides she likes camp after all. |
| Answers will vary but should point to at least one piece of evidence that Dr. Forester is trying to figure out the bones.                             | Dr. Forester figures out the bones!                         |

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#### ACTIVITY PAGE 15.1

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

- The word *evaporate* appears several times in the first excerpt. What is the meaning of the word *evaporate*?  
A. to turn from a solid to a liquid  
B. to turn from a liquid to a gas  
C. to turn from a gas to a liquid  
D. to turn from a liquid to a solid
- Can you provide a detail from paragraph 5 that helps the reader determine the meaning of the word *evaporate*?  
The evaporation process may take many months or even years until all the water has changed state into water vapor.
- From the first excerpt, list three ways in which salt is produced. Give the paragraph number where the method is first introduced.  
Deposits underground (paragraph 3)  
From seawater (paragraph 3 and 4)  
From Great Lakes (paragraph 6)

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ACTIVITY PAGE 15.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

4. "Because solar salt production relies on evaporation, it is easy to understand why most salt ponds are located in places that tend to be hot and dry, and have very little rain." Explain why this is easy to understand.

Students should link this text to the earlier explanation of evaporation.

5. We are told that Alice "lamented." From the context, what do you think *lamented* means?

- ☒ A. to express sorrow  
B. to express happiness  
C. to express tiredness  
D. to express laziness

Give a reason from the text for your answer.

Students should reference Alice's description of the lesson.

6. In the last paragraph of the second excerpt we are told Trevor's eyes "lit up." Is that a literal description? If not, what is it?

Figurative (metaphor)

ACTIVITY PAGE 15.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

7. What inference can we make about Alice's feelings about science from the second excerpt?

- A. She hates it.  
☒ B. She is confused by it.  
C. It is her favorite subject.  
D. It is okay but she prefers ice cream.

Provide evidence from the text, citing the paragraph number or providing quotes, for your answer below.

Answers will vary but should cite the text where Alice describes her lack of understanding of the material.

8. One of these excerpts is informational, and the other is literary. Can you identify which is which? Provide reasons for your answer.

First is informational, second is literary. Answers should include objective facts (for first), use of characters and narrative (for second).

9. For the literary text, can you name some informational elements in that text?

Answers should include objective facts/chemical content.

ACTIVITY PAGE 15.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

10. In the table below, describe how Trevor uses ice cream as an analogy for atoms and compounds.

| Concept                           | How it links to ice cream                   |
|-----------------------------------|---------------------------------------------|
| <i>periodic table of elements</i> | <i>chalkboard showing ice cream flavors</i> |
| <b>Element</b>                    | <b>Ice Cream Flavor</b>                     |
| <b>Atom</b>                       | <b>Scoop</b>                                |
| <b>Molecule</b>                   | <b>Two Scoops</b>                           |
| <b>Compound</b>                   | <b>Two scoops of different flavors</b>      |
|                                   |                                             |
|                                   |                                             |
|                                   |                                             |

ACTIVITY PAGE 15.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

12. Read both excerpts. Can you use the information on elements and compounds in the second excerpt along with information from the first excerpt to explain why salt is a compound? Reference the text from the excerpts you are using.

Answers should combine the information on the chemical formula of salt with the explanation of elements and compounds to identify why salt is a compound.

13. Read both excerpts. Can you explain, using examples from both excerpts, the differences between an element, a compound, and a solution?

Answers should combine information from both texts and background knowledge to identify  
a. An element containing only one kind of bonded atom  
b. A compound containing more than one kind of bonded atom  
c. A solution containing non-bonded elements or compounds mixed together/dissolved



NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

14. Reread paragraphs 4 and 5 of the first excerpt. In the space below, write a narrative literary text that conveys the content in these paragraphs. Complete the table underneath your narrative to explain what you have done.

Please see Writing Prompt scoring rubric in the Teacher Guide for this lesson.

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NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

## Grammar

1. Expand each sentence below using descriptive details, including adjectives and adverbs. You may replace words if you maintain the same meaning.
  - Amy solved the case.
  - I listened to Trevor's explanation.
  - She walked into the ice cream parlor.

Answers will vary but should include at least one adjective or adverb while maintaining the same meaning.

2. Combine each pair of sentences below and underline the linking word you have used.
- I went into the ice cream parlor. The owner smiled at me.
  - I went into the ice cream parlor. I was hungry.
  - I went into the ice cream parlor. I walked right out again.

1. I went into the ice cream parlor and the owner smiled at me.

2. I went into the ice cream parlor because I was hungry

3. I went into the ice cream parlor but I walked right out again.

Chemical Matter I Activity Book

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

3. Reduce each of the following sentences to be as concise as possible.
- The ice cream, soft and tingly on the tongue, made me sigh with pleasure as I devoured it.
  - Salt, which is a fascinating compound, can be extracted in many ways, some of them from ancient times, while some are more modern.

Answers will vary but examples are as follows: 1.) Ice cream is soft and tingly on the tongue. I sigh with pleasure as I devour it.

2.) Salt is a fascinating compound. It can be extracted in many ways. Some of these are from ancient times while some are more modern

4. Circle the subject of each sentence below and then insert a comma after the introductory element.

- A. To be first in line, Alice had to queue outside the parlor for a long time.
- B. Realizing she was annoyed, Trevor let Alice finish her sentence.
- C. Putting her hand in her pocket, Alice said, "I'll buy this."

5. Insert a comma into each of the sentences below in the relevant place and circle it.

- A. You think I'm talking too much, don't you?
- B. Yes, I suppose I do.
- C. It wouldn't help if I taped my mouth shut, would it?
- D. No, I don't think that's a good idea.

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NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

6. Use the events below to construct sentences in the past perfect tense.  
Event 1: going to the ice cream parlor; Event 2: learning about chemistry

I had been to the ice cream parlor before I learned about chemistry.

Event 1: evaporating seawater; Event 2: extracting salt

The seawater had evaporated before we extracted the salt.

## Morphology

7. Write the correct word to complete each sentence, adding the suffix *-ment*.

- A. Solving the case was a great achievement  
(amaze, achieve, align, excite)

- B. People had different views on the culprit. It caused

great **disagreement**  
(agree, disagree, judge, enforce)

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# ACTIVITY PAGE 15.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

8. Write the correct word to complete each sentence:

- A. "I applied three times before I was given permission to join the fossil dig."  
(admission, permission, remission, emission)
- B. "I admitted that I didn't understand what she was talking about."  
(admitted, emitted, transmitted, permitted)
- C. "Your mission should you choose to accept it, is..."  
(mission, missile, admission, transmission)

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# ACTIVITY PAGE A.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

## Questions

- Why did the Great Spirit make feathered suits for the birds?
  - He wanted to use the feathers he had for something.
  - He couldn't make up his mind about which birds he liked best.
  - He didn't like the way the birds' bodies and long legs looked.
  - He wanted the birds to be warm.
- Why did Turkey Buzzard try on every suit?
  - He couldn't make up his mind about which would be the best suit to wear.
  - He wanted to touch all the feathers.
  - He was told he could try on each suit as many times as he wanted.
  - He had to fly a long way to get to the suits.
- A simile compares two things, usually using *like* or *as*. What does the following simile from Paragraph 11 mean?

The next suit shone like gold and the feathers were a beautiful yellow.

- The suit was dull in color and less attractive than the other suits.
- The suit had many colors that made it attractive to look at.
- The feathers were made of gold and they shone in the sunlight.
- The bright yellow feathers made the suit vibrant and colorful, as if it were made of gold.

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# ACTIVITY PAGE A.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

4. What was wrong with each of the following suits Turkey Buzzard tried on?

| Suit        | What was wrong with it?                                                                      |
|-------------|----------------------------------------------------------------------------------------------|
| first suit  | feathers were too long and trailed on the ground as he walked; he could not fly well in them |
| next suit   | all the other birds would see him because he would shine like the face of the Great Spirit   |
| third suit  | it would get dirty too soon                                                                  |
| fourth suit | not enough feathers                                                                          |
| fifth suit  | too many feathers and too many pieces                                                        |

The following question has two parts. Answer Part A and then answer Part B.

5. **Part A:** What is the meaning of the word *homeliest* in the following sentence from paragraph 20?

Turkey Buzzard thought it was the homeliest suit of all.

- colorful
- itchy
- appealing
- unattractive

**Part B:** Underline the words and phrases in the text that helped you determine the meaning of *homeliest*.

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# ACTIVITY PAGE A.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

6. Why did Turkey Buzzard hold his head high and walk proudly in his chosen suit among the other birds?

Answers may vary, but could include that Turkey Buzzard decided to be proud of the suit he ended up choosing. He tried on all the other suits and found something wrong with each one. The suit he chose was the last suit available, but he kept it on and wore it proudly. He did not allow the other birds' teasing to bother him.

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# ACTIVITY PAGE A.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

## Questions

7. What is the painter Titian known for?
- ☒ A. richness of color in landscapes and portraits
  - B. religious art
  - C. working with the artist Giorgione
  - D. being the son of a noble

The following question has two parts. Answer Part A and then answer Part B.

8. **Part A:** What work made it clear that Titian would bring fame and honor to Venice?
- A. the first purely landscape picture he created
  - B. pictures he painted using juices of flowers
  - C. the portrait of Emperor Charles V
  - ☒ D. the walls of the Exchange above the Rialto Bridge

**Part B:** Why did this work make it clear Titian was a talented painter?

Titian's work frescoing the walls of the Exchange above the Rialto  
Bridge was highly praised and it was thought to be better than  
Giorgione's work on the same project. In addition, he was invited  
to finish the frescoes in the Grand Council chamber and to paint  
the portraits of the Doges, Venice's rulers.

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# ACTIVITY PAGE A.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

9. Why is it not surprising that Titian was the first artist to paint a purely landscape picture?
- A. He grew up in Venice, among the canals and busy trading atmosphere.
  - ☒ B. He grew up in the mountains, among beautiful, natural scenes.
  - C. He grew up in Rome, around religious art commissioned by the pope.
  - D. He grew up in a busy city, around lots of people, merchants, and art.

10. What does the following sentence from paragraph 9 mean?

Fame and wealth awaited Titian wherever he went.

- A. It was hard for Titian to find work no matter where he went.
- ☒ B. Titian was so talented that wherever he went he became famous and wealthy.
- C. Titian became famous and wealthy only when he worked with Giorgione.
- D. Titian became famous and wealthy only because he worked with Michelangelo.

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# ACTIVITY PAGE A.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

## Questions

11. What improvements in transportation are presented in this passage? Circle all that apply.
- ☒ A. roads widened to handle wagons and horses
  - ☒ B. stagecoach travel
  - ☒ C. turnpikes
  - D. flatboats
  - ☒ E. steamboats

12. Why did road owners collect a toll?

People figured if they could build good roads, they could  
charge people for using them.

13. Why were improvements in transportation needed in the United States in the 1700s and 1800s?
- A. The population in the United States was declining, as was the need for transportation methods.
  - ☒ B. The population in the United States was growing and spreading, and transportation was needed to accommodate those changes.
  - C. People didn't need to use roads and waterways for travel or for shipping goods.
  - D. Turnpike developers stopped collecting tolls from travelers using the roads.

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# ACTIVITY PAGE A.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

The following question has two parts. Answer Part A and then answer Part B.

14. **Part A:** What is the meaning of the word *folly* in the following sentence from paragraph 12?

Others who saw this odd-looking boat laughed and called it a different name: Fulton's Folly.

- A. important improvement
- B. new approach
- ☒ C. foolish idea
- D. slow method

**Part B:** What words and phrases in the text helped you determine the meaning of *folly*?

"Others who saw this odd-looking boat laughed..."

15. The idiom *had the last laugh* means to succeed when others thought you wouldn't. What does it mean in paragraph 12 when it says Fulton had the last laugh?

Fulton's odd-looking boat, which people had laughed a and  
called a folly, was actually very successful and changed the  
way passengers and goods traveled up and down waterways.

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# ACTIVITY PAGE A.1

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

16. Compare and contrast the stagecoach, turnpikes, and the steamboat as improvements in transportation. Which improvement best addressed transportation issues and why?

The steamboat best addressed transportation issues because it changed the way travel occurred up and down waterways. While improved roads did allow for stagecoach travel, traveling in a stagecoach was uncomfortable, and stops along the way had bad food and poor sleeping conditions. Turnpikes were in better condition than other roads, but they were just as dusty and muddy as the older roads, travelers had to pay to use them, and they did not extend very far west, where the population was spreading.

End-of-Year Reading Comprehension Score: \_\_\_\_\_ /16 points

To receive a point for a two-part question (i.e., 5, 8, and 14), students must correctly answer both parts of the question.

# ACTIVITY PAGE A.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

## End-of-Year Grammar Assessment

Read and answer each question.

For each sentence, draw a vertical line separating the subject and predicate. Circle the entire subject. Draw a wiggly line under the entire predicate.

- Copernicus observed that the planets moved in ways that didn't agree with the long-held geocentric model.
- The Maya and the Aztec civilizations developed in Mesoamerica.

Read each pair of sentences about Don Quixote. If the information in the pair of sentences is similar, rewrite the two sentences using a transition word or phrase that compares the two sentences. If the information in a pair of sentences is different, combine the sentences using a word or phrase that contrasts the two sentences.

| Words and Phrases That Compare | Words and Phrases That Contrast |
|--------------------------------|---------------------------------|
| in the same way                | on the other hand               |
| similarly                      | alternatively                   |
| just as                        | in contrast                     |
| also                           | instead                         |

- Don Quixote thought he saw a man wearing an enchanted helmet. Sancho saw a barber riding a donkey and wearing a basin on his head to protect it from the rain.

Answers may vary.

# ACTIVITY PAGE A.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

4. Don Quixote meddled in an interaction between a farmer and a young boy. Don Quixote meddled in a situation with merchants and servants.

Answers may vary.

5. Don Quixote is idealistic, or thinks positively about things. Sancho is realistic, or sees things the way they actually are.

Answers may vary.

For each of the following sentences, identify the subject by circling it. Then identify the verb. If it is an action verb, underline it with a straight line. If it is a linking verb, underline it with a wiggly line.

- Guild members in Florence chose Ghiberti to help Brunelleschi build the cathedral dome.
- Brunelleschi was angry.
- In the summer of 1911, Ishi emerged from the wilderness in Oroville.
- He was a very unusual sight.

# ACTIVITY PAGE A.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Use the information provided in the "Subject" and "Verb" columns of the following chart to fill in the "Agreement in the Present Tense" column so the subject and verb are in agreement in the present tense.

| Subject     | Verb    | Agreement in the Present Tense |
|-------------|---------|--------------------------------|
| I           | to be   | 10. <u>I am</u>                |
| the sky     | to look | 11. <u>The sky looks</u>       |
| the authors | write   | 12. <u>The authors write</u>   |
| he          | to see  | 13. <u>He sees</u>             |
| they        | run     | 14. <u>They run</u>            |
| we          | to be   | 15. <u>We are</u>              |

Write a complete sentence for any of the subject-verb agreement statements you created in the chart.

16. Answers will vary but should show correct usage of the present tense.

### ACTIVITY PAGE A.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

For each of the following items in a series, write a complete sentence using commas correctly.

crisp air colorful leaves hot cider

17. Answers will vary but should show correct usage of commas.

carrots peas potatoes

18. Answers will vary but should show correct usage of commas.

### ACTIVITY PAGE A.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Use the information provided in the "Subject" and "Verb" columns of the following chart to fill in the "Agreement in the Past Tense" column so the subject and verb are in agreement in the past tense.

| Subject           | Verb    | Agreement in the Past Tense      |
|-------------------|---------|----------------------------------|
| Leonardo da Vinci | to have | 19. <u>Leonardo da Vinci had</u> |
| Native Americans  | to be   | 20. <u>Native Americans were</u> |
| Jacob             | to see  | 21. <u>Jacob saw</u>             |
| I                 | to be   | 22. <u>I was</u>                 |
| we                | to have | 23. <u>We had</u>                |
| she               | to feel | 24. <u>She felt</u>              |

Write a complete sentence for any of the subject-verb agreement statements you created in the chart.

25. Answers will vary but should show correct usage of the present tense.

### ACTIVITY PAGE A.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Use the correct preposition from the word box to complete each sentence. Then write the function (place, time, or partner) in the box below the preposition.

out with after in

26. Galileo was born in Pisa, Italy, in 1564 CE and lived with Copernicus, building on Copernicus's work.  
place  
partner

27. The Arapahoe and Cheyenne fought with the Lakota at the Battle of the Little Bighorn.  
partner

For each pair of words, write a sentence using the correlative conjunctions correctly.

28. not only/but also

Answers will vary but should use the correlative conjunctions correctly.

29. either/or

Answers will vary but should use the correlative conjunctions correctly.

### ACTIVITY PAGE A.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Underline the interjection in each sentence. Then write the type of interjection on the line that follows, *strong* or *mild*.

30. Stop! There might be poison ivy under that bush.

Type: strong

31. Oh, let's come back later when the store is less crowded.

Type: mild

For each word provided in Column 1: Word(s), write one correct pronoun in Column 2: Pronoun.

| Column 1: Word(s) | Column 2: Pronoun  |
|-------------------|--------------------|
| Isabella d'Este   | 32. <u>she</u>     |
| the clouds        | 33. <u>they</u>    |
| Mom, Dad, and I   | 34. <u>we</u>      |
| the teacher       | 35. <u>he, she</u> |
| Martin Luther     | 36. <u>he</u>      |
| my sister         | 37. <u>she</u>     |

### ACTIVITY PAGE A.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Select one row from the chart, and write two sentences. The first sentence should use the noun in Column 1: Word(s) as the subject, and the second sentence should use the pronoun in Column 2: Pronoun as the subject.

38. **Answers may vary.**

Fill in the blanks with the correct pronoun antecedent from the box.

his her their its

39. Martin Luther nailed **his** Ninety-Five Theses to the church door at the University of Wittenberg.
40. Both the Maya and the Aztec built temples in **their** important city centers.
41. The woman shown in Leonardo da Vinci's painting *Mona Lisa* is well-known for **her** mysterious smile.
42. When Native Americans on the Great Plains hunted the buffalo, they used **their** hide for clothing, tepee covers, bedding, and moccasins.

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### ACTIVITY PAGE A.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Add a comma in the appropriate place for each of the following sentences.

43. First, I will finish my homework.
44. Oh, Roberto said it would be easy and it was!
45. Well, we won't get to the field before the game starts.

Read each set of sentences. If the verb tenses are the same and correct, put a ✓ (check mark). If there is an inappropriate shift in verb tense, put an X on the line. Rewrite the sentence(s) marked with an X with the correct verb tense(s).

46.   X   Don Quixote tried to do what he thought was right. Sometimes he will make mistakes when he will attempt to fix things.  
Rewrite sentence(s), if needed:  
**Don Quixote tried to do what he thought was right. Sometimes he made mistakes when he attempted to fix things.**

47.   ✓   Rather than conquer or tame the land, Native Americans blended into the land. They built sturdy, cozy houses.  
Rewrite sentence(s), if needed:  
**Answers will vary but should show correct usage of the present tense.**

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### ACTIVITY PAGE A.3

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Fill in the blanks with the best transitional words or phrases that help make the sentences flow together.

48. Don Quixote and Sancho Panza traveled for days. (*First/At last*)  
**at last** they arrived home.
49. Custer was sure he and his soldiers would win the Battle of the Little Bighorn. (*Next/In the end*) **in the end**, though, the Lakota and their allies won.

Insert a comma in the correct place in the following sentences.

50. No, we won't have time to stop at the craft store before dinner.
51. Teresa, can you please fill this cup with water for the experiment?
52. Saturday is the first day of spring, isn't it?

Circle the correct way to write the following titles.

53. Chapter **"Myths of the Maya"** Myths of the Maya
54. Book "Shifts in Power" **Shifts in Power**
55. Work of Art "Self-Portrait" by Sofonisba Anguissola **Self-Portrait by Sofonisba Anguissola**

End-of-Year Grammar Score: \_\_\_\_\_ /55 points

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### ACTIVITY PAGE A.6

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

#### End-of-Year Morphology Assessment

Read and answer each question. Some questions have two parts. Answer Part A and then answer Part B.

For 1 and 2, write the correct word to complete each sentence.

- Be sure to take your time when you write the note, because the last time, your handwriting was **illegible**, and I couldn't figure out the message.  
(legible, illegible, legal, illegal)
- I have a **regular** piano lesson each week that I attend on Tuesday of each week.  
(responsible, irresponsible, regular, irregular)
- If someone is working on an *international* project, what does that mean?
  - That person is working on a project that involves one or more countries outside of the country in which he or she lives.
  - That person is working on a project alone with no help.
  - That person is working on a project for the country where he or she lives.
  - That person is working on a project with one other person.
- If you *distract* someone from what they are doing, you are \_\_\_\_\_
  - helping them concentrate
  - adding more work for them to complete
  - taking their attention away from what they are doing
  - asking them to explain what they are doing

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# ACTIVITY PAGE A.6

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

5. Which of the following words with the suffix *-ness* means the state or condition of being about to fall asleep?
- A. steadiness
  - B. crispness
  - ☒ C. drowsiness
  - D. emptiness

The following question has two parts. Answer Part A and then answer Part B.

6. **Part A:** Which of the following roots means "to empty"?

- A. *tract*
- B. *mem*
- C. *cred*
- ☒ D. *vac*

**Part B:** Choose the word with the root that means "to empty" and write a sentence using the word.

- A. tractor
- B. remember
- C. credible
- ☒ D. evacuate

Sentence: Answers may vary.

# ACTIVITY PAGE A.6

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

For 7 and 8, write the correct word to complete each sentence.

7. The man was clearly impatient about waiting in line  
(mobile, immobile, patient, impatient)  
for his turn to purchase his items at the store, as he kept checking his watch.
8. My science project is incomplete because I haven't  
(audible, inaudible, complete, incomplete)  
finished the last part.
9. If the dentist extracts a tooth from your mouth, what does the dentist do?
- A. The dentist puts in another tooth.
  - ☒ B. The dentist pulls out a tooth.
  - C. The dentist cleans a tooth.
  - D. The dentist protects a tooth.

The following question has two parts. Answer Part A and then answer Part B.

10. **Part A:** What does the root *serv* mean?

- A. to empty
- ☒ B. to save, protect, or serve
- C. to draw or pull
- D. to remember or recall

**Part B:** Write a sentence using the word *conserve*. Make sure the sentence demonstrates the meaning of the word.

Answers may vary.

# ACTIVITY PAGE A.6

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

11. Which of the following demonstrates the meaning of the word *enable*?

- A. severe drought preventing farmers from getting good crops
- ☒ B. getting a good night's sleep before an important soccer game in order to play well
- C. misplacing the library book you need for your history project
- D. running late for school because you overslept

12. If someone is a *scientist*, what does that person do?

- A. performs a musical solo
- B. plays the piano
- ☒ C. works in a branch of science
- D. makes art

13. A *credible* source is one that is \_\_\_\_\_.

- A. not trustworthy
- ☒ B. trustworthy
- C. remembered
- D. not remembered

14. Circle the correct prefix to add to the root word in the following sentence.

im-      in-      ☒ post-      fore-

Not every baseball team plays games during the \_\_\_\_\_ season because only the teams that did the best during the regular season continue to play.

# ACTIVITY PAGE A.6

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

For 15 and 16, write the correct word to complete each sentence.

15. The police officer had to direct traffic through  
(cancel, cancellation, direct, direction)  
the intersection because the stoplights weren't working.
16. Please tell me what revisions I should make to my  
(revise, revisions, decide, decisions)  
essay about Don Quixote.
17. Which of the following words with the root *mem* means "easy to remember for a particular reason"?
- A. *memoir*
  - B. *remember*
  - C. *commemorate*
  - ☒ D. *memorable*

ACTIVITY PAGE A.6

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

18. Explain what the following statement means:

She had the *foresight* to save money early so when she retired, she could live comfortably.

Answers may vary but should state that the subject is  
looking ahead.

End-of-Year Morphology Score: \_\_\_\_\_ /18 points



# Core Knowledge Language Arts

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# Core Knowledge Language Arts

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