OVERVIEW

Exploring Extremes

FOCUS QUESTION

How and why do people explore extreme environments?

About the Lesson

OBJECTIVES

Content Objectives

- Analyze the type of information included in firsthand and secondhand accounts.
- Compare firsthand and secondhand accounts of the same topic or event.
- Understand how and why scientists study active volcanoes and the frigid sea.

Language Objectives

- Explore a firsthand account and describe the personal details the author shares.
- Use graphic organizers to compare accounts.
- Choose an extreme environment to explore and explain that choice in writing.

ACADEMIC TALK

See **Glossary of Terms** on pp. 478–485.

firsthand account, secondhand account, topic, event, focus, sensory detail, background information, research

Spanish Cognates

evento, detalle sensorial

Build Knowledge

Lesson texts build knowledge about:

- The work done by volcanologists and scientific illustrators
- Hawaii's Kīlauea volcano
- Ocean life near Antarctica

Plan Student Scaffolds

- Use **i-Ready data** to guide grouping and choose strategic scaffolds.
- Use **Teacher Toolbox** resources as needed to address related skills:
  - Evaluate a firsthand account
  - Understand how point of view impacts meaning
- If possible, in Sessions 1 and 3, partner students with the same home language to support one another in understanding how volcanologists explore extreme environments. Students may speak in English or in their home language. EL
- Preview texts and activities to anticipate barriers to engagement, access, and expression. Modify based on needs.

Use Protocols That Meet the Needs of All Students

In order to increase engagement and validate cultural and linguistic behaviors, specific protocols are included in the lesson. To further customize activities for your students, consider optional protocols listed on pp. A46–A51.

PROTOCOL	SESSION	VALIDATES
Vote with Your Feet	1	movement, multiple perspectives
Pass It On	1, 5	spontaneity, connectedness
Stand and Share	1, 3	spontaneity, movement, connectedness
Jump in Reading	2, 4	spontaneity, collective success
Somebody Who	2, 4	social interaction
Take a Poll	3	multiple perspectives
Individual Think Time	4	independence
Pick a Stick	6	spontaneity
Silent Appointment	6	social interaction, nonverbal expression

LEARNING PROGRESSION | Compare Accounts

Students build on this skill:
RI.3.6 Distinguish their own point of view from that of the author of a text.

Students learn this skill:
RI.4.6 Compare and contrast a firsthand and secondhand account of the same event or topic; describe the differences in focus and the information provided.

Students prepare for this skill:
RI.5.6 Analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent.

Students review and practice:

- **RI.4.1** Make inferences
- **RI.4.3** Analyze a scientific text
- **RI.4.4** Determine word meanings

LESSON PLANNING GUIDE

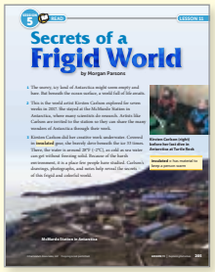
TEXT 1: Science on the Edge • NARRATIVE NONFICTION

			TEXT AT-A-GLANCE	ENGLISH LEARNER SUPPORT (EL)
SESSION 1	**SCAFFOLD READING**		**Concepts/Background** • volcanologists, volcanoes, and lava flow • Hawaii's location and varied topography • research and field experience **Language** • **Vocabulary:** *document, eruption, situation, serious, textbook, (on a) mission* • **Idioms:** *caught off guard*	**Speaking/Reading** • Leverage cognate knowledge **Listening/Reading** • Analyze phrases
SESSION 2	**PRACTICE THE FOCUS STANDARD** • Formative Assessment			**Listening/Speaking** • Reinforce academic vocabulary **Reading** • Role-play or sketch **Writing** • Collaborate with a partner

TEXT 2: River of Fire • SCIENCE ARTICLE

SESSION 3	**SCAFFOLD READING**		**Concepts/Background** • volcanic eruptions • the Hawaiian language **Language** • **Vocabulary:** *oozing, spewing, active, steadily, magma, lava rock samples, predict, bulge* • **Hawaiian Words:** *Kīlauea*	**Speaking/Reading** • Use visual support, Explore content vocabulary, Determine multiple meanings of words, Rephrase questions
SESSION 4	**PRACTICE THE FOCUS STANDARD** • Formative Assessment			**Listening/Speaking** • Reinforce academic vocabulary **Speaking** • Use think time **Speaking/Writing** • Talk before writing

TEXTS 3A & 3B: Secrets of a Frigid World, Drawing Under Ice • SCIENCE ARTICLE, NARRATIVE NONFICTION

SESSION 5	**INDEPENDENT READING AND PRACTICE** • Formative Assessment		**Concepts/Background** • McMurdo Research Station in Antarctica • scientific illustration and photography • ocean life • waterproof equipment • exposure to extreme cold **Language** • **Vocabulary:** *wonders, creative, gear, harsh, reveal, frigid, sea slugs, dragonfish, sea sponge, crystal-clear, pastel, lavenders, (to) surface* • **Figurative Language:** *peeking through the hole was like looking at a starry nighttime sky*	**Speaking/Reading** • Analyze phrases, Determine multiple meanings of words **Listening/Reading** • Role-play, Use visual support, Read aloud questions and answer choices **Writing** • Collaborate with a partner

KNOWLEDGE BUILDING

SESSION 6	**RESPOND TO THE FOCUS QUESTION** • *How and why do people explore extreme environments?*	• Integrate information from the lesson texts • Collaborative discussion • Short response	**Speaking/Writing** • Talk before writing

Before Teaching the Lesson

Preview the texts in advance of teaching the lesson. Plan scaffolds to use and provide background information as needed before reading each text.

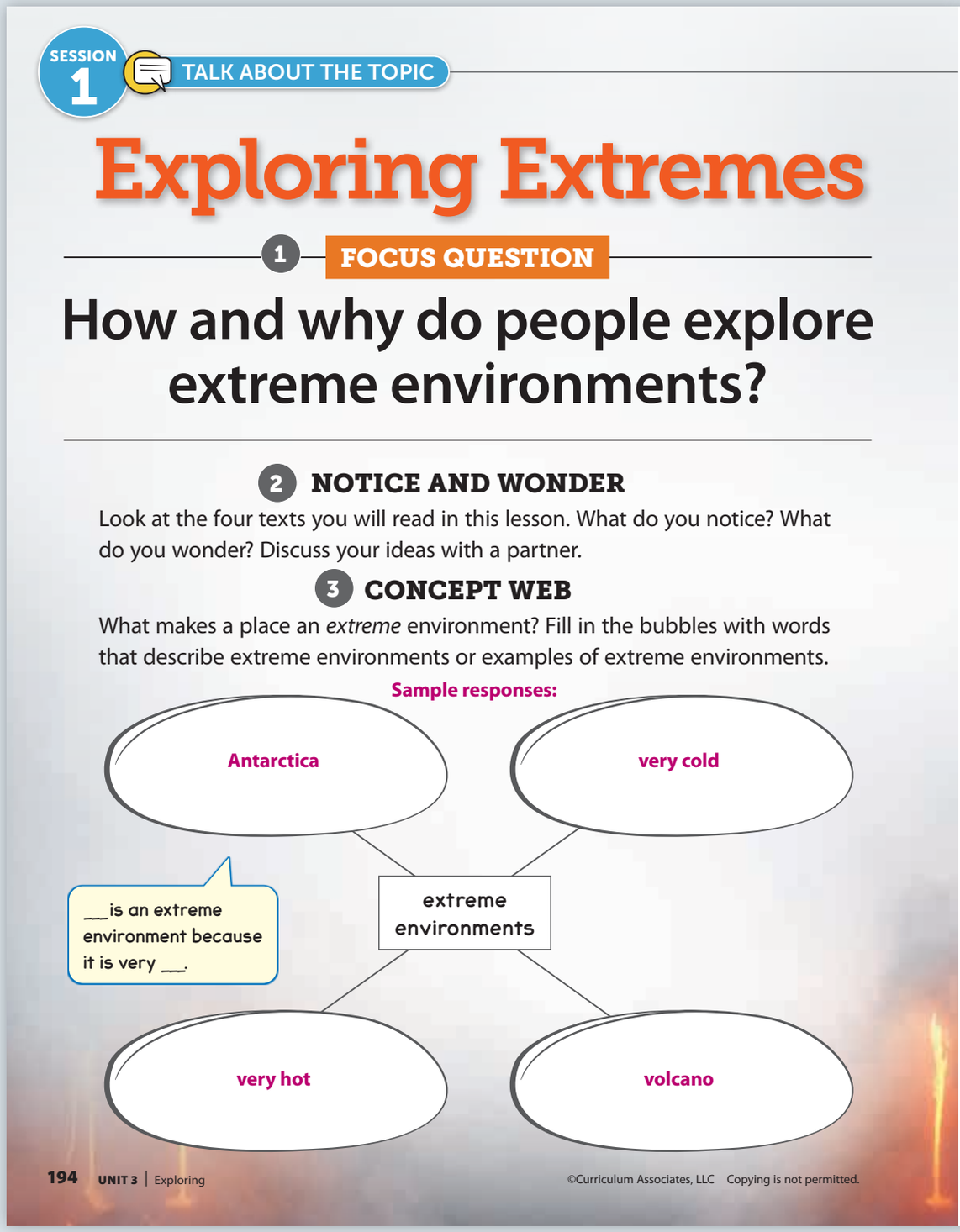
- **Science on the Edge** and **River of Fire: Volcanoes** As an alternate means of representation, provide images or diagrams of volcanoes and explain the process of eruption, in which magma within the volcano flows out as red-hot lava. Magma inside the volcano is so hot that the rock is a liquid. As lava cools, it hardens again. Show the location of Hawaii on a map or globe. Define *fieldwork* and *volcanologist*.
- **Secrets of a Frigid World** and **Drawing Under Ice: Antarctica** Show the location of Antarctica on a map or globe. Explain that McMurdo Station is a scientific research center there.

Talk About the Topic

BUILD STUDENTS' INTEREST

1
- Introduce the lesson topic and the Focus Question. Tell students they will read, talk, and write about extreme environments.
- Have students **Raise a Hand** to share examples of environments they would like to explore.
- Provide photos of different environments to support discussion. **EL**

2
- Ask students to complete Notice and Wonder with a partner.
- Circulate to identify gaps in background knowledge.
- Have students **Vote with Your Feet** to show which passage they are most interested in reading.
- Introduce the focus standard. **Say,** *In this lesson, you will compare firsthand accounts and secondhand accounts of the same topic.*



SESSION 1 TALK ABOUT THE TOPIC

Exploring Extremes

1 **FOCUS QUESTION**

How and why do people explore extreme environments?

2 **NOTICE AND WONDER**

Look at the four texts you will read in this lesson. What do you notice? What do you wonder? Discuss your ideas with a partner.

3 **CONCEPT WEB**

What makes a place an *extreme* environment? Fill in the bubbles with words that describe extreme environments or examples of extreme environments.

Sample responses:

3 INTRODUCE ESSENTIAL CONCEPTS

- Have students **Raise a Hand** to share conditions that make an environment extreme, such as temperature, wind, altitude, or dryness. Then have them brainstorm examples of extreme environments.
- Have students complete the Concept Web and **Turn and Talk** to share their ideas.
- Remind students that one way to agree and build on ideas is to give another example.
- Use **LISTEN FOR** to monitor understanding. Use **Help & Go** scaffolds as needed.
- **LISTEN FOR** Students describe qualities and examples of extreme environments.

HELP & GO: Background

- Guide students to generate words that describe shades of meaning with respect to wetness, dryness, and temperature, such as *cool, cold,* and *freezing*.
- Use a map to show the locations of Antarctica and Hawaii. Display photos of volcanoes or have students examine the photos that accompany the texts. Have students share their observations. **EL**

- Use **Pass It On** to have students share out examples from their concept webs.
- **Ask,** *What's the most extreme environment you've ever visited or experienced? What's an extreme environment you'd like to explore someday?* Have students **Raise a Hand** to share their responses.
- Have students record their ideas about an extreme environment they would like to explore someday. Students will write their idea below the concept web for reference.
- Have students add new words to their word journals.

1 Support Reading

- Set a purpose for reading. **Say,** *You will read to learn how one scientist explores Hawaii's Kīlauea (KEEL-uh-WAY-uh) volcano.*
- Have students read paragraphs 1–3. Have them circle unknown words and mark confusing parts with a question mark.
- Use **CHECK INs** and related **Help & Go** scaffolds as needed to support understanding of the text. Monitor based on annotations, observation, and your knowledge of students.
- **CHECK IN** Students understand what lava is and can use the text, the photo, and the caption to define it.

HELP & GO: Background

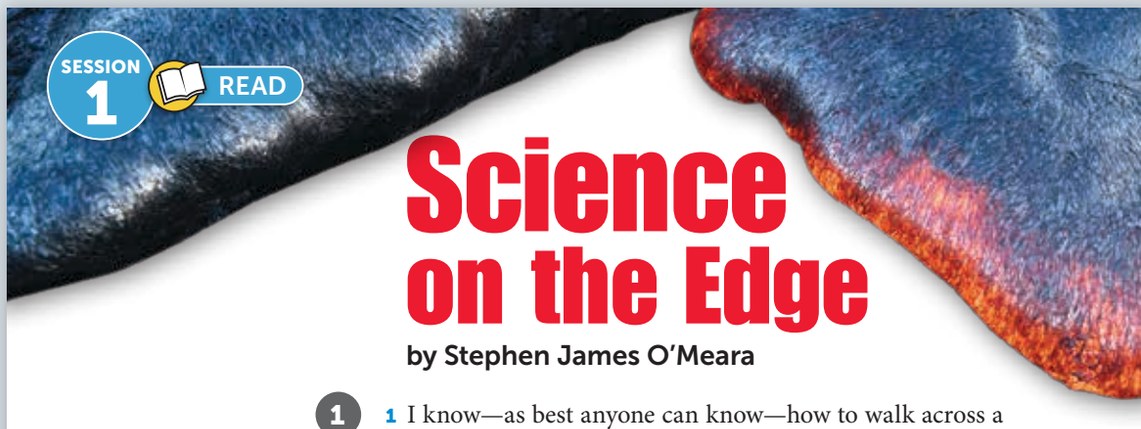
- Have students reread paragraph 2. **Ask,** *What details about lava can help you find it in the photograph? very hot liquid Does the lava look like you imagined? If not, why not?*
- Elicit the Spanish cognates *erupción, volcán, lava volcánica,* and *magma*. Display photos to support understanding. **EL**

2 Stop & Discuss

- Have students **Turn and Talk** to complete the **Stop & Discuss**.
- **LISTEN FOR** Students explain O'Meara's technique and his training to walk on lava.

HELP & GO: Comprehension

- Have students reread paragraphs 2 and 3. **Ask,** *Where did O'Meara have to step? on cooled lava How did he learn about volcanoes? books, experience, Hawaiian experts*
- Compare the surface of cooling lava with ice forming on a winter pond: the top hardens first, but there may be liquid below.



SESSION 1 READ

Science on the Edge

by Stephen James O'Meara

1

1 I know—as best anyone can know—how to walk across a lava flow. I am a volcanologist, a researcher who has traveled the globe to study and document erupting volcanoes. But even with that experience, I still wouldn't walk across just any active lava flow. There are limits, and you have to know them. And that knowledge comes with time and experience.

2 For example, while studying an eruption of Hawaii's Kīlauea volcano in 1982, I had to walk and leap across flowing lava to save my life. It was the first time I had experienced flowing lava in the field, and I was caught off guard. I was trapped on the edge of a 15-foot-high cliff between two lava flows. Beneath me was a pool of **molten** rock. The only way to escape was to cross the lava itself. To do that, I had to find places where the surface of the lava had cooled and hardened enough to support my weight. In these places, less than an inch of cooling rock would separate me from the roughly 1,000°F (538°C) lava below, a temperature about five times as hot as boiling water.

molten = melted

3 How did I know where to walk? Before the eruption, I had been educated—a Native Hawaiian who had walked across hot lava many times had carefully explained what to do and what not to do. I had also gained experience by walking on hot—but not flowing—lava before I found myself in this difficult situation. It takes serious education to do extreme science. And education for this kind of work means textbook knowledge *and* field experience.

2

RI.4.3

Stop & Discuss

How did O'Meara learn to walk on lava? What did he learn to do?

Underline details that support your ideas.

Left and top: The author, Stephen O'Meara, studying lava
Bottom: A lava lake in Hawaii

3

4 Extreme scientists like me are on a mission. We have spent years studying some dangerous sides of nature. The only way to gain more answers is to take some big risks.

5 Where would we be if no one tried to find out what lies beyond what we already know? How do we know what the limits of research are until we prove them? Where would we be if the unknown always frightened us?

6 Extreme science is about adventure, discovery, and knowledge. Extreme scientists, like firefighters, are heroes, not because they do dangerous things, but because they put fear aside and do what they believe is right.

4

RI.4.3

Stop & Discuss

Why does O'Meara explore this extreme environment?

Use details from the text to explain your answer.

3 Support Reading

- Have students read paragraphs 4–6.
- **CHECK IN** Students can explain what it means for scientists to be *on a mission*.

HELP & GO: Vocabulary

- Guide students to use clues such as *gain more answers, dangerous,* and *big risks* to determine that the phrase *on a mission* means "working toward an important goal and focusing on it despite challenges."

4 Stop & Discuss

- Have students **Turn and Talk** to complete the **Stop & Discuss**.
- **LISTEN FOR** Students explain that O'Meara explores this extreme environment to gain scientific information about volcanoes.

HELP & GO: Comprehension

- In paragraph 4, clarify that *dangerous sides of nature* means "dangerous parts of nature." **EL**
- **Ask,** *What kinds of "answers" is O'Meara looking for? scientific information about volcanoes beyond what people already know*
- Point out O'Meara's use of rhetorical questions in paragraph 5. Have students reframe these as statements or answer the questions.
- **Ask,** *Why do you think O'Meara wrote these as questions instead of statements? to help readers think through the ideas for themselves*
- **Ask,** *Why does O'Meara compare extreme scientists to firefighters? How are they alike and different? They both face danger and set aside fear in order to accomplish something important. Firefighters save people. Extreme scientists gain scientific knowledge.*

Discuss the Whole Text

Revisit the Focus Question. **Ask,** *How and why does O'Meara explore extreme environments?* Have students **Stand and Share** their ideas. Record students' responses.

Reconnect to the Text

Have students **Raise a Hand** to summarize how and why O'Meara explores volcanoes.

1 Introduce the Standard

- Use **Jump in Reading** to have students read the introduction.
- Assess students' familiarity with academic terms for this lesson: *firsthand, account, topic, event, focus,* and *sensory details*. Provide synonyms or examples. **EL**
- Explain that a firsthand account is written from a first-person point of view. **Ask,** *How can you tell the author is writing about their own experiences? "I" pronoun, describes personal thoughts, feelings, and observations*

2 Reread/Think

MODEL THE STANDARD Display the graphic organizer and model analysis of firsthand accounts.

- **Say,** *In paragraph 2, O'Meara says he was "caught off guard," which means he was surprised. He describes how he walked across lava that was five times as hot as boiling water by stepping on spots that had cooled. These descriptions of his thoughts and feelings, along with the sensory details he provides, help me understand what it was like to be there.*

GUIDE STANDARDS PRACTICE Have students complete the graphic organizer in pairs.

- **Ask,** *What are the details in each section mostly about? What do they help you imagine or understand? What does O'Meara tell us about volcanology? What parts does he focus on? Does he tell us more about history, facts, data, thoughts, feelings, or observations?*

SESSION 2 PRACTICE

RI.4.6 Compare and contrast a firsthand and secondhand account of the same event or topic; describe the differences in focus and the information provided.

1 Analyze a Firsthand Account

- A **firsthand account** is an informational text written by someone who saw or experienced an event as it happened.
- Firsthand accounts often focus on the author's thoughts and feelings and include sensory details.

2 Reread/Think

Reread "Science on the Edge." What does O'Meara tell us about his experiences as a volcanologist studying Kīlauea? Complete the chart with details from the text. Then describe the focus of the text.

	Text Details
What does O'Meara describe in paragraphs 1–3?	Details from paragraphs 1–3: • **"trapped . . . escape . . . cross the lava . . . find places where the surface of the lava had cooled"** • **"five times as hot as boiling water"** • **learned from a Native Hawaiian** These details help me understand: • **what volcanologists study, what it is like to walk on lava, how he learned to do it**
What does O'Meara explain in paragraphs 4–6?	Details from paragraphs 4–6: • **"The only way to gain more answers is to take some big risks."** • **"Extreme science is about adventure, discovery, and knowledge."** These details help me understand: • **why he does extreme science: to learn new things about the world**

What is the focus of this firsthand account? **O'Meara's thoughts, details about what it was like to walk on lava, and reasons why he does extreme science**

LESSON 11

3 Talk

What kinds of details does O'Meara share about his experience? What do the details help you picture? What do the details help you understand?

O'Meara describes ___.

Details about ___ help me imagine ___.

4 Write

How does the author's firsthand account help you understand his work as a volcanologist? Use at least two details from the text to support your response.

Sample response: O'Meara describes what it was like to walk across lava and reasons why he does this work. He includes sensory details that help the reader imagine what it was like to be trapped by the lava flow. For example, he describes walking on a rock surface one inch above lava that was five times as hot as boiling water. He tells the reader what he was thinking when these events happened. Finally, he describes why he studies in such an extreme environment: He thinks it is important for scientists to take risks so they can learn new things.

WRITING CHECKLIST

- ☐ I described the focus of O'Meara's account.
- ☐ I used at least two details from the text in my response.
- ☐ I used complete sentences.
- ☐ I used correct spelling, punctuation, and capitalization.

3 Talk

- **Say,** *Firsthand accounts make the reader feel close to the experience. What details almost make you feel like you are there?* Direct students to paragraph 2 and have them explain what they imagine as they read.
- **Ask,** *What does O'Meara describe about what he saw, thought, and felt? What does each detail help you picture or understand?*
- Have students act out or draw how O'Meara walked on lava. **EL**
- Point out that this firsthand account focuses on one volcanologist's experience doing fieldwork. **Ask,** *What are you still curious to learn about volcanology?*

4 Write

- Have students complete the Write task, using the checklist to check their work.
  - —Consider having students complete the activity as a partner-writing activity. **EL**
  - —Use written responses to determine whether students need additional support.
- **LOOK FOR** Students include details about the author's thoughts, feelings, and observations that help them understand his experience.

HELP & GO: Writing

- Prompt students to support their ideas with text details. **Ask,** *How do you think O'Meara feels when he is trapped in the lava flow? worried, afraid What clues in the text support your ideas? save my life, escape*

- Use **Somebody Who** to have several students share their responses with the class.

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1 Support Reading

- Set a purpose for reading. **Say,** *Today you will read to find out what scientists know about Kīlauea and what they want to learn.*
- **Take a Poll** to see who voted for this text in the lesson opener.
- Have students preview the passage's photos and use them to explain the title's meaning. **EL**
- Have students read paragraphs 1–4. Have them circle unknown words and mark confusing parts with a question mark.
- Use **CHECK INs** and related **Help & Go** scaffolds as needed.
- **CHECK IN** Students can explain that paragraphs 1 and 2 describe volcanoes in general and 3 and 4 describe Kīlauea.

HELP & GO: Text Structure

- **Ask,** *What are paragraphs 1 and 2 about? volcanoes in general What are paragraphs 3 and 4 about? Kīlauea How are the two sections connected? Kīlauea is one example of a volcano.*

2 Stop & Discuss

- Have students **Turn and Talk** to complete the **Stop & Discuss**.
- **LISTEN FOR** Students can explain how the meaning of the name *Kīlauea* (spewing, much spreading) connects to the volcano's history of eruptions.

HELP & GO: Comprehension

- Direct students to paragraph 3. Have students identify what the name *Kīlauea* means.
- Have students reread paragraphs 3 and 4. **Ask,** *What makes a volcano active? eruptions How often has Kīlauea erupted? 34 times since 1952 Compare this to the information in paragraph 2. Is Kīlauea a quiet volcano or a busy one? busy*
- **Ask,** *How could the volcano's name be a warning? The name explains what it does when it erupts.* **EL**

SESSION 3 READ

River of Fire

Kīlauea erupting

by Stephen Krensky

1 Researchers called volcanologists describe the way the ground around a volcano rumbles and shakes. They report hearing harmful gases hiss, releasing the odor of rotten eggs. They describe a river of lava oozing from cracks in the volcano's surface. These signs show that the volcano may erupt at any time.

2 Volcanic eruptions are among the most powerful forces on earth. The most powerful volcanic eruptions shoot steam, rock, and lava hundreds of feet into the air. But not all volcanoes are the same. Some have not erupted in thousands of years. Others are much busier.

3 Kīlauea, on the southeast coast of the Big Island of Hawaii, is an active volcano. Since 1952, it has erupted 34 times. The word *Kīlauea* itself is a kind of warning. In the Hawaiian language, it means "spewing" or "much spreading." Most of the time, Kīlauea's lava slides slowly but steadily, steaming into the sea. But sometimes it travels inland, toward people's homes.

4 In the last 40 years, the volcano's lava has destroyed hundreds of homes and forced thousands of people to leave the area. Magma, a thick hot liquid made of melted rock, pushes up from deep inside the earth. It spills out of the volcano as lava, bubbling and spitting along the way. This river of fire is a glowing stream of heat. Nothing can hold it back.

RI.4.1

Stop & Discuss

What does the name *Kīlauea* mean? Why do you think Hawaiians chose this name?

Use details from the text to support your ideas.

LESSON 11

3

5 This river of fire holds important clues for researchers. Studying lava and volcanoes is the work of volcano scientists, or volcanologists. These scientists study lava for clues on how a volcano will act. For example, they study lava rock samples after the lava has cooled to find out its age. Knowing how old the lava is helps volcanologists predict how fast the lava will flow the next time the volcano erupts.

6 Fortunately, a volcano usually gives clues or warnings *before* it's ready to erupt. In addition to shaking ground, smelly gases, and oozing lava, a bulge may grow on top or on the side of a volcano. When scientists see this large bump, they know something on the inside is getting ready to push its way out.

7 When volcanologists see these different warning signs, they quickly alert others. This warning often gives people who live nearby time to get to safety.

Kīlauea erupting in 2018 with lava fountains up to 160 feet (48.8 meters) high

4

RI.4.3

Stop & Discuss

What are three things volcanologists do?

Underline details about what volcanologists study, what they look for, and what they do with this information.

One thing volcanologists do is ___.

Volcanologists look for ___ so they can ___.

3 Support Reading

- Have students read paragraphs 5–7.
- **CHECK IN** Students understand that scientists looking for clues about how a volcano will act take lava samples to study.

HELP & GO: Vocabulary

- Direct students to paragraph 5. **Say,** *The word* act *is a multiple-meaning word. You may know one of its meanings: "to play a role in a movie or play." What does it mean here? what the volcano will do* **EL**
- In paragraph 5, have students look around the phrase *lava rock samples* to figure out its meaning. **Ask,** *What is the meaning of* lava rock samples*? pieces of lava that cooled and became hard*

4 Stop & Discuss

- Have students **Turn and Talk** to complete the **Stop & Discuss**.
- **LISTEN FOR** Students can identify key tasks of volcanologists: determining the age of lava samples, watching the volcano for signs it may erupt soon, and sharing any warning signs to keep people safe in case of an eruption.

HELP & GO: Comprehension

- Have students reread paragraph 5. **Ask,** *What do volcanologists do with the lava samples they gather? They study them to find out how old they are. This information helps them predict what later eruptions might be like.*
- Have students revisit paragraph 6. **Ask,** *What do volcanologists do if they notice these changes? They warn people that an eruption may happen soon. This helps the people living near the volcano move to safe locations.*

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5 Support Reading

- Have students read paragraph 8.
- **CHECK IN** Students understand that scientists monitor Kīlauea because it could erupt.

HELP & GO: Sentence Comprehension

- Have students reread the first two sentences in paragraph 8. Point out that the word *although* in the second sentence suggests a contrast. In this context, it means "even though" or "even if." Have students rephrase each part of the sentence. (Even though Kīlauea isn't erupting now, it is still dangerous because it could erupt again.)

6 Stop & Discuss

- Have students **Turn and Talk** to complete the **Stop & Discuss**.
- **LOOK FOR** Students check the first two boxes about Kīlauea's activity and magma chamber.

HELP & GO: Comprehension

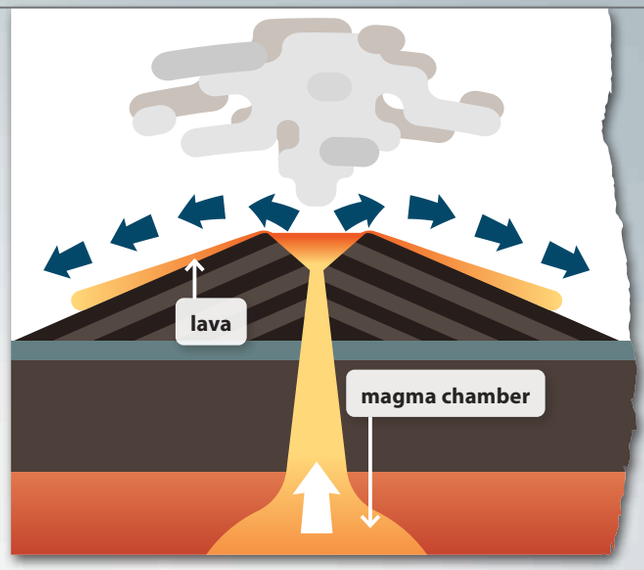
- **Ask,** *What do scientists already know about Kīlauea's activity over its history? It has been a very active volcano. What have scientists noticed about the magma chamber? It is filling up.*
- Reread paragraph 8. **Ask,** *What questions are asked?* Have students restate these questions in their own words. **Ask,** *Who is asking these questions? The author, who is saying what scientists want to find out.* **EL**

Discuss the Whole Text

- **Ask,** *In "River of Fire," how and why do volcanologists explore extreme environments?* Have students **Stand and Share** their ideas. Record students' responses.
- **Ask,** *What questions do these scientists have? Do you think they will find the answers? If so, how?* Have students **Stand and Share** their ideas.

SESSION 3 READ

A geologist uses a thermal camera to measure the temperature (about 93°C or 200°F) of a ground crack.



Magma forms far below Earth's surface and rises, filling the magma chamber under the volcano.

magma chamber = an underground space that holds liquid rock

5

8 Warnings about Kīlauea are especially important because scientists know this volcano has been active for much of its 300,000- to 500,000-year history. Although the eruptions have mostly stopped for now, the danger remains. In 2019, scientific tools revealed that Kīlauea's **magma chamber** was slowly filling up. This is a sign that the volcano could erupt in the near future. When will the volcano erupt? How big will the eruption be? Right now, nobody knows for sure, but one thing is certain. Volcanologists are there, searching the volcano for the answers.

6

RI.4.3

Stop & Discuss

What are two things volcanologists know about Kīlauea?

- [x] Kīlauea has been active for much of its history.
- [x] Kīlauea's magma chamber is filling with lava.
- [ ] Kīlauea's next eruption will be big.

SESSION 4 PRACTICE

RI.4.6 Compare and contrast a firsthand and secondhand account of the same event or topic; describe the differences in focus and the information provided.

LESSON 11

1 Compare Accounts

- Comparing a firsthand account with a secondhand account can help you understand more about a topic or event.
- A **secondhand account** is an informational text about a topic or event written by someone who was not there.
- Secondhand accounts include background information and factual details based on research.

2 Reread/Think

Reread the secondhand account "River of Fire." What does the author tell us about Kīlauea and the volcanologists who study it? Complete the chart with information from the secondhand account.

	Text Details
What does the author describe about volcanoes in paragraphs 1–4?	Details from paragraphs 1–4: • **"volcanic eruptions shoot steam, rock, and lava hundreds of feet into the air"** • **Kīlauea is in Hawaii, has erupted 34 times since 1952, means "spewing," and has destroyed hundreds of homes.** These details help me understand: • **facts about Kīlauea, an active volcano**
What does the author explain about volcanologists in paragraphs 5–8?	Details from paragraphs 5–8: • **study lava samples, make predictions** • **warn people when a volcano is about to erupt** • **look for clues about Kīlauea** These details help me understand: • **how and why volcanologists use clues to learn about volcanoes**

What is the focus of this secondhand account? facts about Kīlauea and information about how and why researchers study it

Reconnect to the Text

- Tell students they will compare the two texts about volcanoes.
- Have students **Raise a Hand** to recall the focus of O'Meara's firsthand account.

1 Practice the Standard

- Use **Jump in Reading** to have students read the introduction.
- Assess students' familiarity with academic terms for this lesson: *secondhand, research,* and *background.* Provide support as needed. **EL**

2 Reread/Think

MODEL THE STANDARD Display the graphic organizer and model analysis of a secondhand account.

- **Say,** *This secondhand account was written by someone who learned about Kīlauea by doing research and reading other texts. In paragraph 1, who feels the ground rumble and shake? The author is describing the volcanologists' experiences and work, not his own experience. In paragraphs 2 and 3, he shares data about how high the eruptions reach and the number of eruptions over time. These details help me understand more facts about Kīlauea.*

GUIDE STANDARD PRACTICE Have students complete the graphic organizer in pairs.

- Have students reread paragraphs 5 and 6. **Ask,** *What do volcanologists look at? What clues do they look for? What do they do when they find new clues?*
- Have partners add information to their charts and discuss the focus. **Ask,** *What new information do you learn about volcanoes and volcanologists from this secondhand account that you did not learn from the firsthand account? What is most of the information about? facts about Kīlauea and how and why scientists study it*

3 Talk

- Have students review their charts from the firsthand and secondhand accounts to compare the information and focus of each account.
- Provide students with **Individual Think Time** to reflect on the Talk questions. **EL**
- Have students **Turn and Talk** about the questions.
- Help students compare the focus of the firsthand and secondhand accounts. **Say,** *Think about how each account can help us answer these questions:*
  - *What is it like when volcanologists do fieldwork?*
  - *What do they do with their samples?*
  - *What facts have they learned about volcanoes?*
  - *What do they do with the evidence and information they gather?*
- Guide students to make connections between what they liked about a text and the characteristics of firsthand and secondhand accounts. **Ask,** *Does this account help you imagine what it was like to be there? Does it give more information about what volcanologists do?*

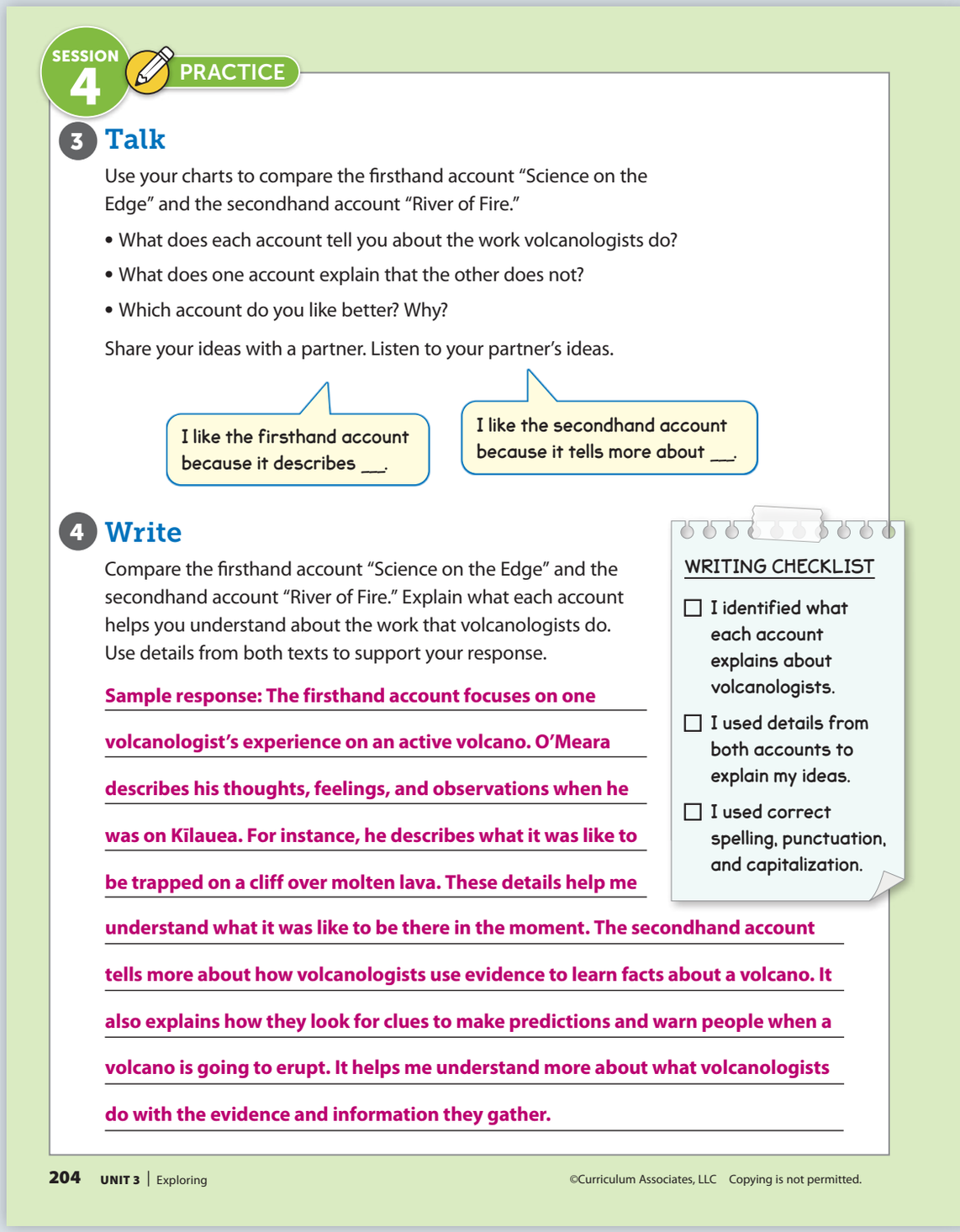
4 Write

- Have students complete the Write task, using the checklist to check their work.
  - Allow partners to use **Stronger and Clearer Each Time** to refine their ideas prior to writing. **EL**
  - Use written responses to determine whether students need additional support.
- **LOOK FOR** Students support their ideas with details from the text.

HELP & GO: Writing

- **Ask,** *What part of the text is easiest for you to picture? What part makes you want to learn more?*

- Use **Somebody Who** to have students share their responses.



SESSION 4 PRACTICE

3 Talk

Use your charts to compare the firsthand account "Science on the Edge" and the secondhand account "River of Fire."

- What does each account tell you about the work volcanologists do?
- What does one account explain that the other does not?
- Which account do you like better? Why?

Share your ideas with a partner. Listen to your partner's ideas.

I like the firsthand account because it describes ___.

I like the secondhand account because it tells more about ___.

4 Write

Compare the firsthand account "Science on the Edge" and the secondhand account "River of Fire." Explain what each account helps you understand about the work that volcanologists do. Use details from both texts to support your response.

Sample response: The firsthand account focuses on one volcanologist's experience on an active volcano. O'Meara describes his thoughts, feelings, and observations when he was on Kīlauea. For instance, he describes what it was like to be trapped on a cliff over molten lava. These details help me understand what it was like to be there in the moment. The secondhand account tells more about how volcanologists use evidence to learn facts about a volcano. It also explains how they look for clues to make predictions and warn people when a volcano is going to erupt. It helps me understand more about what volcanologists do with the evidence and information they gather.

WRITING CHECKLIST

- ☐ I identified what each account explains about volcanologists.
- ☐ I used details from both accounts to explain my ideas.
- ☐ I used correct spelling, punctuation, and capitalization.

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SESSION 5 READ LESSON 11

Secrets of a Frigid World

by Morgan Parsons

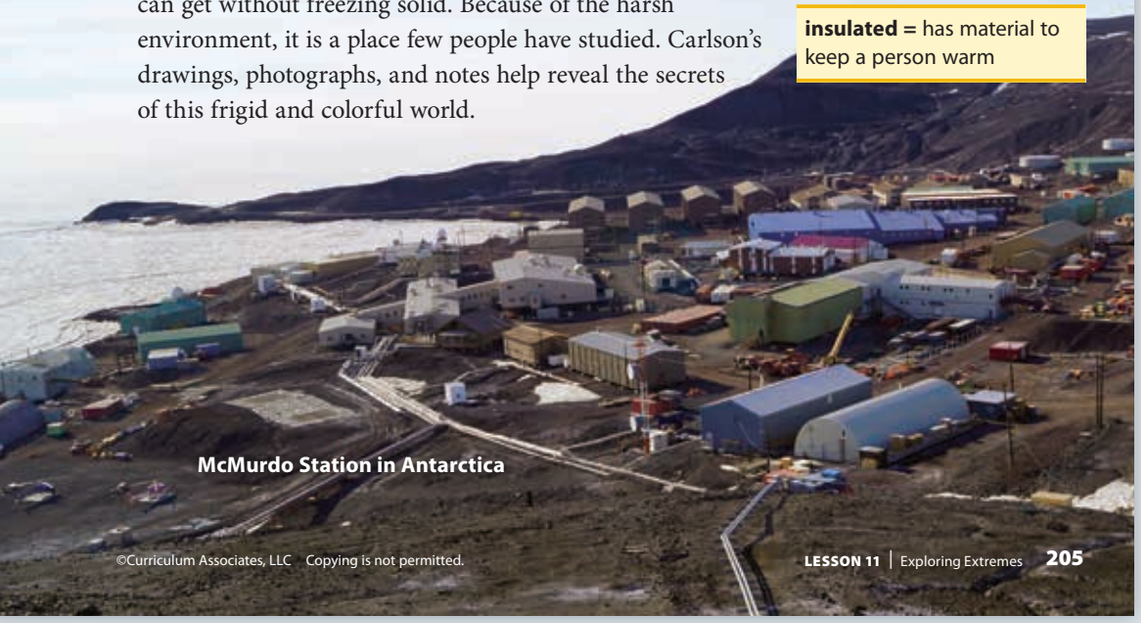
1 The snowy, icy land of Antarctica might seem empty and bare. But beneath the ocean surface, a world full of life awaits.

2 This is the world artist Kirsten Carlson explored for seven weeks in 2017. She stayed at the McMurdo Station in Antarctica, where many scientists do research. Artists like Carlson are invited to the station so they can share the many wonders of Antarctica through their work.

3 Kirsten Carlson did her creative work underwater. Covered in **insulated** gear, she bravely dove beneath the ice 33 times. There, the water is around 28°F (–2°C), as cold as sea water can get without freezing solid. Because of the harsh environment, it is a place few people have studied. Carlson's drawings, photographs, and notes help reveal the secrets of this frigid and colorful world.

Kirsten Carlson (right) before her last dive in Antarctica at Turtle Rock

insulated = has material to keep a person warm



McMurdo Station in Antarctica

Reconnect to the Texts

Display responses to the Focus Question for "Science on the Edge" and "River of Fire." Invite students to **Raise a Hand** to make connections between the two texts. **Ask,** *Why do people explore volcanoes?*

1 Independent Reading

- Set a purpose for learning. **Say,** *Today you will work independently to read and compare a firsthand account and a secondhand account.*
- If students need more support, work with them in small groups to guide reading.
- Use **CHECK INs** and related **Help & Go** scaffolds as needed.
- **CHECK IN** Students understand that a research station is where scientists study an environment.

HELP & GO: Background

- **Say,** *McMurdo Research Station is an international center for scientific research. People come for a few weeks or months to study this unique environment. What kinds of things do you think they might study at McMurdo Research Station?*

- **CHECK IN** Students understand that Antarctica looks bare but is full of rarely seen creatures.

HELP & GO: Language

- Direct students to paragraph 1. Point out that the word *but* tells you there is a contrast or difference. **Ask,** *What is the contrast the author is pointing out? Antarctica may look empty, but many creatures live there.*
- **Ask,** *Why have few people studied the ocean near Antarctica? harsh environment, bitterly cold*
- **Ask,** *What does the phrase* reveal the secrets *help you understand about Carlson's work? Few people have seen what she has seen.* Clarify that no one is purposely keeping these secrets; they are secrets because few people explore Antarctica. **EL**

2 Independent Reading

- **CHECK IN** Students understand the description of the naked dragonfish.

HELP & GO: Sentence Comprehension

- Direct students to the fourth sentence in paragraph 4. Point out the phrase *a kind of fish without scales*. Have students reread the sentence with and without this phrase. **Ask,** *What is this phrase describing? the naked dragonfish The sentence would still make sense without this phrase. Why do you think the author included it? The phrase gives more information about the naked dragonfish and helps readers imagine what it looks like.*

- **CHECK IN** Students understand multiple-meaning words such as *sponge* and *surface*.

HELP & GO: Language

- Explain that *sponge* is a word with multiple meanings. Clarify its meaning in this scientific context. Ask students to tell the meaning they know. If possible, show a photo of a household sponge. Then show a photo of a sea sponge, and explain that it, too, is called a sponge. **EL**
- **Say,** Surface *is a multiple-meaning word. What does the phrase* back at the surface *in paragraph 5 tell you about Carlson?* Back at the surface *describes a place out of the ocean's icy waters, but it also has a figurative meaning: being with other people and sharing what she has learned about the tough animals living in this extreme environment.*

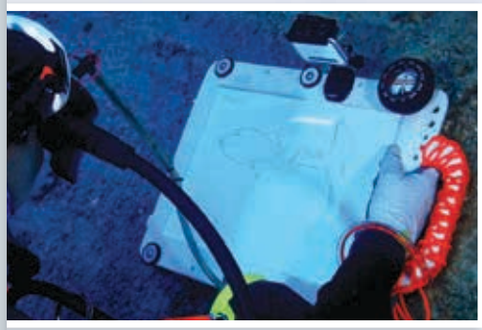
- Use **Pass It On** to have students share a word from the lesson texts that they added to their word journals and also to explain word meanings.

Divers swimming up toward a hole in the ice

2

4 On her dives, Carlson heard the strange calls of Weddell seals. These animals spend much of their time hunting for food beneath the ice. She saw sea stars, sea slugs, jellyfish, and many other creatures. She sketched a naked dragonfish, a kind of fish without scales, hiding near its eggs. Two pointy teeth stuck up from its lower jaw, like a bulldog's. She also drew a giant sea sponge that was almost as big as she was.

5 Back at the surface, Carlson shared her discoveries with the world. She hopes that her team's work will encourage people to think about the connections between art, science, and the natural world in different ways.



Kirsten Carlson's underwater drawing equipment

SESSION 5 READ

LESSON 11

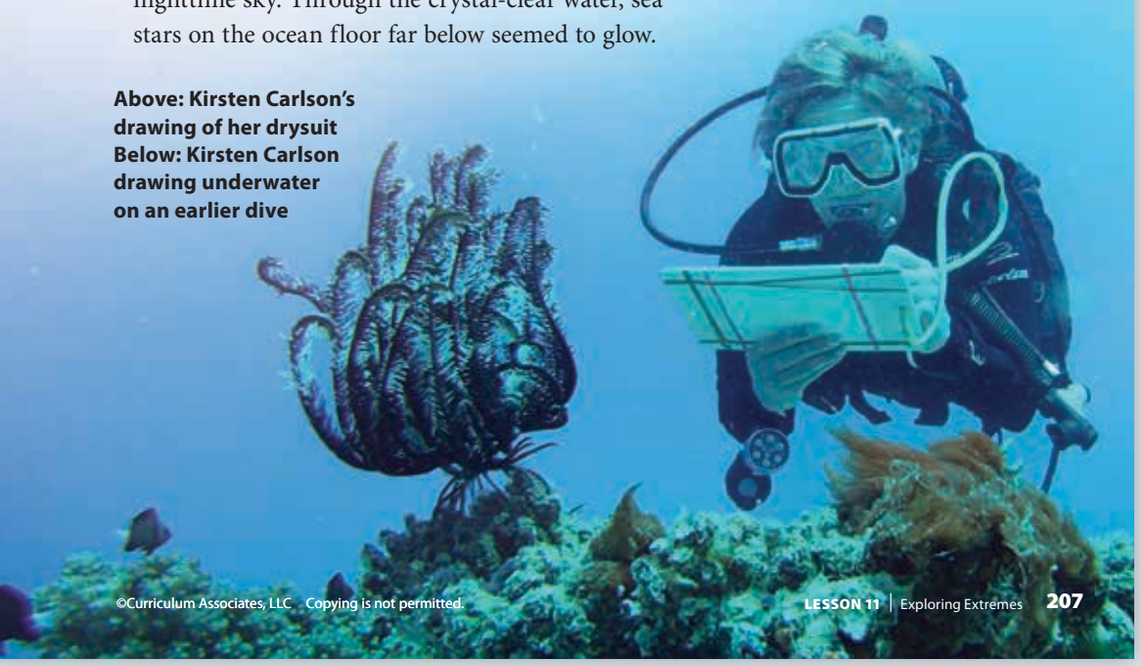
DRAWING UNDER ICE

by Kirsten Carlson

3

Kirsten Carlson is a scientific illustrator who traveled to Antarctica to explore an amazing undersea world.

1 Putting on all my warm, waterproof diving gear took longer than the dive itself. I prepared to enter the chilly water through a large round hole drilled through thick sea ice. These ocean temperatures are colder than a glass of ice water. But peeking through the hole was like looking at a starry nighttime sky. Through the crystal-clear water, sea stars on the ocean floor far below seemed to glow.



Above: Kirsten Carlson's drawing of her drysuit
Below: Kirsten Carlson drawing underwater on an earlier dive

3 Independent Reading

- **CHECK IN** Students understand that Antarctica's very cold climate is what makes it an extreme environment.

HELP & GO: Background

- Display the location of Antarctica on a globe or map. **Ask,** *What do you think the weather in Antarctica is usually like?*
- **Say,** *Carlson puts on waterproof clothing with extra insulation. Why would this be important to do before her dive?* Explain that keeping dry will help Carlson stay warm in the icy water.
- Guide students to visualize Carlson's preparations to dive and act out the scene. **EL**

4 Independent Reading

- **CHECK IN** Students can describe Carlson's underwater artistic process.

HELP & GO: Comprehension

- **Ask,** *How is Carlson able to draw underwater? She has special waterproof paper she can draw on.*
- **Ask,** *Why does Carlson use a camera to "capture" the colors? She has a pencil, but she does not have a way to record color on her paper. Instead, she takes a photograph with her camera to save the images so she can create artwork later.*
- Guide students to examine the photographs and illustrations that accompany the text to better understand Carlson's process. **EL**

SESSION 5 READ

Kirsten Carlson's sketches and paintings of sea creatures

4

2 During my dive, I used a pencil and waterproof paper to sketch sea stars and a giant sponge, one that was shaped like a vase and almost as big as me. I drew a fish peeking out at me from the inside of the sponge. A white, ruffled sea slug hurried across the ocean floor. I used my camera to capture the colors I saw. Many of the creatures are white and pastel: pinks, pale yellows, and lavenders.

3 Thirty minutes into the dive, I felt my hands tingle and knew it was time to surface. Though Antarctica is an extreme environment, it is the best place for scientists to study the toughest animals on Earth.

SESSION 5 PRACTICE

RI.4.6 Compare and contrast a firsthand and secondhand account of the same event or topic; describe the differences in focus and the information provided.

LESSON 11

Respond to Text

5 Reread/Think

Reread "Secrets of a Frigid World" and "Drawing Under Ice." Choose the best response to each question.

1. PART A

Which detail would the authors of "Secrets of a Frigid World" and "Drawing Under Ice" **most likely** agree with?

A. Sea slugs are the most interesting creatures found in Antarctica.

B. The best way to show Antarctica is through photographs.

C. Antarctica can be a dangerous place to explore.

D. Most trips to Antarctica are only a few days long.

PART B

Which detail from "Drawing Under Ice" **best** supports the answer in Part A?

A. "These ocean temperatures are colder than a glass of ice water." (paragraph 1)

B. "But peeking through the hole was like looking at a starry nighttime sky." (paragraph 1)

C. "A white, ruffled sea slug hurried across the ocean floor." (paragraph 2)

D. "I used my camera to capture the colors I saw." (paragraph 2)

2. Read this sentence from paragraph 1 of "Secrets of a Frigid World."

> The snowy, icy land of Antarctica might seem empty and **bare**.

Which word from the sentence helps the reader understand the meaning of *bare*?

A. "snowy"

B. "land"

C. "Antarctica"

D. "empty"

5 Reread/Think

- Have students complete the Reread/Think items independently.
- Consider reading aloud questions and answer choices. EL
- Point out that item 1 has two parts. Students should answer Part A first. Then they should answer Part B.

Answer Analysis

Use the answer analysis below to review the practice items with students. Have students **Raise a Hand** to share responses and to agree and build on or disagree and explain their reasoning.

1. PART A The correct choice is **C**. Both authors mention the cold temperatures and harsh environment. Choice **A** is incorrect because both authors think that many creatures in Antarctica are interesting. Choice **B** is incorrect because both authors appreciate using photographs and drawings to depict Antarctica. Choice **D** is incorrect because neither text says this.

PART B The correct choice is **A**. This detail directly supports the idea that Antarctica is a cold place. Choices **B, C,** and **D** are incorrect because they describe what the environment looks like rather than its dangerous temperature. **DOK 3 | RI.4.6**

2. The correct choice is **D**. The word *bare* means "simple" and "without any features." The word *empty* helps redefine the word *bare*. **DOK 2 | RI.4.4**

6 Answer Analysis

3. See answers in the student book. **DOK 3 | RI.4.6**

7 Write

- Have students respond independently to the Write prompt. **DOK 3 | RI.4.6**
- If students need more support, work with them in small groups to guide them through writing. Use **Help & Go** scaffolds as needed.
- **LOOK FOR** Students can explain what each account describes about Carlson's work.

HELP & GO: Writing

- Have students complete the writing activity as a partner activity. **EL**
- Prompt students to justify their ideas using text evidence. **Ask,** *What details in "Secrets of a Frigid World" help you understand Carlson's dive? information about Antarctica, scientists, and animals, and why Carlson dove What details does Carlson describe in "Drawing Under Ice"? What do they help you understand about Carlson's dive? Carlson's thoughts and actions as she drew underwater in Antarctica, what it was like to be there*

Lesson Wrap-Up

- Have students revisit the Focus Question using examples from the texts. Record responses. Invite students to make connections among the four texts they have read.
- Use **Pass It On** to have students share their ideas. Guide students to agree and build on the ideas of others using examples from the texts.

SESSION 5 PRACTICE

6 Reread/Think

3. Write an X in the box next to each description to show whether it tells about "Secrets of a Frigid World," "Drawing Under Ice," or both texts.

	Secrets of a Frigid World	Drawing Under Ice	Both
Firsthand account		X	
Secondhand account	X		
Describes equipment needed to explore the ocean			X
Explains how long Carlson stayed in Antarctica in 2017	X		

7 Write

Compare the accounts "Secrets of a Frigid World" and "Drawing Under Ice." Describe how the two texts add to your understanding of Kirsten Carlson's work. Use at least one example from each text in your response.

Sample response: "Secrets of a Frigid World" is a secondhand account. It gives information about Antarctica, animals, and scientists. It also tells why Kirsten Carlson drew underwater in 2017: to "share the many wonders of Antarctica." "Drawing Under Ice" is a firsthand account by Carlson, who describes her thoughts and feelings about drawing underwater in Antarctica. She describes details such as how her hands began to tingle after being underwater for 30 minutes. These details help me imagine what her experience was like.

WRITING CHECKLIST

- ☐ I compared the information in both texts.
- ☐ I used at least one example from each text.
- ☐ I used complete sentences.
- ☐ I used correct spelling, punctuation, and capitalization.

SESSION 6 PUT IT TOGETHER LESSON 11

Respond to the Focus Question

How and why do people explore extreme environments?

1 Reread/Think

Sample responses shown.

Reread the text you were most interested in. Then answer the questions.

TEXT: "Drawing Under Ice"

How did a person in the text explore extreme environments? Kirsten Carlson explored under the sea in Antarctica, wearing a waterproof diving suit, going through a hole in the ice, and using a waterproof pencil, paper, and camera.

Why did a person in the text explore extreme environments? Carlson wanted to show people the unique environment and creatures under the sea in Antarctica.

2 Talk

Share what you learned about why people explore extreme environments.

Which environment did you read about? Why?

If you could explore any extreme environment, what would it be, and why?

Share your ideas with a partner. Listen to your partner's ideas.

The extreme environment I would like to explore is ___ because ___.

I would like to find out ___.

3 Write

Describe the extreme environment you would like to explore. Why would this place be worth exploring? What do you think you might discover there?

Respond to the Focus Question

Read the Focus Question. Tell students that today they will answer the question using information from all four texts.

1 Reread/Think

Have each student reread the text that they found most interesting and answer the questions.

2 Talk

- Have students **Turn and Talk** to discuss the questions.
- Use **Pick a Stick** to have students share their ideas with the whole group.

3 Write

- Have students respond independently to the prompt. Circulate to support students.
- **LOOK FOR** Students can explain their interest in exploring a place.

HELP & GO: Writing

- **Say,** *Think like the explorers you read about in the lesson. What do you know already about the place you're interested in? What do you want to find out?*
- Have students **Turn and Talk** about their choice of extreme environments and what they might find there before they write. **EL**

- Use **Silent Appointment** to have students share their writing with a partner.