twig Science Leveled Reader Lessons

GRADE 4



SAMPLE

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OL **On-Level**

EL **English Learners**

The Science of Baseball

Chapter 1: The History of Baseball
This chapter focuses on the history of baseball and the forces involved in throwing and hitting balls. It teaches students strategies that skilled readers use to navigate and comprehend informational text while reading independently.

Chapter 2: STEM Career: Meet a Physicist
This chapter focuses on the career of a physicist. It includes an optional micro-lab in which students use collisions to learn about how energy transfers.

Chapter 3: How to Cheat at Baseball
This chapter examines how baseball players have used science to cheat at the game.



On-Level OL

English Learners EL

OL

The Science of Baseball On-Level Lessons

CHAPTER 1

The History of Baseball

First Read

Overview

This chapter focuses on the history of baseball and the forces involved in throwing and hitting balls. It also teaches students strategies that skilled readers use to navigate and comprehend informational texts while reading independently.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (diagrams)
- Use text structures (sequences and chronologies)
- Write a sequence and chronology summary.

Level Up

For students who struggle with the On-Level book, guide them through a reading of the Below-Level book first. Then have them listen to a recording of the On-Level book and follow along with the text. This scaffolding should prepare students for reading the On-Level book in small groups.

Preview the Text

Have students preview Chapter 1 using the preview routine.

Step 1. Read the title of the chapter. It tells the chapter's topic.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice text features, such as special type, maps, or diagrams.
Step 5. Ask yourself what the chapter will be about.

Prompt students to share what they think the chapter will be about, along with any comments or questions they have about the text.

- ***What challenges might you meet in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Ask students to share their prior knowledge of baseball and the science involved in playing the game. What have they read, seen, or heard in videos and other readings? This will provide students background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary using the vocabulary routine.

- ***Why might an author bold a term?***
- ***What does this add to the text?***

Step 1. Have students find and read the bolded content terms in Chapter 1 (**advantage, disadvantage, statistics, data, energy, forces, transferred**).
Step 2. Ask students to turn to the Visual Glossary on page 31, which they can use to understand a given term. Have students find the entries for *data* and *force* and read them to a partner.
Step 3. Repeat the terms as a class to confirm pronunciations.
Step 4. Point out the meanings of words that may cause confusion. Highlight the prefix *dis-* in *disadvantage*. Note that *dis-* means not or the opposite of. Compare *advantage* and *disadvantage*. Point out the meanings of any words that may cause students confusion.
Step 5. Review additional academic words using simple definitions and context sentences. Point out related words and word parts to expand students' vocabulary.

modern

Define: of the present or recent time

Example: Long ago, people didn't have *modern* machines like cars and computers.

Ask: How do modern machines affect how people live?

Related Words: ancient (antonym)

generate

Define: cause to be, produce

Example: The space heater *generated* a lot of needed warmth for the room.

Ask: What can you generate? What can a machine generate?

Related Words: generated, generating

competitive

Define: having a strong desire to succeed or win; well suited for competition

Example: The extra training helped the baseball team be more *competitive*.

Ask: Are you a competitive person? Why or why not?

Related Words: compete, competition

Word Parts: suffix -ive (adjective form of a noun)

segregate

Define: separate or set apart from others

Example: Long ago, baseball players were *segregated* by race.

Ask: Why is it harmful to segregate people?

Related Words: segregated, segregating, segregation

Read

Ask students how they might approach reading Chapter 1. Model text navigation, as needed. Since students have already previewed the chapter, they should start by rereading the title and introduction.

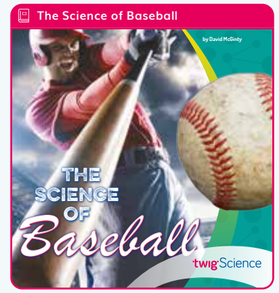
Prompt students to begin their reading of the main text. If they struggle with a bolded term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: Students can use the Visual Glossary on page 31.

The author may suggest the reader look at a photograph, chart, or other visual—in this case, they should stop and do so. If not, they should read the section or page and then look at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does this information relate to the text?***

Remind students that they can go back and study the photos and illustrations more closely when they finish reading. Explain that if the page has a sidebar, students should read it last.



OL

CHAPTER 1

The History of Baseball

Special Needs

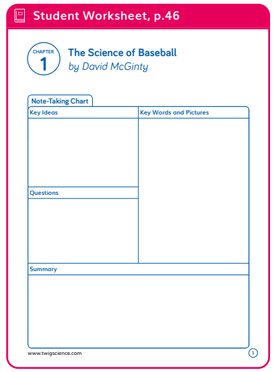
Provide digital tools (e.g., computers or tablets) for students to record notes. Allow alternate ways of expressing ideas, such as through drawings or audio recordings.

Connect to Writing—Note-Taking

Ask students to use the Note-Taking Chart on their student worksheets (page 46).

As students read Chapter 1, have them:

Step 1. Write down key words and phrases to help them remember the big ideas, and draw pictures as memory aids.
Step 2. Note their questions and confusions about the text by jotting down the page and paragraph number of the confusing sentence or section.
Step 3. Write a two- or three-sentence chapter summary.


Student Worksheet, p.46

CHAPTER 1 The Science of Baseball
by David McGinty

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

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While students are reading and taking notes, circulate and take note of any common confusion. During the after-reading discussion, you can go back to the text and model your thinking to clarify.

Build Content Knowledge

During the discussion of the text:

- Have students use the diagram on page 7 and the text on pages 9 and 11 to summarize their understanding of changing speeds when objects collide.
- Review energy of motion and how energy can be transferred. Have students find the supporting evidence in the text and illustrations.
- Review what scientists and players need to know about baseball to improve the game (e.g., a player's performance). Guide students to turn these needs into questions that can be (and have been) explored. Ask what questions students still have about the science of baseball. Provide books and other resources for them to find answers. Guide students to explain what happens when a baseball and bat collide, and why.
- Focus on the forces that affect where and how a baseball moves when it's thrown by a player or hit with a bat. Review the ways in which things like the speed and direction of a baseball can be changed.

Ask Text-Dependent Questions

Use text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

page 3	***Why does the author say science is an important part of baseball? What information in the text supports your answer?***
pages 4–5	***How has baseball changed since its beginnings? How does the photo help you understand some of the changes?***
pages 6–7	***What happens when a batter hits a ball? Why did the author include the diagrams? How do they help you understand collisions?***
pages 8–9	***What does the author want you to know about pitching a ball? What kinds of information did the author provide?***
page 11	***How does the size and shape of a bat and the materials it's made of affect a ball when hit? Find textual evidence to support your answer***
pages 12–13	***What does the author want you to know about Babe Ruth? Why did the author call this section "The Curse of the Bambino"?***
pages 12–13	***What is Jackie Robinson's contribution to baseball? Why did the author include information about Babe Ruth and Jackie Robinson? What evidence does the author give to support his reasons? How does the information help you understand the history of baseball?***

CHAPTER 1

The History of Baseball

Second Read

Revisit the Text

Ask students to identify the special text features in Chapter 1 and explain why the author used them.

- ***Why did the author include the photos and captions on pages 12–13?***
- ***What information did they add?***

Focus on Text Feature—Diagram

Direct students' attention to the diagrams on pages 6–7. Review that a diagram is a labeled drawing that shows how something works, or how the parts of something are arranged.

Review the following steps for reading a diagram and apply them to the Pitching: Energy Transfer or Batting: Energy Transfer diagram.

Step 1. Read the title. This tells you what the diagram shows.
Step 2. Read the labels and captions. They name important parts of the diagram, or tell more about them.
Step 3. Relate the diagram to the text.

Have students turn and talk to a partner and explain what they learned from the diagram. Prompt them to share their answers.

- ***Why did the author include diagrams in this chapter?***
- ***How did the diagrams better help you understand the chapter?***
- ***When and where could you use a diagram in your writing?***

To help students understand the use of diagrams, have them add one to an upcoming writing assignment. When students have to find or create a text feature and then determine where it should go in their own writing and why, they can more easily interpret it in other texts.

Focus on Text Structure—Sequence/Chronology

Determining how a text is structured will help students organize their thinking as they read and comprehend the text. Read the definition of the Sequence/Chronology text structure.

- ***Sequence may describe the order of events, such as the history of flight. Or it may describe the steps in a process, such as how cereal is made.***

Have pairs reread pages 12–13, "The Curse of the Bambino."

- ***What is the author describing in a specific order?***
- ***Does the author use text only, or text and photos?***

Review signal words. Note that writers often use these as clues to a text's structure. Display and discuss a list of sequence/chronology signal words and phrases (e.g., *first, second third, before, on* (date), *in* (date), *not long after, after that, next, at the same time, finally, then, following, while at*). Prompt students to look for these signal words in the texts they read.

Read aloud page 14. As you read, prompt students to listen for signal words that indicate a sequence of events (e.g., *while at* and *not long after*). Record them on a chart as students identify them.

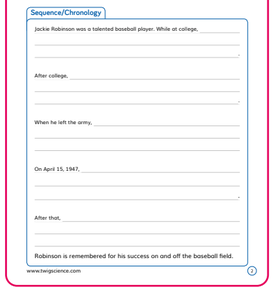
Post the signal words list, add others, and prompt students to look for these words in their readings. During small group lessons, highlight these words and ask students how they help them organize their thinking as they read. Emphasize how noticing these words will help them remember details about the sequence of events in a text.

Connect to Writing—Sequence/Chronology

Have students summarize pages 14–15 using the Sequence/Chronology writing frame on their student worksheets (page 47). Students who want to expand their ideas can use the frame as a springboard, rather than following it directly.

Prompt students to share their summaries with the class.

Student Worksheet, p.47


Sequence/Chronology

Jackie Robinson was a talented baseball player. While at college, _____.

After college, _____.

When he left the army, _____.

On April 15, 1947, _____.

After that, _____.

Robinson is remembered for his success on and off the baseball field.

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Writing Support

Have students record their completed frame on their student worksheets Ask them to underline the sequence/chronology signal words (e.g., *after that, then, on _____*). Prompt students to refer to the completed writing frame when writing sequence and chronology informational text pieces.

English Learners

Writing frames provide great speaking frames. Suggest ELs or students needing additional support use the frame when presenting their ideas.

OL

CHAPTER 2

STEM Career: Meet a Physicist

First Read

Overview

This chapter focuses on the career of a physicist. It includes an optional micro-lab in which students use collisions to learn about energy transfer.

Objectives

Students will:

- Navigate and read informational texts
- Use vocabulary strategies (context clues)
- Build fluency with science texts
- Write Fact Cards.

Word Study Support

On the board, write *physics* and *technologies*. Review the *ph* spelling for /f/ in words like *physics*, *phone*, and *phonics*, and the *ch* spelling for /k/ in words like *technologies*, *chemical*, and *echo*.

Have students generate other words with these less common /f/ and /k/ spellings, most of which are derived from Greek roots (e.g., *chemistry*, *ache*, *character*, *school*, *anchor*, *chaos*, *alphabet*, *dolphin*, *nephew*, *trophy*, *typhoon*).

Preview the Text

Have student preview Chapter 2 using the preview routine established in Chapter 1.

- ***This chapter contains an interview. How does the format of an interview affect how you will read the chapter?***

Prepare

Ask students to share their prior knowledge of physicists (scientists who study matter, energy, motion, and force). What have they read, seen, or heard in videos and other readings? This will provide students background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know, or can guess, about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*theory*, *data analysis*) using the vocabulary routine established in Chapter 1.

Point out that *e-o* in *theory* is not a vowel team. Rather, the letters *t-h-e* form the first syllable—an open syllable with a long vowel sound. Explain that the first syllable in *data* (*da*) is also an open syllable.

curiosity

Define: the desire to learn more about something

Example: The scientist's *curiosity* about animals led him to study the rare tiger.

Ask: What topics capture your curiosity?

Related Words: curious, curiously

inspire

Define: to influence; to fill with a specific feeling or thought

Example: I was *inspired* to buy that book based on your book review.

Ask: What or who has inspired you?

Related Words: inspiration

perform

Define: carry out, do, accomplish

Example: The scientist needs to *perform* many more experiments to find the answers to his questions.

Ask: What happens when a person erupts with anger?

Related Words: performer, performance

Multiple Meaning: to act in a stage play; to sing or play music

Read

Ask students how they might approach reading Chapter 2. Since students have already previewed the text, they should start by rereading the title and introduction.

Prompt students to begin their reading of the main text. Remind students that the chapter is set up as an interview, so they should read the questions and then the answers. If students struggle with a boldfaced term, prompt them to use decoding and context clues to determine its meaning.

Note: Students can use the Visual Glossary on page 31.

If the author suggests the reader look at a photograph or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does this information relate to the text?***

Have students whisper read the chapter. Listen in and offer feedback, if needed. If students struggle, model strategies to help them understand the text (such as visualize, clarify, and make inferences).

Discuss how students navigated the text. Have students turn and talk to a partner about the most fascinating or surprising thing they read in the chapter.

STEM Career: Meet a Physicist

Build Content Knowledge

During the discussion of the text and optional micro-lab:

- If conducting the micro-lab, use it to deepen students' understanding of energy changes. Provide time for them to explain their growing understanding to partners. Listen in and offer feedback, such as providing academic vocabulary or correcting misconceptions.
- Focus on information in the chapter and observations from the optional micro-lab that deepen students' understanding of energy and the transfer of energy.
- If conducting the micro-lab, debrief to allow students to share how it added to their understanding of energy transfer.
- Ask students what questions they still have. Write these on the board. Search for books and other resources for students to explore as they research their questions.
- Focus on how scientists begin an investigation by asking targeted questions, then find the correct tools and resources to explore answers to their questions.
- Highlight the first question on page 18 where Dr. Nathan explains his process.
- If conducting the micro-lab, discuss how changes in water amounts affected students' results.
- Focus on how this chapter adds to students' understanding of collisions and the transfer of energy.

Ask Text-Dependent Questions

Use text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

page 16	*Why is Dr. Nathan well-suited to study the physics of baseball? What clues or evidence does the author provide?*
pages 16-17	*Can you compare Dr. Nathan's research questions to what scientists in Chapter 1 are asking and exploring? How are they the same, or different?*
pages 18-19	*How does Dr. Nathan find answers to his questions? What special tools does he use? What other help does he get? Why is this important? How does this compare to other scientists you've read or learned about?*
page 19	*What does the author want you to know about Dr. Nathan's research tools?*

Optional Micro-Lab—Energy Transfer

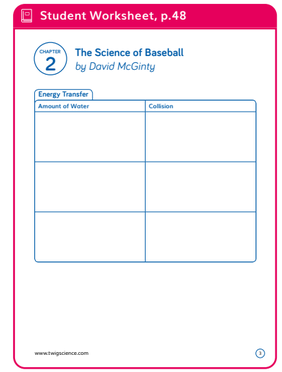
To deepen students' understanding of the key science concepts, conduct the optional micro-lab, Energy Transfer on pages 20–21. Have students start this investigation on a later day and let them continue their exploration during independent work time.

Step 1. Make sure students have all the materials listed.

Step 2. Assist students as they prepare the materials.

Step 3. Guide students through a reading of the directions before they begin, and have them restate each step of the directions to a partner.

Step 4. Give students time to experiment with the materials. Prompt students to record their findings on their student worksheets (page 48), then provide time for them to share and compare their findings.


Student Worksheet, p.48

CHAPTER 2 The Science of Baseball
by David McGinty

Energy Transfer

Amount of Water	Collision

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OL

STEM Career: Meet a Physicist

Second Read

Revisit the Text

Ask students to identify the format of Chapter 2 and explain how it affected the way they navigated the text.

- ***Did you read this chapter differently from Chapter 1?***
- ***If so, what did you do?***

Focus on Fluency—Partner Read

Model reading the introduction using standard phrasing, intonation, and speed. Prompt students to pay attention to these as you read. For example, pause deliberately at a comma. Reread the introduction one sentence at a time, and have students echo read.

Ask students to reread the interview in pairs. One student should act as interviewer and the other should act as interviewee—after students finish, ask them to switch roles.

Circulate, listen in, and offer feedback. Take note of students who need additional support, as well as specific aspects of the reading they struggle with (such as decoding or phrasing).

Focus on Vocabulary—Context Clues

Explain to students the many tools they can use to figure out the meaning of a word while reading. One tool is context clues, or the words and sentences around the unknown word. Authors provide different kinds of clues in their writing.

- **Word Parts:** E.g prefixes, suffixes
- **Definition/Restatement:** Definition of the word is given right after it, often in parentheses, or followed by *is* or *means*
- **Synonyms:** Word with a similar meaning is given, often using the word *or*, *that is*, or *which is*
- **Antonyms:** Word is contrasted with something that means the opposite
- **Examples:** Lists of related things are given and the word is often followed by *such as, include, these,* or *for example*
- **General Clues**

Model how to use definition/restatement and synonym clues to determine word meanings. Write the following sentences from Chapter 2: "Dr. Alan Nathan is Professor Emeritus at the University of Illinois. Emeritus means he's retired."

- ***Look at this word: emeritus. What does this word mean? The first sentence says that Dr. Nathan is Professor Emeritus. The definition of emeritus is given in the next sentence—retired. How do I know? The author uses the word "means" to let the reader know he's giving a definition. Looking for clue words like this can help a reader spot the supports an author gives in a text.***

Direct students' attention to the following pages and words. Guide them to identify the clues the author provided to help the reader determine the word's meaning.

- *statistics*: examples (page 5)
- *knuckleball*: definition (page 9)
- *segregated*: definition (page 14)

When students read Chapter 3, guide them to these words:

- *sign stealing*: definition (page 23)
- *advantage/disadvantage*: examples (page 25)
- *regulating*: definition (page 27)

Prompt students to use some of these context clues in their own writing to support their readers' understanding.

Connect to Writing—Informational Texts

Explain that students will create a fact card about Dr. Nathan. It should look like a typical baseball card. They can use the baseball cards in Chapter 1 as models. This genre reformulation strategy can help deepen students' understanding of the chapter's content.

Review the format of baseball cards. Explain that students can replace the baseball player's stats with facts about Dr. Nathan. Have pairs add a brief description of Dr. Nathan on the front of the card. Prompt them to use details from the interview on their fact cards.

Prompt pairs to brainstorm visuals they could add to their fact card (e.g., photo, decorative border, or background) and what the visuals would add to readers' understanding of their topic.

Explain that variety in sentence length makes a text more interesting. If all the sentences were very long, the text would be boring.

Model how to combine sentences using "and."

- **Original Sentences:** Dr. Nathan is a physicist. He likes science. He likes baseball. He studies the science of baseball.
- **Sentence Combining:** Dr. Nathan is a physicist who studies the science of baseball. He combines his love of science and baseball.

Optional: Extend this activity by encouraging students to use digital tools to type and design their fact cards, add visuals, and print to display on a classroom wall.

Standard English Learners

To acquire standard academic speech and writing, some SELs need to learn to use -s with a verb in the third person, as in "he is" and "he goes." Many SELs will leave out the -s or place it elsewhere, as in "he go" or "we goes." Write a sentence from students' speech or writing. Then provide contrastive analysis work. Write the Standard English form above that sentence and discuss the key differences.

CHAPTER 3

How to Cheat at Baseball

First Read

Overview

This chapter explores how baseball players have used science to cheat at the game.

Objectives

Students will:

- Navigate and read informational texts
- Apply metacognitive comprehension strategies (summarize)
- Interpret text features (photos and captions)
- Synthesize information
- Read and write across texts.

Preview the Text

Have student preview Chapter 3 using the preview routine established in Chapter 1.

- ***What challenges might you face in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Prompt students to share their prior knowledge of cheating. What have they read, seen, or heard in videos and other readings? Remind students that this will provide background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and share what they know about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*corked*, *regulating*) using the vocabulary routine established in Chapter 1.

Remind students of the context clues they studied in the previous chapter, and ask them to define *corked* (page 24) and *regulating* (page 27) using these clues.

Review additional academic words to expand students' vocabulary.

dishonest

Define: not honest

Example: It is *dishonest* to cheat at a game.

Ask: What are other examples of being dishonest?

Word Parts: dis- means not or the opposite of

incident

Define: an event or action

Example: Being late for school should be a rare *incident*.

Ask: What surprising incident has happened recently?

issue

Define: something in question or in dispute

Example: We have an *issue* with how to best recycle our classroom trash.

Ask: How can you solve an issue?

Idioms: at issue (being discussed or disputed), take issue (to disagree)

Read

Ask students how they might approach reading Chapter 3. Model text navigation, if needed. Since students have already previewed the text, they should start by rereading the title and introduction.

Prompt students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: Students can use the Visual Glossary on page 31.

If the author suggests the reader look at a photograph, chart, or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***How do the visuals contribute to your understanding of the text?***
- ***Do they add new information?***
- ***How does that information relate to the text?***

Remind students that if the page has a sidebar, they should read it last.

Have students whisper read the chapter. Listen in and offer feedback. When students struggle, remind them of the metacognitive strategies they can use to help them understand the text (e.g., summarize, visualize, predict, ask questions, make inferences, clarify, and other fix-up strategies).

Metacognitive Strategy—Summarize

Explain that skilled readers use strategies to check their comprehension as they read. One strategy is stopping and summarizing what the author has written. When you summarize, you restate the most important ideas in the text. If you can't easily summarize, it means you need to go back and reread, or use another strategy. If you can summarize, you can continue reading.

Read aloud page 24 to model summarizing.

- ***Let me summarize, or tell the main ideas in the text so far, to see if I understand what I'm reading. In 2003, Sammy Sosa was a well-known baseball player. He was caught cheating when he used a corked bat. How did I do? Do you think I understand what I've read so far?***

As they read the chapter, prompt students to periodically stop and summarize. Point out good stopping points as needed. Remind students that this is one of several strategies they can use to check their comprehension while reading.

English Learners

Provide sentence frames to support students' responses.

- I read that _____.
- A player cheats by _____.
- When a player cheats, _____.

OL

How to Cheat at Baseball

Build Content Knowledge

During the discussion of the text:

- Focus on the different materials used to make bats and how this affects how fast and how far a ball can travel.
- Ask students to list possible bat materials and predict how each might affect how fast and far a ball would travel when hit.
- Have partners summarize what they've learned from the book about energy of motion and how energy is transferred. Take note of their use of content vocabulary and the completeness of their explanations.
- Ask students what questions they would ask and explorations they would do to solve the issue of the "Home Run Spike."
- Focus on the effects of hitting a ball with different kinds of bats.

Ask Text-Dependent Questions

Use text-dependent questions to deepen comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

pages 22–23	*Why do some baseball players and teams cheat? What are the most common ways to cheat? What evidence in the text supports your answer?*
page 24	*What was surprising about Sosa's cheating incident?*
page 25	*What does the author want you to know about corking a bat? Is it really an advantage?*
pages 26–27	*How do different bat materials affect how the ball is hit? Why do some people want to regulate how baseball bats are made? Why did the author include the photo on page 26?*
pages 28-29	*Do you think the recent "Home Run Spike" is caused by cheating? Why or why not?*

How to Cheat at Baseball

Second Read

Revisit the Text

Ask students to identify the special text features in Chapter 3 and explain why the author used them.

- ***How can you use the headings to summarize what you read?***

Focus on Text Feature—Photos and Captions

Review that informational texts often include eye-catching photographs. Sometimes they show what is discussed in the text, so that you can picture the information. Other times, the photos add to what's in the text so you learn something new. A caption explains what the photo shows, and may also add new information that is not in the text.

Review the steps for reading a photo and caption and apply them to those on page 26:

Step 1. Look carefully at the photograph. Study the details. Make a mental list of what you see.
Step 2. If there's more than one photo, compare them. Look for what's similar and what's different.
Step 3. Read the caption. Look for information about the topic—not just what is pictured, but also what is added.

Have pairs explain what they learned from the photos and caption.

- ***Why did the author include photos and captions in this chapter?***
- ***How did the photos and captions help you understand the chapter?***
- ***When and where could you use a photo with a caption in your writing?***

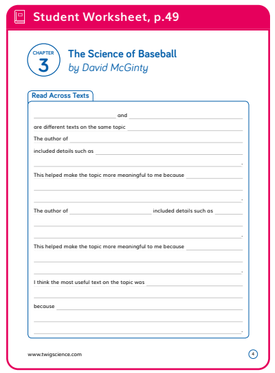
Prompt students to share their answers.

To help students understand the use of photos and captions, have them add both to an upcoming writing assignment. When students have to find or create a text feature, then determine where it should go in a text and why, they can more easily interpret it in other texts.

Connect to Writing—Read Across Texts

Have students compare Chapter 3 to one of the other texts they have read. Ask them to complete the Read Across Texts writing frame on their student worksheets (page 49). Students who want to expand their ideas can use the frame as a springboard, rather than following it directly.

Prompt students to share their comparisons with the class.


Student Worksheet, p.49

CHAPTER 3 The Science of Baseball
by David McGinty

Read Across Texts

_____ and _____
are different texts on the same topic _____
The author of _____
included details such as _____
_____.
This helped make the topic more meaningful to me because _____
_____
_____.
The author of _____ included details such as _____
_____
_____.
This helped make the topic more meaningful to me because _____
_____
_____.
I think the most useful text on the topic was _____
_____
because _____
_____.

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Synthesize Information

To show their growing body of knowledge, have students write a response to the phenomenon: What happens when objects collide?

To build writing stamina, provide an uninterrupted block of writing time for students. Increase this writing time over the course of the year.

Review students' writing and provide notes so that students can revise during independent work time. For example, you might ask students to rewrite their introductory sentences to grab the reader's attention, or add more detail to a fact they've included.

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English language development. These tasks are best administered individually.

Writing Domain
Have students select one of the diagrams on pages 6–7 and write a brief description of what the diagram depicts.

Reading Domain
Use the image on page 22. Write these words: *baseball*, *collision*, and *cheat*. Have students read each one, then match it to the correct part of the image, or use the image to define it.

Listening Domain
Describe the Jackie Robinson photos on pages 14–15. Add key details included in the photos but not in the text (e.g., Robinson meeting with Dr. Martin Luther King, Jr.).

- ***How was baseball different when Jackie Robinson started playing the game?***
- ***How did Jackie Robinson help change baseball?***

Speaking Domain
As students answer the two questions in the Listening Domain task, record their use of academic vocabulary and ability to summarize key details.

OL

EL

The Science of Baseball
English Learner Lessons

CHAPTER 1

The History of Baseball

First Read

Overview

This chapter focuses on the history of baseball and the forces involved in throwing and hitting balls. It also teaches students strategies that skilled readers use to navigate and comprehend informational texts while reading independently.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (diagrams)
- Use text structures (sequences and chronologies)
- Write a sequence and chronology summary.

Level Up

When working with ELs, use the following strategies to help them access the grade-level text.

- **Chunk the Text:** Focus on smaller sections of the text over an extended period of time to provide all the supports students will need to access meaning.
- **Read Aloud:** Consider reading aloud the text or having students listen to a recording before reading it together in small groups. For Emerging (Substantial Support) and some Expanding (Moderate Support) ELs, have them listen to a recording of the Below-Level book first for additional support.
- **Build Background**: Use videos, texts, and other resources to build background and vocabulary prior to reading the book.

Preview the Text

Have students preview Chapter 1 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice any features, such as special type, maps, or diagrams.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Prompt students to share their answers to Step 5, along with any other comments or questions they have about the text.

- ***What challenges might you face in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Ask students to share what they already know about baseball and the science involved in playing the game. What have they read, seen, or heard in videos and other readings? This will provide students with background they can draw on as they read.

Give students 2 minutes to do a turn and talk with a partner and share what they know about the topic. Circulate and provide language support, such as recasting students' sentences using content and academic vocabulary.

Vocabulary Routine

Ensure students understand important new chapter vocabulary using the vocabulary routine.

- ***Why might an author boldface a term?***
- ***What does this add to the text?***

Step 1. Have students find and read the boldfaced content terms in Chapter 1 (**advantage, disadvantage, statistics, data, energy, forces, transferred, energy of motion**).
Step 2. Ask students to turn to the Visual Glossary on page 31. Tell students it may help them understand a given term. Have students find the entries for *data* and *force* and read them to a partner.
Step 3. Repeat the terms as a class to confirm pronunciations.
Step 4. Point out the meanings of any words that may cause students confusion. Highlight the prefix *dis-* in *disadvantage*. Note that *dis-* means not or the *opposite of*. Compare *advantage* and *disadvantage*. Point out the meanings of any words that may cause students confusion.
Step 5. Review the additional academic words using the following simple definitions and context sentences. Point out related words and word parts to expand students' vocabulary.

segregate

Define: separate or set apart from others

Example: Long ago, baseball players were *segregated* by race.

Ask: Why is it harmful to segregate people?

Sentence Frame: Segregating people is harmful because _____ .

Related Words: segregated, segregating, segregation

Say And Repeat: Conclude by saying the word, then have students repeat 3 times.

modern

Define: of the present or recent time

Example: Long ago, people didn't have *modern* machines like cars and computers.

Ask: How do modern machines affect how people live?

Sentence Frame: Modern machines _____ .

Related Words: ancient (antonym)

Say And Repeat: Conclude by saying the word, then have students repeat 3 times.

competitive

Define: having a strong desire to succeed or win; well suited for competition

Example: The extra training helped the baseball team become more *competitive*.

Ask: Are you a competitive person? Why or why not?

Sentence Frame: I am/am not a competitive person because _____ .

Related Words: compete, competition

Word Parts: suffix -ive (adjective form of a noun)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

Read

Discuss with students how they might approach reading Chapter 1. Model text navigation, as needed. Since students have already previewed the chapter, they should start by rereading the title and introduction.

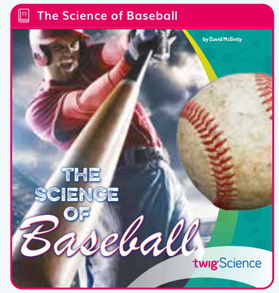
Tell students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

The author may suggest the reader look at a photograph, chart, or other visual—in this case, they should stop and do so. If not, they should read the section or page and then look at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does this information relate to the text?***

Remind students that they can go back and study the photos and illustrations more closely when they finish reading. Tell students that if the page has a sidebar, they should read it last.



Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary.

- **Cognates:** Highlight words that are similar in Spanish and English to accelerate vocabulary building (e.g., *data/datos*).
- **Labels:** Throughout the text, labels on photos and illustrations connect the visuals to words in the chapters. Review these words as part of students' preview of each chapter.
- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

EL

CHAPTER 1

The History of Baseball

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary.

- **Unpack:** Guide students to unpack complex sentences and paragraphs, focusing on meaning. Use the underlined portions of the challenging text to help students break apart and simplify complex ideas. Work with students to rewrite complex sentences/paragraphs using accessible language and sentence structure. Ask: What's happening? Who or what is this about? What does this sentence mean in your own words?
- **Connect:** Some students struggle connecting ideas within a paragraph due to their physical separation across the paragraph or due to the use of pronouns. Use the underlined words and phrases to connect these ideas. For pronouns, guide students to restate each sentence, replacing the pronoun with the noun it refers to in order to clarify meaning.

Connect to Writing—Note-Taking

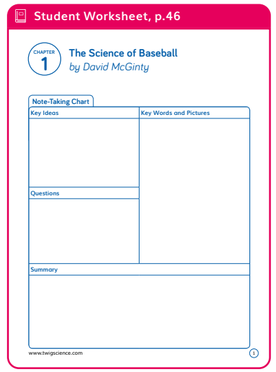
Ask students to use the Note-Taking Chart on their student worksheets (page 46). As students read Chapter 1, have them:

Step 1. Write down key words and phrases to help them remember the big ideas, and draw pictures as memory aids.

Step 2. Note their questions and confusions about the text by jotting down the page and paragraph number of the confusing sentence or section.

Step 3. Write a two- or three-sentence chapter summary.

Complete the chart for the first few pages together. Chorally read the text and model annotating the chart.


Student Worksheet, p.46

CHAPTER 1 The Science of Baseball
by David McGinty

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

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While students are reading and taking notes, circulate and take note of any common confusion. During the after-reading discussion, you can go back to the text and model your thinking to clarify.

Annotate the Text

When annotating the text, guide students to circle:

- Unfamiliar Words
- Confusing Sentences

Prompt students to use context clues to clarify meaning. Use conversation prompts and linguistic frames to discuss students' annotations.

Prompt	Frame
What words did you circle?	I circled _____ .
What words or sentences are confusing?	I don't know what _____ means.
What clues in the text can help us figure out the word? Is there a prefix/suffix/root? What does the prefix/suffix/root mean?	I think _____ might mean _____ because _____.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

pages 2–3	*Why does the author say science is an important part of baseball? What information in the text supports your answer?*
pages 4–5	*How has baseball changed since its beginnings? How does the photo help you understand some of the changes?*
pages 6–7	*What happens when a batter hits a ball? Why did the author include the diagram? How does it help you understand collisions?*
pages 8–9	*What does the author want you to know about pitching a ball? What kinds of information, or facts, did the author provide?*
pages 10–11	*How do the size and shape of the bat affect a ball when hit? How do the materials a bat is made of affect a ball when hit? Find textual evidence, or details, to support your answer.*
pages 12–13	*What does the author want you to know about Babe Ruth? Why did the author call this section "The Curse of the Bambino"?*
pages 14–15	*What is Jackie Robinson's contribution to baseball? How did he make the game better? Why did the author include information about Babe Ruth and Jackie Robinson? What evidence does the author give to support his reasons? How does the information help you understand the history of baseball?*

Special Needs

Provide digital tools (e.g., computers or tablets) for students to record notes. Allow alternate ways of expressing ideas, such as through drawings or audio recordings.

English Learners

Use additional supports for Emerging ELs.

Substantial Support (Emerging Proficiency)

- **Total Physical Response:** Use actions and gestures when possible to communicate ideas.
- **Yes/No Examples:** Ask yes/no questions to encourage students to participate in a discussion. For example, ask: Is this a _____ ?
- **Use Simple Linguistic Frames and Word Banks:** Provide a simple response frame and list possible words for students to choose from in their responses.

The History of Baseball

Build Text Knowledge

During the discussion of the text:

- Have students use the diagram on page 7 and the text on pages 9 and 11 to summarize their understanding of changing speeds when objects collide.
- Review energy of motion and how energy can be transferred. Have students find the supporting evidence in the text and illustrations.
- Review what scientists and players need to know about baseball to improve the game (e.g., a player's performance). Guide students to turn these needs into questions that can be (and have been) explored. Ask what questions students still have about the science of baseball. Provide books and other resources for them to find answers. Guide students to explain what happens when a baseball and bat collide, and why.
- Focus on the forces that affect where and how a baseball moves when it's thrown by a player or hit with a bat. Review the ways in which things like the speed and direction of a baseball can be changed.

Assess Conversation

Use the chart to gauge students' progress as they participate in collaborative conversations. Model conversation exchanges to support students' growth.

Bridging 4	*Students engage in 5 or more exchanges. They support their ideas with evidence and sufficiently synthesize ideas.*
Expanding 3	*Students engage in 3-4 exchanges. They ask and answer questions, agree and disagree, and build on each other's ideas.*
Early Expanding 2	*Students engage in 1 exchange, using only a sentence or two. Sometimes the conversation is extended.*
Emerging 1	*Students offer 1 short answer. The exchange is often highly structured.*
0	*Students are silent during the conversation.*

Revisit the Text

Ask students to identify the special text features in Chapter 1 and explain why the author used them.

- ***Why did the author include the photos and captions on pages 12–13?***
- ***What information did they add?***

Focus on Text Feature—Diagram

Direct students' attention to the diagrams on pages 6–7. Review that a diagram is a labeled drawing that shows how something works, or how the parts of something are arranged.

Review the following steps for reading a diagram and apply them to the "Pitching: Energy Transfer" or "Batting: Energy Transfer" diagram.

Step 1. Read the title. This tells you what the diagram shows.
Step 2. Read the labels and captions. They name important parts of the diagram, or tell more about them.
Step 3. Relate the diagram to the text.

Have students turn and talk to a partner and explain what they learned from the diagram.

- ***Why did the author include diagrams in this chapter?***
- ***How did the diagrams better help you understand the chapter?***
- ***When and where could you use a diagram in your writing?***

Prompt students to share their answers.

To help students understand the use of diagrams, have them add one to an upcoming writing assignment. When students have to find or create a text feature and then determine where it should go in their own writing and why, they can more easily interpret it in other texts.

The History of Baseball

Focus on Text Structure—Sequence/Chronology

Determining how a text is structured will help students organize their thinking as they read and comprehend the text. Read the definition of the Sequence/Chronology text structure.

- ***Sequence may describe the order of events, such as the history of flight. Or it may describe the steps in a process, such as how cereal is made.***

Have student partners reread pages 12–13, "The Curse of the Bambino."

- ***What is the author describing in a specific order?***
- ***Does the author use text only, or text and photos?***

Discuss signal words with students. Note that writers often use these as clues to a text's structure. Display and discuss a list of sequence/chronology signal words and phrases (*e.g., first, second third, before, on* (date), *in* (date), *not long after, after that, next, at the same time, finally, then, following, while at*). Prompt students to look for these signal words in the texts they read.

Read aloud page 14. As you read, prompt students to listen for signal words that indicate a sequence of events (e.g., *while at* and *not long after*). Record these on a chart as students identify them.

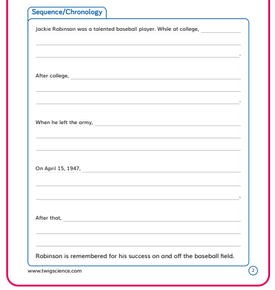
Post the signal words list, add others, and prompt students to look for these words in their readings. During small group lessons, highlight these words and ask students how they help them organize their thinking as they read. Emphasize how noticing these words will help them remember details about the sequence of events in a text.

Connect to Writing—Sequence/Chronology

Have students summarize pages 14–15 using the Sequence/Chronology writing frame on their student worksheets (page 47).

Prompt students to share their summaries with the class. Writing frames provide great speaking frames. Suggest students use the frame when presenting their ideas.

Student Worksheet, p.47


Sequence/Chronology

Jackie Robinson was a talented baseball player. While at college, _____.

After college, _____.

When he left the army, _____.

On April 15, 1947, _____.

After that, _____.

Robinson is remembered for his success on and off the baseball field.

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Writing Support

Have students record their completed frame on their student worksheets. Ask them to underline the sequence/chronology signal words (e.g., *after that, then, on* _____). Prompt students to refer to the completed writing frame when writing sequence and chronology informational text pieces.

STEM Career: Meet a Physicist

Preview the Text

Have students preview Chapter 2 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice any features, such as special type, maps, or diagrams.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Ask students what type of information they expect to learn based on the preview of Chapter 2.

- ***This chapter contains an interview. How does the format of an interview affect how you will read the chapter?***

Prepare

Ask students to share what they already know (if anything) about physicists—scientists who study matter, energy, motion, and force. What have they read, seen, or heard in videos and other readings? This will provide students background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and share what they know, or can guess, about the topic. Circulate and provide language support, such as offering sentence frames.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*theory, data*) using the vocabulary routine established in Chapter 1.

Point out that *e-o* in *theory* is not a vowel team. Rather, the letters *t-h-e* form the first syllable—an open syllable with a long vowel sound. Explain that the first syllable in *data* (*da*) is also an open syllable.

curiosity

Define: the desire to learn more about something

Example: The scientist's *curiosity* about animals led him to study the rare tiger.

Ask: What has curiosity led you to learn more about?

Sentence Frame: Curiosity has led me to _____ .

Related Words: curious, curiously

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

inspire

Define: to influence; to fill with a specific feeling or thought

Example: I was *inspired* to buy that book based on your book review.

Ask: What or who has inspired you?

Sentence Frame: _____ has inspired me because _____ .

Related Words: inspiration

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

EL

First Read

Overview

This chapter focuses on the career of a physicist. It includes an optional micro-lab in which students use collisions to learn about how energy is transferred.

Objectives

Students will:

- Navigate and read informational texts
- Use vocabulary strategies (context clues)
- Build fluency with science texts
- Write Fact Cards.

Word Study Support

Write *physics* and *technologies*. Review the *ph* spelling for /f/ in words like *physics, phone, and phonics*, and the *ch* spelling for /k/ in words like *technologies, chemical, choir, and echo*. Guide students to generate other words with these less common /f/ and /k/ spellings, most of which are derived from Greek roots (e.g., *chemistry, ache, character, school, anchor, chaos, alphabet, dolphin, nephew, trophy, typhoon*). For students whose phonics and word study skills are below level, focus on a couple long vowel spelling patterns they struggle with. Use words from the chapter to model decoding. Extend to other words with these patterns.

STEM Career: Meet a Physicist

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary.

- **Cognates:** Highlight words that are similar in Spanish and English to accelerate vocabulary building (e.g., *curiosity/curiosidad*).
- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

Leveled Reader Supports

You might choose to guide students through an initial reading of the chapter. Multiple supports are provided in the text to assist you in helping students access complex sentences and build overall understanding of key ideas presented in the chapter.

Read

Ask students how they might approach reading Chapter 2. As you did in the previous chapter, help students navigate the text. Since students have already previewed the text, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. Remind students that the chapter is set up as an interview, so they should read the questions and then the answers. If students struggle with a boldfaced term, prompt them to use decoding and context clues to determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does this information relate to the text?***

Have students whisper read the chapter. Listen in and offer feedback, if needed. If students struggle, do an initial echo read of the chapter. Discuss with students how they navigated the text. Have students turn to a partner and retell the most fascinating or surprising thing they read in the chapter.

Build Text Knowledge

During the discussion of the text and optional micro-lab:

- If conducting the micro-lab, use it to deepen students' understanding of energy changes. Provide time for them to explain their growing understanding to partners. Listen in and offer feedback, such as providing academic vocabulary or correcting misconceptions.
- Focus on information in the chapter and observations from the optional micro-lab that deepen students' understanding of energy and the transfer of energy. If conducting the micro-lab, debrief to allow students to share how it added to their understanding of energy transfer. Ask students what questions they still have. Write these on the board. Search for books and other resources for students to explore as they research their questions.
- Focus on how scientists begin an investigation by asking targeted questions, then find the correct tools and resources to explore answers to their questions. Highlight the first question on page 18 where Dr. Nathan explains his process.
- If conducting the micro-lab, discuss how changes in water amounts affected students' results. Focus on how this chapter adds to students' understanding of collisions and the transfer of energy.:

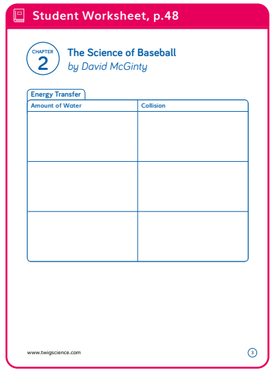
Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

page 16	***Why is Dr. Nathan the perfect scientist to study the physics of baseball? What clues, or evidence, does the author give?***
pages 16-17	***Can you compare Dr. Nathan's research questions to what scientists in Chapter 1 are asking and exploring? How are they the same? How are they different?***
page 18	***How does Dr. Nathan find answers to his questions? What special tools does he use? What other help does he get? Why is this important? How does this compare to other scientists you've read or learned about?***
page 19	***What does the author want you to know about Dr. Nathan's research tools?***

Optional Micro-Lab—Energy Transfer

Student Worksheet, p.48


CHAPTER 2
The Science of Baseball
by David McGinty

Energy Transfer

Amount of Water	Collision

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To deepen students' understanding of the key science concepts presented in the book and highlighted above, you may conduct the optional micro-lab, Energy Transfer on pages 20–21. You may want to start this investigation on a later day and let students continue their exploration during independent work time.

Step 1. Make sure students have all the materials listed—2 clean, empty soda cans with tabs attached, water, string, and a sturdy object (like a chair leg) to affix the string to.
Step 2. Assist students as they prepare the materials.
Step 3. The micro-lab is presented as a read together experience. Read it to students, then repeat it as an echo read. Guide students to restate each step in the directions to a partner to confirm understanding before completing the lab.
Step 4. Give students time to experiment with the materials.
Step 5. Prompt students to record their findings on their student worksheets (page 48). Provide time for students to share and compare their findings.

Collaborative Conversation Support

Rephrasing

Saying things in multiple ways is essential when using new vocabulary or idioms. For example, state a sentence containing academic or content vocabulary then rephrase it using simplified language.

Use Native Language

Allow students to discuss new concepts in their native language with peers (if multiple students speak the same language) before engaging them in a conversation about those ideas in English.

STEM Career: Meet a Physicist

Second Read

Revisit the Text

Ask students to identify the format of Chapter 2 and explain how it affected the way they navigated the text.

- ***Did you read this chapter differently from Chapter 1?***
- ***If so, what did you do?***

Focus on Fluency—Partner Read

Model reading the first question and answer using proper phrasing, intonation, and speed. For example, slightly raising your voice at the end of a question. Then reread the question and answer, one sentence at a time. Have students echo read. Prompt them to pay attention to your pace and phrasing.

Ask student pairs to reread the interview. One student should act as interviewer and the other should act as interviewee—after students finish, ask them to switch roles. Circulate, listen in, and offer feedback. Take note of students who need additional support, as well as specific aspects of the reading they struggle with (such as decoding or phrasing).

Focus on Text Feature—Context Clues

Explain to students the many tools they can use to figure out the meaning of a word while reading. One tool is context clues, or the words and sentences around the unknown word. Authors provide different kinds of clues in their writing.

- **Word Parts:** E.g. prefixes, suffixes
- **Definitions/Restatements:** Definition of the word is given right after it, often in parentheses, or followed by *is* or *means*
- **Synonyms:** Word with a similar meaning is given, often using the word *or, that is,* or *which is*
- **Antonyms:** Word is contrasted with something that means the opposite
- **Examples:** Lists of related things are given and the word is often followed by *such as, include, these,* or *for example*
- **General Clues**

Model for students how to use general clues to determine word meanings. Write the following sentence from Chapter 2: "My whole career has been based on curiosity."

- ***Look at the word: career. What does this word mean? The sentence says that Dr. Nathan's career is based on curiosity—the things he wonders about and wants to know more about. The sentences that follow describe some of the research Dr. Nathan has done as a physicist. That's his job. So, the word career must mean job.***

Direct students' attention to the following pages and words. Guide them to identify the clues the author provided to help the reader determine the word's meaning.

- *statistics:* definition, examples (page 5)
- *knuckleball:* general clues (page 9)
- *segregated:* restatement (page 14)

When students read Chapter 3, guide them to these words:

- *sign stealing:* definition (page 23)
- *advantage/disadvantage:* examples (page 25)
- *regulating:* definition (page 27)

Prompt students to use some of these context clues in their own writing to support their readers' understanding.

Connect to Writing—Informative Texts

Tell students they will create a fact card about Dr. Nathan. It should look like a typical baseball card. They can use the baseball cards in Chapter 1 as models. This genre reformulation strategy will help deepen students' understanding of the chapter's content.

Review the format of the baseball cards. Explain to students that they can replace the baseball player's stats with facts about Dr. Nathan and the work he does. Have students add a brief description of Dr. Nathan on the front of the card. Prompt students to use details from the interview on their fact cards.

Explain to students that variety in sentence length makes a text more interesting. If all the sentences were very long, the text would be boring. Model how to combine sentences using and.

- **Original Sentences:** Dr. Nathan is a physicist. He likes science. He likes baseball. He studies the science of baseball.
- **Sentence Combining:** Dr. Nathan is a physicist who studies the science of baseball. He combines his love of science and baseball.

Have student pairs brainstorm visuals they could add to their fact card (e.g., photo, decorative border or background) and what the visuals would add to readers' understanding of their topic.

Optional: Extend this activity by encouraging students to use digital tools to type and design their fact cards, add visuals, and print to display on a classroom wall.

CHAPTER 3

How to Cheat at Baseball

First Read

Overview

This chapter explores how baseball players have used science to cheat at the game.

Objectives

Students will:

- Navigate and read informational texts
- Apply metacognitive comprehension strategies (summarize)
- Interpret text features (photos and captions)
- Synthesize information
- Read and write across texts.

Preview the Text

Have students preview Chapter 3 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice any features, such as special type, maps, or diagrams.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Ask students what type of information they expect to learn based on the preview of Chapter 3.

- ***What challenges might you face in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Prompt students to share what they already know about cheating. What have they read, seen, or heard in videos and other readings? Remind students that this will provide background they can draw on as they read.

Give students 2 minutes to do a turn and talk with a partner and share what they know about cheating. Offer sentence frames for support, for example:

- I read that _____ .
- A player cheats by _____ .
- When a player cheats, _____ .

Vocabulary Routine

Ensure students understand important chapter vocabulary (*corked, advantage, disadvantage, regulating, data*) using the vocabulary routine established in Chapter 1.

Review the meanings of *advantage* and *disadvantage* using the glossary. Review the additional academic words to expand students' vocabulary.

incident

Define: an event or action

Example: Being late for school should be a rare *incident*.

Ask: What surprising incident has happened recently?

Sentence Frame: One surprising incident was _____ .

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

dishonest

Define: not honest

Example: It is *dishonest* to cheat at a game.

Ask: What are other examples of being *dishonest*?

Sentence Frame: One example of being dishonest is _____ .

Word Parts: dis- means not or the opposite of

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

issue

Define: something in question or in dispute

Example: We have an *issue* with how to best recycle our classroom trash.

Ask: : How can you solve an issue?

Sentence Frame: I can solve an issue by _____ .

Idioms: at issue (being discussed or disputed), take issue (to disagree)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

Make Word Banks

Provide word banks during discussions for students to refer to. Include content and academic words, as well as words that help students link ideas (*because, therefore, in addition*). You can organize the word bank by part of speech, for example, to help students. For Emerging (Substantial Support) ELs, use word banks with one category of words and connect it to a simple linguistic frame. For Expanding (Moderate Support) students, collect words by listening to students' conversation (Collect and Display Language Routine), then add words from the chapter to extend this word bank.

EL

CHAPTER 3

How to Cheat at Baseball

Leveled Reader Supports

You might choose to guide students through an initial reading of the chapter. Multiple supports are provided in the text to assist you in helping students access the vocabulary.

- **Unpack:** Guide students to unpack complex sentences and paragraphs, focusing on meaning. Use the underlined portions of the challenging text to help students break apart and simplify complex ideas. Work with students to rewrite complex sentences/paragraphs using accessible language and sentence structure. Ask: What's happening? Who or what is this about? What does this sentence mean in your own words?

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary.

- **Cognates:** Highlight words that are similar in Spanish and English to accelerate vocabulary building (e.g., *impact*/*impacto*).
- **Use Context:** Guide students to use context clues to figure out the meanings of new words while reading. Reinforce this strategy frequently to build this independent reading habit.
- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

Read

Ask students how they might approach reading Chapter 3. Model text navigation, if needed. Since students have already previewed the text, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph, chart, or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***How do the visuals contribute to your understanding of the text?***
- ***Do they add new information?***
- ***How does this information relate to the text?***

Remind students that if the page has a sidebar, they should read it last.

Have students whisper read the chapter. Listen in and offer feedback. Alternatively, do an initial echo read of the chapter, then have students read it on their own.

Metacognitive Strategy—Summarize

Explain to students that skilled readers use strategies to check their comprehension as they read. One strategy is stopping and summarizing what the author has written. When you summarize, you restate in your own words the most important ideas in the text. If you can't easily summarize, it means you need to go back and reread, or use another strategy. If you can summarize, you can continue reading.

Read aloud page 24 to model summarizing.

- ***Let me summarize, or tell the main ideas in the text so far, to see if I understand what I'm reading. In 2003, Sammy Sosa was a well-known baseball player. He was caught cheating when he used a corked bat. How did I do? Do you think I understand what I've read so far?***

As they read the chapter, prompt students to periodically stop and summarize their reading. Point out good stopping points as needed. Remind students that this is one of several strategies they can use to check their comprehension while reading.

Build Text Knowledge

During the discussion of the text:

- Focus on the different materials used to make bats and how this affects how fast and how far a ball can travel. Ask students to list possible bat materials and predict how each might affect how fast and far a ball would travel when hit.
- Have partners summarize what they've learned from the book about energy of motion and how energy is transferred. Take note of their use of content vocabulary and the completeness of their explanations.
- Ask students what questions they would ask and explorations they would do to solve the issue of the "Home Run Spike."
- Focus on the effects of hitting a ball with different kinds of bats.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

pages 22–23	***Why do some baseball players and teams cheat? What are the most common ways to cheat? Find evidence, or details, in the text to support your answer.***
page 24	***What was surprising about Sosa's cheating incident?***
page 25	***What does the author want you to know about corking a bat? Is it really an advantage, or helpful thing?***
pages 26–27	***How do different bat materials affect how the ball is hit? Why do some people want to regulate, or make rules about, how baseball bats are made? Why did the author include the photo on page 26?***
pages 28–29	***Do you think the recent "Home Run Spike" is caused by cheating? Why or why not?***

CHAPTER 3

How to Cheat at Baseball

Second Read

English Learners

Use additional supports for Emerging ELs.

Substantial Support (Emerging Proficiency)

- **Total Physical Response:** Use actions and gestures to communicate ideas.
- **Yes/No Examples:** Provide two options to encourage students to participate in discussion. Ask: Is this a _____ ?
- **Linguistic Frames and Word Banks:** Provide a simple response frame and list possible words for response.

Extend the Conversation

Extend students' conversation about the ideas presented in the chapter.

- ***What do you think?***
- ***What do you mean by _____ ?***
- ***I'm confused. Please explain.***
- ***How do you know? Find the evidence.***
- ***What clues in the text gave you that idea?***
- ***Do you agree? Why or why not?***

Use these frames to support students' answers.

- I think _____ .
- I mean _____ .
- I know this because _____ .
- I know this because I read _____ .
- I know _____ because _____ .
- One text detail that shows this is _____ .
- This means that _____ .
- I agree. I also think that _____ .
- I disagree. I think that _____ .

Revisit the Text

Ask students to identify the special text features in Chapter 3 and explain why the author used them.

- ***How can you use the headings to summarize what you read?***

Focus on Text Feature—Photos and Captions

Review that informational texts often include eye-catching photographs. Sometimes they show what is discussed in the text, so that you can better picture the information. Other times, the photos add to what's in the text so you learn something new. A caption explains what the photo shows, and may also add new information that is not in the text.

Review the following steps for reading a photo and caption and apply them to those on page 26.

Step 1. Look carefully at the photograph. Study the details. Make a mental list of what you see.
Step 2. If there's more than one photo, compare them. Look for what's similar and what's different.
Step 3. Read the caption. Look for information about the topic—not just what is pictured, but also what is added.

Have student pairs explain what they learned from the photos and caption.

- ***Why did the author include photos and captions in this chapter?***
- ***How did the photos and captions help you understand the chapter?***
- ***When and where could you use a photo with a caption in your writing?***

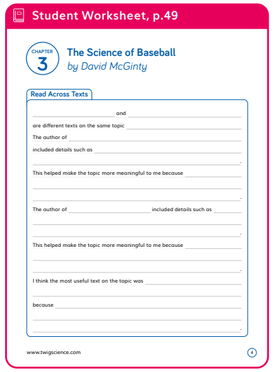
Prompt students to share their answers.

To help students understand the use of photos and captions, have them add one of each to an upcoming writing assignment. When students have to find or create a text feature, then determine where it should go in a text and why, they are better able to interpret it in other texts.

Connect to Writing—Read Across Texts

Have students compare Chapter 3 to one of the other texts they have read in class. Ask them to complete the Read Across Texts writing frame on their student worksheets (page 49).

Prompt students to share their comparisons with the class.


Student Worksheet, p.49

CHAPTER 3
The Science of Baseball
by David McGinty

Read Across Texts

_____ and _____
are different texts on the same topic _____
The author of _____
included details such as _____
_____.
This helped make the topic more meaningful to me because _____
_____.
The author of _____ included details such as _____
_____.
This helped make the topic more meaningful to me because _____
_____.
I think the most useful text on the topic was _____
_____
because _____
_____.

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EL

How to Cheat at Baseball

Synthesize Information

To show their growing body of knowledge, have students write a response to the phenomenon: What happens when objects collide?

To build students' writing stamina, provide an uninterrupted block of writing time for students. Increase the amount of time over the course of the year.

Review students' writing and provide revision notes so that students can revise during independent work time. For example, ask students to rewrite their introductory sentences to grab the reader's attention, or add greater detail to a fact they've included.

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English Language development. These tasks are best administered individually.

Writing Domain

Have students select one of the diagrams on pages 6–7 and write a brief description of what the diagram depicts.

Reading Domain

Use the photo on page 22. Write these words—*baseball, collision, cheat, energy of motion*. Have students read each word, then match it to the correct part of the photo, or use the photo to define it.

Listening Domain

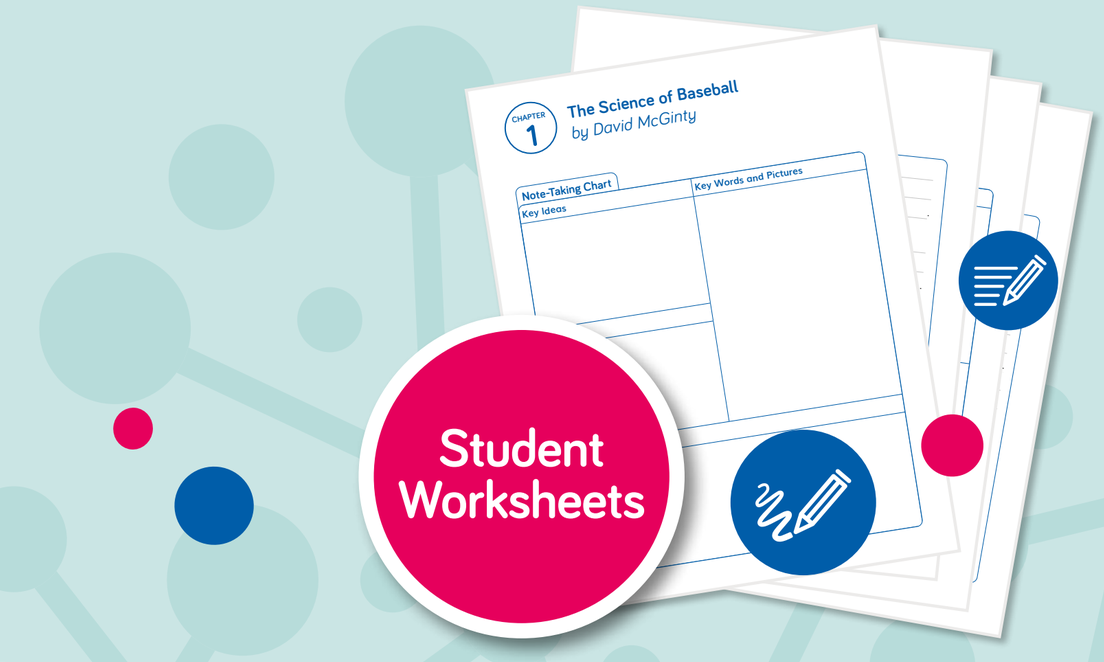
Describe the Jackie Robinson photos on pages 14–15. Add key details included in the photos, but not in the text (e.g., Robinson meeting with Dr. Martin Luther King, Jr.).

- ***How was baseball different when Jackie Robinson started playing the game?***
- ***How did Jackie Robinson help change baseball?***

Speaking Domain

As students answer the two questions in the Listening Domain task, record their use of academic vocabulary and ability to summarize the key details.

The Science of Baseball



CHAPTER 1

The Science of Baseball

by David McGinty

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

Sequence/Chronology

Jackie Robinson was a talented baseball player. While at college, _____

_____

_____.

After college, _____

_____

_____.

When he left the army, _____

_____

_____

On April 15, 1947, _____

_____

_____.

After that, _____

_____

_____

Robinson is remembered for his success on and off the baseball field.

CHAPTER 2

The Science of Baseball

by David McGinty

Energy Transfer

Amount of Water	Collision

CHAPTER 3

The Science of Baseball

by David McGinty

Read Across Texts

_____ and _____ are different texts on the same topic _____.

The author of _____ included details such as _____.

_____.

This helped make the topic more meaningful to me because _____.

_____.

The author of _____ included details such as _____.

_____.

This helped make the topic more meaningful to me because _____.

_____.

I think the most useful text on the topic was _____.

because _____.

_____.

Renewable Energy

Chapter 1: Energy and Fuel
This chapter focuses on the history of energy and fuel production. It teaches students strategies that skilled readers use to navigate and comprehend informational texts while reading independently.

Chapter 2: STEM Career: Meet an Energy Analyst
This chapter focuses on the career of an energy analyst. It includes an optional micro-lab in which students explore the power of wind energy.

Chapter 3: A Cleaner and Cooler Planet
This chapter examines using renewable energy sources to reduce our reliance on fossil fuels.



On-Level OL

English Learners EL

OL

Renewable Energy On-Level Lessons

CHAPTER 1

Energy and Fuel

First Read

Overview

This chapter focuses on the history of energy and fuel production. It also teaches students strategies that skilled readers use to navigate and comprehend informational text while reading independently.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (headings)
- Use text structures (cause and effect)
- Write cause and effect summaries.

Level Up

For students who struggle with the On-Level book, guide them through a reading of the Below-Level book first. Then have them listen to a recording of the On-Level book and follow along with the text. This scaffolding should prepare students for reading the On-Level book in small groups.

Preview the Text

Have students preview Chapter 1 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Prompt students to share their answers to Step 5, along with any other comments or questions they have about the text.

- ***What challenges might you face in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Ask students what they already know about the energy resources we use. What have they read, seen, or heard in videos and other readings? This will provide students background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary using the vocabulary routine.

- ***Why might an author boldface a term?***
- ***What does this add to the text?***

Step 1. Have students find and read the boldfaced content words in Chapter 1 (**clean energy, Industrial Revolution, fuel, taxonomy, photosynthesis, energy transfer, carbon dioxide**).
Step 2. Ask students to turn to the Visual Glossary on page 31. Explain that it may help them understand a given term. Have students find the entries for *Industrial Revolution* and *carbon dioxide* and read them to a partner.
Step 3. Repeat the terms as a class to confirm pronunciations.
Step 4. Highlight open compound words such as *clean energy* and *energy transfer* that might cause students confusion.
Step 5. Review the additional academic words using the following simple definitions and context sentences. Point out related words and word parts to expand students' vocabulary.

convert

Define: to change

Example: Before my trip, I had to *convert* my US dollars into Mexican pesos.

Ask: What can you convert a box into?

Related Words: conversion

renewable

Define: never used up or able to be replaced by new growth; able to begin again

Example: Trees are a *renewable* natural resource.

Ask: What is something that is not renewable?

Related Words: renew, renewed, nonrenewable

Word Parts: -able

transport

Define: to carry or move from one place to another

Example: We used a big truck to *transport* the apples from the farm to the store.

Ask: How would you transport a beehive? An elephant? A book?

Related Word: transportation

Word Parts: -trans (across)

efficient

Define: functioning in the best possible way with the least waste of time and effort

Example: Making a to-do list each day is the best way for me to be *efficient*.

Ask: What would you like to be more efficient at doing?

Related Words: efficiently, efficiency

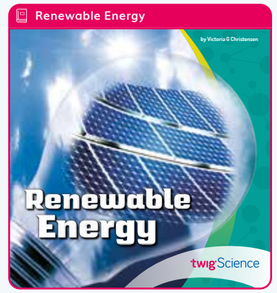
capture

Define: take, catch, or have control over

Example: You can *capture* rainwater in a barrel and use it to water your garden.

Ask: What are two things that can be captured?

Related Words: release (antonym)



OL

Energy and Fuel

Special Needs

Provide digital tools (e.g., tablets) for students to record notes. Encourage alternate ways of expressing ideas, such as through drawings or audio recordings.

Read

Discuss with students how they might approach reading Chapter 1. Model text navigation, as needed. Since students have already previewed the chapter, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: Students may turn to the Visual Glossary on page 31, if needed.

The author may suggest the reader look at a photograph, chart, or other visual—in this case, they should stop and do so. If not, they should read the section or page and then look at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does that information relate to the text?***

Remind students that they can go back and study the photos and illustrations more closely when they finish reading. Explain that if the page has a sidebar, students should read it last.

Connect to Writing—Note-Taking

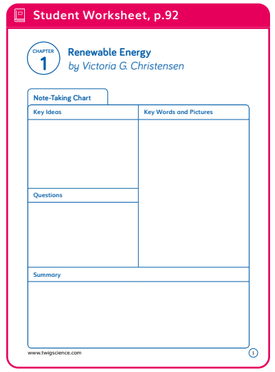
Ask students to refer to the Note-Taking Chart on their student worksheets (page 92).

As students read Chapter 1, have them:

Step 1. Write down key words and phrases to help them remember the big ideas, and draw pictures as memory aids.

Step 2. Note any questions they have about the text or portions of the text that confused them by jotting down the page and paragraph number, or the first few words, of the confusing sentence.

Step 3. Write a two- or three-sentence summary they could use to tell someone what the chapter was about.


Student Worksheet, p.92

CHAPTER 1 Renewable Energy
by Victoria G. Christensen

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

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While students work, circulate and notice any common confusion. During the after-reading discussion, you can go back to the text and model your thinking to clarify.

Build Content Knowledge

During the discussion of the text:

- Focus on the information presented on pages 4, 10, 11, 12, and 13.
- Emphasize the definition provided in the caption on page 3. Focus on the last paragraph on page 11. Have students list the types of energy they use that are detailed in the chapter. Focus on the illustration on page 2.
- Guide students to use the illustrations on pages 2 and 11 to explain energy sources and how they are created.
- Have students debate the role they can play in reducing their community's carbon footprint.
- Guide students to use the text on page 11 to describe photosynthesis and energy transfer.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

pages 2–3	***What is the difference between renewable and nonrenewable resources? What does the author want you to know about renewable resources? Why did the author include the illustration on page 2?***
page 4	***What does the author want you to know about ancient people's use of resources compared to our use today?***
pages 5–7	***How did the Industrial Revolution change our use of natural resources? Find evidence in the text to support your answer.***
pages 9–10	***What are fossil fuels? How do we use them? What do you learn from the illustration on page 10?***
page 11	***Why did the author include the information on plants?***
pages 12-13	***How are fossil fuels and our carbon footprints related? Why is this important?***

Energy and Fuel

Second Read

Revisit the Text

Ask students to identify the special text features in Chapter 1 and explain why the author used each one.

- ***Why did the author include the diagram on page 10?***
- ***What information does it add?***

Focus on Text Feature—Headings

Have students revisit the chapter headings. Review the questions readers should ask when they read informational texts.

- ***What's this chapter about?***
- ***What's the main idea?***

Writers of informational texts give clues that help answer these questions. Review the following steps with students for understanding headings and ask students to apply these to Chapter 1.

Step 1. Read the chapter title to find out the topic.
Step 2. Read the introduction to find out the main ideas of the article.
Step 3. Read the headings to find out the main idea of each section. Headings introduce a topic. They can also be used after reading to help summarize the chapter. Headings often have a special type treatment. They may be boldfaced, all capital letters, or in a color other than black.
Step 4. Look for details in the main body text to get additional facts.

Have students share what they learned from the chapter headings.

- ***Why did the author include headings in this chapter?***
- ***How did the headings help you understand the chapter or remember what it's about?***
- ***When and where could you use headings in your writing?***

To help students understand the use of headings, have them add some to an upcoming writing assignment. When students have to find or create a text feature and then determine where it should go in their own writing and why, they can more easily interpret it in other texts.

Focus on Text Structure—Cause and Effect

Determining how a text is structured will help students organize their thinking as they read and comprehend the text. Read the definition of the cause and effect text structure.

- ***This type of text explains why something happens. To find the effect of something, you should ask, "What happened?" To find the cause, you should ask, "Why did it happen?"***

Have pairs reread page 10, "Fossil Fuels."

- ***Why are fossil fuels not renewable*** (cause)***?***
- ***What is the effect of this on the use of coal, oil, and natural gas?***

Discuss signal words with students. Note that writers often use these as clues to a text's structure. Display and discuss a list of cause and effect signal words and phrases (e.g., *because, therefore, consequently, so, this led to, as a result, if...then*). Prompt students to look for these signal words in the texts they read.

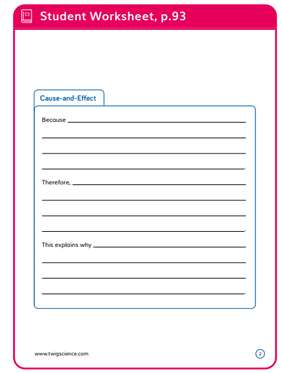
Read aloud page 10. As you read, prompt students to listen for a signal word that indicates cause and effect. Record it on a chart as students identify it (*because*).

Refer to the signal words list, add others, and prompt students to look for these words in their readings. During small group lessons, highlight these words and ask students how they help them organize their thinking as they read. Emphasize how noticing these words will help them remember details about what happens (effects) and why (causes) in a text.

Connect to Writing—Cause and Effect

Have students summarize page 10 using the Cause and Effect writing frame on their student worksheets (page 93). Students who want to expand their ideas can use the frame as a springboard, rather than following it directly.

Prompt students to share their summaries with the class.



OL

English Learners

Writing frames provide great speaking frames. Suggest that ELs or students who need additional support use the frame when presenting their ideas.

Writing Support

Have students record their completed frames on their student worksheets. Ask them to underline the cause and effect signal words (e.g., *because, therefore*). Prompt students to refer to the completed writing frame when writing cause and effect informational text pieces.

STEM Career: Meet an Energy Analyst

First Read

Overview

This chapter focuses on the career of an energy analyst. It includes an optional micro-lab in which students explore the power of wind.

Objectives

Students will:

- Navigate and read informational texts
- Use vocabulary strategies (context clues)
- Build fluency with science texts
- Make posters.

Word Study Support

Write the following Greek roots (prefixes) and their meanings: *hydro-* (*water*), *geo-* (*earth*), *bio-* (*life*). Review each root. Then write the following words from the chapter: *hydroelectric*, *geothermal*, and *bioenergy*. Guide students to use the meanings of the roots and the sentence context to determine the meaning of each word. Challenge students to find and list other words using these roots (e.g., *geology*, *geography*, *biology*, *biography*). Discuss the meanings using the Greek roots as clues.

Preview the Text

Have student preview Chapter 2 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study them later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Ask students what they expect to learn based on the preview.

- ***This chapter contains an interview. How does the format of an interview affect how you will read the chapter?***

Prepare

Ask students what they already know (if anything) about energy analysts, or how energy use is monitored at home. What have they read, seen, or heard in videos and other readings? This will provide students background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know, or can guess, about energy analysts.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*energy analysts*, *energy hogs*, *energy vampires*) using the vocabulary routine established in Chapter 1.

Review the most common meanings of *hogs* and *vampires*, and have students relate these to the meanings of the compound words *energy hogs* and *energy vampires* as they encounter the terms in the chapter.

Review the additional academic words to expand students' vocabulary.

create

Define: make, cause to happen

Example: I *created* a lot of noise when I dropped the plates.

Ask: What have you created at school? At home?

Related Words: creates, created, creating, creation

conserve

Define: to prevent waste or loss

Example: I turn off the faucet when I brush my teeth to *conserve* water.

Ask: How can you conserve water or electricity?

Related Words: conserves, conserved, conserving, conservation

analyze

Define: to carefully study the details of something to identify causes, possible results, or key factors

Example: When we *analyze* our experiment results, we learn more.

Ask: Why might you analyze weather patterns in your city or town?

Related Words: analyzes, analyzed, analyzing, analysis

Read

Ask students how they might approach reading Chapter 2. Help students navigate the text. Since students have already previewed the text, they should start by rereading the title and introduction.

Prompt students to begin their reading of the main text. Remind students that the chapter is set up as an interview, so they should read the questions and then the answers. If students struggle with a boldfaced term, prompt them to use decoding and context clues to determine its meaning.

Note: Students may turn to the Visual Glossary on page 31, if needed.

If the author suggests the reader look at a photograph or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does this information relate to the text?***

Have students whisper read the chapter. Listen in and offer feedback, if needed. If students struggle, model strategies to help them understand the text (such as visualize, clarify, and make inferences).

Discuss with students how they navigated the text. Have students turn and talk to a partner about the most fascinating or surprising thing they read in the chapter.

STEM Career: Meet an Energy Analyst

Build Content Knowledge

During the discussion of the text and optional micro-lab:

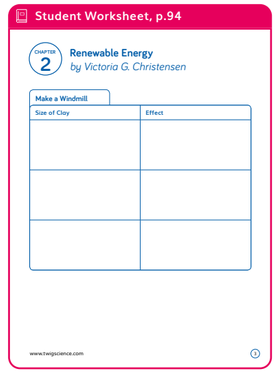
- Focus on the clean energy resources described on page 16.
- If conducting the optional micro-lab, focus on the discussion after students create and experiment with their windmills.
- Ask students to explain how this chapter deepens their understanding of energy. Focus on John Roger's discussion of clean energy resources on page 15 and the accompanying chart.
- Highlight the text on page 18—make sure students can explain the difference between energy hogs and energy vampires.
- If conducting the optional micro-lab, emphasize students' results Observe students as they work. Assist, as needed. Have pairs explain their micro-lab findings.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

page 14	*What does an energy analyst do?*
page 15	*Why did the author include the chart in the interview? How does it relate to what John Rogers does?*
page 16	*What does John Rogers think is the best clean energy resource? Why?*
page 17	*What advice does John Rogers give to reduce our carbon footprint? How does the circle graph help you understand the text?*
page 18	*What's the difference between an energy hog and an energy vampire? Why did the author include this question and answer in the interview?*
page 19	*What does the author want you to know about an energy analyst's tools?*

Optional Micro-Lab—Make a Windmill


Student Worksheet, p.94

CHAPTER 2 Renewable Energy
by Victoria G. Christensen

Make a Windmill

Size of Clay	Effect

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To deepen students' understanding of the key science concepts presented in the book and highlighted above, conduct the optional micro-lab, Make a Windmill, on pages 20–21. You can start this investigation on a later day and let students continue their exploration during independent work time.

Step 1. Make sure each student has all the materials listed—square sheet of paper (about 10 cm), scissors, glue, pencil, straw, 2 rubber bands, 50 cm thread, modeling clay, and tape.
Step 2. Assist students as they prepare the materials, if needed.
Step 3. Guide students through a reading of the directions before they begin, and have them restate each step of the directions to a partner.
Step 4. Give students time to experiment with the materials.
Step 5. Prompt students to record their findings on their student worksheets (page 94). Provide time for students to share and compare their findings.

STEM Career: Meet an Energy Analyst

Second Read

Revisit the Text

Ask students to identify the format of Chapter 2 and explain how it affected the way they navigated the text.

- ***Did you read this chapter differently from Chapter 1?***
- ***If so, what did you do?***

Focus on Fluency—Partner Read

Model reading the introduction using standard phrasing, intonation, and speed. Prompt students to pay attention to these as you read. For example, pause deliberately at a comma. Reread the introduction one sentence at a time, and have students echo-read.

Ask student pairs to reread the interview. One student should act as interviewer and the other should act as interviewee—after students finish, ask them to switch roles. Circulate, listen in, and offer feedback. Take note of students who need additional support, as well as specific aspects of the reading they struggle with (such as decoding or phrasing).

Focus on Vocabulary—Context Clues

Explain to students the many tools they can use to figure out the meaning of a word while reading. One tool is context clues, or the words and sentences around the unknown word.

Authors provide different kinds of clues in their writing.

- **Word Parts:** E.g. prefixes, suffixes
- **Definitions/Restatements:** Definition of the word is given right after it, often in parentheses, or followed by *is* or *means*
- **Synonyms:** Word with a similar meaning is given, often using the word *or*, *that is*, or *which is*
- **Antonyms:** Word is contrasted with something that means the opposite
- **Examples:** Lists of related things are given and the word is often followed by *such as*, *include*, *these*, or *for example*
- **General Clues**

Model for students how to use definition/restatement clues to determine word meanings. Write the following sentences from Chapter 2: "We also hunt _____. They are things that use electricity even when they're off."

- ***Look at this term: energy vampires. What does this mean? The first sentence says they are something that can be hunted, or found. The second sentence gives a definition. The author knew this would be a new term to readers, so she provided a definition directly after the sentence using the new term to avoid any confusion.***

Direct students attention to the following pages and words. Guide them to identify the clues the author provided to help the reader determine the word's meaning.

- *renewable energy*: general clues (page 3)
- *fuel*: definition (page 5)
- *cholera*: general clues (page 7)
- *taxonomy*: definition (page 9)

When students read Chapter 3, guide them to identify and use context clues to determine the meanings of the following words:

- *green*: definition (page 22)
- *turbines*: definition (page 24)

Prompt students to use these context clues in their writing to support their readers' understanding.

Connect to Writing—Informative Texts

Students will create a poster about energy to inform or persuade other students to conserve energy. This genre reformulation strategy will help deepen students' understanding of the chapter's content.

Review the formats of informative and persuasive posters. Remind students to select the type of poster they want to create and gear the text to meet that goal. For example, if they choose a persuasive poster, they must support their reasons with facts. Prompt students to use details from the interview on the poster.

Explain that variety in sentence length makes a text more interesting. If all the sentences were very long, the text would be boring.

Model how to combine sentences using *and* and *because*.

- **Original Sentences:** To conserve energy, look for energy hogs. Look for energy vampires, too. Energy hogs and energy vampires waste a lot of energy.
- **Sentence Combining:** To conserve energy, look for energy hogs and energy vampires because both waste a lot of energy.

Have student pairs brainstorm visuals they could add to their posters (e.g., Energy Use at Home circle graph) and what the visuals would add to readers' understanding of their topic.

Optional: Extend this activity by encouraging students to use digital tools to type and design their posters, add visuals, and print to display on a classroom wall.

CHAPTER 3

A Cleaner and Cooler Planet

First Read

Overview

This chapter examines using renewable energy resources to reduce our reliance on fossil fuels.

Objectives

Students will:

- Navigate and read informational texts
- Apply metacognitive comprehension strategies (summarize)
- Interpret text features (maps)
- Synthesize information
- Read and write across texts.

Preview the Text

Have student preview Chapter 3 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study them later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, ask yourself what the chapter will be about.

- ***What challenges might you face in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Prompt students to share what they already know about different types of renewable energy. What have they read, seen, or heard in videos and other readings? Remind students that this will provide background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*turbines, hydropower, construction*) using the vocabulary routine established in Chapter 1.

Remind students of the context clues they studied in Chapter 2. Ask them to define *hydropower* (page 26) using these clues.

Review the additional academic words to expand students' vocabulary.

device

Define: a machine

Example: We have many *devices* to help us learn in our classroom.

Ask: What devices do you use every day?

Easily Confused Words: devise (to form a plan)

Related Words: gadget

idle

Define: not working; doing nothing

Example: Even though they aren't in use, *idle* machines can still use electricity.

Ask: How would you feel about an idle partner when doing a school project?

Related Words: idled, idling

Read

Ask students how they might approach reading Chapter 3. Model text navigation, if needed. Since students have already previewed the text, they should start by rereading the title and introduction.

Prompt students to being their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: Students may turn to the Visual Glossary on page 31, if needed.

If the author suggests the reader look at a photograph, chart, or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***How do the visuals contribute to your understanding of the text?***
- ***Do they add new information?***
- ***How does this information relate to the text?***

Remind students that if the page has a sidebar, they should read it last.

Have students whisper read the chapter. Listen in and offer feedback. When students struggle, remind them of the metacognitive strategies they can use to help them understand the text (e.g., summarize, visualize, predict, ask questions, make inferences, clarify, and other fix-up strategies).

Metacognitive Strategy—Summarize

Explain to students that skilled readers use strategies to check their comprehension as they read. One strategy is stopping and summarizing what the author has written. When you summarize, you restate in your own words the most important ideas in the text. If you can't easily summarize, it means you need to go back and reread, or use another strategy. If you can summarize, then you can continue reading.

Read aloud page 22 to model summarizing.

- ***Let me summarize, or tell the main ideas in the text so far, to see if I understand what I'm reading. Fossil fuels are used more than clean energy and are cheaper. But they're a problem for our environment. So we need to create better clean energy tools to solve this problem. How did I do? Do you think I understand what I've read so far?***

As they read, prompt students to stop and summarize their reading. Point out good stopping points, as needed. Remind students that this is one strategy they can use to check their comprehension while reading.

English Learners

Provide sentence frames to support students' responses.

- I read that _____.
- We can get energy from _____ and _____.
- One kind of renewable energy is _____ .

OL

CHAPTER 3

A Cleaner and Cooler Planet

Second Read

Build Content Knowledge

During the discussion of the text:

- Guide students to name and describe the forms of power detailed—wind, solar, hydropower. Focus on the information provided about solar power.
- Have students explain how this chapter deepens their understanding of what energy is and how it can be used. Focus on the natural energy resources scientists are researching to replace fossil fuels.
- Guide students to explain each type of clean energy resource and how it works. Have students debate which type of clean energy resource they think is best to invest in.
- Focus on how solar power is derived and used.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen comprehension. Prompt students to cite evidence in the text (specific words, sentence, and illustrations) to support their answers.

page 23	*What does the author want you to know about the promise of wind turbines? Find text evidence to support your answer.*
pages 24–25	*How do wind turbines work? Why did the author include the map? What information does it add?*
pages 26–27	*What does the author want you to know about hydropower? How has it changed over the years? What is your opinion about using this form of energy resource?*
pages 28–29	*What does the author want you to know about solar power? How does it work? What information did you get from the map and photo? How does this information connect or add to the text?*

Revisit the Text

Ask students to identify the special text features in Chapter 3 and explain why the author used these.

- ***How do the sidebars and captions add to your understanding of the text?***
- ***How can you use the headings to summarize what you read?***
- ***What do the maps contribute to the text?***

Focus on Text Feature—Maps

Have students revisit the maps on pages 25, 26, and 28. Review that a map is a flat picture of part of the Earth. There are five main types of maps—political, physical, landform, transportation, and historical.

Review the following steps for reading a map and apply them to each map.

Step 1. Read the title. It tells you what the map is about.
Step 2. Find the map symbols.
Step 3. Look at the map key or legend (if available). It tells you what each map symbol means.
Step 4. Read the map labels and any captions.
Step 5. Find the compass rose (if available). It shows directions on the map.

Give students 2 minutes to turn and talk to a partner and explain what they learned from the maps.

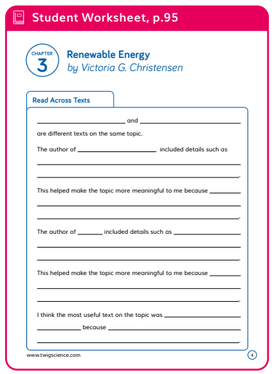
- ***Why did the author include the maps in this chapter?***
- ***How did the maps help you understand the chapter?***
- ***When and where could you use a map in your writing?***

To help students understand the use of maps, have them add one to an upcoming writing assignment. When students have to find or create a text feature before determining where it should go in a text and why, they can more easily interpret it in other texts.

Connect to Writing—Read Across Texts

Have students compare Chapter 3 to one of the other texts they have read in class. Ask them to complete the Read Across Texts writing frame on their student worksheets (page 95). Students who want to expand their ideas can use the frame as a springboard, rather than following it directly.

Prompt students to share their comparisons with the class.


Student Worksheet, p.95

CHAPTER 3 Renewable Energy
by Victoria G. Christensen

Read Across Texts

_____ and _____
are different texts on the same topic.
The author of _____ included details such as
_____
_____.
This helped make the topic more meaningful to me because _____
_____
_____.
The author of _____ included details such as _____
_____
_____.
This helped make the topic more meaningful to me because _____
_____
_____.
I think the most useful text on the topic was _____
_____ because _____
_____.

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OL

A Cleaner and Cooler Planet

Synthesize Information

To show their growing body of knowledge, have students write a response to the phenomenon: How do people produce and transfer energy for their use?

To build students' writing stamina, provide an uninterrupted block of writing time for students. Increase the amount of time over the course of the year.

Review students' writing and provide revision notes so that students can revise during independent work time. For example, ask students to rewrite their introductory sentences to grab the reader's attention, or add detail to a fact they've included.

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English language development. These tasks are best administered individually.

Writing Domain

Have students look at the illustration on page 30 and write a brief description of what is happening.

Reading Domain

Use the illustrations and photos in Chapter 1. Write these words—*wind, fossil fuels, water.* Have students read each word, then match it to the correct photo or illustration.

Listening Domain

Describe the chart on page 2. Add key details included in the illustration, but not in the text (e.g., the use of wood to start fires).

- ***How did people use energy long ago?***
- ***What energy resources are shown?***
- ***Which of these energy resources do we still use today?***

Speaking Domain

As students answer the three questions in the Listening Domain task, record their use of academic vocabulary and ability to summarize the key details.

EL

Renewable Energy
English Learner Lessons

CHAPTER 1

Energy and Fuel

First Read

Overview

This chapter focuses on the history of energy and fuel production. It also teaches students strategies that skilled readers use to navigate and comprehend informational text while reading independently.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (headings)
- Use text structures (cause and effect)
- Write a cause and effect summary.

Level Up

When working with ELs, use the following strategies to help them access the grade-level text.

- **Chunk the Text:** Focus on smaller sections of the text over an extended period of time to provide all the supports students will need to access meaning.
- **Read Aloud:** Consider reading aloud the text or having students listen to a recording before reading it together in small groups. For Emerging (Substantial Support) and some Expanding (Moderate Support) ELs, have them listen to a recording of the Below-Level book first for additional support.
- **Build Background:** Use videos, texts, and other resources to build background and vocabulary prior to reading the book.

Preview the Text

Have students preview Chapter 1 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, what do you think the chapter will be about?

Prompt students to share their answers to Step 5, along with any other comments or questions they have about the text.

- ***What challenges might you face in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Ask students what they already know about the energy sources we use. What have they read, seen, or heard in videos and other readings? This will activate students' background knowledge, which they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and share what they know about energy sources. Circulate and provide language support, such as recasting students' sentences using content and academic vocabulary.

Vocabulary Routine

Ensure students understand important new chapter vocabulary using the vocabulary routine. Before you begin.

- ***Why might an author boldface a term?***
- ***What does this add to the text?***

Step 1. Have students find and read the boldfaced content words in Chapter 1 (**clean energy, Industrial Revolution, fuel, taxonomy, photosynthesis, energy transfer, carbon dioxide**).
Step 2. Ask students to turn to the Visual Glossary on page 31. Tell students it may help them understand a given term. Have students find the entries for *Industrial Revolution* and *carbon dioxide* and read them to a partner.
Step 3. Repeat the terms as a class to confirm pronunciations.
Step 4. Highlight open compound words such as *clean energy* and ***energy transfer*** that might cause students confusion.
Step 5. Review the additional academic words using the following simple definitions and context sentences. Point out related words and word parts to expand students' vocabulary.

renewable

Define: never used up or able to be replaced by new growth; able to begin again

Example: Trees are a *renewable* natural resource.

Ask: What is something that is not renewable?

Sentence Frame: _____ is not renewable because _____ .

Related Words: renew, renewed, nonrenewable

Word Parts: - able

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

capture

Define: take, catch, or have control over

Example: You can *capture* rainwater in a barrel and use it to water your garden.

Ask: What are two things that can be captured?

Sentence Frame: Two things that can be captured are _____ and _____ .

Related Words: release

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

transport

Define: to carry or move from one place to another

Example: We used a big truck to *transport* the apples from the farm to the store.

Ask: How would you transport a beehive? An elephant? A book?

Sentence Frame: I would transport a _____ with _____ .

Related Words: transportation

Word Parts: - trans (across)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

efficient

Define: functioning in the best possible way with the least waste of time and effort

Example: Making a to-do list each day is the best way for me to be *efficient*.

Ask: What would you like to be more efficient at doing?

Sentence Frame: I would like to be more efficient at _____ .

Related Words: efficiently, efficiency

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

convert

Define: to change

Example: Before my trip, I had to *convert* my US dollars into Mexican pesos.

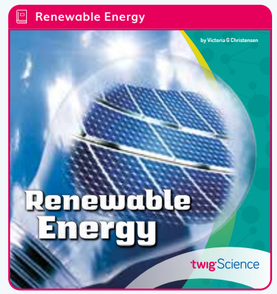
Ask: What can you convert a box into?

Sentence Frame: You can convert a box into _____ .

Related Words: conversion

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

EL



CHAPTER 1

Energy and Fuel

Linguistic Frames

The frames can assist students in presenting their ideas and internalizing linking words. These can be used with Emerging (Substantial Support) and Expanding (Moderate Support) ELs during most discussions. Model the frames for Emerging ELs and guide them as they use the frames. The frames can be presented as optional for Expanding ELs. Provide tiered frames for different levels of ELs as you read and discuss the chapters, such as the following.

- I predict that _____ .
- I predict _____ because _____ .
- Based on the photo, I predict because _____ .

Read

Discuss with students how they might approach reading Chapter 1. Model text navigation, as needed. Since students have already previewed the chapter, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

The author may suggest the reader look at a photograph, chart, or other visual—in this case, they should stop and do so. If not, they should read the section or page and then look at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information? How does that information relate to the text?***

Remind students they can go back and study the photos and illustrations more closely when they finish reading. Tell students that if the page has a sidebar, they should read it last.

Leveled Reader Supports

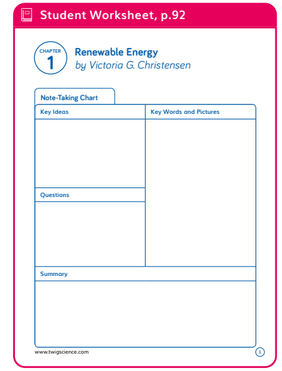
Multiple supports are provided in the text to assist you in helping students access the vocabulary presented.

- **Cognates:** Highlight words that are similar in Spanish and English to accelerate vocabulary building (e.g., *natural/natural*).
- **Use Context:** Guide students to use context clues to figure out the meanings of new words while reading. Reinforce this strategy frequently to build this independent reading habit.
- **Labels:** Throughout the text, labels on photos and illustrations connect the visuals to words in the chapters. Review these words as part of students' preview of each chapter.
- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

Connect to Writing—Note-Taking

Ask students to use the Note-Taking Chart on their student worksheets (page 92). As students read Chapter 1, have them:

Step 1. Write down key words and phrases to help them remember the big ideas, and draw pictures as memory aids.
Step 2. Note any questions they have about the text or portions of the text that confused them by jotting down the page and paragraph number or the first few words of the confusing sentence.
Step 3. Write a two- or three-sentence summary they could use to tell someone what the chapter was about.


Student Worksheet, p.92

CHAPTER 1 Renewable Energy
by Victoria G. Christensen

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

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While students are reading and taking notes, circulate and notice any common confusion. During the after-reading discussion, you can go back to the text and model your thinking to clarify.

Annotate the Text

When annotating the text, guide students to circle the following:

- Unfamiliar Words
- Confusing Sentences

Prompt students to use context clues to clarify meaning. Use conversation prompts and linguistic frames to discuss students' annotations.

Prompt	Frame
Which words did you circle?	I circled _____ .
What words or sentences are confusing?	I don't know what _____ means.
What clues in the text can help us figure out the word? Is there a prefix/suffix/root? What does the prefix/suffix/root mean?	I think _____ might mean _____ because _____ .

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary.

- **Unpack:** Guide students to unpack complex sentences and paragraphs, focusing on meaning. Use the underlined portions of the challenging text to help students break apart and simplify complex ideas. Work with students to rewrite complex sentences/paragraphs using accessible language and sentence structure. Ask prompting questions such as: What's happening? Who or what is this about? What does this sentence mean in your own words?
- **Connect:** Some students struggle connecting ideas within a paragraph due to their physical separation across the paragraph or due to the use of pronouns. Use the underlined words and phrases to connect these ideas. For pronouns, guide students to restate each sentence, replacing the pronoun with the noun it refers to in order to clarify meaning.

Special Needs

Provide digital tools (e.g., tablets) for students to record notes. Encourage alternate ways of expressing ideas, such as through drawings or audio recordings.

Energy and Fuel

Build Text Knowledge

During the discussion of the text:

- Focus on the information presented on pages 4, 10, 11, 12, and 13.
- Emphasize the definition provided in the caption on page 3. Focus on the last paragraph on page 11.
- Have students list the types of energy they use that are detailed in the chapter. Focus on the illustration on page 2.
- Guide students to use the illustrations on pages 2 and 11 to explain energy sources and how they are created.
- Have students debate the role they can play in reducing their community's carbon footprint.
- Guide students to use the text on page 11 to describe photosynthesis and energy transfer.

Assess Conversation

Use the chart to gauge students' progress as they participate in collaborative conversations. Model conversation exchanges to support students' growth.

Bridging 4	*Students engage in 5 or more exchanges. They support their ideas with evidence and sufficiently synthesize ideas.*
Expanding 3	*Students engage in 3-4 exchanges. They ask and answer questions, agree and disagree, and build on each other's ideas.*
Early Expanding 2	*Students engage in 1 exchange, using only a sentence or two. Sometimes the conversation is extended.*
Emerging 1	*Students offer 1 short answer. The exchange is often highly structured.*
0	*Students are silent during the conversation.*

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

pages 2–3	*What is the difference between renewable and nonrenewable resources? What does the author want you to know about renewable resources? Why did the author include the illustration on page 2?*
page 4	*What does the author want you to know about ancient people's use of resources long ago as compared to our use today?*
pages 5–7	*How did the Industrial Revolution change our use of natural resources? Find evidence in the text to support your answer.*
pages 9–10	*What are fossil fuels? How do we use them? What do you learn from the illustration on page 10?*
page 11	*Why did the author include the information on plants?*
pages 12-13	*How are fossil fuels and our carbon footprints related? Why is this important?*

Energy and Fuel

Second Read

Revisit the Text

Ask students to identify the special text features in Chapter 1 and explain why the author used each one.

- ***Why did the author include the diagram on page 10?***
- ***What information does it add?***

Focus on Text Feature—Headings

Have students revisit the chapter headings. Review that when they read informational texts.

- ***What's this chapter about?***
- ***What's the main idea?***

Writers of informational texts give you clues that help you answer these questions. Review the following steps with students for understanding headings and ask students to apply these to Chapter 1.

Step 1. Read the chapter title to find out the topic.
Step 2. Read the introduction to find out the main ideas of the article.
Step 3. Read the headings to find out the main idea of each section. Headings introduce a topic. They can also be used after reading to help summarize the chapter. Headings often have a special type treatment. They may be boldfaced, all capital letters, or in a color other than black.
Step 4. Look for details in the main body text to get additional facts.

Have students share what they learned from the chapter headings.

- ***Why did the author include headings in this chapter?***
- ***How did the headings help you understand the chapter or remember what it's about?***
- ***When and where could you use headings in your writing?***

Prompt students to share their answers.

To help students better understand the use of headings, have them add headings to an upcoming writing assignment. When students have to find or create a text feature and then determine where it should go in their own writing and why, they can more easily interpret this feature in other texts.

Focus on Text Structure—Cause and Effect

Discuss the importance of identifying how a text is structured. Tell students that figuring out how a text is structured will help them organize their thinking as they read and better comprehend the text. Read the definition of the cause and effect text structure.

- ***This type of text explains why something happens. To find the effect of something, you should ask, "What happened?" To find the cause, you should ask, "Why did it happen?"***

Have student partners reread page 10, "Fossil Fuels."

- ***Why are fossil fuels not renewable (cause)?***
- ***What is the effect of this on the use of coal, oil, and natural gas?***

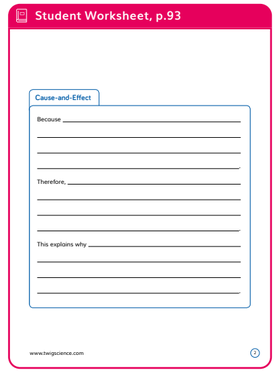
Discuss signal words with students. Note that writers often use these as clues to a text's structure. Display and discuss a list of cause and effect signal words and phrases (e.g. *because, therefore, consequently, so, this led to, as a result, if ... then*). Prompt students to look for these signal words in the texts they read.

Read aloud page 10. As you read, prompt students to listen for a signal word that indicates cause and effect. Record it on a chart as students identify it (*because*).

Post the signal words list, add others, and prompt students to look for these words in their readings. During small group lessons, highlight these words and ask students how they help them organize their thinking as they read. Emphasize how noticing these words will help them remember details about what happens (effects) and why (causes) in a text.

Connect to Writing—Cause and Effect Writing Frame

Have students summarize page 10 using the Cause and Effect writing frame on their student worksheets (page 93). Prompt students to share their summaries with the class. Writing frames provide great speaking frames. Suggest students use the frame when presenting their ideas.


Student Worksheet, p.93

Cause-and-Effect

Because _____

Therefore, _____

This explains why _____

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Writing Support

Have students record their completed frames on their student worksheets. Ask them to underline the cause-and-effect signal words (e.g., *because, therefore*). Prompt students to refer to the completed writing frame when writing cause-and-effect informational text pieces.

STEM Career: Meet an Energy Analyst

First Read

Overview

This chapter focuses on the career of an energy analyst. It includes an optional micro-lab in which students explore the power of wind energy.

Objectives

Students will:

- Navigate and read informational texts
- Use vocabulary strategies (context clues)
- Build fluency with science texts
- Create a poster.

Word Study Support

Write the following Greek roots (prefixes) and their meanings: *hydro-* (water), *geo-* (earth), *bio-* (life). Review each root. Then write the following words from the chapter: *hydroelectric, geothermal, and bioenergy*. Guide students to use the meanings of the roots and the sentence context to determine the meaning of each word. Challenge students to find and list other words using these roots (e.g., *geology, geography, biology, biography*). Discuss the meanings using the Greek roots as clues.

Preview the Text

Have students preview Chapter 2 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, what do you think the chapter will be about?

Ask students what type of information they expect to learn based on the preview of Chapter 2.

- ***This chapter contains an interview. How does the format of an interview affect how you will read the chapter?***

Prepare

Ask students what they already know (if anything) about energy analysts, or how energy use is monitored at home. What have they read, seen, or heard in videos and other readings? This will activate students' background knowledge, which they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and share what they know, or can guess, about energy analysts. Circulate and provide language support, such as recasting students' sentences using content and academic vocabulary.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*energy analysts, energy hogs, energy vampires*) using the vocabulary routine established in Chapter 1.

Review the most common meanings of *hogs* and *vampires*, and have students relate these to the meanings of the compound words *energy hogs* and *energy vampires* as they encounter the terms in the chapter.

Review the additional academic words to expand students' vocabulary.

analyze

Define: to carefully study the details of something to identify causes, possible results, or key factors

Example: When we *analyze* our experiment results, we learn more.

Ask: Why might you analyze weather patterns in your city or town?

Sentence Frame: I analyze weather to _____ .

Related Words: analyzes, analyzed, analyzing, analysis

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

conserve

Define: to prevent waste or loss

Example: I turn off the faucet when I brush my teeth to *conserve* water.

Ask: How can you *conserve* water or electricity?

Sentence Frame: You can conserve _____ by _____ .

Related Words: conserves, conserved, conserving, conservation

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

create

Define: make, cause to happen

Example: I *created* a lot of noise when I dropped the plates.

Ask: What have you *created* at school? At home?

Sentence Frame: I have created _____ a _____ .

Related Words: creates, created, creating, creation

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

Read

Ask students how they might approach reading Chapter 2. As you did in the previous chapter, help students navigate the text. Since students have already previewed the text, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. Remind students that the chapter is set up as an interview, so they should read the questions and then the answers. If students struggle with a boldfaced term, prompt them to use decoding and context clues to determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals. Students should ask themselves:

- ***Does the visual illustrate something in the text?***
- ***Does it add new information? How does this information relate to the text?***

Discuss with students how they navigated the text. Have students turn and talk to a partner about the most fascinating or surprising thing they read in the chapter.

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary presented.

- **Cognates:** Highlight words that are similar in Spanish and English to accelerate vocabulary building (e.g., *depends/depende*).
- **Use Context:** Guide students to use context clues to figure out the meanings of new words while reading. Reinforce this strategy frequently to build this independent reading habit.
- **Greek and Latin Roots:** Teach Greek and Latin roots that can be used to access the meanings of new words. This focus on morphemes will benefit all students.
- **Idioms:** Highlight English idioms that might cause students confusion.
- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

STEM Career: Meet an Energy Analyst

Leveled Reader Supports

You might choose to guide students through an initial reading of the chapter. Multiple supports are provided in the text to assist you in helping students access the vocabulary.

- **Unpack:** Guide students to unpack complex sentences and paragraphs, focusing on meaning. Use the underlined portions of the challenging text to help students break apart and simplify complex ideas. Work with students to rewrite complex sentences/paragraphs using accessible language and sentence structure. Ask: What's happening? Who or what is this about? What does this sentence mean in your own words?

Build Text Knowledge

During the discussion of the text and optional micro-lab:

- Focus on the clean energy sources described on page 16.
- If conducting the optional micro-lab, focus on the discussion after students create and experiment with their windmills.
- Ask students to explain how this chapter deepens their understanding of energy. Focus on John Roger's discussion of clean energy on page 15 and the accompanying chart.
- Highlight on the text on page 18—make sure students can explain the difference between *energy hogs* and *energy vampires*.
- If conducting the optional micro-lab, observe students as they work and assist, as needed. Emphasize students' results and have partners explain their micro-lab findings.

Collaborative Conversation Support

Rephrasing

Saying things in multiple ways is essential when using new vocabulary or idioms. For example, state a sentence containing academic or content vocabulary then rephrase it using simplified language.

Use Native Language

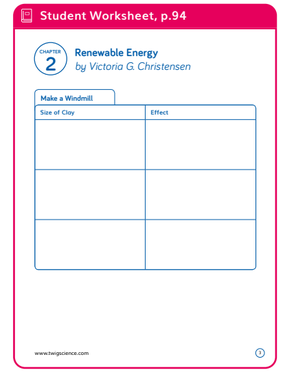
Allow students to discuss new concepts in their native language with peers (if multiple students speak the same language) before engaging them in a conversation about those ideas in English.

Ask Text-Dependent Questions

Ask the text-dependent questions on the following page to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

page 14	*What does an energy analyst do?*
page 15	*Why did the author include the chart in the interview? How does it relate to what John Rogers does?*
page 16	*What does John Rogers think is the best form of clean energy? Why?*
page 17	*What advice does John Rogers give to reduce, or lessen, our carbon footprint? How does the circle graph help you better understand the text?*
page 18	*What's the difference between an energy hog and an energy vampire? Why did the author include this question and answer in the interview?*
page 19	*What does the author want you to know about an energy analyst's tools?*

Optional Micro-Lab—Make a Windmill


Student Worksheet, p.94

CHAPTER 2 Renewable Energy
by Victoria G. Christensen

Make a Windmill

Size of Clay	Effect

www.twigscience.com

To deepen students' understanding of the key science concepts presented in the book and highlighted above, you may conduct the optional micro-lab, Make a Windmill on pages 20–21. You may want to start this investigation on a later day and let students continue their exploration during independent work time.

Step 1. Make sure each student has all the materials listed—square sheet of paper (about 10 cm), scissors, glue, pencil, straw, 2 rubber bands, 50 cm thread, modeling clay, and tape.

Step 2. If needed, assist students as they prepare the materials.

Step 3. The micro-lab is presented as a read together experience. Read it to students, then repeat it as an echo-read. Guide students to restate each step in the directions to a partner to confirm understanding before completing the lab.

Step 4. Give students time to experiment with the materials.

Step 5. Prompt students to record their findings on their student worksheets (page 94). Provide time for students to share and compare their findings.

STEM Career: Meet an Energy Analyst

Second Read

Revisit the Text

Ask students to identify the format of Chapter 2 and explain how it affected the way they navigated the text.

- ***Did you read this chapter differently from Chapter 1? If so, what did you do?***

Focus on Fluency—Partner Read

Model reading the introduction using standard phrasing, intonation, and speed. Prompt students to pay attention to these as you read. For example, pause deliberately at a comma. Reread the introduction one sentence at a time, and have students echo-read.

Ask student pairs to reread the interview. One student should act as interviewer and the other should act as interviewee—after students finish, ask them to switch roles. Circulate, listen in, and offer feedback. Take note of students who need additional support, as well as specific aspects of the reading they struggle with (such as decoding or phrasing).

Focus on Text Feature—Context Clues

Explain to students the many tools they can use to figure out the meaning of a word while reading. One tool is context clues, or the words and sentences around the unknown word. Authors provide different kinds of clues in their writing.

- **Word Parts:** E.g. prefixes, suffixes
- **Definitions/Restatements:** Definition of the word is given right after it, often in parentheses, or followed by *is* or *means*
- **Synonym:** Word with a similar meaning is given, often using the word *or, that is,* or *which is*
- **Antonym:** Word is contrasted with something that means the opposite
- **Examples:** Lists of related things are given and the word is often followed by *such as, include, these,* or *for example*
- **General Clues**

Model for students how to use definition/restatement clues to determine word meanings. Write the following sentences from Chapter 2: "We also hunt energy vampires. They are things that use electricity even when they're off."

- ***Look at the term I underlined: energy vampires. What does this mean? The first sentence says they are something that can be hunted, or found. The second sentence gives a definition. The author knew this would be a new term to readers, so he provided a definition directly after the sentence using the new term to avoid any confusion.***

Direct students attention to the following pages and words. Guide them to identify the clues the author provided to help the reader determine the word's meaning.

- *renewable energy:* (page 3)
- *fuel:* (page 5)
- *cholera:* (page 7)
- *taxonomy:* (page 9)

When students read Chapter 3, guide them to identify and use context clues to determine the meanings of the following words:

- *green:* (page 22)
- *turbines:* (page 24)
- *solar energy:* (page 28)

Prompt students to use these context clues in their writing to support their readers' understanding.

Connect to Writing—Informative Texts

Have students turn the interview into a poster about energy. This genre reformulation strategy helps deepen students' understanding of the chapter's content.

Tell students that they will create a poster about energy to inform or persuade other students to better conserve energy.

Review the formats of informative and persuasive posters. Remind students to select the type of poster they want to create and gear the text to meet that goal. For example, if they choose a persuasive poster, they must support their reasons with facts.

Explain to students that variety in sentence length makes a text more interesting. If all the sentences were very long, the text would be boring. Write the following sentences, or use examples from student writing. Model how to combine the sentences using *and* and *because*.

- **Original Sentences:** To conserve energy, look for energy hogs. Look for energy vampires, too. Energy hogs and energy vampires waste a lot of energy.
- **Sentence Combining:** To conserve energy, look for energy hogs and energy vampires because both waste a lot of energy.

Prompt students to use details from the interview on the poster.

Have student partners to brainstorm visuals they could add to their poster (e.g., Energy Use at Home circle graph) and what the visuals would add to readers' understanding of their topic.

You may extend this activity by encouraging students to use digital tools to type and design their posters, add visuals, and print to display on a classroom wall.

CHAPTER 3

A Cleaner and Cooler Planet

First Read

Overview

This chapter examines using renewable energy sources to reduce our reliance on fossil fuels.

Objectives

Students will:

- Navigate and read informational texts
- Apply metacognitive comprehension strategies (summarize)
- Interpret text features (maps)
- Synthesize information
- Read and write across texts.

Preview the Text

Have students preview Chapter 3 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, what do you think the chapter will be about?

- ***What challenges might you face in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Prompt students to share what they already know about different types of renewable energy. What have they read, seen, or heard in videos and other readings? Remind students that they can draw on this background knowledge as they read.

Give students 2 minutes to turn and talk with a partner and share what they know about renewable energy. Circulate and provide language support, such as the following sentence frames:

- I read that _____ .
- We can get energy from _____ and _____ .
- One kind of renewable energy is _____ .

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*turbines*, *hydropower*, *construction*, *solar energy*) using the vocabulary routine established in Chapter 1.

Remind students of the context clues they studied in the previous chapter, and ask them to define *hydropower* (page 26) and *solar energy* (page 28) using these clues.

Review the additional academic words to expand students' vocabulary.

device

Define: a machine

Example: We have many *devices* to help us learn in our classroom.

Ask: What devices do you use every day?

Sentence Frame: The devices I use every day include _____ .

Easily Confused Words: devise (to form a plan)

Related Words: gadget

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

idle

Define: not working; doing nothing

Example: Even though they aren't in use, *idle* machines can still use electricity.

Ask: How would you feel about an idle partner when doing a school project?

Sentence Frame: I would feel _____ about an idle partner because _____ .

Related Words: idled, idling

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

Make Word Banks

Provide word banks during discussions for students to refer to. Include content and academic words, as well as words that help students link ideas (*because*, *therefore*, *in addition*). You can organize the word bank by part of speech, for example, to help students. For Emerging (Substantial Support) ELs, use word banks with one category of words and connect it to a simple linguistic frame. For Expanding (Moderate Support) ELs, collect words by listening to students' conversation (Collect and Display Language Routine), then add words from the chapter to extend this word bank.

Read

Ask students how they might approach reading Chapter 3. Model text navigation, if needed. Since students have already previewed the text, they should start by rereading the title and introduction. Tell students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph, chart, or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***How do the visuals contribute to your understanding of the text?***
- ***Do they add new information? How does that information relate to the text?***

Remind students that if the page has a sidebar, they should read it last.

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary presented.

- **Cognates:** Highlight words that are similar in Spanish and English to accelerate vocabulary building (e.g., *problem/problema*).
- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

Leveled Reader Supports

You might choose to guide students through an initial reading of the chapter. Multiple supports are provided in the text to assist you in helping students access complex sentences and build overall understanding of key ideas presented in the chapter.

- **Connect:** Some students struggle connecting ideas within a paragraph due to their physical separation across the paragraph or due to the use of pronouns. Use the underlined words and phrases to connect these ideas. For pronouns, guide students to restate each sentence, replacing the pronoun with the noun it refers to in order to clarify meaning.

EL

A Cleaner and Cooler Planet

Metacognitive Strategy—Summarize

Explain to students that skilled readers use strategies to check their comprehension as they read. One strategy is stopping and summarizing what the author has written. When you summarize, you restate in your own words the most important ideas in the text. If you can't easily summarize, it means you need to go back and reread, or use another strategy. If you can summarize, then you can continue reading.

Read aloud page 22 to model summarizing.

- ***Let me summarize, or tell the main ideas in the text so far, to see if I understand what I'm reading. Fossil fuels are used more than clean energy and are cheaper. But they're a problem for our environment. So we need to create better clean energy tools to solve this problem. How did I do? Do you think I understand what I've read so far?***

As they read the chapter, prompt students to periodically stop and summarize their reading. Point out good stopping points, as needed. Remind students that this is one of several strategies they can use to check their comprehension while reading.

Build Text Knowledge

During the discussion of the text:

- Guide students to name and describe the forms of energy detailed—wind, solar, hydropower.
- Focus on the information provided about solar energy. Go over the solar panel diagram on page 29.
- Have students explain how this chapter deepens their understanding of what energy is and how it can be used. Focus on the natural sources of energy scientists are researching to replace fossil fuels.
- Guide students to explain each type of clean energy and how it works.
- Have students debate which type of clean energy they think is best to invest money in.
- Focus on how solar energy is derived and used.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen comprehension. Prompt students to cite evidence in the text (specific words, sentence, and illustrations) to support their answers.

page 23	***What does the author want you to know about the promise of wind energy? Find text evidence to support your answer.***
pages 24–25	***How do wind turbines work? Why did the author include the map? What information does it add?***
pages 26–27	***What does the author want you to know about hydropower? How has it changed over the years? What is your opinion about using this form, or kind, of energy?***
pages 28–29	***What does the author want you to know about solar energy? How does it work? What information did you get from the map and diagram? How does that information connect or add to the text?***

Extend the Conversation

Extend students' conversation about the ideas presented in the chapter.

- ***What do you think?***
- ***What do you mean by _____ ?***
- ***I'm confused. Please explain.***
- ***How do you know? Find the evidence.***
- ***What clues in the text gave you that idea?***
- ***Do you agree? Why or why not?***

Use these frames to support students' answers.

- I think _____ .
- I mean _____ .
- I know this because _____ .
- I know this because I read _____ .
- I know _____ because _____ .
- One text detail that shows this is _____ .
- This means that _____ .
- I agree. I also think that _____ .
- I disagree. I think that _____ .

English Learners

Use additional supports for Emerging ELs.

Substantial Support (Emerging Proficiency)

- **Total Physical Response:** Use actions and gestures when possible to communicate ideas.
- **Yes/No Examples:** Ask yes/no questions to encourage students to participate in a discussion. For example, ask: Is this a _____ ?
- **Use Simple Linguistic Frames and Word Banks:** Provide a simple response frame and list possible words for students to choose from in their responses.

A Cleaner and Cooler Planet

Second Read

Revisit the Text

Ask students to identify the special text features in Chapter 3 and explain why the author used these.

- ***How do the sidebars and captions add to your understanding of the text?***
- ***How can you use the headings to summarize what you read?***
- ***What do the maps contribute to the text?***

Focus on Text Feature—Maps

Have students revisit the maps on pages 25, 26, and 28. Review that a map is a flat picture of part of the Earth. There are five main types of maps—political, physical, landform, transportation, and historical.

Review the following steps for reading a map and apply them to each map.

Step 1. Read the title. It tells you what the map is about.
Step 2. Find the map symbols.
Step 3. Look at the map key or legend (if available). It tells you what each map symbol means.
Step 4. Read the map labels and any captions.
Step 5. Find the compass rose (if available). It shows directions on the map.

Give students 2 minutes to turn and talk to a partner and explain what they learned from the maps.

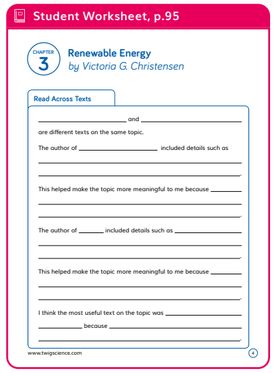
- ***Why did the author include the maps in this chapter?***
- ***How did the maps better help you understand the chapter?***
- ***When and where could you use a map in your writing?***

Prompt students to share their answers.

To help students better understand the use of maps, have them add one to an upcoming writing assignment. When students have to find or create a text feature, then determine where it should go in a text and why, they are better able to interpret these features in other texts.

Connect to Writing—Read Across Texts

Have students compare Chapter 3 to one of the other texts they have read in class. Ask them to complete the Read Across Texts writing frame on their student worksheets (page 95). Students who wish to expand their ideas can use the frame as a springboard, rather than following it directly. Prompt students to share their comparisons with the class.


Student Worksheet, p.95

CHAPTER 3 Renewable Energy
by Victoria G. Christensen

Read Across Texts

_____ and _____ are different texts on the same topic.

The author of _____ included details such as _____

This helped make the topic more meaningful to me because _____

The author of _____ included details such as _____

This helped make the topic more meaningful to me because _____

I think the most useful text on the topic was _____ because _____

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Synthesize Information

To show their growing body of knowledge, have students write a response to the phenomenon: How do people produce and transfer energy for their use?

To build students' writing stamina, provide an uninterrupted block of writing time for students. Increase the amount of time over the course of the year.

Review students' writing and provide revision notes so that students can revise during independent work time. For example, you may ask students to rewrite their introductory sentences to better grab the reader's attention, or add greater detail to a particular fact they've included.

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English Language development. These tasks are best administered individually.

Writing Domain
Have students look at the illustration on page 30 and write a brief description of what is happening.

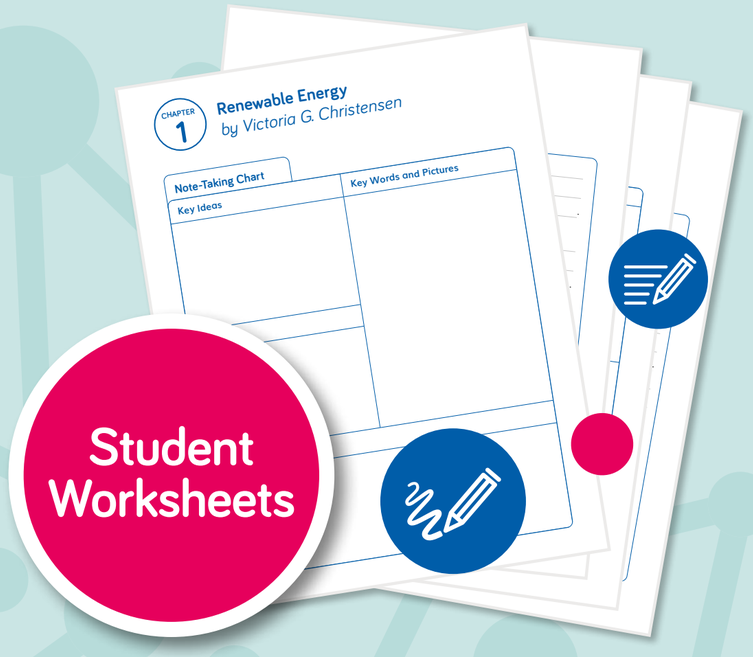
Reading Domain
Use the illustrations and photos in Chapter 1. Write these words: *wind, solar energy, fossil fuels, water.* Have students read each word, then match it to the correct photo or illustration.

Listening Domain
Describe the chart on page 2. Add key details included in the illustration, but not in the text (e.g., the use of wood to start fires).

- ***How did people use energy long ago?***
- ***What energy sources are shown?***
- ***Which of these energy sources do we still use today?***

Speaking Domain
As students answer the three questions in the Listening Domain task, record their use of academic vocabulary and ability to summarize the key details.

Renewable Energy



CHAPTER 1

Renewable Energy

by Victoria G. Christensen

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

Cause-and-Effect

Because _____

_____

_____

_____.

Therefore, _____

_____

_____

_____.

This explains why _____

_____

_____

_____.

CHAPTER 2

Renewable Energy

by Victoria G. Christensen

Make a Windmill

Size of Clay	Effect

CHAPTER 3

Renewable Energy

by Victoria G. Christensen

Read Across Texts

_____ and _____ are different texts on the same topic.

The author of _____ included details such as _____.

This helped make the topic more meaningful to me because _____.

The author of _____ included details such as _____.

This helped make the topic more meaningful to me because _____.

I think the most useful text on the topic was _____ because _____.

Sculpting Landscapes

Chapter 1: How Old Is the Grand Canyon?
This chapter focuses on weathering and erosion and how they have helped to form some of the Earth's most interesting landscapes. It also teaches students strategies that skilled readers use to navigate and comprehend informational texts while reading independently.

Chapter 2: STEM Career: Meet a Geologist
This chapter focuses on the career of a geologist. It includes an optional micro-lab in which students explore chemical weathering.

Chapter 3: Refreezing the Arctic
This chapter examines scientific efforts in the Arctic to lessen the effects of climate change.



On-Level OL

English Learners EL

OL

Sculpting Landscapes On-Level Lessons

CHAPTER 1

How Old Is the Grand Canyon?

First Read

Overview

This chapter focuses on weathering and erosion and how they have helped form some of the Earth's most interesting landscapes. It also teaches students strategies that skilled readers use to navigate and comprehend informational texts while reading independently.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (headings and subheadings)
- Read and write across texts.

Level Up

For students who struggle with the On-Level book, guide them through a reading of the Below-Level book first. Then have them listen to a recording of the On-Level book and follow along with the text. This scaffolding should prepare students for reading the On-Level book in small groups.

Preview the Text

Have students preview Chapter 1 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Prompt students to share their answers to Step 5, along with any other comments or questions they have about the text.

- ***What challenges might they meet in reading the chapter?***
- ***What reading tools do they have to tackle these challenges?***

Prepare

Ask students to share their prior knowledge of the Grand Canyon and how it was formed. What have they read, seen, or heard in videos and other readings? This will provide students background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and share what they know about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary using the vocabulary routine.

- ***Why might an author bold a term?***
- ***What does this add to the text?***

Step 1. Have students find and read the bolded content words in Chapter 1 (**landscape, weathering, erosion, molten rock, limestone, debris, fossils**).
Step 2. Ask students to turn to the Visual Glossary on page 31. Tell students it may help them understand a given term. Have students find the entries for *erosion* and *weathering* and read them to a partner.
Step 3. Repeat the terms as a class to confirm pronunciations.
Step 4. Highlight the difference in meanings of *weather* (the state of the atmosphere including wind, air pressure, temperature) and *weathering* (the process by which rock separates and breaks apart), which might cause students confusion.
Step 5. Review additional academic words using simple definitions and context sentences. Point out related words and word parts to expand students' vocabulary.

transform

Define: change in form, appearance, or structure

Example: They might *transform* our town's old library into a museum.

Ask: What can you transform an empty box into?

Related Words: transformation

enormous

Define: very big

Example: An elephant is an *enormous* land animal.

Ask: What enormous things have you seen?

Related Words: huge, gigantic, mammoth, colossal (synonyms)

sculpt

Define: to form or shape

Example: I can *sculpt* a ball of clay into a vase.

Ask: What tools can you use to sculpt something?

Related Words: sculpts, sculpted, sculpting, sculpture, carved (synonym in chapter)

erode

Define: to eat into or away; slowly destroy

Example: My mistakes on the test *eroded* my confidence in how much I know about volcanoes.

Ask: What can happen when the side of a mountain starts to erode?

Related Words: erodes, eroded, erosion

Word Parts: open syllable (first syllable)

Read

Discuss with students how they might approach reading Chapter 1. Model text navigation, as needed. Since students have already previewed the chapter, they should start by rereading the title and introduction.

Prompt students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: Students can use the Visual Glossary on page 31.

The author may suggest the reader look at a photograph, chart, or other visual—in this case, they should stop and do so. If not, they should read the section or page and then look at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does this information relate to the text?***

Remind students that they can go back and study the photos and illustrations more closely when they finish reading. Tell students that if the page has a sidebar, they should read it last.



OL

CHAPTER 1

How Old Is the Grand Canyon?

Special Needs

Provide digital tools (e.g., computers or tablets) for students to record notes. Encourage alternate ways of expressing ideas, such as through drawings or audio recordings.

Connect to Writing—Note-Taking

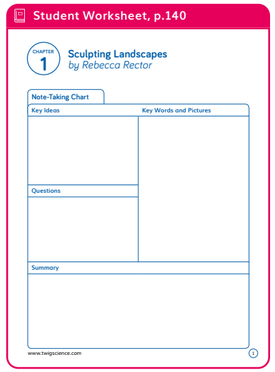
Have students turn to the Note-Taking Chart on their student worksheets (page 140).

As students read Chapter 1, have them:

Step 1. Write key words and phrases to help them remember the big ideas, and draw pictures as memory aids.

Step 2. Note any questions they have about the text or portions of the text that confused them by jotting down the page and paragraph number or the first few words of the confusing sentence.

Step 3. Write a two- or three-sentence summary they could use to tell someone what the chapter was about.


Student Worksheet, p.140

CHAPTER 1 Sculpting Landscapes by Rebecca Rector

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

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While students are reading and taking notes, circulate and notice any common confusion. During the after-reading discussion, you can go back to the text and model your thinking to clarify.

Build Content Knowledge

During the discussion of the text:

- Focus on the diagram and text on pages 12-13. Direct students' attention to the photos on page 5.
- Ask: ***If you used these photos to map this area, how would your map change from 1984 to 2014?***
- Focus on the changes over time to the Grand Canyon. Emphasize the interactions between the land and water sources in the formation of the Grand Canyon.
- Discuss possible dangers associated with weathering and erosion.
- Have partners explain weathering and erosion, using text and photo evidence from the chapter. Circulate, listen in, and offer corrective feedback. Recast student responses to include more content and academic vocabulary.
- Discuss the possible effects of large-scale versus small-scale weathering and erosion.

Ask Text-Dependent Questions

Use these text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

page 3	*Which of the Earth's changes are usually fast? Which are usually slow?*
pages 4–5	*What's the difference between chemical and mechanical weathering? Why did the author include the illustrations on page 4? How do they help your understanding? What is the connection between the photos on page 5 and the text?*
pages 6–7	*What does the author want you to know about Devil's Tower in Wyoming? Why did she include this information in the chapter?*
pages 8–9	*How are these stories from different cultures similar? What do we now know about the ways in which these landscapes formed?*
pages 10–13	*What have scientists learned about the creation of the Grand Canyon? How have they learned this?*

How Old Is the Grand Canyon?

Second Read

Revisit the Text

Ask students to identify the special text features in Chapter 1 and explain why the author used them.

- ***Why did the author include the diagram on page 10?***
- ***What information does it add?***

Focus on Text Feature—Headings and Subheadings

Have students revisit the chapter headings and subheadings. Review that when they read informational texts, students should ask themselves:

- ***What's this chapter about?***
- ***What's the main idea?***

Writers of informational texts give you clues that help you answer these questions. Review these steps for understanding headings and ask students to apply them to Chapter 1.

Step 1. Read the chapter title to find out the topic.
Step 2. Read the introduction to find out the main ideas of the article.
Step 3. Read the headings to find out the main idea of each section. Headings introduce a topic. They can also be used after reading to help summarize the chapter. Headings often have a special type treatment. They may be boldfaced, all capital letters, or in a color other than black.
Step 4. Look for details in the main body text to get additional facts.

Have students share what they learned from the chapter headings.

- ***Why did the author include headings and subheadings in this chapter?***
- ***How did the headings and subheadings better help you understand the chapter or remember what it's about?***
- ***When and where could you use headings and subheadings in your writing?***

Prompt students to share their answers.

To help students understand the use of headings and subheadings, have them add headings to an upcoming writing assignment. When students have to find or create a text feature and then determine where it should go in their own writing and why, they can more easily interpret it in other texts.

Focus on Text Feature—Chart

Have students revisit the charts on page 4. Review that a chart organizes information in the form of a table. It makes complex material easier to understand and to compare and contrast.

Review these steps for reading a chart.

Step 1. Point to the chart titles (Mechanical Weathering and Chemical Weathering). The chart title identifies the chart's topic.
Step 2. Echo read the column headings. These tell the category or kind of information that is found in each column. Column headings give readers a good idea of the main ideas that will be covered.
Step 3. Point out the rows. Tell students these identify each individual entry. In this case, the information is illustrated instead of written in these charts.

Have students turn and talk to a partner and explain what they learned from the charts. Prompt students to share their answers.

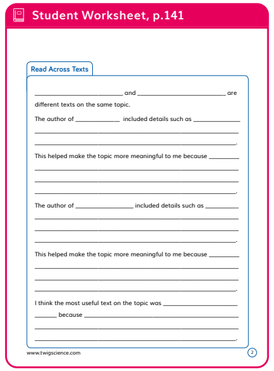
- ***Why did the author include charts in this chapter?***
- ***What facts did the charts add to the words on the page?***
- ***When and where could you use a chart in your writing?***

To help students understand the use of charts, have them add or paste in a chart to an upcoming writing assignment. When students have to find or create a text feature and then determine where it should go in their own writing and why, they can more easily interpret it in other texts.

Connect to Writing—Read Across Texts

Have students compare Chapter 1 to one of the other texts they have read in class. Ask them to complete the Reading Across Texts writing frame on their student worksheets (page 141). Students who want to expand their ideas can use the frame as a springboard, rather than following it directly.

Prompt students to share their comparisons with the class.


Student Worksheet, p.141

Read Across Texts

_____ and _____ are different texts on the same topic.
The author of _____ included details such as _____
_____
_____
This helped make the topic more meaningful to me because _____
_____
_____
_____
The author of _____ included details such as _____
_____
_____
_____
This helped make the topic more meaningful to me because _____
_____
_____
_____
I think the most useful text on the topic was _____
_____ because _____
_____
_____
_____

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OL

STEM Career: Meet a Geologist

First Read

Overview

This chapter focuses on the career of a geologist. It includes an optional micro-lab in which students explore chemical weathering.

Objectives

Students will:

- Navigate and read informational texts
- Use vocabulary strategies (context clues)
- Build fluency with science texts
- Write articles.

Word Study Support

Write key vocabulary words syllable by syllable, such as *ge-ol-o-gist*. Guide students to use what they know about syllable types to read each word. For example, an open syllable (e.g., *ge*, *o*) ends in a vowel and usually has a long vowel sound. A closed syllable (e.g., *ol*, *gist*) ends in a consonant and usually has a short vowel sound.

Preview the Text

Have student preview Chapter 2 using the preview routine established in Chapter 1.

Ask students what type of information they expect to learn based on the preview of Chapter 2.

- ***This chapter contains an interview. How does the format of an interview affect how you will read the chapter?***

Prepare

Ask students to share their prior knowledge of geologists—scientists who study the Earth (e.g., rocks) and the processes that shape or change it over time. What have they read, seen, or heard in videos and other readings? This will provide background students can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know, or can guess, about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*geology*, *sedimentary*, *topographic maps*) using the vocabulary routine established in Chapter 1.

Connect the word *geology* to *geologist*. Point out that *-ist* at the end of *geologist* means a person who practices or is concerned with something; one who does an action. Relate the suffix to common words with *-ist* (e.g., *artist*, *scientist*, *dentist*).

Review additional academic words to expand students' vocabulary.

dissolve

Define: to mix with a liquid and become part of that liquid; to break down and change state

Example: Stir salt into hot water and watch it *dissolve*.

Ask: What else can you dissolve in water?

Related Words: dissolves, dissolved, dissolving

educate

Define: to teach or inform about

Example: The scientist can *educate* us about the reasons animals live in groups.

Ask: What can you educate someone about?

Related Words: education

predict

Define: to tell what might happen

Example: Based on the dark clouds, I *predict* a bad storm is coming

Ask: What do you predict will happen this school year?

Related Words: prediction

Read

Ask students how they might approach reading Chapter 2. As you did in the previous chapter, help students navigate the text. Since students have already previewed the text, they should start by rereading the title and introduction.

Prompt students to begin their reading of the main text. Remind students that the chapter is set up as an interview, so they should read the questions and then the answers. If students struggle with a boldfaced term, prompt them to use decoding and context clues to determine its meaning.

Note: Students can use the Visual Glossary on page 31.

If the author suggests the reader look at a photograph or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does this information relate to the text?***

Have students whisper read the chapter. Listen in and offer feedback, if needed. If students struggle, model strategies to help them understand the text (such as visualize, clarify, and make inferences).

Discuss with students how they navigated the text. Have students turn to a partner and retell the most fascinating or surprising thing they read in the chapter.

STEM Career: Meet a Geologist

Build Content Knowledge

During the discussion of the text and optional micro-lab:

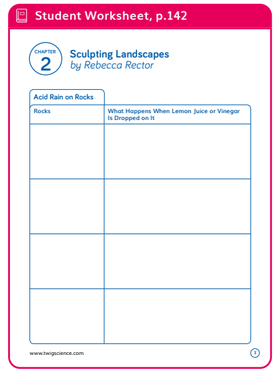
- Focus on the information presented in the interview on page 17.
- If conducting the optional micro-lab, highlight students' observations during and after.
- Connect the role of a geologist to our understanding of the Earth's history.
- Discuss the issues associated with acid rain.
- If conducting the optional micro-lab, focus on students' findings and observations. Connect the lemon juice or vinegar to acid rain and weathering.
- Connect the small-scale effects of acid on rocks in the optional micro-lab to large-scale effects of acid rain on the Earth's landscapes.

Ask Text-Dependent Questions

Use these text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

page 14	*Why did the author include the information about Wayne Ranney working as a tour guide at the Grand Canyon? How does this relate to his job now?*
page 15	*What does a geologist do? Cite details in the text*
page 16	*Does a geologist's job sound fun? Why or why not? Provide examples from the text and photo.*
page 17	*How is a geologist's job related to weathering and erosion?*
pages 18–19	*What does the author want you to know about a geologist's tools?*

Optional Micro-Lab—Acid Rain and Rocks


Student Worksheet, p.142

CHAPTER 2 Sculpting Landscapes
by Rebecca Rector

Acid Rain on Rocks

Rocks	What Happens When Lemon Juice or Vinegar Is Dropped on It

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To deepen students' understanding of the key science concepts presented in the book and highlighted above, conduct the optional micro-lab, Acid Rain and Rocks on pages 20–21.

You can start this investigation on a later day and let students continue their exploration during independent work time.

Step 1. Make sure students have all the materials listed.
Step 2. Assist students as they prepare the materials.
Step 3. Guide students through a reading of the directions before they begin, and have them restate each step of the directions to a partner.
Step 4. Give students time to experiment with the materials.
Step 5. Prompt students to record their findings on their student worksheets (page 142). Provide time for students to share and compare their findings.

STEM Career: Meet a Geologist

Second Read

Revisit the Text

Ask students to identify the format of Chapter 2 and explain how it affected the way they navigated the text.

- ***Did you read this chapter differently from Chapter 1?***
- ***If so, what did you do?***

Focus on Fluency—Partner Read

Model reading the introduction using standard phrasing, intonation, and speed. Prompt students to pay attention to these as you read. For example, pause deliberately at a comma. Reread the introduction one sentence at a time, and have students echo-read.

Ask student pairs to reread the interview. One student should act as interviewer and the other should act as interviewee—after students finish, ask them to switch roles.

Circulate, listen in, and offer feedback. Take note of students who need additional support, as well as specific aspects of the reading they struggle with (such as decoding or phrasing).

Focus on Vocabulary—Context Clues

Explain to students the many tools they can use to figure out the meaning of a word while reading. One tool is context clues, or the words and sentences around the unknown word. Authors provide different kinds of clues in their writing, such as:

- **Word Parts:** E.g. prefixes, suffixes
- **Definition/Restatement:** Definition of the word is given right after it, often in parentheses or followed by *is* or *means*
- **Synonym:** Word with a similar meaning is given, often using *or*, *that is*, or *which is*
- **Antonym:** Word is contrasted with something that means the opposite
- **Examples:** Lists of related things are given and the word is often followed by *such as*, *include*, *these*, or *for example*
- **General Clues**

Model how to use definition/restatement clues to determine word meanings. Write this sentence from Chapter 2: "What I'm interested in is how landscapes evolve, or change over time."

- ***Look at this word: evolve. What does this word mean? After the word evolve in the sentence, I notice the word or and a few additional words that restate what evolve means. The author has restated this harder word in a simpler way to make sure the reader understands it.***

Direct students' attention to the following pages and words. Guide them to identify the clues the author provided to help the reader determine the word's meaning.

- *weathering*: definition/restatement, examples (page 4)
- *natural forces*: examples (page 4)
- *fossils*: definition/restatement, examples, general clues (page 11)

When students read Chapter 3, guide them to these words:

- *seawalls*: general clues (page 23)
- *fossil fuels*: examples (page 25)

Prompt students to use these context clues in their writing to support their readers' understanding.

Connect to Writing—Informative Texts

Have students turn the interview into a short article about geologists for the school website. This Genre Reformulation strategy helps deepen students' understanding of the chapter's content.

Review the format of an article. Remind students to introduce the article topic in an engaging way to draw in their readers. Point out the importance of grouping related information into paragraphs and adding headings to separate key sections of the article. Prompt students to use details and quotes from the interview in their articles.

Pair off students. Have pairs brainstorm visuals they could add to their articles (e.g., photos and captions) and what the visuals would add to readers' understanding of their topic.

Explain that variety in sentence length makes a text more interesting—if all the sentences were very long, the text would be boring. Write these sentences (or use examples from student writing) and model how to combine them using "and."

- **Original Sentences:** A geologist studies how the Earth works. A geologist makes predictions about the climate.
- **Sentence Combining:** A geologist studies how the Earth works and makes predictions about the climate.

Optional: Extend this activity by encouraging students to use digital tools to type and design their articles, add visuals, and print to display on a classroom wall.

Refreezing the Arctic

First Read

Overview

This chapter examines scientific efforts in the Arctic to lessen the effects of climate change.

Objectives

Students will:

- Navigate and read informational texts
- Apply metacognitive comprehension strategies (summarize)
- Use text structures (problem and solution)
- Write a problem and solution summary
- Synthesize information.

Preview the Text

Have student preview Chapter 3 using the preview routine established in Chapter 1.

Ask students what type of information they expect to learn based on the preview of Chapter 3.

- ***What challenges might you face in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Prompt students to share what they already know about cheating. What have they read, seen, or heard in videos and other readings? Remind students that this will provide background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*acid rain*, *habitats*, *global warming*, *fossil fuels*) using the vocabulary routine established in Chapter 1.

Remind students of the context clues they studied in the previous chapter, and ask them to define *global warming* (page 25) and *fossil fuels* (page 25) using these clues.

Review additional academic words to expand students' vocabulary.

reverse

Define: to go in the opposite direction or order

Example: Scientists are working to *reverse* the effects of weathering and erosion on beaches.

Ask: How can you reverse the effects of a sunburn?

Related Words: reverses, reversed, reversing, reversible

artificial

Define: fake, not real

Example: Engineers are developing new personal assistants for our homes and smartphones using *artificial* intelligence.

Ask: How does the taste of artificial flavoring in drinks, like grape or cherry drinks, compare to the taste of the real fruit? Which is better?

Related Words: real (antonym)

reduce

Define: to lessen; to bring down to a smaller amount

Example: You can *reduce* the risk of sunburn if you use sunscreen.

Ask: How can you reduce the weight of your backpack?

Related Words: reduction, reduced, reducing (antonym: increase)

scatter

Define: to throw loosely about

Example: We can *scatter* seeds around the yard.

Ask: Is it better to scatter seeds or drop them carefully in a specific place? Why?

Related Words: scatters, scattered, scattering; disperse (synonym)

Read

Ask students how they might approach reading Chapter 3. Model text navigation, if needed. Since students have already previewed the text, they should start by rereading the title and introduction.

Prompt students to being their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: Students can use the Visual Glossary on page 31.

If the author suggests the reader look at a photograph, chart, or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals. Remind students that if the page has a sidebar, they should read it last.

- ***How do the visuals contribute to your understanding of the text?***
- ***Do they add new information?***
- ***How does that information relate to the text?***

Have students whisper read the chapter. Listen in and offer feedback. When students struggle, remind them of the metacognitive strategies they can use to help them understand the text (e.g., summarize, visualize, predict, ask questions, make inferences, clarify, and other fix-up strategies).

OL

Refreezing the Arctic

English Learners

Provide sentence frames to support students' responses.

- I read that _____.
- In the Arctic, _____.
- Climate change has many effects, such as _____.

Metacognitive Strategy—Summarize

Explain that skilled readers use strategies to check their comprehension as they read. One strategy is summarizing. When you summarize, you restate in your own words the most important ideas in the text. If you can't easily summarize, it means you need to go back and reread, or use another strategy. If you can summarize, then you can continue reading.

Read aloud page 22 to model summarizing.

- ***Let me summarize, or tell the main ideas in the text so far, to see if I understand what I'm reading. Weathering and erosion are causing problems. Scientists are exploring ways to change this. How did I do? Do you think I understand what I've read so far?***

As they read the chapter, prompt students to periodically stop and summarize their reading. Point out good stopping points as needed. Remind students that this is one of several strategies they can use to check their comprehension while reading.

Build Content Knowledge

During the discussion of the text:

- Emphasize the process scientists use to better understand the effects of weathering and erosion.
- Highlight the different and competing solutions the scientists present in the chapter.
- Focus on how scientists test out their theories.
- Review the work of scientists Steven Desch and Julienne Stroeve.
- Focus on page 24. Discuss the map on page 26. Discuss the effects of melting Arctic ice on land, animals, and habitats. Focus on the efforts of both scientists, including the challenges Steven Desch faces in creating Arctic pumps.
- Focus on page 26 and the model Steve Desch and his team of scientists are creating.
- Have partners explain and debate the merits of the two solutions to reversing the effects of global warming on the Arctic.
- Refer to the map on page 26. Focus on the issue of scale as presented on pages 25-26.

Ask Text-Dependent Questions

Use these text-dependent questions to deepen comprehension. Prompt students to cite evidence in the text (specific words, sentence, and illustrations) to support their answers.

page 23	***Why might a seawall not be a good solution to protect beaches from erosion? What does the author want you to know about the effects of a solution to a problem like this?***
pages 24–25	***What is one possible solution to reversing the effects of climate change on the Arctic? Cite details from the text.***
pages 26–27	***Do all scientists agree that refreezing the Arctic is the best solution? Why or why not? What does the disagreement between the two scientists tell you about solving big problems?***
page 28	***What does the author want you to know about the side effects of solutions to environmental problems?***

CHAPTER 3

Refreezing the Arctic

Second Read

Revisit the Text

Ask students to identify the special text features in Chapter 3 and explain why the author used them.

- ***How do the diagram and map add to your understanding of the text?***
- ***How can you use the headings to summarize what you read?***

Focus on Text Structure—Problem/Solution

Discuss the importance of identifying how a text is structured. Tell students that figuring out how a text is structured will help them organize their thinking as they read and better comprehend the text. Read the definition of the Problem and Solution text structure:

- ***This type of text describes a problem and presents one or more possible solutions to that problem.***

Have student partners reread pages 24–27.

- ***What is the problem the author is presenting?***
- ***What possible solutions are offered?***
- ***Does the author use text only, or text and photos?***

Discuss signal words with students. Note that writers often use these as clues to a text's structure. Display and discuss a list of problem and solution signal words and phrases (e.g., *therefore, consequently, so, this led to, as a result, because, if... then, problem, solve, solution*). Prompt students to look for these signal words in the texts they read.

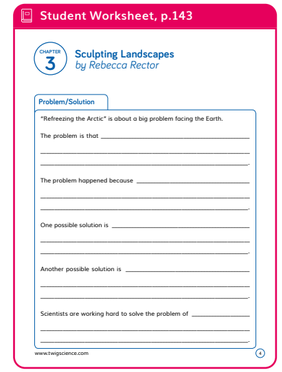
Read aloud pages 24–26. As you read, prompt students to listen for signal words that indicate a problem and one possible solution (e.g., *solution* and *if*). Record them on a chart as students identify them.

Post the signal words list, add others, and prompt students to look for these words in their readings. During small group lessons, highlight these words and ask students how they help them organize their thinking as they read. Emphasize how noticing these words better helps them remember details about the problem and possible solutions.

Connect to Writing—Problem/Solution

Have students summarize pages 24–27 using the Problem/Solution writing frame on their student worksheets (page 143). Students who want to expand their ideas can use the frame as a springboard, rather than following it directly.

Prompt students to orally share their summaries.


Student Worksheet, p.143

CHAPTER 3 Sculpting Landscapes *by Rebecca Rector*

Problem/Solution

"Refreezing the Arctic" is about a big problem facing the Earth.

The problem is that _____

The problem happened because _____

One possible solution is _____

Another possible solution is _____

Scientists are working hard to solve the problem of _____

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Synthesize Information

To show their growing body of knowledge, have students write a response to the phenomenon: How have weathering and erosion sculpted some of Earth's most interesting landscapes?

To build students' writing stamina, provide an uninterrupted block of writing time for students. Increase the amount of time over the course of the year.

Review students' writing and provide notes so that students can revise during independent work time. For example, ask students to rewrite their introductory sentences to grab the reader's attention, or add detail to a fact they've included.

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English language development. These tasks are best administered individually.

Writing Domain

Have students look at the illustrations on page 4 and write a brief description of what is happening.

Reading Domain

Use the photos in Chapter 3. Write: *erosion, landscape, atmosphere, melting ice*.

Have students read each word, then match it to the correct photo or part of a photo.

Listening Domain

Describe the photo on page 17. Add key details included in the photo, but not in the caption (e.g., the effects of wind and water on eroding the landscape).

- ***Describe this landscape. Why are the rocks these shapes?***
- ***How is this similar to other places you've seen or read about?***

Speaking Domain

As students answer the three questions in the Listening Domain task, record their use of academic vocabulary and ability to summarize key details.

Writing Support

Have students record their completed frame on their student worksheets. Ask them to underline the problem and solution signal words (e.g., *solution, because*). Prompt students to refer to the completed writing frame when writing problem and solution informational text pieces.

English Learners

Writing frames provide great speaking frames. Suggest ELs or students needing additional support use the frame when presenting their ideas.

OL

EL

Sculpting Landscapes
English Learner Lessons

CHAPTER 1

How Old Is the Grand Canyon?

First Read

Overview

This chapter focuses on weathering and erosion and how they have helped form some of the Earth's most interesting landscapes. It also teaches students strategies that skilled readers use to navigate and comprehend informational texts while reading independently.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (headings and subheadings)
- Read and write across texts.

Level Up

When working with ELs, use the following strategies to help them access the grade-level text.

- **Chunk the Text:** Focus on smaller sections of the text over an extended period of time to provide all the supports students will need to access meaning.
- **Read Aloud:** Consider reading the text aloud or having students listen to a recording before reading it together in small groups. For Emerging (Substantial Support) and some Expanding (Moderate Support) ELs, have them listen to a recording of the Below-Level book first for additional support.
- **Build Background:** Use videos, texts, and other resources to build background and vocabulary prior to reading the book.

Preview the Text

Have students preview Chapter 1 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study them later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Prompt students to share their answers to Step 5, along with any other comments or questions they have about the text.

- ***What challenges might they meet in reading the chapter?***
- ***What reading tools do they have to tackle these challenges?***

Prepare

Ask students to share what they already know about the Grand Canyon and how it was formed. What have they read, seen, or heard in videos and other readings? This will activate students' background knowledge, which they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and share what they know about the Grand Canyon. Circulate and provide language support, such as recasting students' sentences using content and academic vocabulary.

Vocabulary Routine

Step 1. Have students find and read the boldfaced content words in Chapter 1 (**landscape, weathering, erosion, molten rock, limestone, debris, fossils**).
Step 2. Ask students to turn to the Visual Glossary on page 31. Tell students it may help them understand a given term. Have students find the entries for *erosion* and *weathering* and read them to a partner.
Step 3. Repeat the terms as a class to confirm pronunciations.
Step 4. Highlight the difference in meanings of *weather* (the state of the atmosphere including wind, air pressure, temperature) and *weathering* (the process by which rock separates and breaks apart), which might cause students confusion.
Step 5. Review additional academic words using the following simple definitions and context sentences. Point out related words and word parts to expand students' vocabulary.

erode

Define: to eat into or away; slowly destroy

Example: My mistakes on the test *eroded* my confidence in how much I know about volcanoes.

Ask: What can happen when the side of a mountain starts to erode?

Sentence Frame: When a mountain starts to erode _____ .

Related Words: erodes, eroded, erosion

Word Parts: e- (open syllable)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

sculpt

Define: to form or shape

Example: I can *sculpt* a ball of clay into a vase.

Ask: What tools can you use to sculpt something?

Sentence Frame: You can use _____ to sculpt something.

Related Words: sculpts, sculpted, sculpting, sculpture, carved

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

transform

Define: change in form, appearance, or structure

Example: They might *transform* our town's old library into a museum.

Ask: What can you transform an empty box into?

Sentence Frame: You can transform _____ into _____ .

Related Words: transformation

Define: Conclude by saying the word, then have students repeat 3 times.

enormous

Define: very big

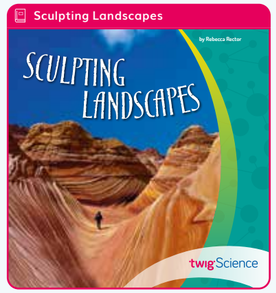
Example: An elephant is an enormous land animal.

Ask: What *enormous* thing have you seen?

Sentence Frame: _____ is enormous. _____ is an enormous thing I've seen.

Related Words: huge, gigantic, mammoth, colossal (synonyms)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.



How Old Is the Grand Canyon?

Linguistic Frames

The frames can assist students in presenting their ideas and internalizing linking words. These can be used with Emerging (Substantial Support) and Expanding (Moderate Support) ELs during most discussions. Model the frames for Emerging ELs and guide them as they use the frames. The frames can be presented as optional for Expanding ELs. Provide tiered frames for different levels of ELs, such as the following:

- I predict that _____ .
- I predict _____ because _____ .
- Based on the photo, I predict because _____ .

Read

Discuss with students how they might approach reading Chapter 1. Model text navigation, as needed. Since students have already previewed the chapter, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

The author may suggest the reader look at a photograph, chart, or other visual—in this case, students should stop and do so. If not, they should read the section or page and then look at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information? How does this information relate to the text?***

Remind students that they can go back and study the photos and illustrations more closely when they finish reading. Tell students that if the page has a sidebar, they should read it last.

Leveled Reader Supports

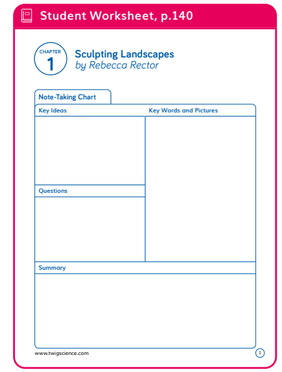
Multiple supports are provided in the text to assist you in helping students access the vocabulary presented.

- **Cognates:** Highlight words that are similar in Spanish and English to accelerate vocabulary building (e.g., *enormous/enorme*).
- Define It: Point out the definitions of key academic words needed for understanding that are not accompanied by sufficient context clues.
- **Use Context:** Guide students to use context clues to figure out the meanings of new words while reading. Reinforce this strategy frequently to build this independent reading habit.
- **Labels:** Throughout the text, labels on photos and illustrations connect the visuals to words in the chapters. Review these words as part of students' preview of each chapter.
- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

Connect to Writing—Note-Taking

Have students turn to the Note-Taking Chart on their student worksheets (page 140). As students read Chapter 1, ask them to:

Step 1. Write down key words and phrases to help them remember the big ideas, and draw pictures as memory aids.
Step 2. Note any questions they have about the text or portions of the text that confused them by jotting down the page and paragraph number or the first few words of the confusing sentence.
Step 3. Write a two- or three-sentence summary they could use to tell someone what the chapter was about.


Student Worksheet, p.140

CHAPTER 1 Sculpting Landscapes *by Rebecca Rector*

Note-Taking Chart

Key Ideas | Key Words and Pictures

Questions

Summary

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While students are reading and taking notes, circulate and notice any common confusion. During the after-reading discussion, you can go back to the text and model your thinking to clarify.

Annotate the Text

When annotating the text, guide students to circle the following:

- Unfamiliar Words
- Confusing Sentences

Then, guide students to use context clues to clarify meaning. Use conversation prompts and linguistic frames to discuss students' annotations.

Prompt	Frame
Which words did you circle?	I circled _____ .
What words or sentences are confusing?	I don't know what _____ means.
What clues in the text can help us figure out the word? Is there a prefix/suffix/root? What does the prefix/suffix/root mean?	I think _____ might mean _____ because _____ .

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary. The supports include:

- **Unpack:** Guide students to unpack complex sentences and paragraphs, focusing on meaning. Use the underlined portions of the challenging text to help students break apart and simplify complex ideas. Work with students to rewrite complex sentences/paragraphs using accessible language and sentence structure. Ask prompting questions such as: What's happening? Who or what is this about? What does this sentence mean in your own words?
- **Connect:** Some students struggle connecting ideas within a paragraph due to their physical separation across the paragraph or due to the use of pronouns. Use the underlined words and phrases to connect these ideas. For pronouns, guide students to restate each sentence, replacing the pronoun with the noun it refers to in order to clarify meaning.

Special Needs

Provide digital tools (e.g., computers or tablets) for students to record notes. Encourage alternate ways of expressing ideas, such as through drawings or audio recordings.

How Old Is the Grand Canyon?

Build Content Knowledge

During the discussion of the text:

- Focus on the diagram and text on pages 12-13. Direct students' attention to the photos on page 5.
- Ask: ***If you used these photos to map this area, how would your map change from 1984 to 2014?***
- Focus on the changes over time to the Grand Canyon. Emphasize the interactions between the land and water sources in the formation of the Grand Canyon.
- Discuss possible dangers associated with weathering and erosion.
- Have partners explain weathering and erosion, using text and photo evidence from the chapter. Circulate, listen in, and offer corrective feedback. Recast student responses to include more content and academic vocabulary.
- Discuss the possible effects of large-scale versus small-scale weathering and erosion.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

page 3	*Which of the Earth's changes are usually fast? Which are usually slow?*
pages 4–5	*What's the difference between chemical and mechanical weathering? Why did the author include the illustrations on page 4? How do they help your understanding? What is the connection between the photos on page 5 and the text?*
pages 6–7	*What does the author want you to know about Devil's Tower in Wyoming? Why did she include this information in the chapter?*
pages 8–9	*How are these stories from different cultures similar, or nearly the same? How do we now know the ways in which these landscapes formed, or were made?*
pages 10–13	*What have scientists learned about how the Grand Canyon was made? How have they learned this?*

Assess Conversation

Use the chart to gauge students' progress as they participate in collaborative conversations. Model conversation exchanges to support students' growth.

Bridging 4	*Students engage in 5 or more exchanges. They support their ideas with evidence and sufficiently synthesize ideas.*
Expanding 3	*Students engage in 3–4 exchanges. They ask and answer questions, agree and disagree, and build on each other's ideas.*
Early Expanding 2	*Students engage in 1 exchange, using only a sentence or two. Sometimes the conversation is extended.*
Emerging 1	*Students offer 1 short answer. The exchange is often highly structured.*
0	*Students are silent during the conversation.*

How Old Is the Grand Canyon?

Second Read

Revisit the Text

Ask students to identify the special text features in Chapter 1 and explain why the author used them.

- ***Why did the author include the diagram on page 10?***
- ***What information does it add?***

Focus on Text Feature—Headings and Subheadings

Have students revisit the chapter headings and subheadings. Review that when they read informational texts, students should ask themselves:

- ***What's this chapter about?***
- ***What's the main idea here?***

Writers of informational texts give you clues that help you answer these questions. Review the following steps with students for understanding headings and ask students to apply these to Chapter 1.

Step 1. Read the chapter title to find out the topic.
Step 2. Read the introduction to find out the main ideas of the article.
Step 3. Read the headings to find out the main idea of each section. Headings introduce a topic. They can also be used after reading to help summarize the chapter. Headings often have a special type treatment. They may be boldfaced, all capital letters, or in a color other than black.
Step 4. Look for details in the main body text to get additional facts.

Have students share what they learned from the chapter headings.

- ***Why did the author include headings and subheadings in this chapter?***
- ***How did the headings and subheadings better help you understand the chapter or remember what it's about?***
- ***When and where could you use headings and subheadings in your writing?***

Prompt students to share their answers.

To help students better understand the use of headings and subheadings, have them add headings to an upcoming writing assignment. When students have to find or create a text feature and then determine where it should go in their own writing and why, they can more easily interpret this feature in other texts.

Focus on Text Structure—Chart

Have students revisit the charts on page 4. Review that a chart organizes information in the form of a table. It makes complex material easier to understand and to compare and contrast. Review the following steps for reading a chart:

Step 1. Point to the chart titles (Mechanical Weathering and Chemical Weathering). The chart title identifies the chart's topic.
Step 2. Echo read the column headings. These tell the category or kind of information that is found in each column. Column headings give readers a good idea of the main ideas that will be covered.
Step 3. Point out the rows. Tell students these identify each individual entry. In this case, the information is illustrated instead of written in these charts.

Have students turn and talk to a partner and explain what they learned from the charts.

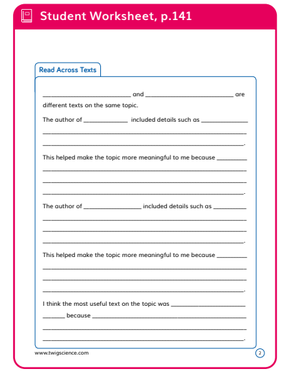
- ***Why did the author include charts in this chapter?***
- ***What facts did the charts add to the words on the page?***
- ***When and where could you use a chart in your writing?***

Prompt students to share their answers.

To help students better understand the use of charts, have them add or paste in a chart to an upcoming writing assignment. When students have to find or create a text feature and then determine where it should go in their own writing and why, they can more easily interpret this feature in other texts.

Connect to Writing—Read Across Texts

Have students compare Chapter 1 to one of the other texts they have read in class. Ask them to complete the Reading Across Texts writing frame on their student worksheets (page 141). Prompt students to share their comparisons with the class, encouraging them to use the writing frame as a speaking frame.


Student Worksheet, p.141

Read Across Texts

_____ and _____ are different texts on the same topic.

The author of _____ included details such as _____

This helped make the topic more meaningful to me because _____

The author of _____ included details such as _____

This helped make the topic more meaningful to me because _____

I think the most useful text on the topic was _____ because _____

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CHAPTER 2

STEM Career: Meet a Geologist

First Read

Overview

This chapter focuses on the career of a geologist. It includes an optional micro-lab in which students explore chemical weathering.

Objectives

Students will:

- Navigate and read informational texts
- Use vocabulary strategies (context clues)
- Build fluency with science texts
- Write an article.

Word Study Support

Write key vocabulary words syllable by syllable, such as *ge-ol-o-gist*. Guide students to use what they know about syllable types to read each word. For example, an open syllable (e.g., *ge*, *o*) ends in a vowel and usually has a long vowel sound. A closed syllable (e.g., *ol, gist*) ends in a consonant and usually has a short vowel sound.

For students whose phonics and word study skills are below level, focus on a couple long vowel and complex vowel spelling patterns they struggle with. Use words from the chapter to model decoding. Extend to other words with these patterns.

Preview the Text

Have student preview Chapter 2 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study them later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Ask students what type of information they expect to learn based on the preview of Chapter 2.

- ***This chapter contains an interview. How does the format of an interview affect how you will read the chapter?***

Prepare

Ask students what they already know (if anything) about geologists—scientists who study the Earth (e.g., rocks) and the processes that shape or change it over time. What have they read, seen, or heard in videos and other readings? This will activate students' background knowledge, which they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know, or can guess, about geologists. Circulate and provide language support, such as offering sentence frames.

Vocabulary Routine

Ensure that students understand important new chapter vocabulary (*geology, sedimentary, topographic maps*) using the vocabulary routine established in Chapter 1.

Connect the word *geology* to *geologist*. Point out that *-ist* at the end of *geologist* means a person who practices or is concerned with something; one who does an action. Relate the suffix to common words with *-ist* (e.g., *artist, scientist, dentist*).

Review the additional academic words to expand students' vocabulary.

dissolve

Define: to mix with a liquid and become part of that liquid; to break down and change state

Example: Stir salt into hot water and watch it *dissolve*.

Ask: What else can you dissolve in water?

Sentence Frame: You can dissolve _____ in water.

Related Words: dissolves, dissolved, dissolving

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

predict

Define: to tell what might happen

Example: Based on the dark clouds, I *predict* a bad storm is coming.

Ask: What do you predict will happen this school year?

Sentence Frame: I predict _____ . I predict because _____ .

Related Words: prediction

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

educate

Define: to teach or inform about

Example: The scientist can *educate* us about the reasons animals live in groups.

Ask: What can you educate someone about?

Sentence Frame: I can educate _____ about _____ .

Related Words: education

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

STEM Career: Meet a Geologist

Read

Ask students how they might approach reading Chapter 2. As you did in the previous chapter, help students navigate the text. Since students have already previewed the text, they should start by rereading the title and introduction. Tell students to begin their reading of the main text. Remind students that the chapter is set up as an interview, so they should read the questions and then the answers. If students struggle with a boldfaced term, prompt them to use decoding and context clues to determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information? How does this information relate to the text?***

Discuss with students how they navigated the text. Have students turn to a partner and retell the most fascinating or surprising thing they read in the chapter.

Build Content Knowledge

During the discussion of the text and the optional micro-lab:

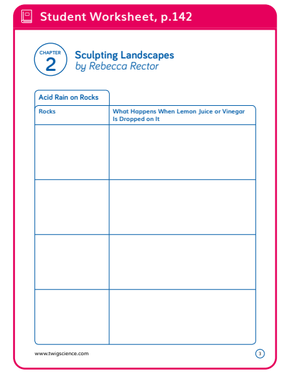
- Focus on the information presented in the interview on page 17.
- Connect the role of a geologist to our understanding of the Earth's history.
- Discuss the issues associated with acid rain.
- If conducting the optional micro-lab, focus on students' findings and observations during and after. Connect the lemon juice or vinegar to acid rain and weathering.
- Connect the small-scale effects of acid on rocks in the optional micro-lab to large-scale effects of acid rain on the Earth's landscapes.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

page 14	***Why did the author include the information about Wayne Ranney working as a tour guide at the Grand Canyon? How does this relate to his job now?***
page 15	***What does a geologist do? Find details in the text to support your answer.***
page 16	***Does a geologist's job sound fun? Why or why not? Give examples from the text and photo.***
page 17	***How is a geologist's job related to weathering and erosion?***
pages 18–19	***What does the author want you to know about a geologist's tools?***

Optional Micro-Lab—Acid Rain and Rocks


Student Worksheet, p.142

CHAPTER 2 Sculpting Landscapes
by Rebecca Rector

Acid Rain on Rocks

Rocks	What Happens When Lemon Juice or Vinegar Is Dropped on It

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To deepen students' understanding of the key science concepts presented in the book and highlighted above, you may conduct the optional micro-lab, Acid Rain and Rocks on pages 20–21. You may want to start this investigation on a later day and let students continue their exploration during independent work time.

Step 1. Make sure students have all the materials listed—small samples of different rock types, lemon juice or vinegar, and medicine droppers.
Step 2. Assist students as they prepare the materials.
Step 3. The micro-lab is presented as a read together experience. Read it to students, then repeat it as an echo-read. Guide students to restate each step in the directions to a partner to confirm understanding before completing the lab.
Step 4. Give students time to experiment with the materials.
Step 5. Prompt students to record their findings on their student worksheets (page 142). Provide time for students to share and compare their findings.

Collaborative Conversation Support

Rephrasing

Saying things in multiple ways is essential when using new vocabulary or idioms. For example, state a sentence containing academic or content vocabulary then rephrase it using simplified language.

Use Native Language

Allow students to discuss new concepts in their native language with peers (if multiple students speak the same language) before engaging them in a conversation about those ideas in English.

EL

STEM Career: Meet a Geologist

Second Read

Revisit the Text

Ask students to identify the format of Chapter 2 and explain how it affected the way they navigated the text.

- ***Did you read this chapter differently from Chapter 1? If so, what did you do?***

Focus on Fluency—Partner Read

Model reading the introduction using standard phrasing, intonation, and speed. Prompt students to pay attention to these as you read. For example, pause deliberately at a comma. Reread the introduction one sentence at a time, and have students echo-read.

Ask student pairs to reread the interview. One student should act as interviewer and the other should act as interviewee—after students finish, ask them to switch roles. Circulate, listen in, and offer feedback. Take note of students who need additional support, as well as specific aspects of the reading they struggle with (such as decoding or phrasing).

Focus on Text Feature—Context Clues

Explain to students the many tools they can use to figure out the meaning of a word while reading. One tool is context clues, or the words and sentences around the unknown word. Authors provide different kinds of clues in their writing, such as:

- **Word Parts:** E.g. prefixes, suffixes
- **Definitions/Restatements:** Definition of the word is given right after it, often in parentheses, or followed by *is* or *means*
- **Synonyms:** Word with a similar meaning is given, a word or phrase such as *or, that is,* or *which is*
- **Antonyms:** Word is contrasted with something that means the opposite
- **Examples:** Lists of related things are given and the word is often followed by *such as, include, these,* or *for example*
- **General Clues**

Model for students how to use definition/restatement clues to determine word meanings. Write the following sentences from Chapter 2: "What I'm interested in is how landscapes *evolve*, or change over time."

- ***Look at the word: evolve. What does this word mean? After the word evolve in the sentence, I notice the word or and a few additional words that restate what evolve means. The author has restated this harder word in a simpler way to make sure the reader understands it.***

Direct students attention to the following pages and words. Guide them to identify the clues the author provided to help the reader determine the word's meaning.

- *weathering:* (page 4)
- *natural forces:* (page 4; examples provided in the sentences that follow)
- *fossils:* (page 11)

When students read Chapter 3, guide them to these words:

- *seawalls:* (page 23)
- *fossil fuels:* (page 25; examples provided in the sentences that follow)

Prompt students to use these context clues in their writing to support their readers' understanding.

Connect to Writing—Informative Texts

Have students turn the interview into a short article about geologists. This genre reformulation strategy helps deepen students' understanding of the chapter's content.

Tell students that they will write an article about a geologist for a school website.

Review the format of an article. Remind students to introduce the article topic in an engaging way to draw in their readers. Point out the importance of grouping related information into paragraphs and adding headings to separate key sections of the article.

Explain to students that variety in sentence length makes a text more interesting—if all the sentences were very long, for example, the text would be boring. Write the following sentences, or use examples from student writing. Model how to combine the sentences using *and*.

- **Original Sentences:** A geologist studies how the Earth works. A geologist makes predictions about the climate.
- **Sentence Combining:** A geologist studies how the Earth works and makes predictions about the climate.

Prompt students to use details and quotes from the interview in their articles.

Have student partners brainstorm visuals they could add to their articles (e.g., photos and captions) and what the visuals would add to readers' understanding of their topic.

You may extend this activity by encouraging students to use digital tools to type and design their articles, add visuals, and print to display on a classroom wall.

Refreezing the Arctic

First Read

Overview

This chapter examines scientific efforts in the Arctic to lessen the effects of climate change.

Objectives

Students will:

- Navigate and read informational texts
- Apply metacognitive comprehension strategies (summarize)
- Use text structures (problem and solution)
- Write a problem and solution summary
- Synthesize information.

Preview the Text

Have students preview Chapter 3 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study them later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Ask students what type of information they expect to learn based on the preview of Chapter 3.

- ***What challenges might you face in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Prompt students to share what they already know about climate change and/or the Arctic. What have they read, seen, or heard in videos and other readings? Remind students that they can draw on this background knowledge as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know about the topic. Offer sentence frames to support students' responses, for example:

- I read that _____ .
- In the Arctic _____ .
- Climate change has many effects, such as _____ .

Vocabulary Routine

Ensure that students understand important new chapter vocabulary (*acid rain*, *habitats*, *global warming*, *fossil fuels*) using the vocabulary routine established in Chapter 1.

Remind students of the context clues they studied in the previous chapter, and ask them to define *global warming* (page 25) and *fossil fuels* (page 25) using these clues.

Review the additional academic words to expand students' vocabulary.

scatter

Define: to throw loosely about

Example: We can *scatter* seeds around the yard.

Ask: Is it better to scatter seeds or drop them carefully in a specific place? Why?

Sentence Frame: It is/isn't better to scatter seeds because _____ .

Related Words: scatters, scattered, scattering, disperse (synonym)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

reduce

Define: to lessen; bring down to a smaller amount

Example: You can *reduce* the risk of sunburn if you use sunscreen.

Ask: How can you reduce the weight of your backpack?

Sentence Frame: I can reduce _____ by _____ .

Related Words: reduction, reduced, reducing, increase (antonym)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

artificial

Define: fake; not real

Example: Engineers are developing new personal assistants for our homes and smartphones using *artificial* intelligence.

Ask: How does the taste of artificial flavoring in drinks, like grape or cherry drinks, compare to the taste of the real fruit? Which is better?

Sentence Frame: The tastes of _____ and _____ are alike/different. _____ tastes better.

Related Words: real (antonym)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

reverse

Define: to go in the opposite direction or order

Example: Scientists are working to *reverse* the effects of weathering and erosion on beaches.

Ask: How can you reverse the effects of a sunburn?

Sentence Frame: You can reverse the effects of _____ by _____ .

Related Words: reverses, reversed, reversing, reversible

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

Refreezing the Arctic

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary presented.

- **Cognates:** Highlight words that are similar in Spanish and English to accelerate vocabulary building (e.g., *reduce/reducir*).
- **Define It:** Point out the definitions of key academic words needed for understanding that are not accompanied by sufficient context clues.
- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary presented.

- **Unpack:** Guide students to unpack complex sentences and paragraphs, focusing on meaning. Use the underlined portions of the challenging text to help students break apart and simplify complex ideas. Work with students to rewrite complex sentences/paragraphs using accessible language and sentence structure. Ask: What's happening? Who or what is this about? What does this sentence mean in your own words?
- **Connect:** Some students struggle connecting ideas within a paragraph due to their physical separation across the paragraph or due to the use of pronouns. Use the underlined words and phrases to connect these ideas. For pronouns, guide students to restate each sentence, replacing the pronoun with the noun it refers to in order to clarify meaning.

Make Word Banks

Provide word banks during discussions for students to refer to. Include content and academic words, as well as words that help students link ideas (*because, therefore, in addition*). You can organize the word bank by part of speech, for example, to help students. For Emerging (Substantial Support) ELs, use word banks with one category of words and connect it to a simple linguistic frame. For Expanding (Moderate Support) ELs, collect words by listening to students' conversation (Collect and Display Language Routine), then add words from the chapter to extend this word bank.

Read

Ask students how they might approach reading Chapter 3. Model text navigation, if needed. Since students have already previewed the text, they should start by rereading the title and introduction.

Tell students to being their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph, chart, or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***How do the visuals contribute to your understanding of the text?***
- ***Do they add new information? How does that information relate to the text?***

Remind students that if the page has a sidebar, they should read it last.

Metacognitive Strategy—Summarize

Explain to students that skilled readers use strategies to check their comprehension as they read. One strategy is stopping and summarizing what the author has written. When you summarize, you restate in your own words the most important ideas in the text. If you can't easily summarize, it means you need to go back and reread, or use another strategy. If you can summarize, then you can continue reading.

Read aloud page 22 to model summarizing.

- ***Let me summarize, or tell the main ideas in the text so far, to see if I understand what I'm reading. Weathering and erosion are causing problems. Scientists are exploring ways to change this. How did I do? Do you think I understand what I've read so far?***

As they read the chapter, prompt students to periodically stop and summarize their reading. Point out good stopping points as needed. Remind students that this is one of several strategies they can use to check their comprehension while reading.

Build Content Knowledge

During the discussion of the text:

- Emphasize the process scientists use to better understand the effects of weathering and erosion.
- Highlight the different and competing solutions the scientists present in the chapter.
- Focus on how scientists test out their theories.
- Review the work of scientists Steven Desch and Julienne Stroeve.
- Focus on page 24. Discuss the map on page 26. Discuss the effects of melting Arctic ice on land, animals, and habitats. Focus on the efforts of both scientists, including the challenges Steven Desch faces in creating Arctic pumps.
- Focus on page 26 and the model Steve Desch and his team of scientists are creating.
- Have partners explain and debate the merits of the two solutions to reversing the effects of global warming on the Arctic.
- Refer to the map on page 26. Focus on the issue of scale as presented on pages 25-26.

CHAPTER 3

Refreezing the Arctic

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen comprehension. Prompt students to cite evidence in the text (specific words, sentence, and illustrations) to support their answers.

page 23	***Why might a seawall not be a good solution to protect, or save, beaches from erosion? What does the author want you to know about the effects of a solution to a problem like this?***
pages 24-25	***What is one possible solution to reversing, or changing, the effects of climate change on the Arctic? Find details in the text to support your answer.***
pages 26-27	***Do all scientists agree that refreezing the Arctic is the best solution? Why or why not? What does the disagreement between scientists Steven Desch and Julienne Stroeve tell you about solving big problems like global warming?***
page 28	***What does the author want you to know about the side effects of solutions to problems affecting the environment?***

Extend the Conversation

Extend students' conversation about the ideas presented in the chapter.

- ***What do you think?***
- ***What do you mean by _____ ?***
- ***I'm confused. Please explain.***
- ***How do you know? Find the evidence.***
- ***What clues in the text gave you that idea?***
- ***Do you agree? Why or why not?***

Use these frames to support students' answers.

- I think _____ .
- I mean _____ .
- I know this because _____ .
- I know this because I read _____ .
- I know _____ because .
- One text detail that shows this is _____ .
- This means that _____ .
- I agree. I also think that _____ .
- I disagree. I think that _____ .

Revisit the Text

Ask students to identify the special text features in Chapter 3 and explain why the author used them.

- ***How do the diagram and map add to your understanding of the text?***
- ***How can you use the headings to summarize what you read?***

Focus on Text Structure—Problem and Solution

Discuss the importance of identifying how a text is structured. Tell students that figuring out how a text is structured will help them organize their thinking as they read and better comprehend the text. Read the definition of the Problem and Solution text structure:

- This type of text describes a problem and presents one or more possible solutions to that problem.

Have student partners reread pages 24–27.

- ***What is the problem the author is presenting?***
- ***What possible solutions are offered?***
- ***Does the author use text only, or text and photos?***

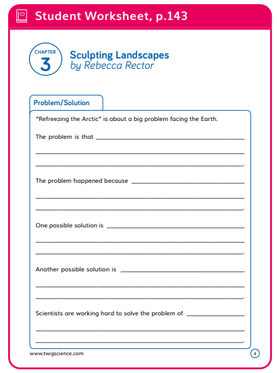
Discuss signal words with students. Note that writers often use these as clues to a text's structure. Display and discuss a list of problem and solution signal words and phrases (e.g. *therefore, consequently, so, this led to, as a result, because, if... then, problem, solve, solution*). Prompt students to look for these signal words in the texts they read.

Read aloud pages 24–26. As you read, prompt students to listen for signal words that indicate a problem and one possible solution (e.g., *solution* and *if*). Record them on a chart as students identify them.

Post the signal words list, add others, and prompt students to look for these words in their readings. During small group lessons, highlight these words and ask students how they help them organize their thinking as they read. Emphasize how noticing these words better helps them remember details about the problem and possible solutions.

Connect to Writing—Text Structure Writing Frame

Have students summarize pages 24–27 using the Problem and Solution writing frame on their student worksheets (page 143). Students who wish to expand on their ideas can use the frame as a springboard, rather than following it directly. Prompt students to orally share their summaries.


Student Worksheet, p.143

CHAPTER 3 Sculpting Landscapes
by Rebecca Rector

Problem/Solution

"Refreezing the Arctic" is about a big problem facing the Earth.

The problem is that _____

The problem happened because _____

One possible solution is _____

Another possible solution is _____

Scientists are working hard to solve the problem of _____

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EL

Second Read

English Learners

Writing frames provide great speaking frames. Suggest ELs or students needing additional support use the frame when presenting their ideas.

Writing Support

Have students record their completed frame on their student worksheets. Ask them to underline the problem and solution signal words (e.g., *solution, because*). Prompt students to refer to the completed writing frame when writing problem and solution informational text pieces.

English Learners

Use additional supports for emerging ELs

Substantial Support (Emerging Proficiency)

- **Total Physical Response:** Use actions and gestures when possible to communicate ideas.
- **Yes/No Examples:** Ask yes/no questions to encourage students to participate in a discussion. For example, ask: Is this a _____ ?
- **Linguistic Frames and Word Banks:** Provide a simple response frame and list possible words for students to choose from in their responses.

Refreezing the Arctic

Synthesize Information

To show their growing body of knowledge, have students write a response to the phenomenon: How have weathering and erosion sculpted some of Earth's most interesting landscapes?

To build students' writing stamina, provide an uninterrupted block of writing time for students. Increase the amount of time over the course of the year.

Review students' writing and provide revision notes so that students can revise during independent work time. For example, you may ask students to rewrite their introductory sentences to better grab the reader's attention, or add greater detail to a particular fact they've included.

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English Language development. These tasks are best administered individually.

Writing Domain

Have students look at the illustrations on page 4 and write a brief description of what is happening.

Reading Domain

Use the photos in Chapter 3. Write these words: *erosion, landscape, atmosphere, melting ice.* Have students read each word, then match it to the correct photo or part of a photo.

Listening Domain

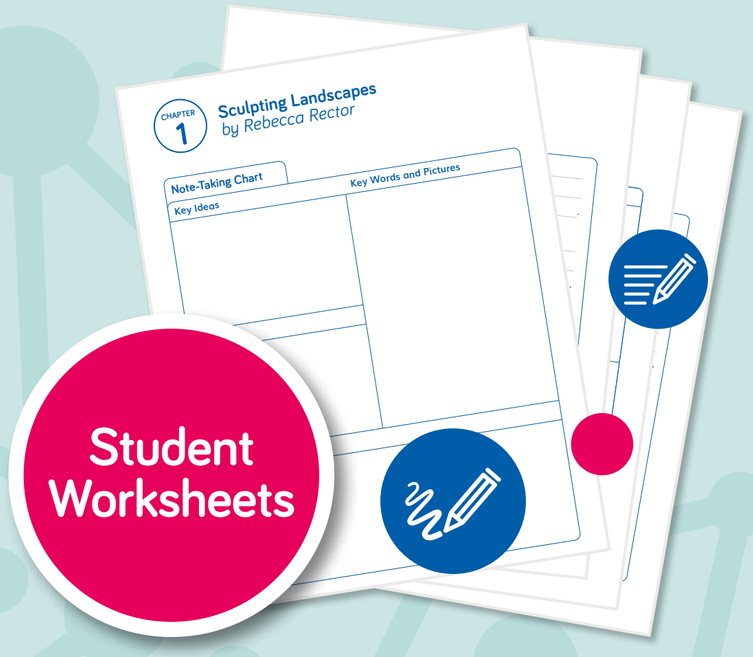
Describe the photo on page 17. Add key details included in the photo, but not in the caption (e.g., the effects of wind and water on eroding the landscape).

- ***Describe this landscape. Why are the rocks these shapes? How is this similar to other places you've seen or read about?***

Speaking Domain

As students answer the questions in the Listening Domain task, record their use of academic vocabulary and ability to summarize key details.

Sculpting Landscapes



CHAPTER 1

Sculpting Landscapes
by Rebecca Rector

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

Read Across Texts

_____ and _____ are different texts on the same topic.

The author of _____ included details such as _____

_____

_____.

This helped make the topic more meaningful to me because _____

_____

_____

_____.

The author of _____ included details such as _____

_____

_____

_____.

This helped make the topic more meaningful to me because _____

_____

_____

_____.

I think the most useful text on the topic was _____

_____ because _____

_____

_____.

CHAPTER 2

Sculpting Landscapes
by Rebecca Rector

Acid Rain on Rocks

Rocks	What Happens When Lemon Juice or Vinegar Is Dropped on It

CHAPTER 3

Sculpting Landscapes
by Rebecca Rector

Problem/Solution

"Refreezing the Arctic" is about a big problem facing the Earth.

The problem is that _____

_____

_____.

The problem happened because _____

_____

_____.

One possible solution is _____

_____

_____.

Another possible solution is _____

_____

_____.

Scientists are working hard to solve the problem of _____

_____

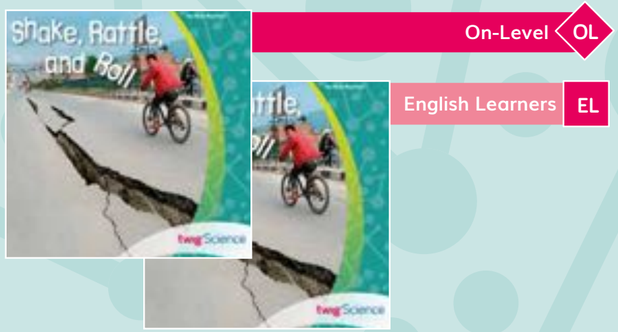
_____.

Shake, Rattle, and Roll

Chapter 1: The Curious Scientist
This chapter focuses on the practices scientists use to learn about earthquakes. It teaches students strategies that skilled readers use to navigate and comprehend informational texts while reading independently.

Chapter 2: STEM Career: Meet a Seismologist
This chapter focuses on the career of a seismologist. It includes an optional micro-lab in which students learn how energy is stored and released during an earthquake.

Chapter 3: Earthquake-Proofing: What's the Cost?
This chapter examines different ways that engineers earthquake-proof buildings.



OL

Shake, Rattle, and Roll On-Level Lessons

CHAPTER 1

The Curious Scientist

First Read

Overview

This chapter focuses on the practices scientists use to learn about earthquakes. It teaches students strategies that skilled readers use to navigate and comprehend information while reading independently.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (headings, maps, graphs)
- Read and write across texts.

Level Up

For students who struggle with the On Level book, guide them through a reading of the Below Level book first. Then have them listen to a recording of the On Level book and follow along with the text. This scaffolding should prepare students for reading the On Level book in small groups.

Preview the Text

Have students preview Chapter 1 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study them later.
Step 4. Notice any features, such as special type, maps, or diagrams.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Prompt students to share their answers to Step 5, along with any other comments or questions they have about the text.

- ***What challenges might you face in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Ask students to share what they already know about earthquakes, and how scientists have learned about them. What have they read, seen, or heard in videos and other readings? This will provide students background they can draw on as they read.

Give students 2 minutes to do a turn and talk with a partner and share what they know about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary using the vocabulary routine.

- ***Why might an author boldface a term?***
- ***What does this add to the text?***

Step 1. Have students find and read the boldfaced content terms in Chapter 1 (**data**, **crust**, **tectonic plate**, **fault line**, **seismic waves**, **seismograph**, **magnitude**).
Step 2. Ask students to turn to the Visual Glossary on page 31. Tell students it may help them understand a given term.
Step 3. Repeat the terms as a class to confirm pronunciations.
Step 4. Point out the meanings of multiple-meaning words such as *crust* and *fault* that may cause students confusion.
Step 5. Review the additional academic words using the following simple definitions and context sentences. Point out related words and word parts to expand students' vocabulary.

originate

Define: to begin

Example: Where did the game of baseball *originate*?

Ask: Why would it be important to know where a rumor originated?

Related Words: origin, original

observation

Define: the act of looking closely at something and noticing details

Example: *Observations* of plants have taught us how they grow best.

Ask: What interesting observations have you made at school?

Related Words: observe, observer, observing, observatory

Word Parts: -tion

massive

Define: very large

Example: The *massive* building had over fifty floors.

Ask: What is the most massive thing you've seen?

Related Words: gigantic, huge

Word Parts: suffix -ive (adjective form of a verb)

ancient

Define: very old; of a time in the long past

Example: The scientists dug up an *ancient* city in Egypt.

Ask: What can you learn from ancient books, artifacts, and tools?

Related Words: modern (antonym)



CHAPTER 1

The Curious Scientist

Read

Ask students how they might approach reading Chapter 1. Model text navigation, if needed. Since students have already previewed the text, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

The author may suggest the reader look at a photograph, chart, or other visual. In this case, they should stop and do so. If not, they should read the section or page and then look at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information? How does that information relate to the text?***

Remind students they can go back and study the photos and illustrations more closely when they finish reading. Tell students that if the page has a sidebar, they should read it last.

Connect to Writing—Note-Taking

Have students turn to the Note-Taking Chart on their student worksheets (page 188).

As students read Chapter 1, ask them to:

Step 1. Write down key words and phrases to help them remember the big ideas; they can also draw pictures.

Step 2. Note their questions and confusions about the text by jotting down the page and paragraph number of the confusing sentence or section.

Step 3. Write a two- or three-sentence chapter summary.

While students are reading and taking notes, circulate and take note of any common confusion. During the after-reading discussion, you can go back to the text and model your thinking to clarify.

Student Worksheet, p.188

CHAPTER 1 **Shake, Rattle, and Roll**
by Alice Boynton

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

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Special Needs

Provide digital tools (e.g. tablets) for students to record notes. Allow alternate ways of expressing ideas, such as through drawings.

Build Content Knowledge

During the discussion of the text:

- Focus on reading and interpreting the maps on pages 10, 12, and 13. Teach students a map-reading routine; discuss how these maps complement the text.
- Stress the three kinds of natural hazards mentioned in the text and how they are related: earthquakes, tsunamis, and volcanoes. Have students record details on the causes and effects of earthquakes.
- Highlight the steps Aristotle took to arrive at his conclusions about earthquakes (collected facts, recorded data, asked questions, made observations, arrived at conclusions based on evidence); relate these to today's science and engineering practices.
- Emphasize the patterns that can be determined by looking at the Ring of Fire maps on pages 12–13.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

pages 3–5	***Why did the author include the information on Aristotle? How does it compare to the information on earthquake myths? What does the author think about Aristotle's conclusions? How do you know?***
pages 6–7	***Why did the author include the illustration of the stone being dropped in the water? How does that help the reader?***
pages 8–9	***Why is an earthquake's magnitude important? How do you know?***
pages 10–11	***How does the comic strip on page 11 add to what you know about tsunamis? Why might the author have included it?***
pages 12–13	***What patters do you notice on the map?***
pages 14–15	***What emergency procedures are used in places where earthquakes are common? How are these procedures similar to the ones you use for natural disasters where you live?***

OL

The Curious Scientist

Second Read

Revisit the Text

Ask students to identify the special text features in Chapter 1 and explain why the author used them.

- ***Why did the author include the illustration and caption on page 10?***
- ***What information did these add?***

Focus on Text Feature—Map

Direct students to the Tectonic Plate map on page 12. Review that a map is a flat picture of part of the Earth. There are five main types of maps: political, physical, landform, transportation, and historical.

Review the following steps for reading a map and apply them to this one.

Step 1. Read the title. This tells you what the map shows.
Step 2. Find the map symbols.
Step 3. Look at the map key or legend. This tells you what the map symbols mean.
Step 4. Read the map labels and any captions.
Step 5. Find the compass rose (if present). This shows directions on the map.

Give students 2 minutes to turn and talk with a partner and share what they learned from the map.

- ***Why did the author include maps in this chapter?***
- ***How did the maps help you understand the chapter better?***
- ***When and where could you use a map in your writing?***

Prompt students to share their answers.

Focus on Text Feature—Graph

Direct students to the graph on page 9. Review that a graph is a picture that shows information about amounts or numbers. It tells a lot with very few words and lets you quickly compare and contrast information.

There are many types of graphs, such as bar graphs, circle graphs, line graphs, and pictographs.

Review the following steps for reading a graph and apply them to the moment magnitude scale graph.

Step 1. Read the title. This tells you what the graph shows.
Step 2. Read the labels. Ask what they tell about the kinds of information in the graph.
Step 3. Read across each line of the graph and determine the connection between the earthquake magnitude, number of earthquakes per year, and total energy release.
Step 4. Compare and contrast the information in the graph.

Give students 2 minutes to turn and talk with a partner and share what they learned from the graph.

- ***Why did the author include the graph?***
- ***How did the graph help you understand the chapter better?***
- ***When and where could you use a graph in your own writing?***

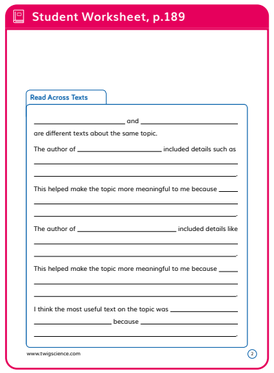
Prompt students to share their answers.

To help students understand the use of maps or graphs, have them add one to an upcoming writing assignment. When students have to find or create a text feature and then determine where it should go in their own writing and why, they can more easily interpret it in other texts.

Connect to Writing—Read Across Texts

Have students compare Chapter 1 to one of the other texts they've read in class. Ask them to complete the Read Across Texts writing frame on their student worksheets (page 189). Students who wish to expand their ideas can use the frame as a springboard, rather than following it directly.

Prompt students to share their comparisons.


Student Worksheet, p.189

Read Across Texts

_____ and _____
are different texts about the same topic.
The author of _____ included details such as
_____
_____
This helped make the topic more meaningful to me because _____
_____
_____
The author of _____ included details like
_____
_____
This helped make the topic more meaningful to me because _____
_____
_____
I think the most useful text on the topic was _____
_____ because _____
_____

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OL

STEM Career: Meet a Seismologist

First Read

Overview

This chapter focuses on the career of a seismologist and includes an optional micro-lab in which students learn how energy is stored and released during an earthquake.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (headings, maps, graphs)
- Read and write across texts.

Preview the Text

Have students preview Chapter 2 using the preview routine introduced in Chapter 1.

Prompt students to share their answers to Step 5, along with any other comments or questions they have about the text. Tell them that this chapter includes an interview.

- How might the interview format affect your reading of the chapter?

Prepare

Ask students to share what they already know, or want to know, about seismologists—scientists who study earthquakes. What have they read, seen, or heard in videos and other readings? Remind students that this will provide background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and share what they know about seismologists.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*seismologists, volcanologists*) using the vocabulary routine introduced in Chapter 1.

Point out that the *-ist* at the end of *seismologist* and *volcanologist* means a person who specializes in a (specific) art or science or skill. Ask students to brainstorm other related words with -ist (such as *artist*, *scientist*, and *violinist*).

Review the additional academic words to expand students' vocabulary.

remote

Define: far off, removed

Example: The scientists studied plants on a *remote* island.

Ask: What might be different about traveling to a remote place?

Related Words: close (antonym), near (antonym)

erupt

Define: to burst forth

Example: When the volcano *erupts*, it sends rock, lava, and gases into the air.

Ask: What happens when a person erupts with anger?

Related Words: erupting, eruption

evacuate

Define: to leave a place, such as a dangerous one, for safety or as a precaution

Example: We had to *evacuate* our neighborhood for fear of mudslides.

Ask: Why would you have to evacuate your home?

Related Words: evacuates, evacuated, evacuating, evacuation

Word Study Support

Write key vocabulary words syllable by syllable, such as *vol-can-ol-o-gist*. Guide students to use what they know about syllable types to read each word. For example, a closed syllable (e.g. *vol*, *can*, *ol*, *gist*) ends in a consonant and usually has a short vowel sound. An open syllable (e.g. *o*) ends in a vowel and usually has a long vowel sound.

Read

Ask students how they might approach reading Chapter 2. As you did in the previous chapter, help students navigate the text. Since students have already previewed the text, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. Remind students that the chapter is set up as an interview, so they should read the questions and then the answers. If students struggle with a boldfaced term, prompt them to use decoding and context clues to determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***What do the visuals add to the text?***

Have students whisper read the chapter. Listen in and offer feedback, if needed. If students struggle, model strategies to help them understand the text (such as visualize, clarify, and make inferences).

Discuss with students how they navigated the text. Have students turn to a partner and retell the most fascinating or surprising thing they read in the chapter.

STEM Career: Meet a Seismologist

Build Content Knowledge

During the discussion of the text and optional micro-lab:

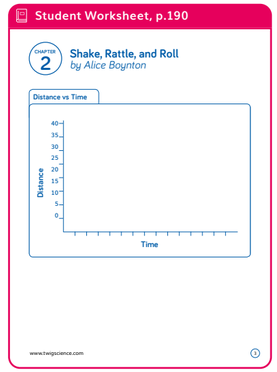
- If conducting the micro-lab, guide students as they experiment and debrief with partners.
- Help students relate the materials used in the experiment to parts of the Earth (e.g. blocks represent tectonic plates).
- Prompt students to summarize their understanding of how earthquakes occur. Have them share any questions they still have.
- Review the parts of the Earth's crust shown on page 8 and how tectonic plates function.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

page 16	*What does a seismologist do? Can you cite details in the text?*
page 17	*What dangers does a seismologist face? What might a seismologist do to prepare for these dangers?*
page 18	*How does a seismologist prepare for the dangers on the job?*
page 18	*What else would you like to know about earthquakes? Where can you find out more?*
page 19	*What does the author want you to know about a seismologist's tools?*

Optional Micro-Lab—Earthquake Blocks


Student Worksheet, p.190

CHAPTER 2 Shake, Rattle, and Roll
by Alice Boynton

Distance vs Time

Distance: 40, 35, 30, 25, 20, 15, 10, 5, 0

Time

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To deepen students' understanding of the key science concepts presented in the book and highlighted above, you may have them conduct the optional micro-lab, Earthquake Blocks on pages 20–21. You may want to start this investigation on a later day and let students continue their exploration during independent work time.

Step 1. Make sure each student has all the necessary materials—2 x 4 piece of wood, eye bolt, 10 thin rubber bands,sandpaper, and tape measure.
Step 2. Assist students as they prepare the materials.
Step 3. Guide students through a reading of the directions before they begin, and have them restate each step of the directions to a partner.
Step 4. Give students time to experiment with the materials.
Step 5. Prompt students to draw or graph their findings in the Distance vs. Time graph on their student worksheets (page 190). Provide time for students to share and compare their findings.

STEM Career: Meet a Seismologist

Second Read

Revisit the Text

Ask students to identify the format of Chapter 2 and explain how it affected the way they navigated the text.

- Did you read this chapter differently from Chapter 1?
- If so, what did you do?

Focus on Fluency—Partner Read

Model reading the introduction using standard phrasing, intonation, and speed. Prompt students to pay attention to these as you read. For example, pause deliberately at a comma. Reread the introduction one sentence at a time, and have students echo-read.

Ask student pairs to reread the interview. One student should act as interviewer and the other should act as interviewee. Once students finish, ask them to switch roles. Circulate, listen in, and offer feedback. Take note of students who need additional support, as well as specific aspects of the reading they struggle with (such as decoding or phrasing).

Focus on Vocabulary—Context Clues

Explain to students the many tools they can use to figure out the meaning of a word while reading. One tool is context clues, or the words and sentences around the unknown word. Authors provide different kinds of clues in their writing.

- **Word Part Clues:** E.g. prefixes, suffixes
- **Definition/Restatement:** Definition of the word is given right after it, often in parentheses or followed by *is* or *means*
- **Synonym:** Word with a similar meaning is given, often using the word *or*, *that is*, or *which is*
- **Antonym:** Word is contrasted with something that means the opposite
- **Examples:** Lists of related things are given and the word is often followed by *such as*, *include*, *these*, or *for example*
- **General Clues**

Model for students how to use definition/restatement and synonym clues to determine word meanings. Write the following sentences from Chapter 2: "For example, earthquake swarms are an important sign. That's when lots of little earthquakes occur near a volcano."

- ***Look at the words I underlined: earthquake swarms. What does this term mean? The first sentence (and the sentence before it) explains that earthquake swarms are an important sign a volcano might erupt. The second sentence says they are "lots of little earthquakes that occur near a volcano." The author has given a definition of the term in the following sentence to help the reader understand the new vocabulary.***

Continue modeling using the word segments on page 6. Point out the key word *or*. Direct students' attention to the following pages and words. Guide them to identify the clues the author provided to help the reader determine the word's meaning.

- *fault line*: definition (page 6)
- *seismic waves*: definition (page 7)
- *crust*, *mantle outer core*, *inner core*: definition (page 8)
- *magnitude*: definition (page 8)
- *tsunami*: definition (page 10)

When students read Chapter 3, guide them to identify and use context clues to determine the meanings of the following words.

- *tremor:* definition (page 24)
- *engineers:* definition (page 25)

Prompt students to use some of these context clues in their own writing to support readers' understanding.

Connect to Writing—Informative Texts

Tell students that they will write an article about a seismologist for a school newspaper, and review the format of the article. Remind students to introduce the article topic in an engaging way to draw in their readers. Prompt students to use details and quotes from the interview in the article. This genre reformulation strategy helps deepen students' understanding of the chapter's content.

Point out the importance of grouping related information into paragraphs, such as the tools seismologists use in one paragraph and the dangers they face in another.

Explain to students that variety in sentence length makes a text more interesting. If all the sentences were very long, the text would be boring. Model how to combine the sentences using *and*:

- **Original Sentences:** Rebecca Bell studies rocks. She studies seismic waves. She does experiments on the waves.
- **Sentence Combining:** Rebecca Bell studies rocks and seismic waves. She also does experiments on the waves to learn more about earthquakes.

Have student pairs brainstorm visuals they could add to their article (e.g. photos and captions).

- ***What do the visuals add to readers' understanding of your topic?***

Optional: Extend this activity by encouraging students to use digital tools to type and design their articles, add visuals, and print them for display on a classroom wall.

Standard English Learners

Many SELs have difficulties with subject-verb agreement when the verbs *do/does*, *have/has*, and *was/were*, e.g. are used. Additional grammar instruction and practice may be needed—write an example problem sentence, then provide contrastive analysis. Write the Standard English form above that sentence and discuss the key differences as a class.

Earthquake Proofing: What's the Cost?

First Read

Overview

This chapter examines various approaches that engineers use to earthquake-proof buildings.

Objectives

Students will:

- Navigate and read informational texts
- Apply metacognitive comprehension strategies (summarize)
- Use text structures (compare/contrast)
- Write a compare/contrast summary
- Synthesize information.

Preview the Text

Have students preview Chapter 3 using the preview routine introduced in Chapter 1.

Ask students to share their answers to Step 5.

- What challenges might you face in reading?
- What reading tools do you have to tackle these challenges?

Prepare

Prompt students to share what they already know about earthquake safety. What have they read, seen, or heard in videos and other readings? Remind students that this will provide background they can draw on as they read.

Give students 2 minutes to do a turn and talk with a partner and share what they know about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*nowcasting, tremors, engineers*) using the vocabulary routine introduced in Chapter 1.

Review the additional academic words to expand students' vocabulary.

prevent

Define: to stop from happening

Example: I closed the window to *prevent* the rain from coming in.

Ask: How can you prevent mosquito bites?

Related Words: prevention, preventable, unpreventable

hazard

Define: a danger or risk that can be difficult to avoid

Example: Climbing a ladder without help can be a *hazard*.

Ask: What hazards could someone face at the beach?

Related Words: hazardous (antonym: safety)

reduce

Define: to lessen; to bring down to a smaller amount

Example: You can *reduce* the risk of sunburn if you use sunscreen.

Ask: How do you reduce your amount of homework?

Related Words: reduction, reduced, reducing (antonym: increase)

collapse

Define: to fall down or cave in

Example: I was so tired that I *collapsed* onto the couch.

Ask: What could cause a building to collapse?

Related Words: collapsed, collapsing, collapsible

Read

Ask students how they might approach reading Chapter 3. Model text navigation, if needed. Since students have already previewed the text, they should start by rereading the title and introduction.

Tell students to being their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph, chart, or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***How do the visuals contribute to your understanding of the text?***

Remind students that if the page has a sidebar, they should read it last.

Have students whisper read the chapter. Listen in and offer feedback. When students struggle, remind them of the metacognitive strategies they can use to help them understand the text (such as summarize, visualize, predict, ask questions, make inferences, clarify, and other fix-up strategies).

Metacognitive Strategy—Summarize

Explain to students that skilled readers use strategies to check their comprehension as they read. One strategy is stopping and summarizing what the author has written. When you summarize, you restate in your own words the most important ideas in the text. If you can't easily summarize, it means you need to go back and reread, or use another strategy. If you can summarize, then you can continue reading.

Read page 23 to model summarizing.

- ***Let me summarize, or share the main ideas in the text so far, to see if I understand. Scientists have learned where earthquakes are likely to occur. However, they haven't learned when an earthquake will happen. How did I do? Do you think I understand what I've read?***

As they read the chapter, prompt students to periodically stop and summarize their reading. Point out good stopping points, if needed. Remind students that this is just one of the strategies they can use to check their comprehension while they read.

When they finish reading, have students discuss how they navigated the text.

- ***Did summarizing help you check your understanding as you read***

English Learners

Provide sentence frames to support students' responses.

- I read that _____.
- To stay safe during an earthquake, _____.
- Earthquake safety is important because _____.

Earthquake Proofing: What's the Cost?

Build Content Knowledge

During the discussion of the text:

- Emphasize the solutions presented by various scientists for earthquake-proofing buildings. Have students compare and contrast the solutions in terms of cost and practicality.
- Highlight the problems engineers are trying to solve and the variety of solutions they're testing.
- Point out how engineers create models, such as shaking tables, to test their building plans.
- Focus on the structural changes made to buildings to make them earthquake-proof.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

pages 22–23	***What does the author want you to know about earthquake prediction? Why did the author include the photo and caption about the Diablo Canyon Power Plant?***
page 24	***What have scientists done to help us predict earthquakes? How are these things making a difference? Cite examples.***
page 25	***What do engineers do to select the best place to build something? Why is this important?***
pages 26–27	***What does the author think about earthquake-proofing a city? How do you know? What is your opinion? Why?***
page 28	***What creative things are scientists doing to make buildings safer from earthquakes? Which of these ideas might work best? Why?***

Revisit the Text

Ask students to identify the special text features in Chapter 3 and explain why the author used these.

- ***How do the photos and captions add to your understanding?***
- ***How can you use the headings to summarize what you read?***

Focus on Text Structure—Compare/Contrast

Direct students' attention to the text's structure and discuss the importance of identifying this when reading. Explain that determining how a text is structured will help students organize their thinking as they read and better comprehend the text.

Read the definition of the Compare/Contrast text structure:

- ***This type of text points out the likenesses and differences between two or more subjects.***

Have student pairs reread page 28, "Testing Continues."

- ***How does the author compare the two houses, or show how they are alike?***
- ***How does the author contrast them, or show how they are different?***
- ***Does the author use text only, or text and photos?***

Discuss signal words, explaining that writers often use them to indicate a text's structure. Reinforce the use of signal words with the following steps:

Step 1. Display a list of compare/contrast signal words and phrases (such as *like*, *as*, *similar to*, *different than*, *in contrast*, *likewise*) and encourage students to look for them in future texts they read.

Step 2. Read page 28, prompting students to listen for signal words that indicate comparisons and contrasts.

Step 3. Record these signal words on a chart as students identify them (including *likewise* and *different*).

Step 4. Ask students to brainstorm other signal words, and add them to your chart.

During small group lessons, you can highlight these words and ask students how they helped them organize their thinking as they read. You may also emphasize how noticing these words can help students more easily remember details about how two or more things are similar or different.

Earthquake Proofing: What's the Cost?

Writing Support

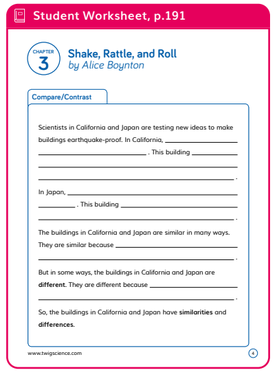
Have students record their completed frame on their student worksheets. Ask them to underline the compare and contrast signal words (e.g. *similar*, *different*). Prompt students to refer to the completed writing frame when writing compare and contrast informational text pieces.

English Learners

Writing frames provide great speaking frames. Suggest that ELs or students needing additional support use the writing frame when presenting their ideas.

Connect to Writing—Compare/Contrast

Have students summarize page 28 using the Compare/Contrast writing frame on their student worksheets (page 191). Students who wish to expand their ideas can use the frame as a springboard, rather than following it directly. Prompt students to share their summaries.


Student Worksheet, p.191

CHAPTER 3 Shake, Rattle, and Roll *by Alice Boynton*

Compare/Contrast

Scientists in California and Japan are testing new ideas to make buildings earthquake-proof. In California, _____. This building _____

In Japan, _____. This building _____

The buildings in California and Japan are similar in many ways. They are similar because _____

But in some ways, the buildings in California and Japan are **different**. They are different because _____

So, the buildings in California and Japan have **similarities** and **differences**.

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Synthesize Information

To show their growing body of knowledge, have students write a response to the problem: How can we reduce the damage caused by earthquakes?

To build students' writing stamina, provide an uninterrupted block of writing time for students. Increase the amount of time over the course of the year.

Review students' writing and provide revision notes so that students can revise during independent work time. For example, you may ask students to rewrite their introductory sentences to better grab the reader's attention, or add greater detail to a particular fact they've included.

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English language development. These tasks are best administered individually.

Writing Domain

Have students look at the map on page 10 and write a brief description of what is happening.

Reading Domain

Use the illustration on page 13. Write these sentences on the board:

- "All the Earth's earthquakes can be found on the Ring of Fire."
- "Earthquakes and volcanoes are common along the Ring of Fire."
- "Volcanoes cause earthquakes and tsunamis."

Have students read each sentence, then choose the one that best matches the illustration. Continue with other photos, illustrations, and graphic aids.

Listening Domain

Read aloud the paragraph about West Africa on page 4.

- Who lives on the giant's head?
- What else can be found there?
- What causes an earthquake?

Speaking Domain

If students share their Earthquake Blocks experiment graph, record their use of academic vocabulary and connecting words to explain their comparisons.

EL

Shake, Rattle, and Roll
English Learner Lessons

CHAPTER 1

The Curious Scientist

First Read

Overview

This chapter focuses on the practices scientists use to learn about earthquakes. It teaches students strategies that skilled readers use to navigate and comprehend information while reading independently.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (headings, maps, graphs)
- Read and write across texts.

Level Up

When working with ELs, use the following strategies to help them access the grade-level text.

- **Chunk the Text:** Focus on smaller sections of the text over an extended period of time to provide all the supports students will need to access meaning.
- **Read Aloud:** Consider reading the text aloud or having students listen to a recording before reading it together in small groups. For Emerging (Substantial Support) and some Expanding (Moderate Support) ELs, have them listen to a recording of the Below-Level book first for additional support.
- **Build Background:** Use videos, texts, and other resources to build background and vocabulary prior to reading the book.

Preview the Text

Have students preview Chapter 1 using the preview routine.

Step 1. Read the title of the chapter. What does the title tell you?
Step 2. Read the introduction and headings. What new information do they give you?
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice any features, such as special type, maps, or diagrams.
Step 5. What do you think this chapter will be about? Why?

Prompt students to share their answers to Step 5, along with any other comments or questions they have about the text.

- ***What challenges might you face in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Ask students to share what they already know about earthquakes, and how scientists have learned about them. What have they read, seen, or heard in videos and other readings? This will activate students' background knowledge, which they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and share what they know about the topic. Circulate and provide language support, such as recasting students' sentences using content and academic vocabulary.

Vocabulary Routine

Ensure students understand important new chapter vocabulary using the vocabulary routine.

- ***Why might an author boldface a term?***
- ***What does this add to the text?***

Step 1. Have students find and read the boldfaced content terms in Chapter 1 (**data, crust, tectonic plate, fault line, seismic waves, seismograph, magnitude**).
Step 2. Ask students to turn to the Visual Glossary on page 31. Tell students it may help them understand a given term.
Step 3. Repeat the terms as a class to confirm pronunciations.
Step 4. Point out the meanings of multiple-meaning words such as *crust* and *fault* that may cause students confusion.
Step 5. Review the additional academic words using the following simple definitions and context sentences. Point out related words and word parts to expand students' vocabulary.

observation

Define: the act of looking closely at something and noticing details

Example: *Observations* of plants have taught us how they grow best.

Ask: What interesting observations have you made at school?

Sentence Frame: The most interesting observation _____.

Related Words: observe, observer, observing, observatory

Word Parts: -tion

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

massive

Define: very large

Example: The *massive* building had over fifty floors.

Ask: What is the most massive thing you've seen?

Sentence Frame: The most massive thing _____.

Related Words: gigantic, huge

Word Parts: suffix -ive (adjective form of a verb)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

ancient

Define: very old; of a time in the long past

Example: The scientists dug up an *ancient* city in Egypt.

Ask: What can you learn from ancient books, artifacts, and tools?

Sentence Frame: You can learn _____ from ancient _____.

Related Words: modern (antonym).

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

originate

Define: to begin

Example: Where did the game of baseball *originate*?

Ask: Why would it be important to know where a rumor originated?

Sentence Frame: It would be important to _____ because _____.

Related Words: origin, original

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.



Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access complex sentences and build overall understanding of key ideas presented in the chapter. These supports include:

- **Unpack It!:** Guide students to unpack complex sentences and paragraphs, focusing on meaning. Help students break apart and simplify complex ideas using accessible language and sentence structure. Point out special features, such as words that connect these ideas (e.g., conjunctions, text structure signal words), prepositional phrases that separate clauses within sentences, academic vocabulary, and so on. Ask: What's happening? Who or what is this about? What does this sentence mean in your own words?
- **Connect It!:** Some students struggle connecting ideas within a paragraph due to their physical separation across the paragraph or due to the use of pronouns. Use the underlined words and phrases to connect these ideas. For pronouns, guide students to restate each sentence, replacing the pronoun with the noun it refers to in order to clarify meaning.

CHAPTER 1

The Curious Scientist

Linguistic Frames

Linguistic frames can assist students in presenting their ideas and internalizing linking words. These can be used with Emerging (Substantial Support) and Expanding (Moderate Support) ELs during most discussions. Model the frames for Emerging ELs and guide them as they use the frames.

Note: The frames can be presented as optional for Expanding ELs. Provide tiered frames for different levels of ELs as you read and discuss the chapters.

- I predict that _____
- I predict _____ because _____ .
- Based on the photo, I predict _____ because _____ .

Read

Ask students how they might approach reading Chapter 1. Model text navigation if needed. Since students have already previewed the text, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, students can refer to the Visual Glossary on page 31.

The author may suggest the reader look at a photograph, chart, or other visual—in this case, they should stop and do so. If not, they should read the section or page and then look at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does this information relate to the text?***

Remind students they can go back and study the photos and illustrations more closely when they finish reading. Tell students that if the page has a sidebar, they should read it last.

Annotate the Text

When annotating the text, guide students to circle:

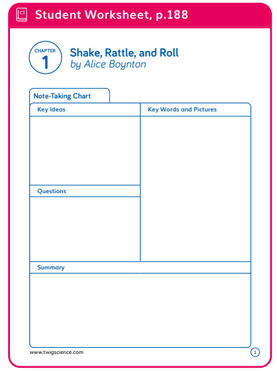
- Unfamiliar Words
- Confusing Sentences

Prompt students to use context clues to clarify meaning. Use conversation prompts and linguistic frames to discuss students' annotations.

Prompt	Frame
Which words did you circle?	I circled _____.
Which words or sentences are confusing?	I don't know what_____ means.
What clues in the text can help us figure out the word? Is there a prefix/suffix/root? What does the prefix/suffix/root mean?	I think _____ might mean _____ because _____.

Connect to Writing—Note-Taking

Student Worksheet, p.188


CHAPTER 1
Shake, Rattle, and Roll
by Alice Boynton
Note-Taking Chart
Key Ideas
Key Words and Pictures
Questions
Summary
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Have students turn to the Note-Taking Chart on their student worksheets (page 188).

As students read Chapter 1, ask them to:

Step 1. Write down key words and phrases to help them remember the big ideas; they can also draw pictures.
Step 2. Note their questions and confusions about the text by jotting down the page and paragraph number of the confusing sentence or section.
Step 3. Write a two- or three-sentence chapter summary.

Complete the chart for the first few pages together. Chorally read the text and model annotating the chart.

While students are reading and taking notes, circulate and take note of any common confusion. During the after-reading discussion, you can go back to the text and model your thinking to clarify.

Special Needs

Provide digital tools (e.g. tablets) for students to record notes. Allow alternate ways of expressing ideas, such as through drawings.

EL

The Curious Scientist

Build Content Knowledge

During the discussion of the text:

- Focus on reading and interpreting the maps on pages 10, 12, and 13. Teach students a map-reading routine; discuss how these maps complement the text.
- Stress the three kinds of natural hazards mentioned in the text and how they are related: earthquakes, tsunamis, and volcanoes. Have students record details on the causes and effects of earthquakes.
- Highlight the steps Aristotle took to arrive at his conclusions about earthquakes (collected facts, recorded data, asked questions, made observations, arrived at conclusions based on evidence); relate these to today's science and engineering practices.
- Emphasize the patterns that can be determined by looking at the Ring of Fire maps on pages 12–13.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

pages 3–5	*Why did the author include the information on Aristotle? How does it compare to the information on the ancient myths? What does the author think about Aristotle's ideas? How do you know?*
pages 6–7	*Why did the author include the illustration of the stone being dropped in the water? How does that help the reader?*
pages 8–9	*Why is an earthquake's magnitude important? What kinds of information did the author provide?*
pages 10–11	*How does the comic strip on page 11 add to what you know about tsunamis? Why might the author have included it?*
pages 12–13	*What patterns do you notice on the map?*
pages 14–15	*What emergency procedures are used in places where earthquakes are common? How are these procedures similar to the ones you use for natural disasters like earthquakes, hurricanes, and tornadoes where you live?*

Assess Conversation

Use the chart to gauge students' progress as they participate in collaborative conversations. Model conversation exchanges to support students' growth.

Bridging 4	*Students engage in 5 or more exchanges. They support their ideas with evidence and sufficiently synthesize ideas.*
Expanding 3	*Students engage in 3-4 exchanges. They ask and answer questions, agree and disagree, and build on each other's ideas.*
Early Expanding 2	*Students engage in 1 exchange, using only a sentence or two. Sometimes the conversation is extended.*
Emerging 1	*Students offer 1 short answer. The exchange is often highly structured.*
0	*Students are silent during the conversation.*

The Curious Scientist

Second Read

Revisit the Text

Ask students to identify the special text features in Chapter 1 and explain why the author used them.

- ***Why did the author include the illustration and caption on page 10?***
- ***What information did these add?***

Focus on Text Feature—Map

Direct students to the Tectonic Plate map on page 12. Review that a map is a flat picture of part of the Earth. There are five main types of maps: political, physical, landform, transportation, and historical.

Review the following steps for reading a map and apply them to this one.

Step 1. Read the title. This tells you what the map shows.
Step 2. Find the map symbols.
Step 3. Look at the map key or legend. This tells you what the map symbols mean.
Step 4. Read the map labels and any captions.
Step 5. Find the compass rose (if present). This shows directions on the map.

Give students 2 minutes to turn and talk with a partner and share what they learned from the map.

- ***Why did the author include maps in this chapter?***
- ***How did the maps help you understand the chapter better?***
- ***When and where could you use a map in your writing?***

Prompt students to share their answers.

Focus on Text Structure—Graph

Direct students to the graph on page 9. Review that a graph is a picture that shows information about amounts or numbers. It tells a lot with very few words and lets you quickly compare and contrast information. There are many types of graphs, such as bar graphs, pie charts, line graphs, and pictographs.

Review the following steps for reading a graph and apply them to the moment magnitude scale graph.

Step 1. Read the title. This tells you what the graph shows.
Step 2. Read the labels. Ask what they tell about the kinds of information in the graph.
Step 3. Read across each line of the graph and determine the connection between the earthquake magnitude, number of earthquakes per year, and total energy release.
Step 4. Compare and contrast the information in the graph.

Give students 2 minutes to turn and talk with a partner and share what they learned from the graph.

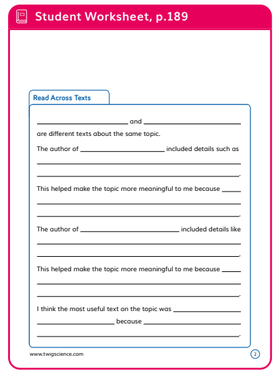
- ***Why did the author include the graph?***
- ***How did the graph help you understand the chapter better?***
- ***When and where could you use a graph in your own writing?***

Prompt students to share their answers.

To help students understand the use of maps and graphs, have them add one to an upcoming writing assignment. When students have to find or create a text feature and then determine where it should go in their own writing and why, they can more easily interpret it in other texts.

Connect to Writing—Read Across Texts

Have students compare Chapter 1 to one of the other texts they've read in class. Ask them to complete the Read Across Texts writing frame on their student worksheets (page 189). Prompt students to share their comparisons. Have students use the writing frame as a speaking frame.


Student Worksheet, p.189

Read Across Texts

_____ and _____
are different texts about the same topic.
The author of _____ included details such as
_____
_____
This helped make the topic more meaningful to me because _____
_____
_____
The author of _____ included details like
_____
_____
This helped make the topic more meaningful to me because _____
_____
_____
I think the most useful text on the topic was _____
_____ because _____
_____

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CHAPTER 2

STEM Career: Meet a Seismologist

First Read

Overview

This chapter focuses on the career of a seismologist and includes an optional micro-lab in which students learn how energy is stored and released during an earthquake.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (headings, maps, graphs)
- Read and write across texts.

Word Study Support

Write key vocabulary words syllable by syllable, such as *vol-can-ol-o-gist*. Guide students to use what they know about syllable types to read each word. For example, a closed syllable (e.g., *vol*, *can*, *ol*, *gist*) ends in a consonant and usually has a short vowel sound. An open syllable (e.g., *o*) ends in a vowel and usually has a long vowel sound.

For students whose phonics and word study skills are below level, focus on a few long vowel and complex vowel spelling patterns they struggle with. Use words from the chapter to model decoding. Extend to other words with these patterns.

Preview the Text

Have students preview Chapter 2 using the preview routine established in Chapter 1.

Prompt students to share their answers to Step 5, along with any other comments or questions they have about the text. Tell them that this chapter includes an interview.

- ***How might the interview format affect your reading of the chapter?***

Prepare

Ask students to share what they already know, or want to know, about seismologists—scientists who study earthquakes. What have they read, seen, or heard in videos and other readings? Remind students that they can draw on this background knowledge as they read.

Give students 2 minutes to turn and talk with a partner and share what they know about the topic. Circulate and provide language support, such as offering sentence frames.

Vocabulary Routine

Ensure that students understand important new chapter vocabulary (*seismologists*, *volcanologists*) using the vocabulary routine established in Chapter 1.

Point out that the *-ist* at the end of *seismologist* and *volcanologist* means a person who specializes in a (specific) art or science or skill. Ask students to brainstorm other related words with the suffix *-ist* (such as *artist*, *scientist*, and *violinist*).

Review the additional academic words to expand students' vocabulary.

evacuate

Define: to leave a place, such as a dangerous one, for safety or as a precaution

Example: We had to *evacuate* our neighborhood for fear of mudslides.

Ask: Why might you have to evacuate your home?

Sentence Frame: You would have to evacuate your home if _____.

Related Words: evacuates, evacuated, evacuating, evacuation

Word Parts: suffix -ion (noun form of a verb)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

erupt

Define: to burst forth

Example: When the volcano *erupts*, it sends rock, lava, and gases into the air.

Ask: What happens when a person erupts with anger?

Sentence Frame: When a person erupts with anger _____.

Related Words: erupting, eruption

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

Read

Ask students how they might approach reading Chapter 2. As you did in the previous chapter, help students navigate the text. Since students have already previewed the text, they should start by rereading the title and introduction.

Guide students through an initial reading of the chapter. Multiple supports are provided in the text to assist you in helping students access complex sentences and build overall understanding of key ideas presented in the chapter. Tell students to begin their reading of the main text. Remind students that the chapter is set up as an interview, so they should read the questions and then the answers. If students struggle with a boldfaced term, prompt them to use decoding and context clues to determine its meaning.

Note: If necessary, students can refer to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***What do the visuals add to the text?***

Discuss with students how they navigated the text. Have students turn to a partner and retell the most fascinating or surprising thing they read.

Build Content Knowledge

During the discussion of the text and optional micro-lab:

- If conducting the micro-lab, guide students as they experiment and debrief with partners.
- Help students relate the materials used in the experiment to parts of the Earth (e.g., blocks represent tectonic plates).
- Prompt students to summarize their understanding of how earthquakes occur. Have them share any questions they still have.
- Review the parts of the Earth's crust shown on page 8 and how tectonic plates function.

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access complex sentences and build overall understanding of key ideas presented in the chapter.

- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

CHAPTER 2

STEM Career: Meet a Seismologist

Second Read

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

page 16	*What does a seismologist do? Find details in the text to support your answer.*
page 17	*What dangers does a seismologist face? What might a seismologist do to prepare, or get ready, for these dangers?*
page 18	*How does a seismologist prepare for the dangers on the job?*
page 18	*What else would you like to know about earthquakes? Where can you find out more?*
page 19	*What does the author want you to know about a seismologist's tools?*

Optional Micro-Lab–Earthquake Blocks

To deepen students' understanding of the key science concepts presented in the book and highlighted above, you may have them conduct the optional micro-lab, Earthquake Blocks on pages 20–21. You may want to start this investigation on a later day and let students continue their exploration during independent work time.

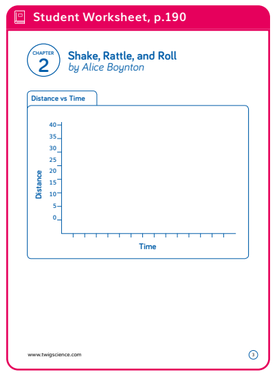
Step 1. Make sure each student has all the necessary materials (2 x 4 piece of wood, eye bolt, 10 thin rubber bands,sandpaper, and tape measure).

Step 2. Assist students as they prepare the materials.

Step 3. Read the directions aloud before students begin. Have them restate each step of the directions to a partner to confirm understanding.

Step 4. Give students time to experiment with the materials.

Step 5. Prompt students to draw or graph their findings in the Distance vs. Time graph on their student worksheets (page 190). Provide time for students to share and compare their findings.



Revisit the Text

Ask students to identify the format of Chapter 2 and explain how it affected the way they navigated the text.

- ***Did you read this chapter differently from Chapter 1?***
- ***If so, what did you do?***

Focus on Fluency—Partner Read

Model reading the first question and answer using proper phrasing, intonation, and speed. For example, pause at a comma. Then reread the question and answer, one sentence at a time. Have students echo read. Prompt them to pay attention to your pace and phrasing.

Ask student pairs to reread the interview. One student should act as interviewer and the other should act as interviewee—after students finish, ask them to switch roles. Circulate, listen in, and offer feedback. Take note of students who need additional support, as well as specific aspects of the reading they struggle with (such as decoding or phrasing).

STEM Career: Meet a Seismologist

Focus on Vocabulary—Context Clues

Explain to students the many tools they can use to figure out the meaning of a word while reading. One tool is context clues, or the words and sentences around the unknown word.

Authors provide different kinds of clues in their writing.

- **Word Parts:** E.g. prefixes, suffixes
- **Definitions/Restatements:** Definition of the word is given right after it, often in parentheses, or followed by *is* or *means*
- **Synonym:** Word with a similar meaning is given, often using the words *or*, *that is*, or *which is*
- **Antonym:** Word is contrasted with something that means the opposite
- **Examples:** Lists of related things are given and the word is often followed by *such as*, *include*, *these*, or *for example*
- **General Clues**

Model for students how to use definition/restatement and synonym clues to determine word meanings. Write the following sentences from Chapter 2: "For example, earthquake swarms are an important sign. That's when lots of little earthquakes occur near a volcano."

- ***Look at the words: earthquake swarms. What does this term mean? The first sentence (and the sentence before it) explains that earthquake swarms are an important sign a volcano might erupt. The second sentence says they are "lots of little earthquakes that occur near a volcano." The author has given a definition of the term in the following sentence to help the reader understand the new vocabulary.***

Continue modeling using the word segments on page 6. Point out the key word *or*.

Direct students' attention to the following pages and words. Guide them to identify the clues the author provided to help the reader determine the word's meaning.

- *fault line:* definition (page 6)
- *seismic waves:* definition (page 7)
- *crust*, *mantle*, *outer core*, *inner core:* definition (page 8)
- *magnitude:* definition (page 8)
- *tsunami:* definition (page 10)

When students read Chapter 3, guide them to identify and use context clues to determine the meanings of the following words.

- *tremor:* definition (page 24)
- *engineers:* general clues (page 25)

Prompt students to use some of these context clues in their own writing to support readers' understanding.

Connect to Writing—Informative Texts

Tell students that they will write an article about a seismologist for a school newspaper, and review the format of the article. Remind students to introduce the article topic in an engaging way to draw in their readers. Prompt students to use details and quotes from the interview in their articles. This genre reformulation strategy will help deepen students' understanding of the chapter's content.

Point out the importance of grouping related information into paragraphs, such as the tools seismologists use in one paragraph and the dangers they face in another.

Explain to students that variety in sentence length makes a text more interesting. If all the sentences were short, for example, the text would be choppy.

Model how to combine sentences using *and*.

- **Original Sentences:** Rebecca Bell studies rocks. She studies seismic waves. She does experiments on the waves.
- **Combined Sentences:** Rebecca Bell studies rocks and seismic waves. She also does experiments on the waves to learn more about earthquakes.

Have student pairs brainstorm visuals they could add to their article (e.g. photos and captions).

- ***What do the visuals add to readers' understanding of your topic?***

Optional: Extend this activity by encouraging students to use digital tools to type and design their articles, add visuals, and print them for display on a classroom wall.

Earthquake Proofing: What's the Cost?

First Read

Overview

This chapter examines various approaches that engineers use to earthquake-proof buildings.

Objectives

Students will:

- Navigate and read informational texts
- Apply metacognitive comprehension strategies (summarize)
- Use text structures (compare/contrast)
- Write a compare/contrast summary
- Synthesize information.

Preview the Text

Have students preview Chapter 3 using the preview routine established in Chapter 1.

Ask students to share their answers to Step 5.

- ***What challenges might you face in reading?***
- ***What reading tools do you have to tackle these challenges?***

Prepare

Prompt students to share what they already know about earthquake safety. What have they read, seen, or heard in videos and other readings? Remind students that this will provide background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and share what they know about the topic.

Vocabulary Routine

Ensure students understand important chapter vocabulary (*nowcasting*, *tremors*, *engineers*) using the vocabulary routine established in Chapter 1.

Review the additional academic words to expand students' vocabulary.

collapse

Define: to fall down or cave in

Example: I was so tired that I *collapsed* onto the couch.

Ask: What could cause a building to collapse?

Sentence Frame: _____ could cause a building to collapse.

Related Words: collapsed, collapsing, collapsible

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

prevent

Define: to stop from happening

Example: I closed the window to *prevent* the rain from coming in.

Ask: How can you prevent mosquito bites?

Sentence Frame: You can prevent _____ by _____ .

Related Words: prevention, preventable, unpreventable

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

hazard

Define: a danger or risk that can be difficult to avoid

Example: Climbing a ladder without help can be a *hazard*.

Ask: What hazards could someone face at the beach?

Sentence Frame: _____ are hazards in _____ .

Related Words: hazardous, (antonym: safety)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

reduce

Define: to lessen; to bring down to a smaller amount

Example: You can *reduce* the risk of sunburn if you use sunscreen.

Ask: How do you reduce your amount of homework?

Sentence Frame: You can reduce _____ by _____ .

Related Words: reduction, reduced, reducing, (antonym: increase)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

Earthquake Proofing: What's the Cost?

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary presented.

- **Cognates:** Highlight words that are similar in Spanish and English to accelerate vocabulary building (e.g., *structures/estructuras*).
- **Use Context:** Guide students to use context clues to figure out the meanings of new words while reading. Reinforce this strategy frequently to build this independent reading habit.
- **Idioms:** Highlight English idioms that might cause students confusion.
- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

English Learners

Provide sentence frames to support students' responses.

- I read that _____ .
- To stay safe during an earthquake, _____ .
- Earthquake safety is important because _____ .

Make Word Banks

Provide word banks during discussions for students to refer to. Include content and academic words, as well as words that help students link ideas (*because, therefore, in addition*). You can organize the word bank by part of speech, e.g., to help students.

For Emerging (Substantial Support) ELs, use word banks with one category of words and connect it to a simple linguistic frame. For Expanding (Moderate Support) ELs, collect words by listening to students' conversation (Collect and Display Language Routine), then add words from the chapter to extend this word bank.

Read

Ask students how they might approach reading Chapter 3. Model text navigation, if needed. Since students have already previewed the text, they should start by rereading the title and introduction.

Guide students through an initial reading of the chapter. Then, tell students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, students can refer to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph, chart, or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***How do the visuals contribute to your understanding of the text?***

Remind students that if the page has a sidebar, they should read it last.

Metacognitive Strategy—Summarize

Explain to students that skilled readers use strategies to check their comprehension as they read. One strategy is stopping and summarizing what the author has written. When you summarize, you restate in your own words the most important ideas in the text. If you can't easily summarize, it means you need to go back and reread, or use another strategy. If you can summarize, you can continue reading.

Read page 23 to model summarizing.

- ***Let me summarize, or share the main ideas in the text so far, to see if I understand. Scientists have learned where earthquakes are likely to occur. However, they haven't learned when an earthquake will happen. How did I do? Do you think I understand what I've read?***

As they read the chapter, prompt students to periodically stop and summarize their reading. Point out good stopping points, if needed. Remind students that this is just one of the strategies they can use to check their comprehension while they read.

When they finish reading, have students discuss how they navigated the text.

- ***Did summarizing help you check your understanding as you read?***

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access complex sentences and build understanding of the key ideas.

- **Unpack It!:** Guide students to unpack complex sentences and paragraphs, focusing on meaning. Help students break apart and simplify complex ideas using accessible language and sentence structure. Point out special features, such as words that connect these ideas (e.g., conjunctions, text structure signal words), prepositional phrases that separate clauses within sentences, academic vocabulary, and so on. Ask: What's happening? Who or what is this about? What does this sentence mean in your own words?

Extend the Conversation

Extend students' conversation about the ideas presented in the chapter.

- ***What do you think?***
- ***What do you mean by _____ ?***
- ***I'm confused. Please explain.***
- ***How do you know? Find the evidence.***
- ***What clues in the text gave you that idea?***
- ***Do you agree? Why or why not?***

Use sentence frames to support students' answers.

- I think _____ .
- I mean _____ .
- I know this because _____
- I know this because I read _____ .
- I know _____ because _____ .
- This means that _____ .
- I disagree. I think that _____ .

English Learners

Use additional supports for Emerging ELs

Substantial Support (Emerging Proficiency)

- **Total Physical Response:** Use actions and gestures to communicate ideas.
- **Yes/No Examples:** Ask yes/no questions to encourage students to participate in discussion. Is this a _____?
- **Simple Linguistic Frames with Word Banks:** Provide a simple response frame and list possible words for response.
- **Total Physical Response:** Use actions and gestures to communicate ideas.

Earthquake Proofing: What's the Cost?

Second Read

Build Content Knowledge

During the discussion of the text:

- Emphasize the solutions presented by various scientists for earthquake-proofing buildings. Have students compare and contrast the solutions in terms of cost and practicality.
- Highlight the problems engineers are trying to solve and the variety of solutions they're testing.
- Point out how engineers create models, such as shaking tables, to test their building plans.
- Focus on the structural changes made to buildings to make them earthquake-proof.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

pages 22–23	*What does the author want you to know about predicting when and where earthquakes will happen? Why did the author include the photo and caption about the Diablo Canyon Power Plant?*
page 24	*What have scientists done to help us predict earthquakes? How are these things making a difference? Find examples to support your answer.*
page 25	*What do engineers do to pick the best place to build something? Why is this important?*
pages 26–27	*What does the author think about earthquake-proofing a city? How do you know? What is your opinion? Why?*
page 28	*What creative things are scientists doing to make buildings safer from earthquakes? Which of these ideas might work best? Why?*

Revisit The Text

Ask students to identify the special text features in Chapter 3 and explain why the author used these.

- ***How do the photos and captions add to your understanding?***
- ***How can you use the headings to summarize what you read?***

Focus on Text Structure—Compare/Contrast

Direct students' attention to the text's structure and discuss the importance of identifying this when reading. Explain that determining how a text is structured will help students organize their thinking as they read and better comprehend the text.

Read the definition of the Compare/Contrast text structure:

- ***This type of text points out the likenesses and differences between two or more subjects.***

Have student pairs reread page 28, "Testing Continues."

- ***How does the author compare the two houses, or show how they are alike?***
- ***How does the author contrast them, or show how they are different?***
- ***Does the author use text only, or text and photos?***

Discuss signal words, explaining that writers often use them to indicate a text's structure. Reinforce the use of signal words with the following steps:

Step 1. Display a list of compare/contrast signal words and phrases (such as *like, as, similar to, different than, in contrast, likewise*) and encourage students to look for them in future texts they read.

Step 2. Read page 28, prompting students to listen for signal words that indicate comparisons and contrasts.

Step 3. Record these signal words on a chart as students identify them (including *likewise* and *different*).

Step 4. Ask students to brainstorm other signal words, and add them to your chart.

During small group lessons, you can highlight these words and ask students how they helped them organize their thinking as they read. You may also emphasize how noticing these words can help students more easily remember details about how two or more things are similar or different.

Earthquake Proofing: What's the Cost?

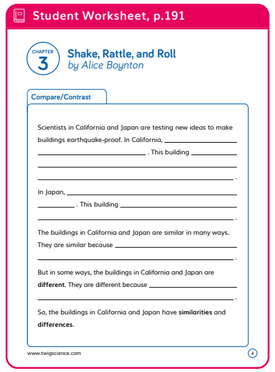
Writing Support

Have students record their completed frame on their student worksheets. Ask them to underline the compare and contrast signal words (e.g. *similar*, *different*). Prompt students to refer to the completed writing frame when writing compare and contrast informational text pieces.

Connect to Writing—Compare/Contrast

Have students summarize page 28 using the Compare/Contrast writing frame on their student worksheets (page 191).

Prompt students to share their summaries with the class. Writing frames provide great speaking frames. Encourage students to use the frame when presenting their ideas.


Student Worksheet, p.191

CHAPTER 3 Shake, Rattle, and Roll
by Alice Boynton

Compare/Contrast

Scientists in California and Japan are testing new ideas to make buildings earthquake-proof. In California, _____ . This building _____ .

In Japan, _____ . This building _____ .

The buildings in California and Japan are similar in many ways. They are similar because _____ .

But in some ways, the buildings in California and Japan are **different**. They are different because _____ .

So, the buildings in California and Japan have **similarities** and **differences**.

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Synthesize Information

To show their growing body of knowledge, have students write a response to the problem: How can we reduce the damage caused by earthquakes?

To build students' writing stamina, provide an uninterrupted block of writing time for students. Increase the amount of time over the course of the year.

Review students' writing and provide revision notes so that students can revise during independent work time. For example, ask students to rewrite their introductory sentences to grab the reader's attention, or add detail to a fact they've included.

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English language development. These tasks are best administered individually.

Writing Domain

Have students look at the map on page 10 and write a brief description of what is happening.

Reading Domain

Use the illustration on page 13. Write:

- "All the Earth's earthquakes can be found on the Ring of Fire."
- "Earthquakes and volcanoes are common along the Ring of Fire."
- "Volcanoes cause earthquakes and tsunamis."

Have students read each sentence, then choose the one that best matches the illustration. Continue with other photos, illustrations, and graphic aids.

Listening Domain

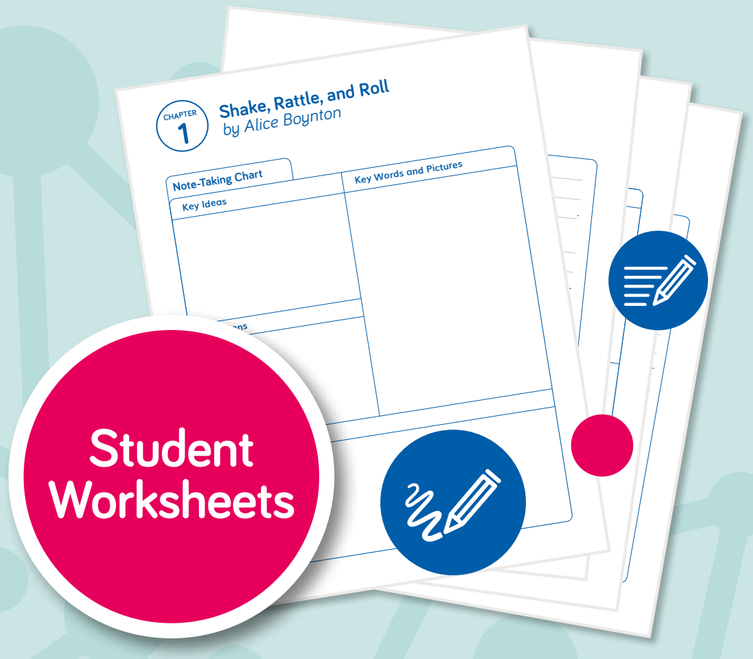
Read aloud the West Africa paragraph on page 4.

- ***Who lives on the giant's head? What else can be found there? What causes an earthquake?***

Speaking Domain

If students share their Earthquake Blocks experiment graphs, record their use of academic vocabulary and connecting words to explain their comparisons.

Shake, Rattle, and Roll



CHAPTER 1

Shake, Rattle, and Roll

by Alice Boynton

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

Read Across Texts

_____ and _____ are different texts about the same topic.

The author of _____ included details such as

_____

_____.

This helped make the topic more meaningful to me because _____

_____

_____.

The author of _____ included details like

_____

_____.

This helped make the topic more meaningful to me because _____

_____

_____.

I think the most useful text on the topic was _____ _____ because _____

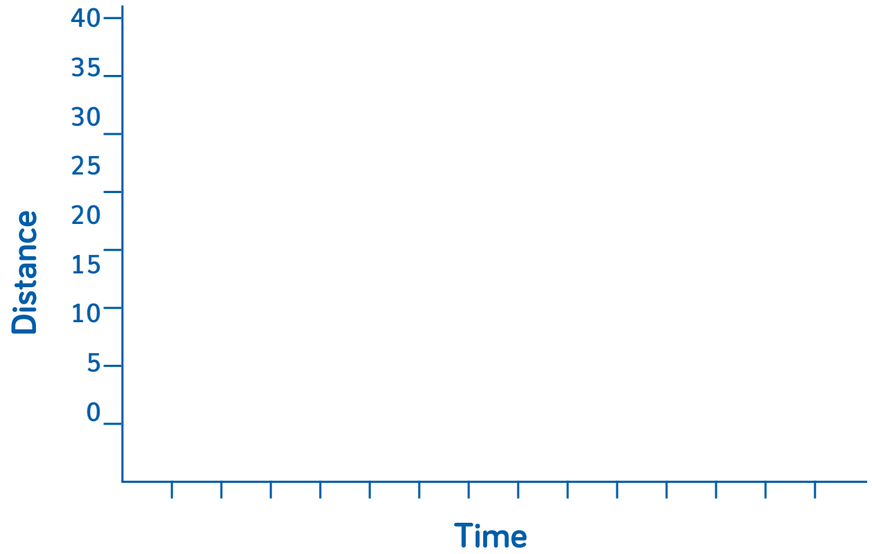
_____.

CHAPTER 2

Shake, Rattle, and Roll

by Alice Boynton

Distance vs Time



CHAPTER 3

Shake, Rattle, and Roll

by Alice Boynton

Compare/Contrast

Scientists in California and Japan are testing new ideas to make buildings earthquake-proof. In California, _____ _____ . This building _____ _____ _____ .

In Japan, _____ _____ . This building _____ _____ .

The buildings in California and Japan are similar in many ways. They are similar because _____ _____ .

But in some ways, the buildings in California and Japan are **different.** They are different because _____ _____ .

So, the buildings in California and Japan have **similarities** and **differences**.

Amazing Animal Senses

Chapter 1: Animal Senses
This chapter focuses on animal senses and how animals use them to survive. It teaches students strategies that skilled readers use to navigate and comprehend informational texts while reading independently.

Chapter 2: STEM Career: Meet an Animal Behavior Scientist
This chapter focuses on the career of an animal behavior scientist. It includes an optional micro-lab in which students conduct an experiment on the role of the human nose in tasting foods.

Chapter 3: Sense-Inspired Tech
This chapter examines inventions inspired by amazing animal senses.



On-Level OL

English Learners EL

OL

Amazing Animal Senses On-Level Lessons

CHAPTER 1

Animal Senses

First Read

Overview

This chapter focuses on animal senses and how animals use them to survive. It teaches students strategies that skilled readers use to navigate and comprehend informational texts while reading independently.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (headings and subheadings, special type)
- Read and write across texts.

Level-Up

For students who struggle with the On-Level book, guide them through a reading of the Below-Level book first. Then have them listen to a recording of the On-Level book and follow along with the text. This scaffolding should prepare students for reading the On-Level book in small groups.

Preview the Text

Have students preview Chapter 1 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Prompt students to share their answers to Step 5, along with any other comments or questions they have about the text.

- ***What challenges might you meet in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Ask students what they already know about animal senses and how they compare to human senses. What have they read, seen, or heard in videos and other readings? This will provide students background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary using the vocabulary routine.

- ***Why might an author boldface a term?***

Step 1. Have students find and read the boldfaced content words in Chapter 1 (**senses, receptors, magnetic field, echolocation, ultraviolet light**).
Step 2. Ask students to turn to the Visual Glossary on page 31. Tell students it may help them understand a given term.
Step 3. Repeat the terms as a class to confirm pronunciations. Highlight the compound word *echolocation*. Point out the two parts of this word (*echo*, *location*) and how they relate to the meaning of the word.
Step 4. Review additional academic words using the following simple definitions and context sentences. Point out related words and word parts to expand students' vocabulary.

survive

Define: live

Example: We need food, water, and oxygen to *survive*.

Ask: What do animals need to survive?

Related Words: survival

detect

Define: discover or find out that something exists

Example: If you *detect* the odor of gas, there might be a dangerous leak.

Ask: What senses can you use to detect something?

Related Words: detection, undetectable

evaluate

Define: to determine or judge the worth or value of something

Example: We must *evaluate* our experiment to figure out what went wrong.

Ask: Is it important to evaluate your actions toward your classmates? Why or why not?

Related Words: evaluation

myth

Define: a traditional story often told to explain something in nature

Example: Is the *myth* that bats can turn you into a vampire true?

Ask: What myths have you read or heard about things in nature?

Related Words: mythical

Read

Discuss with students how they might approach reading Chapter 1. Model text navigation, as needed. Since students have already previewed the chapter, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

The author may suggest the reader look at a photograph, chart, or other visual. In this case, they should stop and do so. If not, they should read the section or page and then look at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does this information relate to the text?***

Remind students that they can go back and study the photos and illustrations more closely when they finish reading. Tell students that if the page has a sidebar, they should read it last.



OL

CHAPTER 1

Animal Senses

Special Needs

Provide digital tools (e.g., tablets) for students to record notes. Encourage alternate ways of expressing ideas, such as through drawings or audio recordings.

Connect to Writing—Note-Taking

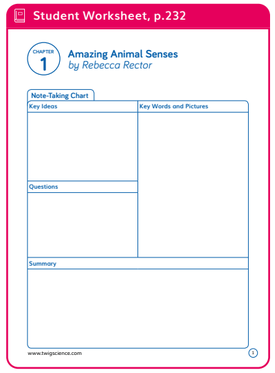
Ask students to use the Note-Taking Chart on their student worksheets (page 232).

As students read Chapter 1, have them:

Step 1. Write down key words and phrases to help them remember the big ideas, and draw pictures as memory aids

Step 2. Note any questions they have about the text or portions of the text that confused them by jotting down the page and paragraph number or the first few words of the confusing sentence

Step 3. Write a two- or three-sentence summary that they could use to tell someone what the chapter was about.


Student Worksheet, p.232

CHAPTER 1 Amazing Animal Senses
by Rebecca Rector

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

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While students are reading and taking notes, circulate and notice any common confusion. During the after-reading discussion, you can go back to the text and model your thinking to clarify.

Build Content Knowledge

During the discussion of the text:

- Highlight the specific senses of each animal mentioned and the link to its survival.
- Focus on the information in the chart on page 6.
- Focus on the internal and external body parts that animals use to sense things in their environment and how these differ from animal to animal.
- Highlight the information on page 5 about magnetic and electric fields.
- Point out Romanes' experiment on page 7 and the steps he took to learn about dog senses. Ask students what questions they still have about animal senses.
- Engage students in a debate about animals predicting earthquakes, using the information on page 13. Ask what they would need to do to further their exploration of this scientific question.
- Emphasize the internal and external body parts that animals use to sense things in their environment and how these differ from animal to animal.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

pages 2–3	*What are our five senses? How do our senses compare to some animal senses? Can you cite examples?*
pages 4–5	*How are animal senses related to their survival? What examples did the author give? Why did the author include the photos? How do they relate to the text?*
page 6	*Why did the author include the chart? How does it support the author's idea that animals have "super senses"?*
pages 8–13	*How did the information about myths change what you know or believe about animals? How are the myths related to animal senses? Which was most surprising? Why?*

Animal Senses

Second Read

Revisit the Text

Ask students to identify the special text features in Chapter 1 and explain why the author used each one.

- ***Why did the author include the sidebar on page 7?***
- ***What information did it add?***

Focus on Text Feature—Headings and Subheadings

Have students revisit the chapter headings and subheadings. Review the questions students should consider when reading informational texts.

- ***What's this chapter about?***
- ***What's the main idea?***

Writers of informational texts give you clues that help you answer these questions. Review the following steps with students for understanding headings and subheadings and ask students to apply these to Chapter 1.

Step 1. Read the chapter title to find out the topic.
Step 2. Read the introduction to find out the main ideas of the article.
Step 3. Read the headings and subheadings to find out the main idea of each section.
- Headings get you ready for what you will read. They can also be used after reading to help you summarize the chapter. Headings often have some special type treatment. They may be boldfaced, all capital letters, or shown in a color other than black.
- Subheadings are also treated differently, such as in another color. They are in the section under a main heading and help to break up the text into manageable chunks.

Step 4. Look for details in the main body text to get additional facts.

Have students share what they learned from the chapter headings and subheadings.

- ***Why did the author include headings and subheadings in this chapter?***
- ***How did the headings and subheadings help you understand the chapter or remember what it's about?***
- ***When and where could you use headings and subheadings in your writing?***

Prompt students to share their answers.

Focus on Text Feature—Special Type

Have students revisit the special type in the chapter. Review that writers of informational texts provide visual clues, such as special type, that alert the reader to important ideas and vocabulary central to the topic.

The title and headings get readers ready for what they are going to read. They provide an outline of the main ideas in the text. Special type, such as boldface, italics, and color calls out important vocabulary related to the topic. Sometimes authors will also provide pronunciations of difficult words to help readers pronounce them.

Review the following steps for using special type.

Step 1. The title is hard to miss—it's big. It tells you what the chapter is about.
Step 2. Pay attention to the boldfaced words. They indicate important vocabulary about the topic. Be sure you understand what they mean.
Step 3. Use pronunciation tips, if provided.

Have students turn and talk with a partner and explain what they learned from the special type.

- ***Why did the author include special type in this chapter?***
- ***How did the special type help you understand the chapter?***
- ***When and where could you use special type in your writing?***

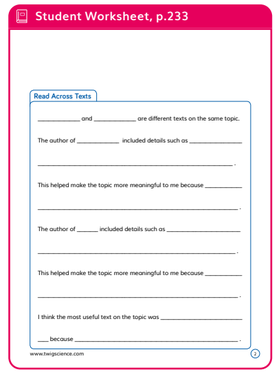
Prompt students to share their answers.

To help students understand the use of headings or special type, have them add colorful headings or important vocabulary words in boldface to an upcoming writing assignment. When students have to find or create a text feature and then determine where they should go in their own writing and why, they can more easily interpret it in other texts.

Connect to Writing—Read Across Texts

Have students compare Chapter 1 to one of the other texts they have read in class. Ask them to complete the Read Across Text writing frame on their student worksheets (page 233). Students who wish to expand their ideas can use the frame as a springboard, rather than following it directly.

Prompt students to share their comparisons with the class.


Student Worksheet, p.233

Read Across Texts

_____ and _____ are different texts on the same topic.

The author of _____ included details such as _____

_____.

This helped make the topic more meaningful to me because _____

_____.

The author of _____ included details such as _____

_____.

This helped make the topic more meaningful to me because _____

_____.

I think the most useful text on the topic was _____

_____ because _____.

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STEM Career: Meet an Animal Behavior Scientist

First Read

Overview

This chapter focuses on the career of an animal behavior scientist. It includes an optional micro-lab in which students conduct an experiment on the role of the nose in tasting foods.

Objectives

Students will:

- Navigate and read informational texts
- Use vocabulary strategy (context clues)
- Build fluency with science texts
- Write process documents.

Word Study Support

Write key vocabulary words syllable by syllable, such as *ad-ap-ta-tions*. Guide students to use what they know about syllables types to read each word. For example, a closed syllable (e.g., *ad*, *ap*) ends in a consonant and usually has a short vowel sound. An open syllable (e.g., *ta*) ends in a vowel and usually has a long vowel sound. Point out the common syllable *-tion*, pronounced */shun/*.

Preview the Text

Have student preview Chapter 2 using the preview routine established in Chapter 1.

- ***This chapter contains an interview. How does the format of an interview affect how you will read the chapter?***

Prepare

Ask students what they already know (if anything) about animal behavior scientists. What have they read, seen, or heard in videos and other readings? This will provide students background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know, or can guess, about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*animal behavior scientist, species, adaptations, echolocation, laboratory, experimental design, observe, document*) using the vocabulary routine established in Chapter 1.

Point out that *lab* is short for *laboratory*.

Review the additional academic words to expand students' vocabulary.

observe

Define: to look closely at something and notice details

Example: You can use a microscope to *observe* something very small.

Ask: What animals have you observed in or near your home?

Related Words: observation, observer, observing, observatory

document

Define: to write down evidence or facts found or learned

Example: We will *document* the results of our experiment today.

Ask: Why is it important to document findings during and after an experiment?

Related Words: documentation

exotic

Define: unusual or strange; from a faraway place

Example: The Central Park Zoo contains many different *exotic* parrots, such as blue-headed macaws.

Ask: Which exotic animal is your favorite?

Word Parts: exo- (outside, such as exoskeleton, exterior, or exit)

venomous

Define: poisonous

Example: A *venomous* snake can kill with one bite.

Ask: How should you act around a venomous animal?

Word Parts: -ous [adjective form of a word, as in venom (noun)/venomous (adjective)]

Read

Ask students how they might approach reading Chapter 2. As you did in the previous chapter, help students navigate the text. Since students have already previewed the text, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. Remind students that the chapter is set up as an interview, so they should read the questions and then the answers. If students struggle with a boldfaced term, prompt them to use decoding and context clues to determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does this information relate to the text?***

Have students whisper read the chapter. Listen in and offer feedback, if needed. If students struggle, model strategies to help them understand the text (such as visualize, clarify, and make inferences).

Discuss with students how they navigated the text. Have students turn and talk with a partner about the most fascinating or surprising thing they read in the chapter.

Build Content Knowledge

During the discussion of the text and optional micro-lab:

- Highlight Dr. Brinkløv's findings regarding the animals she is studying.
- Emphasize the body parts we use to taste.
- Point out the scientific questions Dr. Brinkløv asks and the steps she takes to figure out the answers. Highlight the content on page 16.
- If conducting the optional micro-lab, focus on the experiment and students' observations during and after it. Guide students to explain their findings about the role the nose plays in detecting taste.
- Focus on the body parts we use to taste.

STEM Career: Meet an Animal Behavior Scientist

Second Read

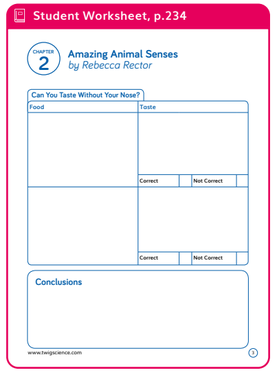
Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen comprehension. Prompt students to cite evidence in the text (specific words, sentence, and illustrations) to support their answers.

pages 14–15	*Dr. Brinkløv says that being an animal behavior scientist is like being a spy. What does she mean? Can you cite evidence to support your answer?*
page 15	*How is studying animals in a lab different from studying them in the wild? Why are both important to an animal behavior scientist?*
page 16	*What steps does Dr. Brinkløv go through to conduct her research? Cite details in the text. How is this similar to the steps we go through when conducting our experiments in class?*
page 17	*How does Dr. Brinkløv feel about being an animal behavior scientist? How do you know?*
page 18	*What dangers does Dr. Brinkløv face on the job? What does she do to reduce her risks?*
page 19	*What does the author want you to know about an animal behavior scientist's tools?*

Optional Micro-Lab—Can You Taste Without Your Nose?

To deepen students' understanding of the key science concepts presented in the book and highlighted above, you may conduct the optional micro-lab, Can You Taste Without Your Nose? on pages 20–21. You may want to start this investigation on a later day and let students continue their exploration during independent work time.


Student Worksheet, p.234

CHAPTER 2 Amazing Animal Senses *by Rebecca Rector*

Can You Taste Without Your Nose?

Food | Taste

Correct | Not Correct

Correct | Not Correct

Conclusions

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Step 1. Make sure student pairs have all the materials listed—small pieces of peeled apples and potatoes, 2 bowls, 2 cups of water, and a handkerchief or bandana (to use as a blindfold).

Step 2. If needed, assist students as they prepare the materials.

Step 3. Guide students through a reading of the directions before they begin, and have them restate each step of the directions to a partner.

Step 4. Give students time to experiment with the materials.

Step 5. Prompt students to record their findings on their student worksheets (page 234). Provide time for students to share and compare their findings.

Revisit the Text

Prompt students to identify the special format of Chapter 2 and explain how it affected the way they navigated the text.

- ***Did you read this chapter differently from Chapter 1? If so, what did you do?***

Focus on Fluency—Partner Read

Model reading the introduction using standard phrasing, intonation, and speed. Prompt students to pay attention to these as you read. For example, pause deliberately at a comma. Reread the introduction one sentence at a time, and have students echo read.

Ask student pairs to reread the interview. One student should act as interviewer and the other should act as interviewee—after students finish, ask them to switch roles. Circulate, listen in, and offer feedback. Take note of students who need additional support, as well as specific aspects of the reading they struggle with (such as decoding or phrasing).

Focus on Vocabulary—Context Clues

Explain to students the many tools they can use to figure out the meaning of a word while reading. One tool is context clues, or the words and sentences around the unknown word. Authors provide different kinds of clues in their writing, such as:

- **Word Part Clues:** E.g. prefixes, suffixes
- **Definition/Restatement:** Definition of the word is given right after it, often in parentheses or followed by *is* or *means*
- **Synonym:** Word with a similar meaning is given, often using the word *or, that is*, or *which is*
- **Antonym:** Word is contrasted with something that means the opposite
- **Examples:** Lists of related things are given and the word is often followed by *such as, include, these*, or *for example*
- **General Clues**

Model for students how to use definition/restatement clues to determine word meanings. Write the following sentence from Chapter 2: "By learning more about an animal species, we can help conserve, or save, the amazing diversity that surrounds us."

- ***Look at the word I underlined: conserve. What does this word mean? I see that right after the word the author has given a synonym, or a word that means almost the same. Authors often do this with a difficult and important word. They follow the word with or and a word that means almost the same thing. The author has given a synonym for the word to help the reader understand it.***

STEM Career: Meet an Animal Behavior Scientist

Direct students' attention to the following pages and words. Guide them to identify the clues the author provided to help the reader determine the word's meaning:

- *echolocation:* definition (page 5)
- *magnetite:* definition (page 6)
- *scent:* synonym (page 11)

When students read Chapter 3, guide them to identify and use context clues to determine the meanings of the following words:

- *membranes:* context (page 27)
- *stool:* synonym (page 29)

Prompt students to use these context clues in their writing to support their readers' understanding.

Connect to Writing—Informative Texts

Have students turn the interview into a process document, explaining the steps a scientist uses to investigate a phenomenon. This genre reformulation strategy will help deepen students' understanding of the chapter's content.

Review the format of process document, including using a numbered series of steps. Remind students to include details at each step and provide examples from the chapter or from their own experiences. Prompt them to use details from the interview in their process documents.

Explain to students that variety in sentence length adds interest to a piece of text. For example, if all the sentences were short, the text would sound choppy. Adding precise details helps readers understand your writing.

Model how to combine sentences to make them more complex and to connect ideas.

- **Original Sentences:** Discuss your findings with others. Get their ideas.
- **Sentence Combining and Adding Precise Details:** Discuss your findings with others to get their ideas about new discoveries you made or what still needs to be investigated.

Have student pairs brainstorm visuals they could add to their texts (e.g., photos and captions) and what the visuals would add to readers' understanding of their topic.

Optional: Extend this activity by encouraging students to use digital tools to type and design their process documents, add visuals, and print to display on a classroom wall.

Standard English Learners

Some SELs will use several negatives in a sentence when only one is required, as in *Nobody never said nothing.* The more negatives used indicate the more negative the statement.

To master Standard English, some SELs will need considerable practice to gain control of any, ever, and either after a negative word. Write a sentence from students' speech or writing. Then provide contrastive analysis work. Write the Standard English form above that sentence. Discuss the key differences.

Sense-Inspired Tech

Prepare

Prompt students to share what they already know about the use of animal senses in technology. What have they read, seen, or heard in videos and other readings? Remind students that this will provide background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*chlorophyll, hearing aids, microphone, membranes, cancer, chemicals*) using the vocabulary routine established in Chapter 1.

Highlight the *ch* spelling for */k/* in many science words, such as *chemical* and *chlorophyll*.

Review the additional academic words to expand students' vocabulary.`

inspire

Define: to produce an idea or feeling; to influence

Example: I was *inspired* by the skating competition to learn how to ice skate.

Ask: What has inspired you to do or learn something new?

Related Words: inspired, inspiration

vibrate

Define: to shake or move back and forth quickly

Example: My phone *vibrated* when you called.

Ask: Put your hand on your throat. Say the /b/ sound. Then say the /v/ sound. Which sound made your throat vibrate?

Related Words: vibration

external

Define: on the outside

Example: The *external* parts of a butterfly include its wings.

Ask: What external parts does an elephant have?

Word Parts: ex (out)

internal

Define: on the inside

Example: The *internal* parts of a human include the heart and lungs.

Ask: What internal rooms can you find in a house?

First Read

Overview

This chapter examines inventions inspired by amazing animal senses.

Objectives

Students will:

- Navigate and read informational texts
- Apply metacognitive comprehension strategies (summarize)
- Use text structures (description)
- Write description summaries
- Synthesize information.

Sense-Inspired Tech

Read

Ask students how they might approach reading Chapter 3. Model text navigation, if needed. Since students have already previewed the text, they should start by rereading the title and introduction.

Tell students to being their reading of the main text. If they struggle with a boldfaced term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph, chart, or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***How do the visuals contribute to your understanding of the text?***
- ***Do they add new information?***
- ***How does that information relate to the text?***

Remind students that if the page has a sidebar, they should read it last.

Have students whisper read the chapter. Listen in and offer feedback. When students struggle, remind them of the metacognitive strategies they can use to help them understand the text (e.g., summarize, visualize, predict, ask questions, make inferences, clarify, and other fix-up strategies).

Build Content Knowledge

During the discussion of the text:

- Discuss the special animal senses covered in the chapter, how animals use them for survival, and how learning about them can help humans.
- Point out the special animal senses covered in the chapter and the body part(s) used.
- Emphasize the new technologies inspired by animal senses and the impact they might have.
- Highlight how and why scientists are studying the various animals covered in the chapter. What questions are they asking? What steps are they taking to find the answers? Ask students what questions they still have. Discuss how they can find the answers.
- Engage students in a debate on which invention ideas are most important to them and why.
- Focus on how scientists observe patterns of animal behavior to better understand the power of their unique senses.
- Discuss how animals in our environment are giving scientists ideas to improve our lives as well as helping us better understand what the animals need to survive.

English Learners

Provide sentence frames to support students' responses.

- I read that _____.
- Animals sense using _____.
- The _____ has a special way of _____. It uses its _____ to _____.

Metacognitive Strategy—Summarize

Explain to students that skilled readers use strategies to check their comprehension as they read. One strategy is stopping and summarizing what the author has written. When you summarize, you restate in your own words the most important ideas in the text. If you can't easily summarize, it means you need to go back and reread, or use another strategy. If you can summarize, then you can continue reading.

Read aloud page 22 to model summarizing.

- ***Let me summarize, or tell the main ideas in the text so far, to see if I understand what I'm reading. Scientists and inventors are studying animal senses. They are using what they learn to make new things to help us. How did I do? Do you think I understand what I've read so far?***

As they read the chapter, prompt students to periodically stop and summarize their reading. Point out good stopping points, as needed. Remind students that this is one of several strategies they can use to check their comprehension while reading.

Sense-Inspired Tech

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen comprehension. Prompt students to cite evidence in the text (specific words, sentence, and illustrations) to support their answers.

page 23	*How are scientists using what they know about bats to help the blind? Why did the author add the photos and illustration? How do they relate to the text? How do they add to your understanding?*
page 24	*What does the author want you to know about lobster senses? Cite examples.*
page 25	*What does the author think about using these special eye drops? How do you know? What is your opinion of this idea?*
pages 26–27	*Find the hearing aid in the photo. How are crickets helping scientists improve hearing aids?*
pages 28–29	*How are these animals giving scientists ideas for new inventions? Why are these ideas important? Which are you most excited about? Why?*

Revisit the Text

Ask students to identify the special text features in Chapter 3 and explain why the author used each one.

- ***How do the photos and captions add to your understanding of the text?***
- ***How can you use the headings to summarize what you read?***

Focus on Text Structure—Description

Determining how a text is structured will help students organize their thinking as they read and comprehend the text.

Read the definition of the Description text structure:

- ***This type of text provides facts about a subject, event, person, or concept. It is the most common text structure used in textbooks.***

Have student pairs reread page 22.

- ***What is the author describing?***
- ***What details does the author provide?***
- ***Does the author use text only, or text and photos?***

Explain that writers often use signal words as clues to a text's structure. Display and discuss a list of description signal words and phrases (e.g. *for example*, *such as*). Other clues to this text structure's organization include items in a series separated by commas, dates, and numbers. Prompt students to look for these signal words in the texts they read.

Read aloud page 22. As you read, prompt students to listen for signal words that indicate description. Record them on a T-chart as students identify them.

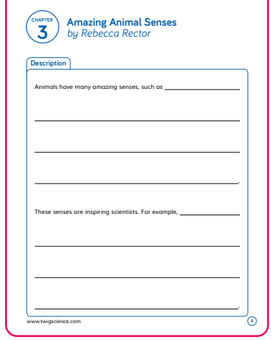
Post the signal words list, add others, and prompt students to look for these words in their readings. During small group lessons, highlight these words and ask students how they help them organize their thinking as they read. Emphasize how noticing these words will help them remember details about how two or more things are similar and different.

Connect to Writing—Description

Have students summarize page 22 using the Description writing frame on their student worksheets (page 235). Students who wish to expand their ideas can use the frame as a springboard, rather than following it directly.

Prompt students to share their summaries with the class.

Student Worksheet, p.235


CHAPTER 3
Amazing Animal Senses
by Rebecca Rector

Description

Animals have many amazing senses, such as _____

_____

_____

_____

These senses are inspiring scientists. For example, _____

_____

_____

_____

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OL

Second Read

Writing Support

Have students record their completed frame on their student worksheets. Ask them to underline the description signal words (e.g., *for example*, *such as*). Prompt students to refer to the completed writing frame when writing description informational text pieces.

Sense-Inspired Tech

English Learners

Writing frames provide great speaking frames. Suggest ELs or students needing additional support use the frame when presenting their ideas.

Synthesize Information

To show their growing body of knowledge, have students write a response to the phenomenon: How do the many parts of my body work together to help me live in the world?

To build students' writing stamina, provide an uninterrupted block of writing time for students. Increase the amount of time over the course of the year.

Review students' writing and provide revision notes so that students can revise during independent work time. For example, ask students to rewrite their introductory sentences to grab the reader's attention, or add detail to a fact they've included.

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English language development. These tasks are best administered individually.

Writing Domain

Have students look at the illustrations on page 21 and write a brief description of what is happening.

Reading Domain

Use the illustrations on page 6.

- "Some animals, like bats, can sense heat."
- "Some animals sense electric pulses and find their food that way."
- "Some animals use sound to find where things are."

Have students read each sentence, then match it to the correct illustration.

Listening Domain

Describe the photos on pages 4–5. Add key details included in the illustration, but not in the text (e.g., each animal's habitat).

- ***What animals do you see?***
- ***Where do they live?***
- ***What special senses do they have?***
- ***How do they use these senses to survive?***

Speaking Domain

As students answer the four questions in the Listening Domain task, record their use of academic vocabulary and ability to summarize the key details.

EL

Amazing Animal Senses
English Learner Lessons

CHAPTER 1

Animal Senses

First Read

Overview

This chapter focuses on animal senses and how animals use them to survive. It teaches students strategies that skilled readers use to navigate and comprehend informational texts while reading independently.

Objectives

Students will:

- Navigate and read informational texts
- Apply comprehension and vocabulary strategies
- Interpret text features (headings and subheadings, special type)
- Read and write across texts.

Level Up

When working with ELs, use the following strategies to help them access the grade-level text.

- **Chunk the Text:** Focus on smaller sections of the text over an extended period of time to provide all the supports students will need to access meaning.
- **Read Aloud:** Consider reading aloud the text or having students listen to a recording before reading it together in small groups. For Emerging (Substantial Support) and some Expanding (Moderate Support) ELs, have them listen to a recording of the Below-Level book first for additional support.
- **Build Background:** Use videos, texts, and other resources to build background and vocabulary prior to reading the book.

Preview the Text

Have students preview Chapter 1 using the preview routine.

Step 1. Read the title of the chapter. It tells the topic of the chapter.
Step 2. Read the introduction and headings. They relate to the main idea of each section of the chapter. Think about what the main ideas may be.
Step 3. Look over the photos and illustrations. You'll study these later.
Step 4. Notice any features, such as special type, a map, or a diagram.
Step 5. Based on your preview, ask yourself what the chapter will be about.

Prompt students to share their answers to Step 5, along with any other comments or questions they have about the text.

- ***What challenges might you meet in reading the chapter?***
- ***What reading tools do you have to tackle them?***

Prepare

Ask students what they already know about animal senses and how they compare to human senses. What have they read, seen, or heard in videos and other readings? This will provide students background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know about the topic. Circulate and provide language support, such as recasting students' sentences using content and academic vocabulary.

Vocabulary Routine

Ensure students understand important new chapter vocabulary using the vocabulary routine.

- ***Why might an author bold a term?***

Step 1. Have students find and read the bolded content words in Chapter 1 (**senses, receptors, magnetic field, echolocation, ultraviolet light**).
Step 2. Ask students to turn to the Visual Glossary on page 31. Tell students it may help them understand a given term.
Step 3. Repeat the terms as a class to confirm pronunciations. Highlight the compound word *echolocation*. Point out the two parts of this word (*echo, location*) and how they relate to the meaning of the word.
Step 4. Review additional academic words using the following simple definitions and context sentences. Point out related words and word parts to expand students' vocabulary.

evaluate

Define: to determine or judge the worth or value of something

Example: We must *evaluate* our experiment to figure out what went wrong.

Ask: Is it important to evaluate your actions toward your classmates? Why or why not?

Sentence Frame: It is/isn't important to evaluate _____ because _____ .

Related Words: evaluation

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

survive

Define: live

Example: We need food, water, and oxygen to *survive* .

Ask: What do animals need to survive?

Sentence Frame: _____ need _____ to survive.

Related Words: survival

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

detect

Define: discover or find out that something exists

Example: If you *detect* the odor of gas, there might be a dangerous leak.

Ask: What senses can you use to detect something?

Sentence Frame: I use _____ to detect _____ .

Related Words: detection, undetectable

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

Read

Discuss with students how they might approach reading Chapter 1. Model text navigation, as needed. Since students have already previewed the chapter, they should start by rereading the title and introduction.

Tell students to begin their reading of the main text. If they struggle with a bolded term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

The author may suggest the reader look at a photograph, chart, or other visual. In this case, they should stop and do so. If not, they should read the section or page and then look at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information? How does this information relate to the text?***

Remind students that they can go back and study the photos and illustrations more closely when they finish reading. Tell students that if the page has a sidebar, they should read it last.



Linguistic Frames

Linguistic frames can assist students in presenting their ideas and internalizing linking words. These can be used with Emerging (Substantial Support) and Expanding (Moderate Support) ELs during most discussions. Model the frames for Emerging ELs and guide them as they use the frames.

Note: The frames can be presented as optional for Expanding ELs. Provide tiered frames for different levels of ELs as you read and discuss the chapters.

- I predict that _____ .
- I predict _____ because _____ .

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary.

- **Cognates:** Highlight words that are similar in Spanish and English to accelerate vocabulary building (e.g., *animals*/*animales*).
- **Labels:** Throughout the text, labels on photos and illustrations connect the visuals to words in the chapters. Review these words as part of students' chapter preview.
- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

CHAPTER 1

Animal Senses

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access complex sentences and build overall understanding of key ideas presented in the chapter.

- **Unpack It!:** What's happening? Who or what is this about? What does this sentence mean in your own words? Guide students to unpack complex sentences and paragraphs. Focus on meaning. Use the underlined portions of the text to help students break apart and simplify complex ideas. Write simple sentences for each complex sentence or paragraph that expresses the basic ideas using accessible language and sentence structure. Point out special features in the sentences, such as words that connect these ideas (e.g., conjunctions, text structure signal words), prepositional phrases that separate clauses within sentences, academic vocabulary, and so on. Use everyday language in your recasting of the sentences and ideas. What's happening? Who or what is this about? What does this sentence mean in your own words
- **Connect It!:** Some students struggle connecting ideas within a paragraph due to their physical separation across the paragraph or the use of pronouns. Use the underlined words and phrases to connect these ideas. For pronouns, guide students to restate each sentence, replacing the pronoun with the noun it refers to in order to clarify meaning.
- **Text Structure:** Highlight examples of clear text structures and signal words indicating these structures. Explain how these words can be used to help students organize their thinking about the text and remember text details.

Special Needs

Provide digital tools (e.g., tablets) for students to record notes. Encourage alternate ways of expressing ideas, such as through drawings or audio recordings.

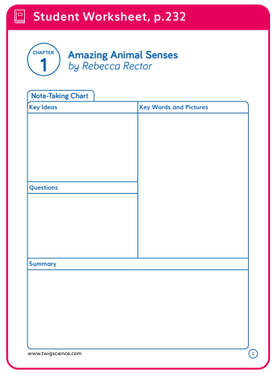
Connect to Writing—Note-Taking

Ask students to use the Note-Taking Chart on their student worksheets (page 232). As students read Chapter 1, have them:

Step 1. Write down key words and phrases to help them remember the big ideas, and draw pictures as memory aids.

Step 2. Note any questions they have about the text or portions of the text that confused them by jotting down the page and paragraph number or the first few words of the confusing sentence.

Step 3. Write a two- or three-sentence summary that they could use to tell someone what the chapter was about.


Student Worksheet, p.232

CHAPTER 1 Amazing Animal Senses
by Rebecca Rector

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

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While students are reading and taking notes, circulate and notice any common confusion. During the after-reading discussion, you can go back to the text and model your thinking to clarify.

Annotate the Text

When annotating the text, guide students to circle:

- Unfamiliar Words
- Confusing Sentences

Prompt students to use context clues to clarify meaning. Use conversation prompts and linguistic frames to discuss students' annotations.

Prompt	Frame
What words did you circle?	I circled _____ .
What words or sentences are confusing?	I don't know what _____ means.
What clues in the text can help us figure out the word? Is there a prefix/suffix/root? What does the prefix/suffix/root mean?	I think _____ might mean _____ because _____ .

Build Content Knowledge

During the discussion of the text:

- Highlight the specific senses of each animal mentioned and the link to its survival.
- Focus on the information in the chart on page 6.
- Focus on the internal and external body parts that animals use to sense things in their environment and how these differ from animal to animal.
- Highlight the information on page 5 about magnetic and electric fields.
- Point out Romanes' experiment on page 7 and the steps he took to learn about dog senses. Ask students what questions they still have about animal senses. Engage students in a debate about animals predicting earthquakes, using the information on page 13. Ask what they would need to do to further their exploration of this scientific question.
- Emphasize the internal and external body parts that animals use to sense things in their environment and how these differ from animal to animal.

Animal Senses

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen students' comprehension. Prompt students to cite evidence in the text (specific words, sentences, and illustrations) to support their answers.

pages 2–3	*What are our five senses? How do our senses compare to some animal senses—that is, how are they alike? Find examples in the text to support your answer.*
pages 4–5	*How are animal senses related to their survival? What examples did the author give? Why did the author include the photos? How do they connect to the text?*
page 6	*Why did the author include the chart? How does it support the author's idea that animals have "super senses"?*
pages 8–13	*How did the information about myths change what you know or believe about animals? How are the myths related to animal senses? Which was most surprising? Why?*

Assess Conversation

Use the chart to gauge students' progress as they participate in collaborative conversations. Model conversation exchanges to support students' growth.

Bridging 4	*Students engage in 5 or more exchanges. They support their ideas with evidence and sufficiently synthesize ideas.*
Expanding 3	*Students engage in 3–4 exchanges. They ask and answer questions, agree and disagree, and build on each other's ideas.*
Early Expanding 2	*Students engage in 1 exchange, using only a sentence or two. Sometimes the conversation is extended.*
Emerging 1	*Students offer 1 short answer. The exchange is often highly structured.*
0	*Students are silent during the conversation.*

Revisit the Text

Ask students to identify the special text features in Chapter 1 and explain why the author used each one.

- ***Why did the author include the sidebar on page 7?***
- ***What information did it add?***

Focus on Text Feature—Headings and Subheadings

Have students revisit the chapter headings and subheadings. Review that when they read informational texts, they should ask themselves:

- ***What's this chapter about?***
- ***What's the main idea?***

Writers of informational texts give you clues that help you answer these questions. Review the following steps with students for understanding headings and subheadings and ask students to apply these to Chapter 1.

Step 1. Read the chapter title to find out the topic.
Step 2. Read the introduction to find out the main ideas of the article.
Step 3. Read the headings and subheadings to find out the main idea of each section.
- Headings get you ready for what you will read. They can also be used after reading to help you summarize the chapter. Headings often have some special type treatment. They may be bolded, all capital letters, or shown in a color other than black.
- Subheadings are also treated differently, such as in another color. They are in the section under a main heading and help to break up the text into manageable chunks.

Step 4. Look for details in the main body text to get additional facts.

Have students share what they learned from the chapter headings and subheadings.

- ***Why did the author include headings and subheadings in this chapter?***
- ***How did the headings and subheadings help you understand the chapter or remember what it's about?***
- ***When and where could you use headings and subheadings in your writing?***

Prompt students to share their answers.

To help students understand the use of headings and subheadings, have them add headings to an upcoming writing assignment. Subheadings may be too sophisticated at this level for most students.

CHAPTER 2

Animal Senses

Focus on Text Feature—Special Type

Have students revisit the special type in the chapter. Review that writers of informational texts provide visual clues, such as special type, that alert the reader to important ideas and vocabulary central to the topic.

The title and headings get readers ready for what they are going to read. They provide an outline of the main ideas in the text. Special type, such as bold, italics, and color calls out important vocabulary related to the topic. Sometimes authors will also provide pronunciations of difficult words to help readers pronounce them.

Review the following steps for using special type.

Step 1. The title is hard to miss—it's big. It tells you what the chapter is about.
Step 2. Pay attention to the bolded words. They indicate important vocabulary about the topic. Be sure you understand what they mean.
Step 3. Use pronunciation tips, if provided.

Have students turn and talk to a partner and explain what they learned from the special type.

- ***Why did the author include special type in this chapter?***
- ***How did the special type help you understand the chapter?***
- ***When and where could you use special type in your writing?***

Prompt students to share their answers.

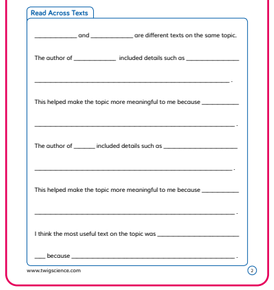
To help students understand the use of special type, have them add colorful headings or important vocabulary words in bold to an upcoming writing assignment. When students have to find or create a text feature and then determine where they should go in their own writing and why, they can more easily interpret this feature in other texts.

Connect to Writing—Read Across Texts

Have students compare Chapter 1 to one of the other texts they have read in class. Ask them to complete the Read Across Texts writing frame on their student worksheets (page 233).

Prompt students to share their comparisons with the class. Have students use the writing frame as a speaking frame.

Student Worksheet, p.233


Read Across Texts

_____ and _____ are different texts on the same topic.

The author of _____ included details such as _____ _____.

This helped make the topic more meaningful to me because _____ _____.

The author of _____ included details such as _____ _____.

This helped make the topic more meaningful to me because _____ _____.

I think the most useful text on the topic was _____ ___ because _____.

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STEM Career: Meet an Animal Behavior Scientist

Preview the Text

Have student preview Chapter 2 using the preview routine established in Chapter 1.

- ***This chapter contains an interview. How does the format of an interview affect how you will read the chapter?***

Prepare

Ask students what they already know (if anything) about animal behavior scientists. What have they read, seen, or heard in videos and other readings? This will provide students background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know, or can guess, about the topic. Circulate and provide language support, such as offering sentence frames.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*animal behavior scientist, species, adaptations, echolocation, laboratory, experimental design, observe, document*) using the vocabulary routine established in Chapter 1.

Point out that *lab* is short for *laboratory.*

Review the additional academic words to expand students' vocabulary.

observe

Define: to look closely at something and notice details

Example: You can use a microscope to *observe* something very small.

Ask: What animals have you observed in or near your home?

Sentence Frame: I have observed _____ .

Related Words: observation, observer, observing, observatory

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

document

Define: to write down evidence or facts found or learned

Example: We will *document* the results of our experiment today.

Ask: Why is it important to document findings during and after an experiment?

Sentence Frame: It is important to document findings because _____ .

Related Words: documentation

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

EL

First Read

Overview

This chapter focuses on the career of an animal behavior scientist. It includes an optional micro-lab in which students conduct an experiment on the role of the nose in tasting foods.

Objectives

Students will:

- Navigate and read informational texts
- Use vocabulary strategy (context clues)
- Build fluency with science texts
- Write a process document.

Word Study Support

Write key vocabulary words syllable by syllable, such as *ad-ap-ta-tions*. Guide students to use what they know about syllables types to read each word. Point out the common syllable - *tion*, pronounced */shun/*.

For students whose phonics and word study skills are below level, focus on a couple long vowel and r-controlled vowel spelling patterns they struggle with. Use words from the chapter to model decoding. Extend to other words with these patterns.

STEM Career: Meet an Animal Behavior Scientist

venomous

Define: poisonous

Example: A *venomous* snake can kill with one bite.

Ask: How should you act around a *venonmous* animal?

Sentence Frame: If I saw a venomous animal, I would _____ .

Word Parts: -ous [adjective form of a word, as in venom (noun)/venomous (adjective)]

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

exotic

Define: unusual or strange; from a faraway place

Example: The Central Park Zoo contains many different *exotic* parrots, such as blue-headed macaws.

Ask: Which exotic animal is your favorite?

Sentence Frame: My favourite exotic animals is _____ .

Word Parts: exo- (outside, such as exoskeleton, exterior, or exit)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

Read

Ask students how they might approach reading Chapter 2. As you did in the previous chapter, help students navigate the text. Since students have already previewed the text, they should start by rereading the title and introduction.

Guide students through an initial reading of the chapter. Then, tell students to begin their reading of the main text. Remind students that the chapter is set up as an interview, so they should read the questions and then the answers. If students struggle with a boldfaced term, prompt them to use decoding and context clues to determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***Does the visual illustrate something in the text?***
- ***Does it add new information?***
- ***How does this information relate to the text?***

Have students whisper read the chapter. Listen in and offer feedback, if needed. If students struggle, model strategies to help them understand the text (such as visualize, clarify, and make inferences).

Discuss with students how they navigated the text. Have students turn and talk to a partner about the most fascinating or surprising thing they read in the chapter.

Build Content Knowledge

During the discussion of the text and optional micro-lab:

- Highlight Dr. Brinkløv's findings regarding the animals she is studying.
- Emphasize the body parts we use to taste.
- Point out the scientific questions Dr. Brinkløv asks and the steps she takes to figure out the answers. Highlight the content on page 16.
- If conducting the optional micro-lab, focus on the experiment and students' observations during and after it. Guide students to explain their findings about the role the nose plays in detecting taste.
- Focus on the body parts we use to taste.

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen comprehension. Prompt students to cite evidence in the text (specific words, sentence, and illustrations) to support their answers.

pages 14–15	***Dr. Brinkløv says that being an animal behavior scientist is like being a spy. What does she mean? Find evidence in the text to support your answer.***
page 15	***How is studying animals in a lab different from studying them in the wild? Why are both important to an animal behavior scientist?***
page 16	***What steps does Dr. Brinkløv go through to conduct, or do, her research? Find details in the text. How is this similar to the steps we go through when conducting our experiments in class?***
page 17	***How does Dr. Brinkløv feel about being an animal behavior scientist? How do you know?***
page 18	***What dangers does Dr. Brinkløv face on the job? What does she do to reduce, or lessen, her risks?***
page 19	***What does the author want you to know about an animal behavior scientist's tools?***

Collaborative Conversation Support

Rephrasing

Saying things in multiple ways is essential when using new vocabulary or idioms. For example, say a sentence containing academic or content vocabulary, then rephrase it using simplified language.

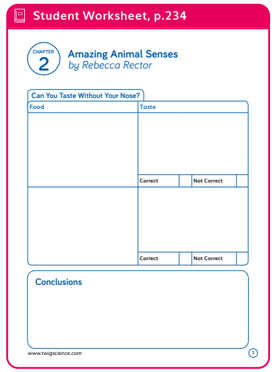
Use Native Language

Allow students to discuss new concepts in their native language with peers (if multiple students speak the same language) before engaging them in a conversation about these ideas in English.

CHAPTER 2

STEM Career: Meet an Animal Behavior Scientist

Optional Micro-Lab—Can You Taste Without Your Nose?


Student Worksheet, p.234

CHAPTER 2
Amazing Animal Senses
by Rebecca Rector

Can You Taste Without Your Nose?

Food	Taste
	Correct / Not Correct
	Correct / Not Correct

Conclusions

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To deepen students' understanding of the key science concepts presented in the book and highlighted above, you may conduct the optional micro-lab, Can You Taste Without Your Nose? on pages 20–21. You may want to start this investigation on a later day and let students continue their exploration during independent work time.

Step 1. Make sure student pairs have all the materials listed—small pieces of peeled apples and potatoes, 2 bowls, 2 cups of water, and a handkerchief or bandana (to use as a blindfold).
Step 2. If needed, assist students as they prepare the materials.
Step 3. The micro-lab is presented as a read together experience. Read it to students, then repeat it as an echo read. Guide students to restate each step in the directions to a partner to confirm understanding before completing the lab.
Step 4. Give students time to experiment with the materials.
Step 5. Prompt students to record their findings on their student worksheets (page 234). Provide time for students to share and compare their findings.

Second Read

Revisit the Text

Prompt students to identify the special format of Chapter 2 and explain how it affected the way they navigated the text.

- ***Did you read this chapter differently from Chapter 1? If so, what did you do?***

Focus on Fluency—Partner Read

Model reading the introduction using standard phrasing, intonation, and speed. Prompt students to pay attention to these as you read. For example, pause deliberately at a comma. Reread the introduction one sentence at a time, and have students echo read.

Ask student pairs to reread the interview. One student should act as interviewer and the other should act as interviewee—after students finish, ask them to switch roles. Circulate, listen in, and offer feedback. Take note of students who need additional support, as well as specific aspects of the reading they struggle with (such as decoding or phrasing).

Focus on Vocabulary—Context Clues

Explain to students the many tools they can use to figure out the meaning of a word while reading. One tool is context clues, or the words and sentences around the unknown word.

Authors provide different kinds of clues in their writing.

- **Word Part Clues:** E.g. prefixes, suffixes
- **Definition/Restatement:** Definition of the word is given right after it, often in parentheses or followed by *is* or *means*
- **Synonym:** Word with a similar meaning is given, often using the word *or, that is,* or *which is*
- **Antonym:** Word is contrasted with something that means the opposite
- **Examples:** Lists of related things are given and the word is often followed by *such as, include, these,* or *for example*
- **General Clues**

Model for students how to use definition/restatement clues to determine word meanings. Write the following sentence from Chapter 2: "By learning more about an animal species, we can help conserve, or save, the amazing diversity that surrounds us."

- ***Look at the word: conserve. What does this word mean? I see that right after the word the author has given a synonym, or a word that means almost the same. Authors often do this with a difficult and important word. They follow the word with or and a word that means almost the same thing. The author has given a synonym for the word to help the reader understand it.***

STEM Career: Meet an Animal Behavior Scientist

Direct students' attention to the following pages and words. Guide them to identify the clues the author provided to help the reader determine the word's meaning:

- *echolocation*: definition (page 5)
- *magnetite*: definition (page 6)
- *scent:* synonym (page 11)

When students read Chapter 3, guide them to identify and use context clues to determine the meanings of the following words:

- *membranes*: context (page 27)
- *stool:* synonym (page 29)

Prompt students to use these context clues in their writing to support their readers' understanding.

Connect to Writing—Informative Texts

Have students turn the interview into a process document, explaining the steps a scientist uses to investigate a phenomenon. This genre reformulation strategy helps deepen students' understanding of the chapter's content.

Tell students that they will write a Steps in the Process document.

Review the format of process document, including using a numbered series of steps. Remind students to include details at each step and provide examples from the chapter or from their own experiences.

Explain to students that variety in sentence length adds interest to a piece of text. For example, if all the sentences were short, the text would sound choppy. Adding precise details helps readers better understand your writing. Model how to combine the sentences to make them more complex and to connect ideas. For example:

- **Original Sentences:** Discuss your findings with others. Get their ideas.
- **Sentence Combining and Adding Precise Details:** Discuss your findings with others to get their ideas about new discoveries you made or what still needs to be investigated.

Prompt students to use details from the interview in their process documents.

Have student partners brainstorm visuals they could add to their texts (e.g., photos and captions) and what the visuals would add to readers' understanding of their topic.

You may extend this activity by encouraging students to use digital tools to type and design their process documents, add visuals, and print to display on a classroom wall.

Sense-Inspired Tech

Prepare

Prompt students to share what they already know about the use of animal senses in technology. What have they read, seen, or heard in videos and other readings? Remind students that this will provide them with background they can draw on as they read.

Give students 2 minutes to turn and talk with a partner and discuss what they know about the topic.

Vocabulary Routine

Ensure students understand important new chapter vocabulary (*chlorophyll, hearing aids, microphone, membranes, cancer, chemicals*) using the vocabulary routine established in Chapter 1.

Highlight the *ch* spelling for */k/* in many science words, such as *chemical* and *chlorophyll*.

Review the additional academic words to expand students' vocabulary.

inspire

Define: to produce an idea or feeling; to influence

Example: I was *inspired* by the skating competition to learn how to ice skate.

Ask: What has inspired you to do or learn something new?

Sentence Frame: I have been inspired by _____ to _____ .

Related Words: inspired, inspiration

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

vision

Define: sight, seeing with the eyes

Example: My *vision* is really bad at night.

Ask: What can have a bad effect on your vision?

Sentence Frame: _____ can have a bad effect on my vision.

Word Parts: Latin root vis (to see)

Related Words: visible

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

external

Define: on the outside

Example: The *external* parts of a butterfly include its wings.

Ask: What *external* parts does an elephant have?

Sentence Frame: The external parts of an elephant include _____ .

Word Parts: ex- (out)

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

internal

Define: on the inside

Example: The *internal* parts of a human include the heart and lungs.

Ask: What internal rooms can you find in a house?

Sentence Frame: The internal rooms in a house include _____ .

Say and Repeat: Conclude by saying the word, then have students repeat 3 times.

EL

First Read

Overview

This chapter examines inventions inspired by amazing animal senses.

Objectives

Students will:

- Navigate and read informational texts
- Apply metacognitive comprehension strategies (summarize)
- Use text structures (description)
- Write description summaries
- Synthesize information.

CHAPTER 3

Sense-Inspired Tech

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access complex sentences and build understanding of the key ideas.

- **Unpack It!:** Guide students to unpack complex sentences and paragraph. Focus on meaning. Use the underlined portions of the text to help students break apart and simplify complex ideas. Write simple sentences for each complex sentence or paragraph that expresses the basic ideas using accessible language and sentence structure. Point out special features in the sentences, such as words that connect these ideas (e.g., conjunctions, text structure, signal words), prepositional phrases that separate clauses within sentences, academic vocabulary, and so on. Use everyday language in your recasting of the sentences and ideas. What's happening? Who or what is this about? What does this sentence mean in your own words?
- **Connect It!:** Some students struggle connecting ideas within a paragraph due to their physical separation across the paragraph or the use of pronouns. Use the underlined words and phrases to connect these ideas. For pronouns, guide students to restate each sentence, replacing the pronoun with the noun it refers to in order to clarify meaning.

Make Word Banks

Provide word banks during discussions for students to refer to. Include content and academic words, as well as words that help students link ideas (*because, therefore, in addition*). You can organize the word bank by part of speech, e.g., to help students.

For Emerging (Substantial Support) ELs, use word banks with one category of words and connect it to a simple linguistic frame. For Expanding (Moderate Support) ELs, collect words by listening to students' conversation (Collect and Display Language Routine), then add words from the chapter to extend this word bank.

Read

Ask students how they might approach reading Chapter 3. Model text navigation, if needed. Since students have already previewed the text, they should start by rereading the title and introduction.

Guide students through an initial reading of the chapter. Then, tell students to being their reading of the main text. If they struggle with a bolded term, prompt them to use context clues and/or structural analysis to pronounce and determine its meaning.

Note: If necessary, they may turn to the Visual Glossary on page 31.

If the author suggests the reader look at a photograph, chart, or other visual, they should stop and do so. If not, students should read the section or page first before looking at its visuals.

- ***How do the visuals contribute to your understanding of the text?***
- ***Do they add new information?***
- ***How does this information relate to the text?***

Remind students that if the page has a sidebar, they should read it last.

Leveled Reader Supports

Multiple supports are provided in the text to assist you in helping students access the vocabulary.

- **Cognates:** Highlight words that are similar in Spanish and English to accelerate vocabulary building (e.g., *information*/*informacion*).
- **Define It:** Point out the definitions of key academic words needed for understanding.
- **Visual Glossary:** Refer to the visual glossary before, during, and after reading to reinforce key content vocabulary.

Metacognitive Strategy—Summarize

Explain to students that skilled readers use strategies to check their comprehension as they read. One strategy is stopping and summarizing what the author has written. When you summarize, you restate in your own words the most important ideas in the text. If you can't easily summarize, it means you need to go back and reread, or use another strategy. If you can summarize, then you can continue reading.

Read aloud page 22 to model summarizing.

- ***Let me summarize, or tell the main ideas in the text so far, to see if I understand what I'm reading. Scientists and inventors are studying animal senses. They are using what they learn to make new things to help us. How did I do? Do you think I understand what I've read so far?***

As they read the chapter, prompt students to periodically stop and summarize their reading. Point out good stopping points, as needed. Remind students that this is one of several strategies they can use to check their comprehension while reading.

Build Content Knowledge

During the discussion of the text:

- Discuss the special animal senses covered in the chapter, how animals use them for survival, and how learning about them can help humans.
- Point out the special animal senses covered in the chapter and the body part(s) used.
- Emphasize the new technologies inspired by animal senses and the impact they might have.
- Highlight how and why scientists are studying the various animals covered in the chapter. What questions are they asking? What steps are they taking to find the answers? Ask students what questions they still have. Discuss how they can find the answers.
- Engage students in a debate on which invention ideas are most important to them and why.
- Focus on how scientists observe patterns of animal behavior to better understand the power of their unique senses.
- Discuss how animals in our environment are giving scientists ideas to improve our lives as well as helping us better understand what the animals need to survive.

English Learners

Provide sentence frames to support students' responses.

- I read that _____ .
- Animals sense using _____ .
- The _____ has a special way of _____ . It uses its _____ to _____ .

CHAPTER 3

Sense-Inspired Tech

Second Read

Ask Text-Dependent Questions

Ask the following text-dependent questions to deepen comprehension. Prompt students to cite evidence in the text (specific words, sentence, and illustrations) to support their answers.

page 23	*How are scientists using what they know about bats to help the blind? Why did the author add the photos and illustration? How do they relate to the text? How do they add to your understanding?*
page 24	*What does the author want you to know about lobster senses? Find examples to support your answer.*
page 25	*What does the author think about using these special eye drops? How do you know? What is your opinion of this idea?*
pages 26–27	*Find the hearing aid in the photo. How are crickets helping scientists improve, or make better, hearing aids?*
pages 28–29	*How are these animals giving scientists ideas for new inventions? Why are these ideas important? Which are you most excited about? Why?*

Revisit the Text

Ask students to identify the special text features in Chapter 3 and explain why the author used each one.

- ***How do the photos and captions add to your understanding of the text?***
- ***How can you use the headings to summarize what you read?***

Focus on Text Structure—Description

Discuss the importance of identifying how a text is structured. Tell students that figuring out how a text is structured will help them organize their thinking as they read and better comprehend the text.

Read the definition of the Description text structure:

- ***This type of text provides facts about a subject, event, person, or concept. It is the most common text structure used in textbooks.***

Have student partners reread page 22.

- ***What is the author describing?***
- ***What details does the author provide?***
- ***Does the author use text only, or text and photos?***

Explain that writers often use signal words as clues to a text's structure. Display and discuss a list of description signal words and phrases (e.g. *for example, such as*). Other clues to this text structure's organization include items in a series separated by commas, dates, and numbers. Prompt students to look for these signal words in the texts they read.

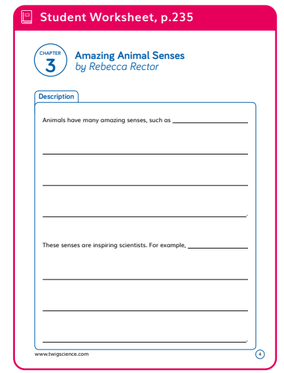
Read aloud page 22. As you read, prompt students to listen for signal words that indicate description. Record them on a T-chart as students identify them.

Post the signal words list, add others, and prompt students to look for these words in their readings. During small group lessons, highlight these words and ask students how they help them organize their thinking as they read. Emphasize how noticing these words will help them remember details about how two or more things are similar and different.

Connect to Writing—Text Structure Writing Frame

Have students summarize page 22 using the Description writing frame on their student worksheets (page 235). Prompt students to share their summaries with the class.

Writing frames provide great speaking frames. Suggest students use the frame when presenting their ideas.


Student Worksheet, p.235

CHAPTER 3 Amazing Animal Senses
by Rebecca Rector

Description

Animals have many amazing senses, such as _____

These senses are inspiring scientists. For example, _____

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English Learners

Use additional supports for Emerging ELs.

Substantial Support (Emerging Proficiency)

- **Total Physical Response:** Use actions and gestures to communicate ideas.
- **Yes/No Examples:** Provide two options to encourage students to participate in discussion. Ask: Is this a _____ ?
- **Linguistic Frames and Word Banks:** Provide a simple response frame and list possible words for response.

Extend the Conversation

Extend students' conversation about the ideas presented in the chapter.

- ***What do you think?***
- ***What do you mean by _____ ?***
- ***I'm confused. Can you explain?***
- ***How do you know? Find the evidence.***
- ***What clues in the text gave you that idea?***
- ***Do you agree? Why or why not?***

Use sentence frames to support students' answers.

- I think _____ .
- I mean _____ .
- I know this because _____ .
- I know this because I read _____ .
- I know _____ because _____ .
- This means that _____ .
- I agree. I also think that _____ .
- I disagree. I think that _____ .

Writing Support

Have students record their completed frame on their student worksheets. Ask them to underline the description signal words (e.g., *for example, such as*). Prompt students to refer to the completed writing frame when writing description informational text pieces.

EL

Sense-Inspired Tech

Synthesize Information

To show their growing body of knowledge, have students write a response to the phenomenon: How do the many parts of my body work together to help me live in the world?

To build students' writing stamina, provide an uninterrupted block of writing time for students. Increase the amount of time over the course of the year.

Review students' writing and provide revision notes so that students can revise during independent work time. For example, you may ask students to rewrite their introductory sentences to better grab the reader's attention, or add greater detail to a particular fact they've included.

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English Language development. These tasks are best administered individually.

Writing Domain
Have students look at the illustrations on page 21 and write a brief description of what is happening.

Reading Domain
Use the illustrations on page 6.

Write these sentences: "Some animals, like bats, can sense heat. Some animals sense electric pulses and find their food that way. Some animals use sound to find where things are."

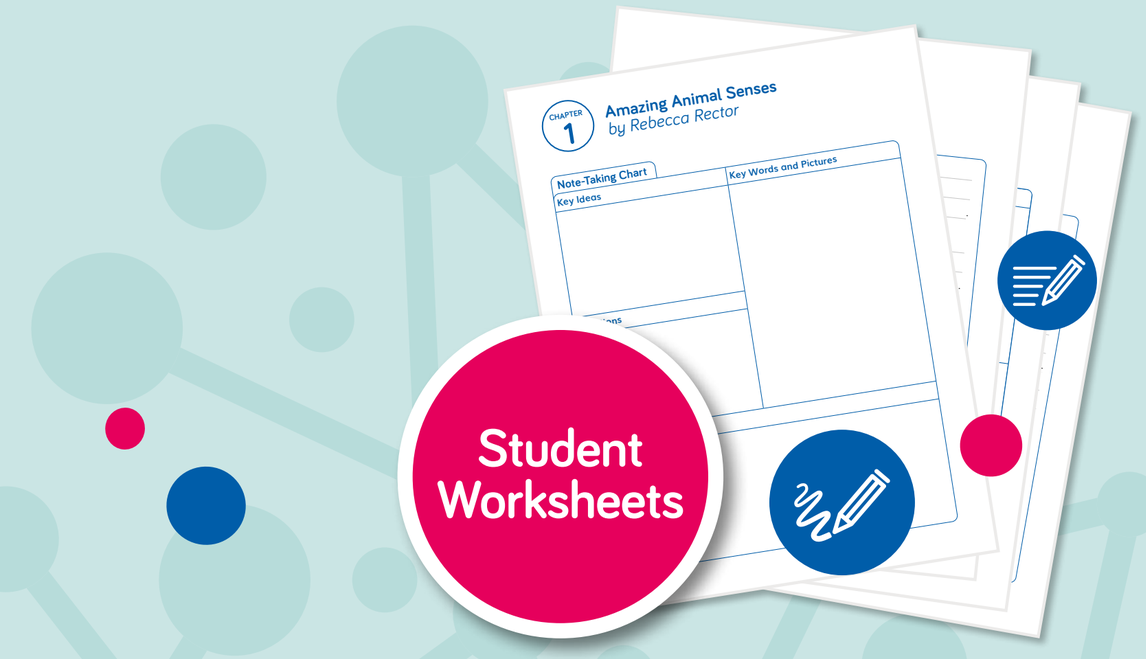
Have students read each sentence, then match it to the correct illustration.

Listening Domain
Describe the photos on pages 4–5. Add key details included in the illustration, but not in the text (e.g., each animal's habitat).

- ***What animals do you see?***
- ***Where do they live?***
- ***What special senses do they have?***
- ***How do they use these senses to survive?***

Speaking Domain
As students answer the four questions in the Listening Domain task, record their use of academic vocabulary and ability to summarize the key details.

Amazing Animal Senses



CHAPTER 1

Amazing Animal Senses

by Rebecca Rector

Note-Taking Chart

Key Ideas	Key Words and Pictures
Questions	
Summary	

Read Across Texts

_____ and _____ are different texts on the same topic.

The author of _____ included details such as _____

_____ .

This helped make the topic more meaningful to me because _____

_____ .

The author of _____ included details such as _____

_____ .

This helped make the topic more meaningful to me because _____

_____ .

I think the most useful text on the topic was _____

____ because _____ .

CHAPTER 2

Amazing Animal Senses

by Rebecca Rector

Can You Taste Without Your Nose?

Food	Taste			
	Correct		Not Correct	
	Correct		Not Correct	

Conclusions