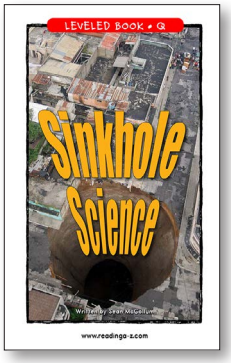
Sinkhole Science



About the Book

Text Type: Nonfiction/Informational **Page Count:** 16 **Word Count:** 1,033

Book Summary

Explore one of the strangest natural events on Earth in *Sinkhole Science*. Seen all over the world, these amazing holes can appear suddenly or develop slowly over years. Readers will learn about the kinds of sinkholes, what causes them, and where they are most likely to occur. Diagrams, maps, and amazing photos support the text.

About the Lesson

Targeted Reading Strategy

- Summarize

Objectives

- Summarize to understand text
- Identify details to compare and contrast
- Recognize and use verbs
- Identify and form compound words

Materials

Green text indicates resources are available on the website.

- Book—*Sinkhole Science* (copy for each student)
- Chalkboard or dry-erase board
- Dictionaries
- Compare and contrast, verbs, compound words worksheets
- Discussion cards

Indicates an opportunity for students to mark in the book. (All activities may be demonstrated by projecting the book on an interactive whiteboard or completed with paper and pencil if the books are reused.)

Vocabulary

*Bold vocabulary words also appear in a pre-made lesson for this title on VocabularyA–Z.com.

- **Content words:**
  Story critical: ***bedrock*** *(n.),* ***dissolves*** *(v.),* ***eroding*** *(v.),* ***karst*** *(n.),* ***overburden*** *(n.),* ***sinkholes*** *(n.)*
  Enrichment: ***chasm*** *(n.),* ***destructive*** *(adj.),* ***geologists*** *(n.),* ***mines*** *(n.),* ***sediment*** *(n.),* ***triggered*** *(v.)*

Before Reading

Build Background

- Write the word *geology* on the board. Ask students if they know what the word means or what words come to mind when they think about the word. Discuss or explain that *geology* is *the study of the earth—what it is made of, its structure, and its history.*
- Next, show students the photographs on pages 3 and 4. Explain to students that geologists (scientists who study the earth) are fascinated with what are called *sinkholes* and that they will learn more about them in this book.

Preview the Book

Introduce the Book

- Give students their copy of the book. Guide them to the front and back covers and read the title. Have students discuss what they see on the covers. Encourage them to offer ideas as to what type of book it is (genre, text type, and so on) and what it might be about.
- Show students the title page. Discuss the information on the page (title of book, author's name.)

Introduce the Reading Strategy: Summarize

- Direct students to the table of contents. Remind students that the table of contents provides an overview of what the book is about. Ask students what they expect to find out about in each section.
- Have students preview the rest of the book, looking at illustrations, photographs, captions, and other text features. Show students the glossary and explain its purpose.
- Explain to students that one way to understand and remember information in a book is to stop now and then during reading to summarize in their mind what they are reading about in the book.
- Model how to summarize.
  Think-aloud: *As I read this book, I am going to stop every now and then to remind myself what I have read about so far. This helps me remember what I'm reading and makes me think about new information. When I finish reading the book, I should be able to tell, in my own words, some of the information about sinkholes that I read about.*
- As students read, encourage them to use other reading strategies in addition to the targeted strategy presented in this section.

Introduce the Comprehension Skill: Compare and contrast

- Explain that one way an author helps readers understand information in a book is to tell how topics in the book are alike and different.
- Have students look at the photographs on the front and back covers.
- Model how to compare and contrast using photographs.
  Think-aloud: *These photographs show different types of sinkholes. They are alike in some ways and different in some ways. Some ways they are alike is that they are all in the Earth and appear to be huge holes. Some ways they are different is that one is on land and one is in the ocean. One seems to be located in a city, where humans may be, and the other is out in the middle of the ocean, where there are no man-made structures around it.*
- Draw a T-chart on the board. Label the left side *Front-Cover Sinkhole* and right side *Back-Cover Sinkhole.* Explain that in this example, information relating to the front cover photograph will be written on the left side of the chart. Information that relates to the back cover photograph will be written on the right side of the chart. Remind students that T-charts help us to visually compare two topics.
- Model how to compare and contrast information using the T-chart.
- Have students identify similarities and differences between the photographs on the front and back covers. Record these on the T-chart.

Introduce the Vocabulary

- Have students turn to the table of contents on page 3 and read the section titles. Ask volunteers to predict what these items might have to do with the study of sinkholes.
- Point out the glossary at the back of the book. Review or explain that a glossary and a dictionary contain lists of words and their definitions.

- Model how students can use the dictionary to find a word's meaning. Have them locate the word *eroding* in the dictionary. Invite a volunteer to read the definition for *eroding.* Have students compare the dictionary definition with the glossary definition. Have them compare these with their prior knowledge of the word. Point out that often a dictionary lists more than one definition for a word or may only list the root word *(erode).* One must often find the root word and read all of the definitions or entries to find the meaning or verb tense that most closely represents the context in which the word appears.
- Have students follow along on page 5 as you read the sentence in which the word *eroding* is found to confirm the meaning of the word. Repeat the exercise with the remaining vocabulary words.

Set the Purpose

- Have students read to learn about the different types of sinkholes and what causes them.

During Reading

Student Reading

- **Guide the reading:** Have students read to the end of page 6. Encourage those who finish before others to reread the text. When students are ready, discuss the important information they identified.
- Model summarizing important information in the book.
  Think-aloud: *As I read up through page 6, I paused to summarize in my mind what I learned about two sinkholes in Guatemala City and what causes sinkholes. For example, I read that in 2007 two sinkholes opened up within blocks of each other. I also read that sinkholes happen all over the world and that they are caused by eroding rocks and soil. Rain and underground water wear away soft bedrock, and then, the earth above it (known as overburden) drops down. I'll keep reading to learn more interesting facts about sinkholes. While I read, I'll summarize what I've read to help me remember the new information.*
- **Check for understanding:** Have students read to the end of page 8 and study the diagram on page 9. Invite some students to share the important information about *cover-subsidence sinkholes*. Ask other students to summarize *cover-collapse sinkholes*. Point out that the diagrams and numbered lists on pages 7 and 9 serve as a summary of what causes the two types of sinkholes.
- Remind students again about what it means to compare and contrast information in text. Create a new T-chart on the board and label the two sides *Cover-Subsidence* and *Cover-Collapse.* Discuss the information on pages 7 and 9, and ask students to help you record the appropriate information on the correct side of the chart (for example, you might write *water dissolves bedrock* on both sides of the T-chart; *slow downward erosion creates a surface bowl* on the *Cover-Subsidence* side; *arch-shaped hollow suddenly and dramatically sinks* on the *Cover-Collapse* side). Using the information on the chart, ask volunteers to point out what the two types of sinkholes have in common and what is different.
- Have students read the remainder of the book. Remind them to think about the details in the book so they can summarize the information after they read.

  Have students make a question mark in their book beside any word they do not understand or cannot pronounce. Encourage them to use the strategies they have learned to read each word and figure out its meaning.

After Reading

- Ask students what words, if any, they marked in their book. Use this opportunity to model how they can read these words using decoding strategies and context clues.

Reflect on the Reading Strategy

- Ask students to explain how the strategy of summarizing helped them understand the book.
- **Think-aloud:** *I know that summarizing keeps me actively involved in what I'm reading and helps me understand and remember what I've read. I know that I will remember more about sinkholes because I summarized the information in my own words as I read the book.*
- **Independent practice:** Assign students one of the remaining sections of the book and have them write a summary on a separate sheet of paper. If time allows, invite students to read their completed summaries aloud.

Reflect on the Comprehension Skill

- **Discussion:** Review with students the similarities and differences between natural sinkholes and those caused by humans. Review how this information would be organized on a T-chart.
- **Independent practice:** Introduce, explain, and have students complete the compare-and-contrast worksheet. If time allows, discuss their responses aloud.
- **Enduring understanding:** In this book, you read about sinkholes that can occur just about anywhere. Now that you know this, what will you think about the next time you walk across an open field or empty parking lot?

Build Skills

Grammar and Mechanics: Verbs

- Review or explain that *verbs* are words that describe actions. Ask students to think of one verb in their mind. Remind them that the word should show an action of some kind. Randomly select students to share the verb they thought of. Write a list of verbs on the board.
- Write the following sentences on the board: *Sinkholes happen all over the world; Water trickles and flows, eroding rocks and soil.*
- Have students count the verbs and show on their fingers how many verbs they see. Invite volunteers to come up to the board and circle the verbs in each sentence *(happen, trickles, flows, eroding).*
- Explain to students that some nonfiction texts, especially those that describe a process (for example, how a sinkhole develops), are written in the *present tense* (for example, *trickles*) instead of the *past tense* (for example, *trickled*). Point out to students that the majority of this book is written in the present tense.
- Next, explain to students that while a verb is an action word, some action verbs are easier to pick out than others. A verb can describe a physical action *(jump)*, a mental action *(think)*, or a state of being *(is)*. Write the word *is* on the board. Point out that the word *is* is a verb, because the state of being something *is* an action. Create a list on the board of other verbs of being, such as *do*, *seem*, and *have*, and their various tenses or conjugations, such as *does*, *has*, *had, seems, are, am, were, was*, and so on.

  Check for understanding: Have students work with a partner to locate and circle all the verbs on pages 11 and 12. Remind them to look for verbs of being, such as *is, was,* and *have,* which are more difficult to identify. When students are done, have them share and discuss their list with the class. As students work, clarify the difference between present-tense and past-tense verbs if needed.
- **Independent practice:** Introduce, explain, and have students complete the verbs worksheet. If time allows, discuss their answers aloud after students finish.

Word Work: Compound words

- Review or explain that when two short words are combined to form a new word, the new word is called a *compound word*.

- Write the word *sinkhole* on the board. Ask students which two words they see in *sinkhole (sink* and *hole)*. Explain that this word is called a *compound word*. A *compound word* has *two parts that make up one word meaning.*
- Have students turn to page 5 in the book. Read the following sentence from the last paragraph: *Bedrock is a layer of underground rock.* Have students find two compound words in the sentence *(bedrock* and *underground)*. Explain that often the definitions of the two separate words can help students figure out the meaning of the bigger word (for example, *underground* literally means *under the ground*).
- Have students follow along as you read the second paragraph on page 8. Ask them to locate the compound words *(rainwater, underground, sinkholes)* and identify the two separate words that make up each compound word. Discuss the definitions of each word, using the smaller words to figure out the meaning of the compound word.
- **Check for understanding:** Have student pairs turn to page 11 and find three more compound words *(skyscraper, nowhere,* and *crisscross).* Have them discuss with their partner what the word means on the basis of its two base words.
- **Independent practice:** Introduce, explain, and have students complete the compound word worksheet. Discuss their answers aloud after students finish.

Build Fluency

Independent Reading

- Allow students to read their book independently. Additionally, partners can take turns reading parts of the book to each other.

Home Connection

- Give students their book to take home to read with parents, caregivers, siblings, or friends. Have students summarize what they learned about sinkholes.

Extend the Reading

Informational Writing Connection

Provide print and Internet resources for students to further research one of the natural sinkholes highlighted in the book. Invite students to add to the knowledge learned in the book by finding three additional facts about its size, location, and what plants and animals live there. Citing information from their research on note cards, have students participate in a roundtable sharing and discussion format.

Visit WritingA–Z.com for a lesson and leveled materials on informational writing.

Science Connection

Provide Internet and other media resources for students to build models of sinkholes to watch the process in action (see http://pbskids.org/dragonflytv/show/sinkholes.html for example). Gather materials ahead of time and assign students to small groups. Have groups record their results and compare results with other groups.

Skill Review

Discussion cards covering comprehension skills and strategies not explicitly taught with the book are provided as an extension activity. The following is a list of some ways these cards can be used with students:

- Use as discussion starters for literature circles.
- Have students choose one or more cards and write a response, either as an essay or as a journal entry.
- Distribute before reading the book and have students use one of the questions as a purpose for reading.
- Cut apart and use the cards as game cards with a board game.
- Conduct a class discussion as a review before the book quiz.

Assessment

Monitor students to determine if they can:

- consistently use the strategy of summarizing to comprehend the text during discussion and on a worksheet
- compare and contrast nonfiction details within the text during discussion and on a worksheet
- correctly identify verbs in the text, during discussion, and on a worksheet
- accurately identify, understand, and form compound words from the text and on a worksheet

Comprehension Checks

- Book Quiz
- Retelling Rubric