

Ask®

Buried Treasure

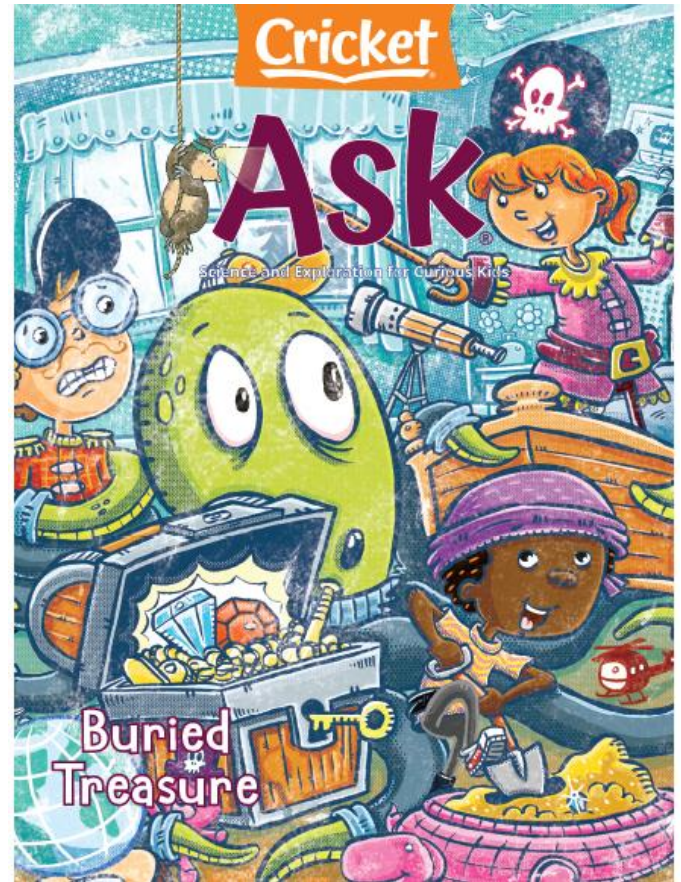
From precious gems to stinky sewer pipes, many surprises lie hidden beneath your feet. This issue of ASK explores the complex systems and the rare precious jewels that exist underground.

CONVERSATION QUESTION

What lies buried beneath the earth's surface?

TEACHING OBJECTIVES

- Students will learn about one of England's largest buried treasure discoveries.
- Students will learn what lies beneath some of the busiest cities in the world.
- Students will learn about the characteristics of various gems.
- Students will construct explanations.
- Students will examine structure and function.
- Students will classify information.
- Students will participate in a chocolate chip cookie excavation.
- Students will plot routes on a subway map.
- Students will use a given format to create an entry for the Gallery of Stick Gems.



In addition to supplemental materials focused on core STEM skills, this flexible teaching tool offers vocabulary-building activities, questions for discussion, and cross-curricular activities.

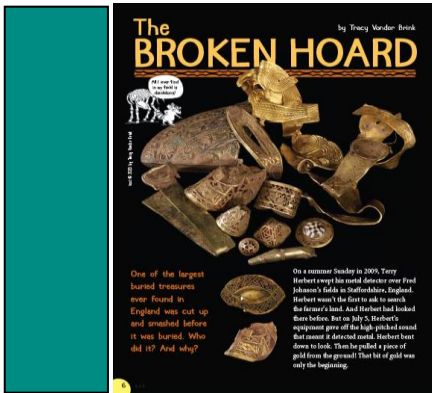
SELECTIONS

- **The Broken Hoard**
Expository Nonfiction
- **What's Under New York City?**
Expository Nonfiction
- **Ask a Pirate About Treasure**
Creative Nonfiction

The Broken Hoard

pp. 6–11, Expository Nonfiction

Readers will learn how a local man and his metal detector uncovered a piece of gold that led to one of the largest buried treasures ever found in England. Actual photographs of the Staffordshire Hoard enhance the engaging text.



RESOURCES

- Construct Explanations: Thoughts and Theories

OBJECTIVES

- Students will learn about one of England's largest buried treasure discoveries.
- Students will construct explanations.
- Students will participate in a chocolate chip cookie excavation.

KEY VOCABULARY

- hoard** (p. 6) a collection of objects that were all buried in the same place at the same time
- excavate** (p. 7) to remove earth carefully and systematically from an area in order to find buried remains
- smiths** (p. 10) people skilled in the art of heating metal until it is soft and then hammering it into shape

ENGAGE

Conversation Question: What lies buried beneath the earth's surface?

As a motivating pre-reading activity for the article, arrange the class into three groups. Give each group a bag containing a mix of three different 20-piece puzzle pieces. (Adjust according to students' abilities.) Have them empty out the bag and look through their "hoard." Instruct students to work cooperatively to make sense of their find and then take action. The students will likely begin to notice, sort, and construct the puzzles. Discuss their process as it relates to the field of archeology.

INTRODUCE VOCABULARY

List the three key terms on the board and have pairs of students define each word. Then post the definitions provided so that students may check their work. Have the pairs choose at least seven additional words from the article and procure definitions. Instruct them to create a mini-crossword puzzle using all ten words. Share puzzles with another class for use as a pre-reading activity for the article.

READ & DISCUSS

Reinforce comprehension of the concepts presented in the article by using the following questions to direct a discussion.

- How was the Staffordshire Hoard found?
- What was unusual about what was found at the excavation site?
- What artifacts did the hoard contain?
- Why was it noteworthy that certain items were NOT found in the hoard?
- What was the task of the team of conservators?
- How did the city councils in Staffordshire handle the excavation of the hoard?

SKILL FOCUS: Construct Explanations

INSTRUCT: Advise students to review the article and to study the theories regarding how the artifacts found in the Staffordshire Hoard wound up broken and buried. Distribute the *Construct Explanations: Thoughts and Theories* graphic organizer and tell students they will work with a partner and use information directly from the text to complete the two columns of the graphic organizer. Have students answer the THINK TANK question independently using logical reasoning and details.

ASSESS: Collect and review the worksheets to check skills.

EXTEND

STEM: Provide each student with a chocolate chip cookie, a toothpick, and a paper plate. Have students "excavate" the chocolate chips by using the toothpick to break away the cookies without breaking the chips. Remind students that this can be slow, delicate work and that it is important to be patient. How many chips did students successfully excavate? Did students use any strategies to increase their success? Have students discuss their processes and results.

Thoughts and Theories

Construct Explanations Review the article and study each theory regarding the mystery of the broken hoard. Explain each theory's strengths and weaknesses.

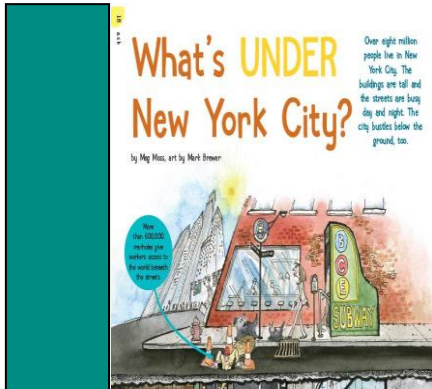
Theory	Theory Strength	Theory Weakness
Battle Offering		
A King's Treasure		
Recycling		

THINK TANK: Use the back of this paper to explain which theory you think is most likely and why. If you have your own theory, provide an explanation using details to support your thinking.

What's Under New York City?

pp. 18–21, Expository Nonfiction

Beyond buried treasure and tree roots, a whole new world may dwell beneath your feet. This article examines the tunnels, transit systems, and power grids that exist under some major cities.



RESOURCES

- Structure and Function: What Lies Below?

OBJECTIVES

- Students will learn what lies beneath some of the busiest cities in the world.
- Students will examine structure and function.
- Students will plot routes on a subway map.

KEY VOCABULARY

- **reservoir** (p. 19) a usually artificial lake that is used to store a large supply of water for use in people's homes, in businesses and schools, and in other places
- **quarry** (p. 20) to dig up or take stone or other materials
- **filtered** (p. 21) removed something by using a filter

ENGAGE

Conversation Question: What lies buried beneath the earth's surface?

Read aloud the title of the article—"What's Under New York City?"—and ask students to predict the content of the article. Distribute the article and have students do a picture/word walk through the pages. Invite volunteers to answer the title question and list their responses on the board. Encourage students to share their experiences visiting (or living in) a major city and discuss the sights, sounds, and smells.

INTRODUCE VOCABULARY

Display the following statements and underline the key vocabulary terms. Review how to infer the meanings of new words by using context clues and background knowledge. Then have partners work together to determine the meaning of each word. Reveal definitions.

1. The reservoir was low after the long drought.
2. Soon, workers will begin to quarry limestone for the new building.
3. At the beach, we used a sieve to filter out sand and find small shells.

READ & DISCUSS

As a post-reading activity, lead a discussion using the following questions.

1. Explain the meaning of this sentence from the article: "The city bustles below the ground, too."
2. What is the purpose of manholes?
3. Where does city water come from?
4. Where do New York City buildings get their electricity from?
5. What challenges do sewer workers face?

SKILL FOCUS: Structure and Function

INSTRUCT: Elicit from students that the main idea of the article is to inform readers of the systems that function below the surface of major cities. Present the *Structure and Function: What Lies Below?* graphic organizer. Tell students they will be using information from the article to record and explain the function of each element listed.

ASSESS: Circulate and discuss content with students. Collect graphic organizers to assess their ability to understand the structure-and-function relationship.

EXTEND

Geography: Display a New York City subway map (available online). Explain how the different colors, letters, and numbers represent different routes to different places. Point out one particular line and foster application by asking questions such as, *Where does the route begin and end? What stop comes after 'X' street if you are traveling north/south/east/west? How many stops are between Station X and Station Y?* Then have students choose another line and create questions for a partner to answer. Have students peer-review the answers.

What Lies Below?

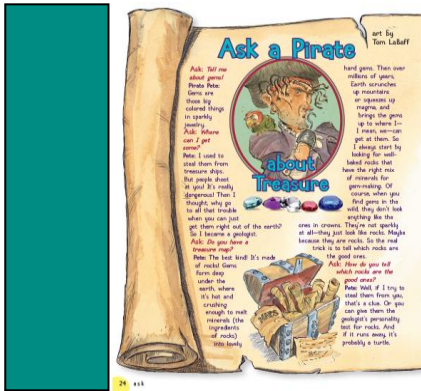
Structure and Function Many structures and systems exist below our major cities. They provide different functions for the bustling cities. Explain the function of the different underground structures and systems listed in the chart below.

What is/was the function of...
steam pipes under New York City?
natural caves under St. Louis?
narrow-gauge railway tunnels under Chicago?
criss-crossed tunnels in Paris?

Ask a Pirate About Treasure

pp. 24–28, Creative Nonfiction

This article begins with treasure-seeker Pirate Pete discussing the formation and discovery of gems. Several pages are dedicated to the traits, characteristics, and locations of various glorious gems.



RESOURCES

- Classify Information: Rock Solid

OBJECTIVES

- Students will learn about the characteristics of various gems.
- Students will classify information.
- Students will follow a given format to create an entry for the Gallery of Sticky Gems.

KEY VOCABULARY

- geologist (p. 24)** a scientist who studies the history and physical characteristics of the earth

ENGAGE

Conversation Question: What lies buried beneath the earth's surface?

Use a K-W-L chart (Know–Want to Know–Learned) to record students' prior knowledge about gems, as well as what they would like to know about these beautiful stones. Return to the chart after completion of the reading/activities and have students add details about what they have learned. If there are remaining curiosities about gems, allow the class to use books and the internet to find more information.

INTRODUCE VOCABULARY

Post and read aloud the vocabulary word. Tell students that many scientific terms have Greek and Latin roots. Break apart the terms and show the root meanings. Then compare to actual definitions.

geo = earth / **ologist** = one who studies the science of

Ask: How does knowing root meanings help to decode new words?

Using the root meanings given above, ask students to determine the meaning of the words **geography** and **cardiologist**.

READ & DISCUSS

Post and discuss questions prior to reading. Have students read the article independently and answer the questions in full sentences.

- Why did Pirate Pete become a geologist?
- How do gems get pushed up to where they can be mined?
- List and explain the five characteristics that are outlined in Pirate Pete's *Personality Test for Rocks*.
- What two rocks are the next hardest after diamonds?
- What makes the famous Hope Diamond blue?

SKILL FOCUS: Classify Information

INSTRUCT: Guide students to obtain information from the text, captions, and photos in the article. Remind students that the article was written to teach readers about the characteristics, traits, and locations of specific gems. Introduce the *Classify Information: Rock Solid* graphic organizer and instruct students to record their findings. Lead the activity and demonstrate how to reread pertinent passages and how to mark the correct column.

ASSESS: Review information students have recorded on their charts.

EXTEND

Language Arts: Have the class return to page 28 and scan through the Gallery of Sticky Gems. Although these are not actual gems, the page allows students to connect with the material on a more elementary level, in addition to supplying some humor. Point out to students that the author used the same format (made of; how to tell if you have one; where to find them) to describe the candy gems and the real gems. Challenge students to use this format to create their own entry into the Gallery of Sticky Gems.

Rock Solid

Classify Information Use information from the article to properly classify the details listed below. Place an **X** in the correct column to show which gem the statement describes.

Gem Detail	Diamonds	Sapphires	Emeralds	Rubies
They are the hardest natural rock on Earth and will cut any other stone.	X			
If you shine a light through this gem to make a rainbow, it will be missing the blue and yellow bands.				
This gem is lab-grown and is used to make watches and computers.				
They make hexagonal crystals and often have cracks inside.				
They will glow orange under UV light.				
They will glow blue if x-rays are fired at them.				
They are made of corundum with iron or titanium for color.				
They ride to the surface in thin, deep tubes of magma called kimberlite pipes.				
They are the rarest of all gems.				
Good places to look for these gems are Colombia, Brazil, and even North Carolina.				