

Ask®

How Did They Build That?

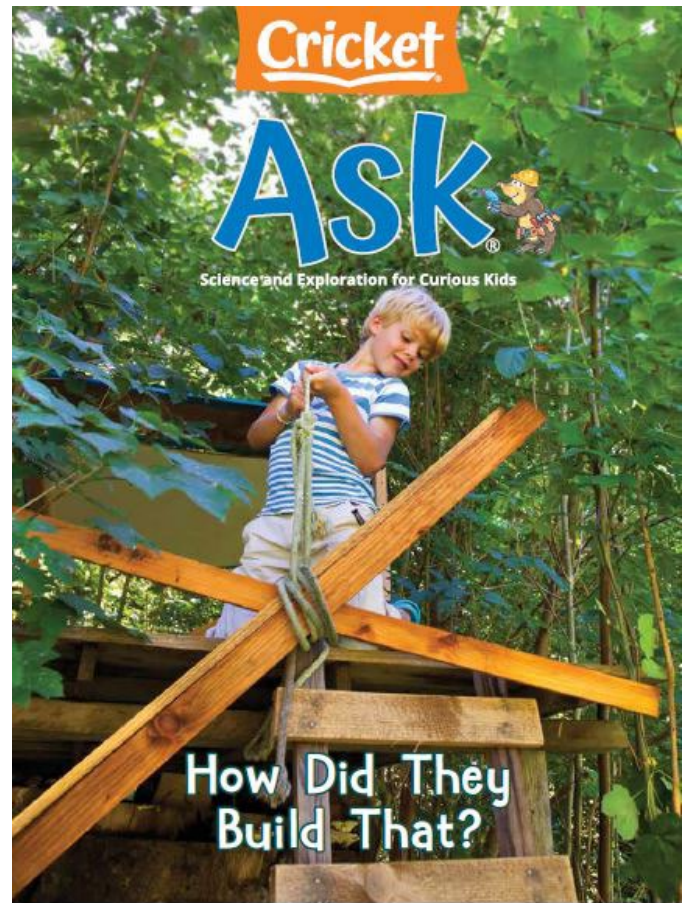
This issue of ASK magazine transports readers through the centuries to learn about building materials and practices. From famous towers to residential homes, stability and durability have always been key factors in building design. In addition, modern builders are being called upon to incorporate “green” practices to address our current environmental concerns.

CONVERSATION QUESTION

How do construction strategies differ?

TEACHING OBJECTIVES

- Students will learn why and, theoretically, how the ancient tombs were built.
- Students will learn about the construction history of the Leaning Tower of Pisa.
- Students will learn how green buildings benefit the entire planet.
- Students will construct explanations.
- Students will analyze a process.
- Students will analyze solutions.
- Students will use a mathematical process to solve a theme-based word problem.
- Students will construct stable structures using simple materials.
- Students will research green practices and products.



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.

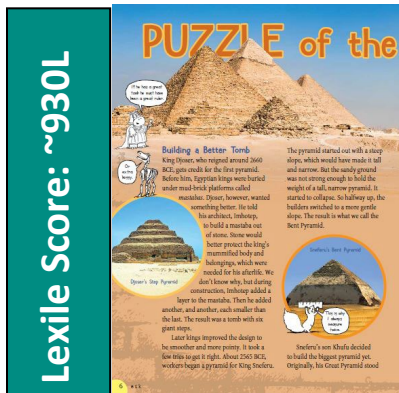
SELECTIONS

- **Puzzle of the Pyramids**
Expository Nonfiction, ~930L
- **That's a Problem!**
Graphic Nonfiction, ~870L
- **Building Green**
Expository Nonfiction, ~890L

Puzzle of the Pyramids

pp. 6–11, Expository Nonfiction

Using millions of massive stone blocks and simple tools, the ancient Egyptians built some of the most amazing structures on Earth. Readers will learn why, when, where, and possibly how, the majestic pyramids were erected.



RESOURCES

- Construct Explanations: Perplexing Pyramids

OBJECTIVES

- Students will learn why and, theoretically, how the ancient tombs were built.
- Students will construct explanations.
- Students will use a mathematical process to solve a theme-based word problem.

KEY VOCABULARY

- **mastaba (p. 6)** an ancient Egyptian tomb made of mud brick, rectangular in plan with sloping sides and a flat roof
- **chamber (p. 7)** a room used for a special purpose
- **masons (p. 8)** skilled workers who work with stone, brick, or concrete

ENGAGE

Conversation Question: How do construction strategies differ?

Ask students to discuss the biggest human-made structures they are familiar with. Use books and the internet to provide visuals of the formations being discussed. From the world's tallest building (Burj Khalifa, in Dubai) to the world's tallest roller coaster (Kingda Ka, in New Jersey), have students consider the human effort, tools, and process of building such enormous structures. Finally, provide students with photos or a video clip of the Great Pyramid of Giza. Guide a discussion theorizing how it might have been constructed.

INTRODUCE VOCABULARY

Post and discuss the key terms, as well as the title of the article. Be sure that students understand the definitions before reading the article. As a post-reading activity, have students use the three vocabulary words to summarize the article in paragraph form.

READ & DISCUSS

As a post-reading activity, lead a discussion based on the questions below. Have student pairs choose one question to investigate further.

1. How did kings who succeeded King Djoser improve the pyramids?
2. What items were the tombs filled with?
3. Where did most of the stone for the pyramids come from?
4. How was the location of the pyramids decided?
5. Why didn't ancient builders share or write down their knowledge?
6. Why did the ancient Egyptians build pyramid-shaped tombs?

SKILL FOCUS: Construct Explanations

INSTRUCT: Advise students to review the article and to study the theories regarding how the stones of the pyramids were moved and placed. Distribute the *Construct Explanations: Perplexing Pyramids* graphic organizer. Have students work in pairs to use information directly from the text to complete the two columns of the chart. Have students work independently and use logical reasoning and details to answer the Think Tank question.

ASSESS: Collect and review the worksheets to check skills.

EXTEND

Mathematics Page 9 of the article states, "The [pyramid] building stones weighed two or three tons each. Khufu's pyramid contains around 2,300,000 of them." Using an average weight of 2.5 tons per stone, how many tons of stones were used in the construction of Khufu's pyramid? Instruct students to use the R-D-W (Read-Draw-Write) process to calculate and express the answer.

(Answer: 5,750,000 tons)

Perplexing Pyramids

Constructing Explanations Review the text and study each theory about how the stones were moved and placed when building the pyramids. Explain each theory's strengths and weaknesses.

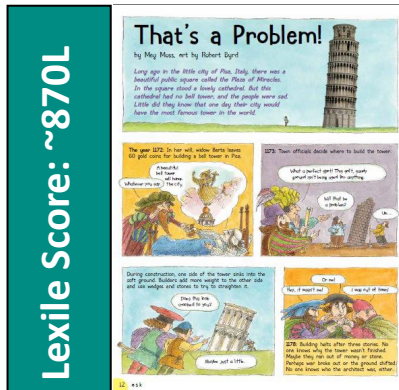
Theory	Theory Strength	Theory Weakness
A single ramp was built.		
A spiral ramp was built.		
Stairs were built.		
Stones were rolled.		

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.

That's a Problem!

pp. 12–14, Graphic Nonfiction

The most famous tower in the world lies in the heart of a beautiful public square in Italy called the Plaza of Miracles. This article details the construction journey of the Leaning Tower of Pisa.



RESOURCES

- Analyze Process: Try and Try Again

OBJECTIVES

- Students will learn about the construction history of the Leaning Tower of Pisa.
- Students will analyze a process.
- Students will construct stable structures using simple materials.

KEY VOCABULARY

- halts** (p. 12) stops happening
- flawed** (p. 13) imperfect in some way
- quaint** (p. 13) having an unusual quality or appearance that is attractive or appealing
- flock** (p. 13) to gather or move in a crowd

ENGAGE

Conversation Question: How do construction strategies differ?

Inform students that they will be reading “That’s a Problem!”—an article about the Leaning Tower of Pisa in Italy. Share a time when you have uttered the title’s phrase. Then encourage students to tell the class about a time when they have exclaimed, “That’s a Problem!” Remind students that problems are often fixable. Explain that they will learn about a construction problem that took centuries to fix.

INTRODUCE VOCABULARY

Post and review the four vocabulary words. Explain that these terms will be found in the article “That’s a Problem!” Ask students which two words are verbs and which two words are adjectives. Then review the meanings of antonyms and synonyms and have students provide an antonym and synonym for each vocabulary term.

READ & DISCUSS

Post and discuss questions prior to reading. Have students read the article independently. Then read the article aloud, pausing when answers to the questions are revealed.

- What things are unknown about the Leaning Tower of Pisa?
- Why did one side of the tower sink into the ground during construction?
- What was added to the tower in 1370?
- Why did government officials close the tower in 1839 in spite of public outrage and lost tourist revenue?
- When engineer John Burland worked to settle the tower in 1999, why did some people hope the tower wouldn’t get “too straight”?

SKILL FOCUS: Analyzing Process

INSTRUCT: Have students work in pairs to highlight details in the article about how different engineers and architects tried to solve problems that arose during construction of the Tower of Pisa. Distribute copies of the *Analyze Process: Try and Try Again* graphic organizer. Then tell students they are responsible for analyzing the various building processes.

ASSESS: Review the worksheet with the class and instruct students to amend their answers if necessary.

EXTEND

STEM Students can practice science, technology, engineering, and mathematics skills with simple building projects. Supply students with basic materials (straws, paper cups, toothpicks, tape, recyclables, etc.), and have groups of students compete to build the most impressive structure they can within a given time period. Allow planning time before students begin construction and facilitate a discussion on sound building principles. Remind students that stability is key!

Try and Try Again

Analyzing Process Use information from the article to explain each builder's strategy and why it was or was not successful.

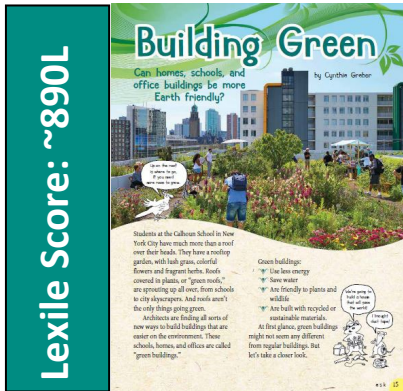
Giovanni de Simone
Strategy:
Successful/Not Successful? Why?
Alessandro Gherardesca
Strategy:
Successful/Not Successful? Why?
John Burland
Strategy:
Successful/Not Successful? Why?

Ask® Teacher Guide: September 2022

Building Green

pp. 15–19, Expository Nonfiction

Readers will learn how homes, schools, and office buildings are becoming more Earth-friendly. Green strategies that combat the world's environmental crisis are presented in this engaging text.



RESOURCES

- Examine Solutions: Going Green

OBJECTIVES

- Students will learn how green buildings benefit the entire planet.
- Students will analyze solutions.
- Students will research green practices and products.

KEY VOCABULARY

- **insulation** (p. 16) material used to stop heat, sound, or electricity from going into or out of something
- **renewable** (p. 24) able to be replaced by nature
- **generator** (p. 18) a machine that produces power

ENGAGE

Conversation Question: How do construction strategies differ?

Discuss the use of colors in American phrases, such as “seeing red” (angry) and “feeling blue” (sad). Have students consider other colors that have meanings beyond their hues. Then post the title of the article, “Building Green.” Ask students to explain the title’s meaning and predict the content of the article. Revisit the predictions after reading.

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.

- Insulation was added to the attic of the old farmhouse to keep out cold air in winter and hot air in summer.
- Some environmentalists would like to see fossil fuels replaced by renewable energy sources.
- A large generator in the complex provided electricity after the storm outages.

READ & DISCUSS

Pose the following questions to prompt meaningful discussion.

1. What is a green building?
2. Typically, where does the energy that lights rooms and runs appliances come from?
3. How do green roofs benefit building occupants and the environment?
4. How are some cities addressing flooding problems from rainstorms?
5. What is the LEED seal rating system?

SKILL FOCUS: Examine Solutions

INSTRUCT: Inform students that they will be rereading the article and marking passages that show how green buildings save energy, water, and materials. Distribute copies of the *Examine Solutions: Going Green* graphic organizer. Explain that students will record how green buildings help to solve the problem of Earth’s depleting resources.

ASSESS: Have students use the worksheet to teach someone at home about green buildings.

EXTEND

Environmental Science From wind farms to solar panels, sustainable energy sources are being utilized across the globe. Designers of cars and buildings are eager to incorporate environmental practices and products. Have students peruse current newspaper/internet articles to find examples of changes being made in residential homes and in public structures that indicate a trend toward using more Earth-friendly products and practices.

Going Green

Examining Solutions Explain how “green buildings” are solving the problems of the rapidly depleting finite resources listed below.

Energy	Water	Materials