

Fossil Discoveries

Fill in the circle by the correct answer. Then write the answers to numbers 3, 4, and 5.

1. In the context of this text, a curiosity is _____.
 (A) strange behavior
 (B) a strong desire to learn
 (C) an unusual fact
 (D) an odd or unusual thing
2. An unstable rock is likely to _____.
 (A) remain in place
 (B) be steady
 (C) give way
 (D) be safe
3. Museums and scientific papers gave credit to others for the fossils discovered by Mary Anning. What would you say to the ones responsible if you could go back in time?

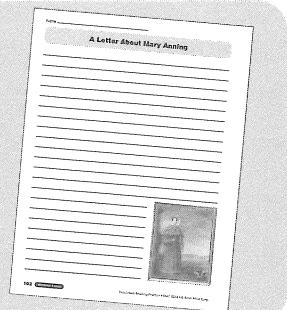
4. Anning's work was not recognized because she was poor and a woman. How did she overcome this?

5. What advice would Mary Anning have for young scientists today?

Write About the Topic

Use the Writing Form to write about what you read.

Imagine yourself back in time. Write a letter to the Geological Society giving them advice.



Structural Engineers

Level 1 ■

Words to Know list, Reading Selection, and Reading Comprehension questions

Level 2 ■ ■

Words to Know list, Reading Selection, and Reading Comprehension questions

Level 3

Words to Know list, Reading Selection, and Reading Comprehension questions

Assemble the Unit

Reproduce and distribute one copy for each student:

- Visual Literacy page: Building a Skyscraper, page 111
 - Level 1, 2, or 3 Reading Selection and Reading Comprehension page and the corresponding Words to Know list
 - Graphic Organizer of your choosing, provided on pages 180–186
 - Writing Form: Structural Engineers, page 112

Introduce the Topic

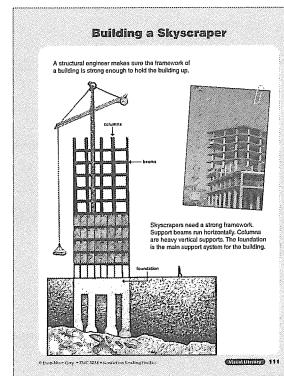
Read aloud the captions and discuss the pictures on page 111. Point out that the graphics show the “skeleton” of each building. Ask students to share what they know about how buildings are constructed. Tell students they will read about a structural engineer’s job.

Read and Respond

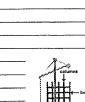
Form leveled groups and review the Words to Know lists with each group of students. Instruct each group to read their selection individually, in pairs, or as a group. Have students complete the Reading Comprehension page for their selection.

Write About the Topic

Read aloud the leveled writing prompt for each group. Tell students to use the Graphic Organizer to plan their writing. Direct students to use their Writing Form to respond to their prompt.



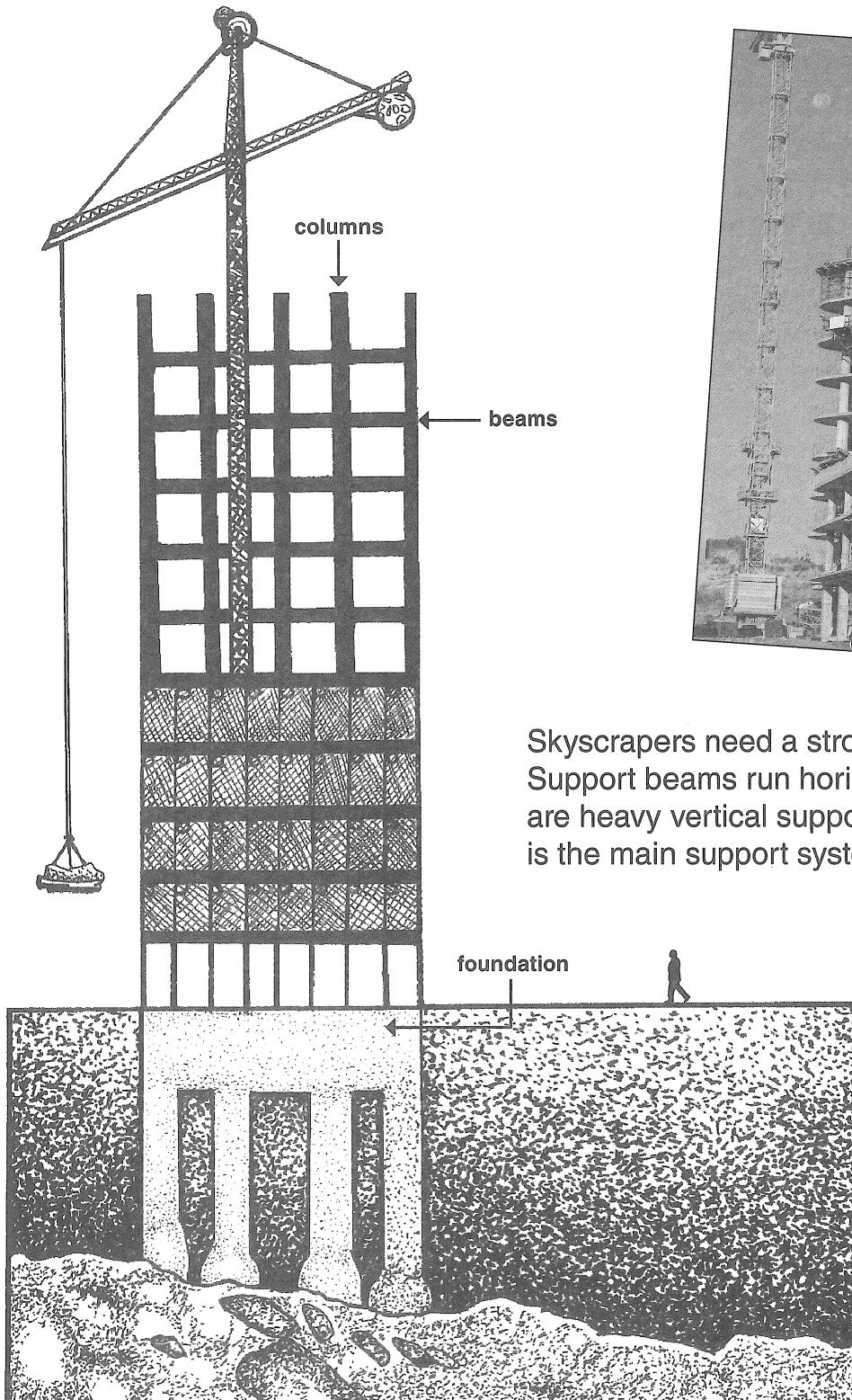
Visual Literacy

Name			
Structural Engineers			
<hr/>			
			

Writing Form

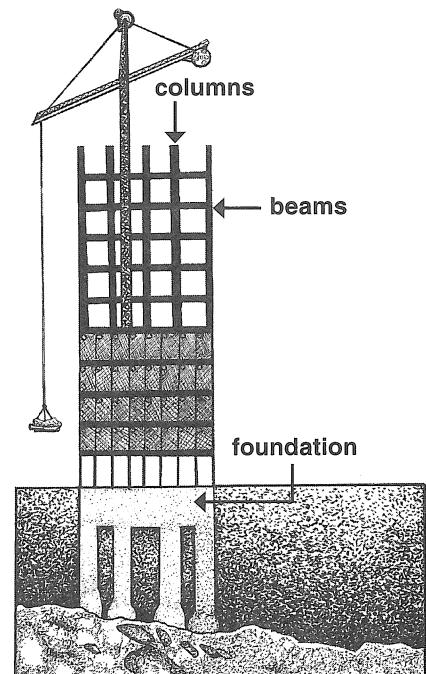
Building a Skyscraper

A structural engineer makes sure the framework of a building is strong enough to hold the building up.



Skyscrapers need a strong framework. Support beams run horizontally. Columns are heavy vertical supports. The foundation is the main support system for the building.

Structural Engineers



Words to Know

The Job of a Structural Engineer

structural engineer
architects
plans
structurally
sound
stability
calculations
framework
vertical
horizontal

Structural Engineers ■■■



Words to Know

What Structural Engineers Do

structural engineers
architects
layout
structure
stability
rigidity
calculations
framework
specifically
software
ensure

Structural Engineers ■■■

Words to Know

Using Math to Build Skyscrapers

skyscrapers
gazed
architect
plans
structural engineer
forces
expand
contract
acting
software

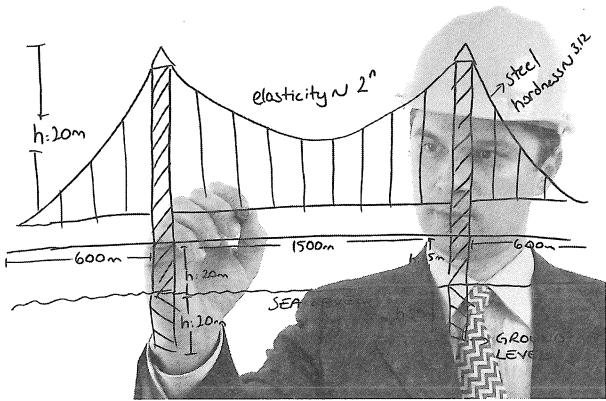
Structural Engineers ■■■■■

The Job of a Structural Engineer

Do you like to solve math problems? If you do, you might want to become a structural engineer. Many people have never heard of structural engineers. But most people know about architects. Architects design buildings. The building might be a house in a neighborhood or a tall office building in a city. Architects figure out what the building will look like and draw the plans.

Standing Up to the Math

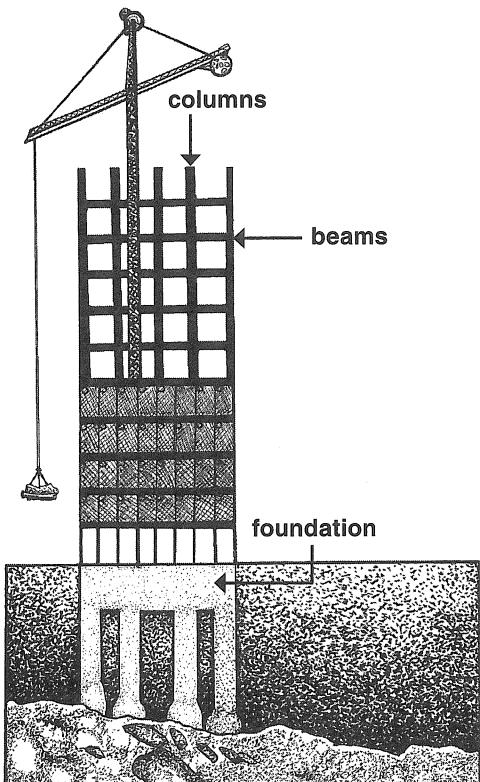
It's important that buildings are structurally sound, or strong enough to stand up to everyday use, weather, and natural disasters. Architects hire structural engineers to make sure their buildings are safe. Structural engineers are trained to understand, predict, and calculate the stability and strength of buildings. They use math to make these calculations.



Structural engineers first look over the architect's plans, then they make the building's framework. The framework holds the building up. It includes columns, beams, and the foundation. Columns are posts that give vertical (up-and-down) support. Beams give horizontal (side-to-side) support between columns. The foundation is in the ground. It holds up the whole building.

Math Makes It Safe

There are many different types of columns, beams, and foundations. Some are stronger than others. The structural engineer has to figure out which types are required to build a safe and stable structure. He or she does this by working out lots of math problems. Math helps the engineer figure out how much support is needed. Luckily, there are programs that structural engineers use to help them do this. But sometimes, the engineer works problems with a pencil and a piece of paper—just like you do!



After figuring out all the building requirements, the engineer draws up plans. The plans show where the framework will go. The plans also show how the framework fits together.

The structural engineer has used math for a very important reason. He or she figured out how to make the building stand up. The engineer also made sure the building was safe.

The Job of a Structural Engineer

Fill in the circle by the correct answer. Then write the answers to numbers 3, 4, and 5.

1. Structural engineers _____.
 (A) design buildings
 (B) make sure buildings are safe
 (C) make sure buildings are in cities
 (D) figure out what the building will look like
 2. An architect and a structural engineer _____.
 (A) don't use math in their jobs
 (B) don't share their plans
 (C) only work together on large buildings
 (D) work together to build structures that are safe
 3. Explain why the framework is an important part of a building.
-
-

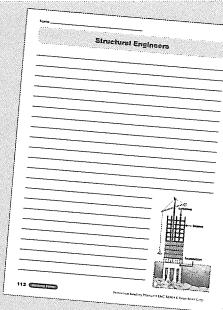
4. Write one way math helps a structural engineer.
-
-

5. Do you agree with the writer that structural engineers use math for a very important reason?
-
-

Write About the Topic

Use the Writing Form to write about what you read.

Explain what a structural engineer does and why the job is important.



What Structural Engineers Do

You have probably seen a building under construction. You may know that architects design buildings. They figure out what the building will look like and plan the layout, or where all of the rooms will be.

Math Carries the Load

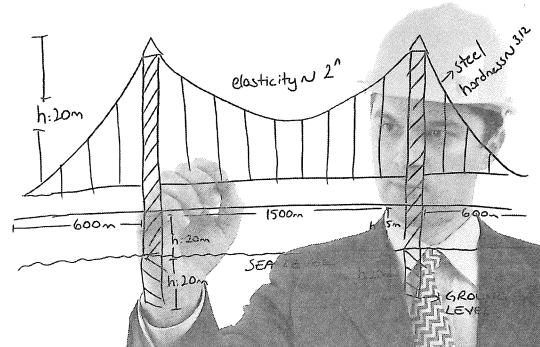
The architect works with a team of people to build a safe structure, and a structural engineer is at the top of the list. Why? Structural engineers figure out how to make buildings stand up. They are trained to understand, predict, and calculate the stability, strength, and rigidity of buildings and other structures. They use math to make these calculations. The engineer starts by designing the building's framework. The framework includes columns, beams, and the foundation. Columns are vertical. Beams are horizontal. The foundation is in the ground. You don't always see the framework. That's because it's hidden inside the roof and walls and under the floor. But the framework is important because it holds the building up and helps it stand up to everyday use, weather, and natural disasters.

The framework carries the weight, or loads, of a building. These loads aren't the same throughout a building. Imagine holding a book in your hands. This is like the load at the top floor of a building. The load is light because there isn't much weight above it to hold up. Now imagine holding a stack of 10 books. This is like the load at the foundation of a building. The load is heavy because the foundation carries the weight of the whole building.

Structural engineers have to figure out the loads on the building. To do this, they use math. Specifically, multiplication, division, algebra, and geometry. They start by figuring out the lighter loads at the top of the building. Then they work down to the heavier loads at the foundation. They don't have to do it all by themselves; they use software programs designed specifically for their job.

Math Determines the Framework

Next, structural engineers design the framework that will hold up all the loads. Columns, beams, and foundations come in many shapes and sizes. After calculating what is needed, the engineer selects the strongest ones where the loads are heaviest. It's important to ensure that the building is safe and that it will remain standing for many years.



Framework of concrete columns and beams

What Structural Engineers Do

Fill in the circle by the correct answer. Then write the answers to numbers 3, 4, and 5.

1. A structural engineer's most important job is to _____.
Ⓐ figure out what the building will look like
Ⓑ figure out where the building will be
Ⓒ make buildings safe
Ⓓ make buildings tall
2. The load at the top floor of a building is _____.
Ⓐ the same as all the floors
Ⓑ the same as the bottom floor
Ⓒ heavy
Ⓓ light
3. In your own words, explain what structural engineers are trained to do.

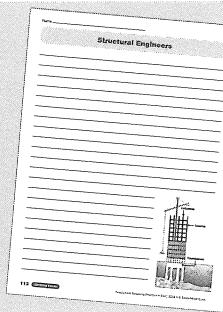
4. Describe what the framework is and what it does.

5. Why is math important to a structural engineer?

Write About the Topic

Use the Writing Form to write about what you read.

Explain how a structural engineer makes buildings safe.



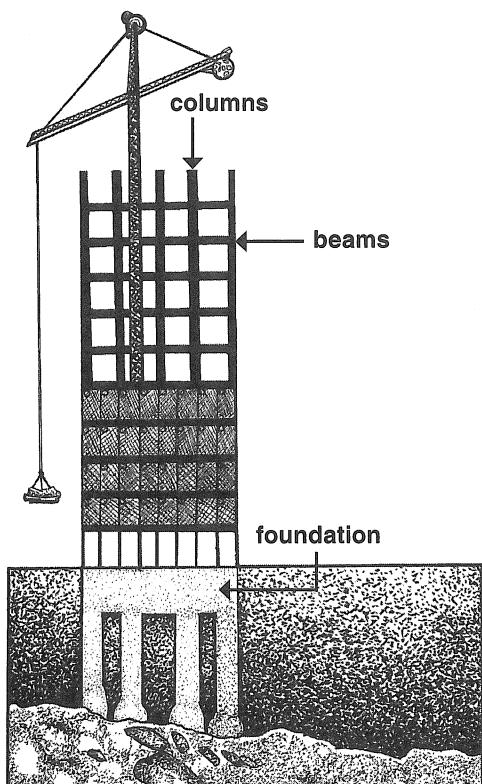
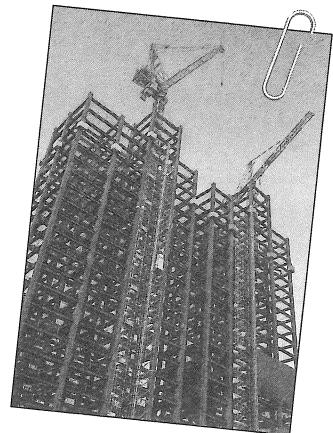
Using Math to Build Skyscrapers

Have you ever gazed up at a tall building? It has many stories and reaches high into the sky. That's why a very tall building is often called a skyscraper.

It takes a lot of planning to build a skyscraper. An architect first designs the building and draws up plans showing what it will look like. Then these plans go to a structural engineer.

The structural engineer studies the plans and figures out how to make the building stand up. It's an important job, because many forces act on a building to topple it. Gravity pulls the weight of the building and its contents downward. Wind blows the building sideways. Earthquakes shake a building side to side and up and down. Heat makes a building expand, and cold makes it contract.

The engineer ensures that the building can hold up against these forces. The engineer does this by designing the building's support features. A building's main support features are beams, columns, and the foundation. Beams are horizontal features that carry the building's weight between columns. Columns are vertical and carry the building's weight downward. The foundation in the ground supports the entire building. Support features provide a sturdy framework inside buildings, much like a skeleton provides a sturdy framework inside human bodies.



To design the building's support features, engineers use multiplication, division, algebra, and geometry. The engineer starts at the top floor and works down to the foundation, which carries all the weight. The engineer figures out all the forces acting on each point of the building. It takes many math problems to figure out these forces. That's why engineers use special software programs and reference books.

After the engineer figures out the forces, he or she selects the best support feature for each part of the building. There are many choices. Beams, columns, and foundations come in many different sizes and shapes and can be made from different materials. The engineer also figures out how all the support features fit together.

Finally, the engineer draws up plans of the building and all its support features. People who build the skyscraper follow both the architect's and the structural engineer's plans.