

$$\frac{1}{10} = \frac{10}{100}$$

$$0.1 = \frac{10}{100}$$

$$1 = \frac{10}{100}$$

$$0.1 = 0.10$$

$$\frac{1}{10} = \frac{10}{100}$$

**Engineering Marvels**

# Bridges Around the World

Understanding Fractions



**Elise Wallace**

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# Great Feats of Architecture

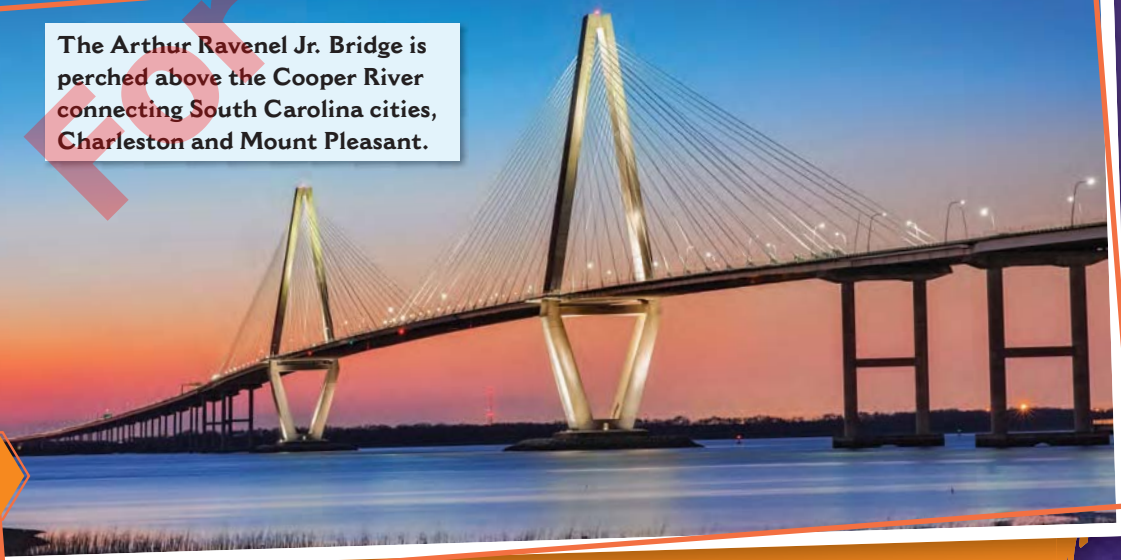
Bridges help people cross great heights. They help people cross water that would otherwise be **inaccessible**. People use them to walk, bike, and drive to new places. Because of bridges, many of the world's wonders become available.

Some bridges are more than a link between two places. They are **feats** of architecture. When we see pictures, we are dazzled by their size. But, when we learn about each **engineering** feat, these bridges become even more awe-inspiring.

The stories of these bridges celebrate **engineers** and **architects**. They show the work of some of the best minds in the world. These people think outside-the-box to create original structures. In doing so, they have helped construct some of the most famous and revered bridges in the world.

But, architects and engineers do not work alone. Many skilled workers help bring their visions to life. From an idea, to a sketch, to a **blueprint**, to a construction site, each great bridge is the work of many minds and countless hours.

The Arthur Ravenel Jr. Bridge is perched above the Cooper River connecting South Carolina cities, Charleston and Mount Pleasant.



The Golden Gate Bridge connects the city of San Francisco to Marin County.



Akashi Kaikyo Bridge crosses over the Akashi Strait in Japan.



# The Americas

There are many shining bridges in the Americas. Many of them have changed the future of architecture.

## Confederation Bridge

The Confederation Bridge in Canada links Prince Edward Island to New Brunswick. In the past, people could only get to the island by ferryboats. In winter, ice was likely to stop the boats. Some people wanted a bridge. Other people wanted to keep the existing boat system. They did not want people from the **mainland** to have a year-round link to the island. The people voted to settle the issue. Fifty-nine percent of the people voted “yes” to the bridge.

In 1997, the 8-mile (13-kilometer) bridge was finished. It is the longest bridge in the world to span icy waters. Engineers designed the bridge with drivers’ safety in mind. They made sure the bridge has curves. Drivers are more likely to stay focused if they need to drive on a curved road rather than a straight one. Engineers also made sure to include thousands of drain ports. These keep water and ice from sitting on the road. With Canada’s rainy and snowy seasons, this is a required feature!



Confederation Bridge

## LET'S EXPLORE MATH

It takes about 10 minutes to drive across the 8-mile long Confederation Bridge. Imagine that a vehicle is being driven the same distance every minute. Is it being driven more or less than 1 mile each minute? Explain your reasoning.

## Brooklyn Bridge

The Brooklyn Bridge is **iconic**. It spans the East River between Brooklyn and Manhattan in New York City. It was designed by John Augustus Roebling. This **suspension bridge** was the first to use steel cables.

Sadly, Roebling died before building began. His son took over the project. When it was completed in 1883, it was the longest bridge in the world. It has a total length of 5,989 feet (1,825 meters). Each day, thousands of people still cross the Brooklyn Bridge.



Brooklyn Bridge

John Augustus Roebling

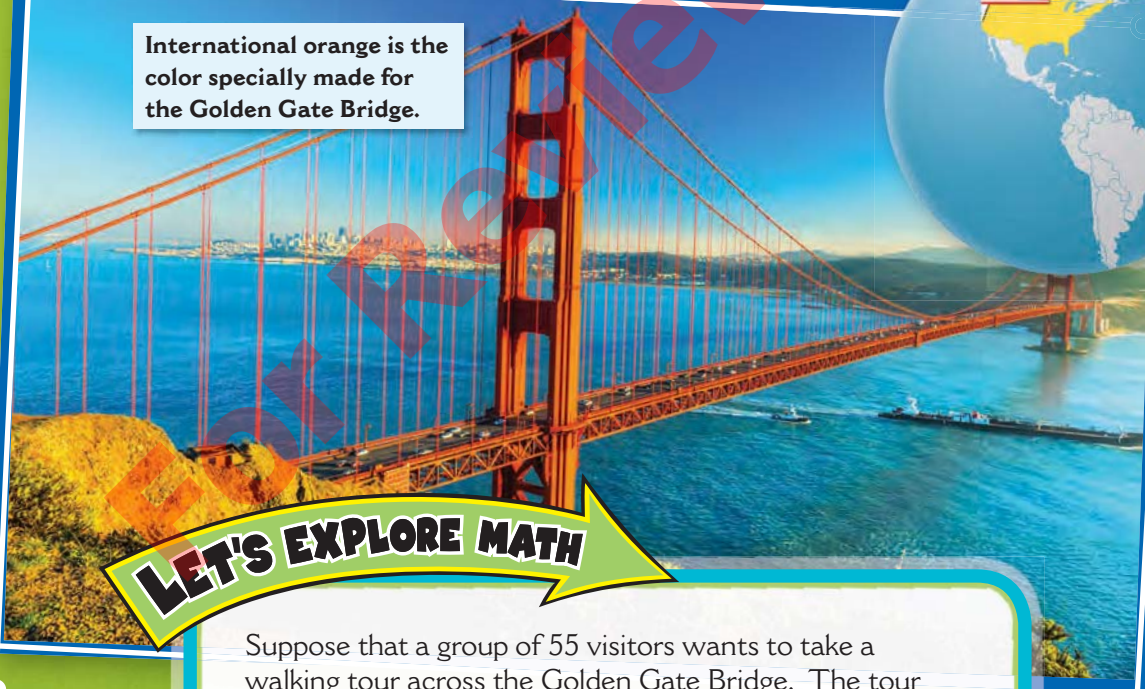
## Golden Gate Bridge

The Golden Gate Bridge is a suspension bridge in San Francisco, California. Joseph B. Strauss oversaw its construction. He was an engineer. He hired Irving Morrow to help design the bridge. It was finished in 1937.

The main span of the bridge is 4,200 ft. (1,280 m) long. This span is suspended from two cables that join two tall towers. The towers are 746 ft. (227 m) tall.

The bridge has a distinct red-orange hue. No one thought red paint could withstand the salty air. But, Morrow liked the color and found a **durable** paint. The bright color makes the bridge visible even on the foggiest days.

International orange is the color specially made for the Golden Gate Bridge.



**LET'S EXPLORE MATH**

Suppose that a group of 55 visitors wants to take a walking tour across the Golden Gate Bridge. The tour guides can only have a maximum of 12 people in each group. How many tour guides are needed to take all of the visitors on walking tours? Explain your reasoning.

# Math Talk

1. How are fractions examples of division problems?
2. How can fractions show remainders?
3. How are these situations similar and different?
  - a. If 15 students share 5 pizzas equally, what part of a whole pizza will each student get?
  - b. If 5 students share 15 pizzas, what part of a whole pizza will each student get?
4. How can you use an area model to show 3 workers sharing 8 sandwiches equally?
5. There are 2 bagels and 4 students. Tisha says, “There is no way to equally share the bagels because I cannot divide 2 by 4.” What can you tell Tisha?
6. How might engineers designing bridges use fractions?