

Name: \_\_\_\_\_

# Bridge Mechanics

By Lydia Lukidis

Bridges are built over obstacles like roads, rivers, or railroad tracks. They allow people or vehicles to cross from one side to another. Without them, we would have a hard time moving around.

Bridges existed a long time ago. Back then, they were built with logs, stones, ropes, and vines. Some were very simple, like a basic footbridge made out of a fallen tree trunk. But today, bridges are bigger, stronger, and more modern. This is because we have better technology today.

If you think it's easy to design and build a bridge, think again! Bridges are a mix of science, architecture, math, and design. They are designed by skilled engineers who have to keep many details in mind. And they can take years to build.

First of all, bridges must be very resilient. They need to be strong enough to not only support their weight, but also the weight of the people and vehicles that go over them. Think about this: the Golden Gate Bridge in San Francisco weighs 887,000 tons. Then imagine the weight of hundreds of people and cars. That's pretty heavy!



*The Golden Gate Bridge in San Francisco is an example of a suspension bridge.*



*The Maslencia Bridge in Croatia is a beautiful arch bridge.*

Bridges need to have a solid foundation and must last a long time. They must also be built in a way that protects them from earthquakes, strong winds, and freezing. Bridges are very safe. Partial or total collapses are very rare.

There are various types of bridges. The three main types of bridges are arch, suspension, and beam. Let's take a closer look at each one.

Arch bridges were invented a long time ago by the Romans. They were built out of stone or brick, and rested on support structures in the shape of arches. Arch bridges built today are built with concrete and steel.

Beam bridges are horizontal beams supported by columns. The columns take the weight of the people and vehicles passing on the beam. These bridges are very old as well, and people used stone and trees to build them. Today, they can be built out of concrete and steel.



*The 7 Mile Bridge in the Florida Keys is an example of a beam bridge.*

Suspension bridges have two main pillars on either side of the deck. The pillars are connected by two or more cables. The deck is suspended from vertical cables or rods attached to the main cables. They are more modern, with the first ones being built in the early 19th century.

Like roads and railroads, bridges need to be maintained. They need to be watched carefully and repaired every so often so they remain safe. Many cities depend on bridges. Traveling without them would be difficult.

Here are a few fun facts about bridges. The oldest bridge in the world is the Zhaozhou Bridge. It's in China. It's an arch bridge made out of stone that was built in 605 A.D. Believe it or not, it's still standing and being used today! But if you're looking for one of the most beautiful and famous bridges, it would be the Golden Gate Bridge in San Francisco. It's a suspension bridge that was built in 1937. It has a total length of 8,981 feet. If you think that's long, you should see the Danyang–Kunshan Grand Bridge in China. It's just over 541,339 feet long! It's the world's longest bridge. It took 4 years to build, with the help of 10,000 workers, and cost about \$8.5 million.

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1. Based on the information in the article, how long have the oldest bridges been around?
- a. more than five decades
  - b. more than five hundred years
  - c. more than a thousand years
  - d. more than a million years

2. Each of the following images is an example of one of the three major bridge types described in the article: arch, beam, and suspension. Identify the type of bridge each picture represents by writing it on the line below the picture.



\_\_\_\_\_

3. The oldest bridge in the world, the Zhaozhou Bridge in China, is an example of a(n) \_\_\_\_\_ bridge.

4. The Golden Gate Bridge in San Francisco is an example of a(n) \_\_\_\_\_ bridge.

5. If you see a bridge that looks like a horizontal structure being held up by columns, you are looking at a(n) \_\_\_\_\_ bridge.

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Match each vocabulary word from the article with the correct definition.

\_\_\_\_\_ 1. columns

\_\_\_\_\_ 2. cables

\_\_\_\_\_ 3. resilient

\_\_\_\_\_ 4. architecture

\_\_\_\_\_ 5. obstacles

\_\_\_\_\_ 6. engineers

\_\_\_\_\_ 7. foundation

\_\_\_\_\_ 8. vertical

\_\_\_\_\_ 9. horizontal

\_\_\_\_\_ 10. modern

a. the design and construction of buildings, bridges, and other physical structures

b. at a right angle to the horizon; straight up and down

c. people who design or build machines, engines, or structures

d. parallel to the horizon

e. able to withstand difficult conditions

f. pillars that stand upright and support a structure

g. occurring in recent times rather than in the past

h. things that block your path or prevent you from moving forward

i. strong, thick ropes used to support suspension bridges

j. the base of a structure that bears its weight and supports it





# ANSWER KEY

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**suspension**



**beam**



**arch**

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| <b>i</b> 2. cables       | <b>b.</b> at a right angle to the horizon; straight up and down                            |
| <b>e</b> 3. resilient    | <b>c.</b> people who design or build machines, engines, or structures                      |
| <b>a</b> 4. architecture | <b>d.</b> parallel to the horizon  |
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| <b>c</b> 6. engineers    | <b>f.</b> pillars that stand upright and support a structure                               |
| <b>j</b> 7. foundation   | <b>g.</b> occurring in recent times rather than in the past                                |
| <b>b</b> 8. vertical     | <b>h.</b> things that block your path or prevent you from moving forward                   |
| <b>d</b> 9. horizontal   | <b>i.</b> strong, thick ropes used to support suspension bridges                           |
| <b>g</b> 10. modern      | <b>j.</b> the base of a structure that bears its weight and supports it                    |