

# Building Bridges

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There are many famous bridges in the world. In New York there is the Brooklyn Bridge. In San Francisco there is the Golden Gate Bridge, and in Italy, the Ponte Vecchio. All of these bridges have different lengths, styles and heights, but what they have in common is that they connect two locations to each other.

The idea of putting up a bridge comes from awareness of a problem: people cannot easily get from one point to another. Perhaps that is because those points are separated by water, or a road, or a valley, or a large piece of impassable land. So, instead of sailing or climbing or walking through this obstacle, the best solution to the problem is to build a bridge. The function of a bridge is to span such physical obstacles, providing passage over them.

Building a bridge is no easy task. There are many aspects and elements that need to be examined before building can begin.

One of the first challenges to tackle is deciding on the type of bridge needed. Bridges can be categorized into several different types, depending on what they need to carry and what structural elements are used.

Beam bridges, for instance, are made with horizontal beams supported at each end. Beam bridges are typically made of steel, concrete or wood, and rarely exceed 250 feet. They are some of the most common bridges.

Truss bridges, however, feature load-bearing structures called trusses, which are connected elements forming triangles. These are one of the oldest types of modern bridges, and are one of the cheapest to make, since they often require less material than other bridges.

A cantilever bridge is built using horizontal beams supported on only one end. They are built using similar materials to the beam bridges. These bridges are designed to handle road or rail traffic, and can span over 1,500 feet.

Arch bridges have substructures called abutments at each end, creating curved arches. These bridges work by transferring the weight of the bridge and whatever is loaded onto it, into these abutments. They are not the most economical bridges to build, and are usually made from concrete, wrought iron, cast iron and masonry.

A suspension bridge is a bridge suspended from cables. These cables hang from towers attached to the bridge by something called a caisson, which is a tower that is implanted deep into the river or lake. These bridges can carry cars, trucks and pedestrians, and are made from steel rope, steel wire and cast chain links.

Cable-stayed bridges, like suspension bridges, are held up by cables. But in a cable-stayed bridge, less cable is required to keep the bridge attached to the towers.

Once the types of bridges are reviewed, builders and designers have to figure out which bridge best suits the need of the area.

Is the bridge over water? And if so, do large boats pass underneath? Some bridges are permanently built, and do not open and close, or rise. Moveable bridges, on the other hand, are designed to move out of the way when boats or other tall traffic comes through. This is something that has to be decided before design can begin.

Another issue to look at is length. How long is the bridge going to be? Some bridges, like the beam bridges, may not be long enough for the space. Then designers and builders may need to start looking at a suspension bridge instead.

It is also important to determine what the bridge is being used for. Is it going to be for bike riders and walkers, or will it carry trains and cars? Will the bridge be carrying water, like an aqueduct bridge? Will power lines be attached to the bridge? These are all factors that must be addressed when selecting the type and design of a bridge. Designers will also evaluate how many cars, trucks and people will be passing over the bridge each day, and whether there will be heavy traffic on the bridge. It is important to know all of these numbers before building a bridge, because you want everyone to be safe. A collapse or accident could not only cost a lot of money, but also injure or kill travelers.

Of course cost is often a factor when looking to build any structure. On a budget, designers may have to put aside their grand plans for elaborate design or innovation and stick to the basics. The cost of maintenance and upkeep for the bridge is also a factor in the building process. If materials picked need to be washed regularly, or if they don't survive much wear and tear, then a lot of money will have to go into the upkeep of the structure.

All of these aspects add up to prove that it is important for the people who want to build a bridge to hire a group of designers and construction workers they know and trust will make the right decisions. When constructing such a large structure that will cost a great deal of money and involve daily use, it is imperative that all the criteria for safety and design be filled. If you do it correctly, a bridge can solve a problem, and also keep everyone safe.

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

1. What do all bridges have in common?

- A All bridges are held up by cables.
- B All bridges are built over water.
- C All bridges connect two locations with each other.
- D All bridges are strong enough to support cars and trucks.

2. A bridge can be a solution. What problem can it solve?

- A People cannot easily get from one place to another.
- B Some people in the United States do not have enough money to visit Italy.
- C Some building materials do not survive much wear and tear.
- D The collapse of a structure can injure and kill people.

3. Read this sentence from the passage: "Building a bridge is no easy task."

What evidence from the passage supports this statement?

- A A beam bridge is a common type of bridge and rarely exceeds 250 feet.
- B The Brooklyn Bridge, the Golden Gate Bridge, and the Ponte Vecchio are all examples of famous bridges.
- C Sometimes water or valleys make it difficult for people to get from one place to another.
- D People building a bridge must consider length, cost, safety, and what the bridge will carry.

4. Why might building a bridge to get somewhere be a better solution than sailing or walking around an obstacle?

- A Building a bridge might allow people to get somewhere faster than sailing or walking.
- B Building a bridge might cause travelers to die if it collapses while there are people crossing it.
- C Building a bridge is a fun project that anyone over the age of 12 can do without much thought or effort.
- D Building a bridge might require using materials that need to be washed regularly.

5. What is this passage mainly about?

- A problems and solutions
- B bridges and bridge design
- C water, roads, valleys, and impassable land
- D New York and San Francisco

6. Read the following sentences: "The cost of maintenance and upkeep for the bridge is also a factor in the building process. If materials picked need to be washed regularly, or if they don't survive much wear and tear, then a lot of money will have to go into the upkeep of the **structure**."

What does the word **structure** mean?

- A something that is easy to do
- B something that does not cost much money
- C something that is unsafe
- D something that is built

7. Choose the answer that best completes the sentence below.

There are many types of bridges, \_\_\_\_\_ cantilever bridges and suspension bridges.

- A in contrast
- B such as
- C then
- D initially

8. Describe truss bridges.

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9. Describe suspension bridges.

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10. Imagine that you are in charge of building a bridge that allows cars to travel over a river. You are asked to build the bridge as cheaply as possible. What kind of bridge would you build? Explain your choice using information from the passage.

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