





# 13 Bridges

## Children Should Know

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Munich · London · New York



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## Traveling across space and time

**B**ridges can help you take many kinds of journeys. They can carry you over swift rivers, shimmering lakes, and deep mountain passes; and they can lead you into grand cities and scenic landscapes. A bridge can also take you on another kind of journey. . . a journey back into history.

Difficult terms are explained here.

45 • Glossary

People have built bridges for thousands of years. The earliest ones were simple and often made of wood, so they didn't last very long. But over time, they became grander and more complex. Many of the oldest bridges that survive today were made by great empires, such as ancient Rome and China, and they can teach us a lot about those distant times. Ancient Roman bridges feature giant, precisely cut stones, showing the brilliant craftsmanship of the Roman builders. Over time, people developed new kinds of technology, and bridges reflected those changes. The Industrial Revolution\* saw new kinds of bridges made from iron and steel. Today's bridges can connect people and communities in new ways.



42 • Millau Viaduct

In this book, you will explore 13 of the most beautiful bridges from the last 2,000 years. Through words and pictures, you will learn how these structures were built and why they were so important. An asterisk\* follows some of the words in the book. These words may be hard to understand, but a glossary at the back of the book will explain them to you.



38 • Golden Gate Bridge

Each chapter offers you a timeline showing the important events that were taking place when that bridge was made. You will also find some quiz questions about what you read. And if you want to learn more about a particular bridge, we provide tips for finding helpful books and places to visit. You may even get an idea for making a bridge of your own!



36 • Sydney Harbour Bridge



30 • Brooklyn Bridge



34 • Tower Bridge



51 BC Julius Caesar finishes the Roman conquest of Gaul\*

27 BC Augustus becomes the first Roman emperor

AD 70 Romans conquer the city of Jerusalem

AD 80 Colosseum completed in Rome

100 BC

75 BC

50 BC

25 BC

0

AD 25

AD 50

AD 75

AD 100

AD 125

AD 150

AD 175



## Pont du Gard

The Pont du Gard's limestone arches seem to emerge from deep within the hills above the Gardon River. The Romans originally built this bridge with the help of wooden scaffolding.\* Do you see the stones that stick out of the walls? They were probably used to hold the scaffolding in place.



AD 293 Roman Empire divided under Emperor Diocletian

AD 313 Edict of Milan makes Christianity tolerated in the Roman Empire

AD 324 Constantinople becomes capital of the Eastern Roman Empire

AD 200

AD 225

AD 250

AD 275

AD 300

AD 325

AD 350

AD 375

AD 400

AD 425

AD 450

AD 475

# Pont du Gard

## The might and beauty of ancient Rome

Ancient peoples built bridges all over the world. Some were made of wood, some with rope, and some with simple stones. Most of these bridges no longer exist today, and we know about them only because people described them in their writings and stories. But the ancient Romans were different. They built bridges to last for eternity.

More than 2,000 years ago, the Roman Empire was the largest and wealthiest empire in the world. Romans brought a new way of life to much of Europe. Their cities had grand villas, huge public baths, and massive amphitheaters\* for entertaining the public. To support all these places, the Romans needed two important things: running water and bridges. So they perfected a kind of structure that met both requirements: the aqueduct.

Aqueducts were road-like structures that carried water from a lake or other source to a thirsty city. These amazing creations needed to stretch for many miles, often across hilly, uneven land. Parts of the aqueduct had to be placed on top of bridges that were built over rivers, gorges, or valleys. The most famous—and most beautiful—aqueduct bridge to survive is the Pont du Gard, in what is now southern France.

The Pont du Gard was part of a 31-mile (50-kilometer) aqueduct that brought water from a remote spring to the city of Nemausus (present-day Nîmes). It was built over the Gardon River, which lay about 160 feet (48.8 meters) below the surface of the aqueduct. To construct such a large bridge, the Romans designed three layers of massive semicircular arches.\* The bottom layer was built into the rocky ground on the banks of the river, making the bridge strong and stable. Each layer was made of huge



### About This Bridge ...

**Date**

ca. AD 50

**Place**
Vers-Pont-du-Gard,  
near Nîmes, France
**Crosses**

Gardon River

**Type**

Aqueduct bridge

**Total Length**

902 feet (275 meters)

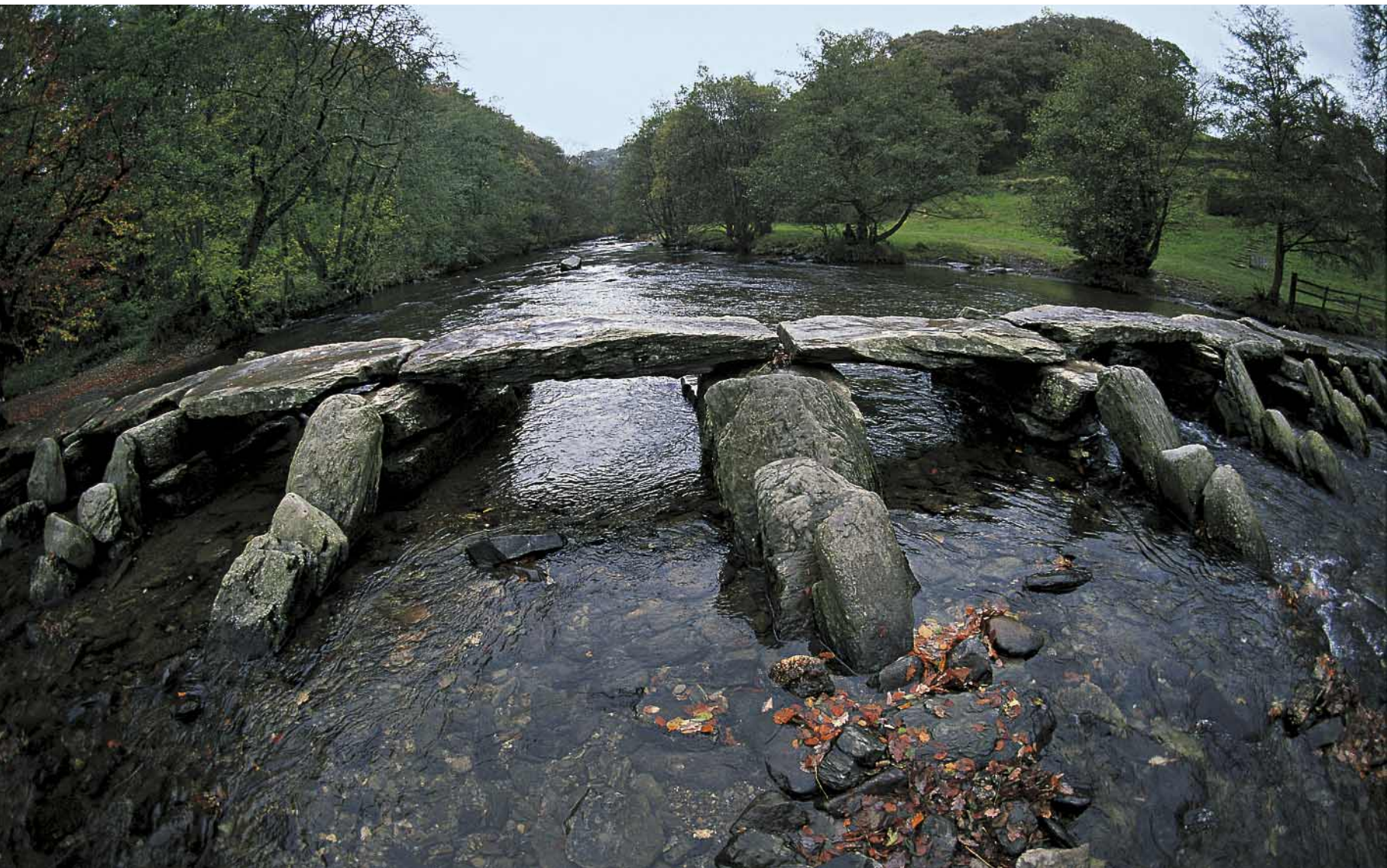
**Designer**

Unknown


**Did you know?**

After the Roman Empire fell, the Pont du Gard became a toll bridge. People had to pay a fee to the local ruler in order to cross it.





## Tarr Steps

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People were building bridges more than a thousand years before the Romans. These ancient structures may have looked something like the Tarr Steps bridge (shown here), which stands in Exmoor National Park in England. No one knows the age of Tarr Steps, however, or who built it. The huge stones are not from Exmoor—so they must have been dragged for many miles using primitive equipment!

stones that were cut and placed together perfectly—so perfectly, in fact, that they didn't need any mortar to hold them in place. The top layer of the bridge contained the channel where the precious water was carried. This channel was lined with cement to make it smooth and to let the water flow easily across the aqueduct. The Romans built the Pont du Gard so well that it survived for hundreds of years. Even today, people walk across its beautiful arches to enjoy a view of the Gardon River.





### Alcántara Bridge

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Roman builders also constructed the Alcántara Bridge in western Spain. Completed in AD 106, this bridge is unusual for its time because we know the name of its architect: Caius Julius Lacer.

220 BC Qin Shi Huang, first emperor of China, begins building the Great Wall

114 BC Trade between China and Europe begins to grow on the Silk Road

27 BC Augustus becomes first Roman Emperor

AD 220 China divided after the fall of the Han Dynasty

250 BC 205 BC 160 BC 115 BC 70 BC 25 BC 20 AD 65 AD 110 AD 155 AD 200 AD 245 AD

## Anji Bridge

### New ideas from ancient China

In AD 600, China had an empire almost as large as ancient Rome. Chinese emperors sponsored huge building projects to unite their empire's different regions. Canals, roads, and temples began to appear all over China. So, too, did bridges.

Like the ancient Romans, Chinese builders sought to use new technologies to make their bridges stronger and more durable. Today, the country's best known bridge—and the oldest one to survive—is called the Anji Bridge. It crosses the Xiao River in what is now the Hebei province in northeast China. What makes the bridge so unusual for its time is its use of a new building feature: the segmental arch.\* Segmental arches are much wider and shallower than Roman semicircular arches.\* And when a segmental arch bridge is made properly, it can cover longer distances with less building material than a semicircular arch bridge.

However, constructing a giant segmental arch is difficult. The builders of Anji Bridge had to make their arch with 28 layers (or "courses") of stone. These layers were formed with carefully cut stone blocks, which were held together with cement and X-shaped iron joints.\* The builders also made two side arches on either side of the main arch, enabling the bridge to be lighter and more durable—especially during periods of flooding. When completed in AD 605, the Anji Bridge



#### About This Bridge ...

##### Date

AD 595–605

##### Place

Zhao County, near Shijiazhuang, China

##### Crosses

Xiao River

##### Type

Segmental arch bridge

##### Total Length

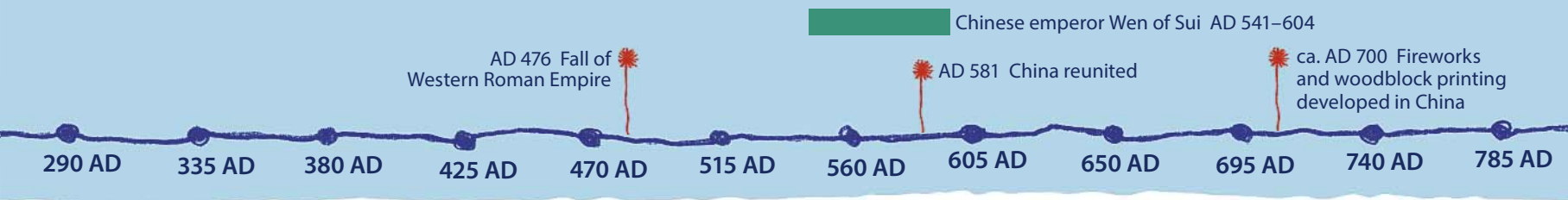
162 feet (51 meters)

##### Designer

Unknown







### Anji Bridge

The Anji Bridge stretches gracefully over the Xiao River. When the river floods, water can pass through the small arches on either side of the bridge and prevent it from getting damaged.