



13 Bridges Children Should Know

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

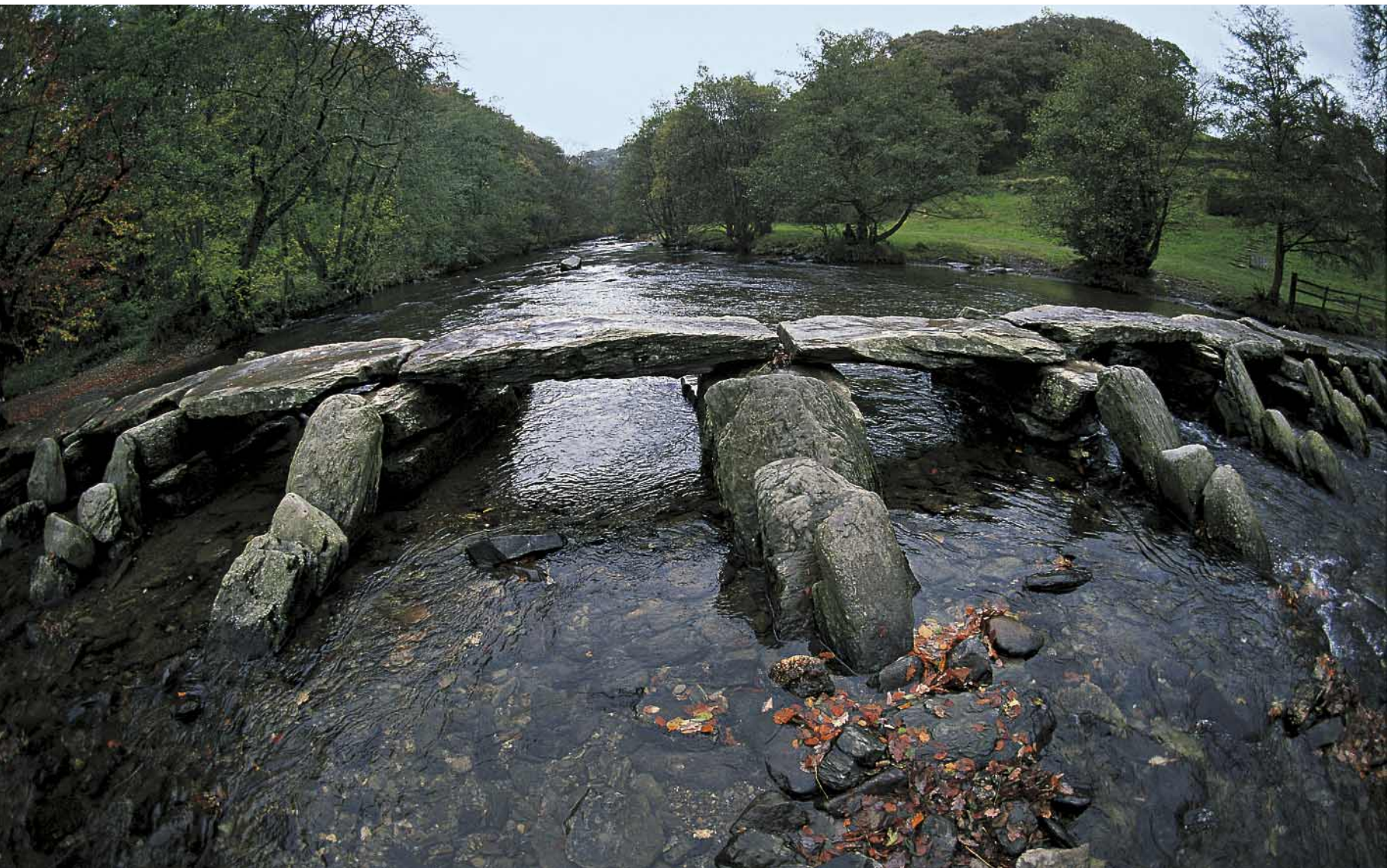
902 feet (275 meters)

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

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

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



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

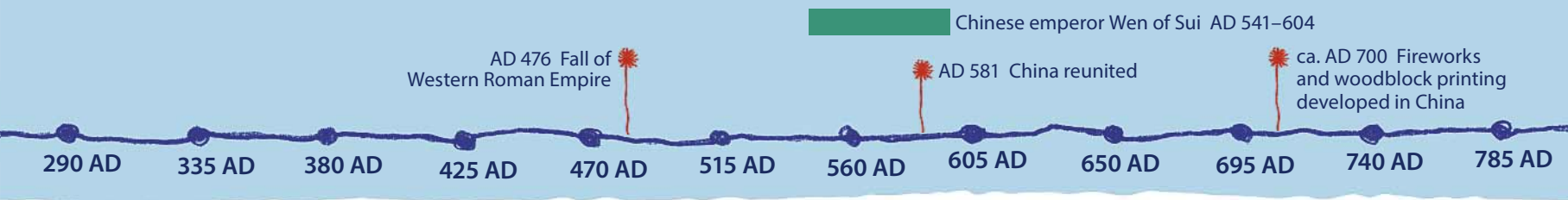
New ideas from ancient China

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





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.





Jade Belt Bridge

was unlike anything built in other parts of the world. Its graceful arch extended 122 feet (37 meters) across the river, far wider than the arches on the Pont du Gard. In fact, a segmental arch bridge would not appear in Europe for another 700 years!

Other Chinese bridges also make use of interesting arches. This structure, called the Jade Belt Bridge, was completed in Beijing in 1764 for the emperor Qianlong. It has an extremely tall arch that allowed the emperor's royal boat to pass through it.

Try drawing your own fancy bridge. What shape would it take?



800 Charlemagne becomes first Holy Roman Emperor*

1096–99 First Crusade

800 830 860 890 920 950 980 1010 1040 1070 1100 1130



Charles Bridge

Many medieval bridges had tower gates that separated the bridge from the town. But the Old Town tower of the Charles Bridge was among the grandest. Its tall, pitched roof is decorated like a church spire.

Emperor Charles IV 1316–1378

Peter Parler ca. 1330–1399

ca. 1440 Johannes Gutenberg invents the printing press

1270 Great Synagogue completed in Prague

1346–53 Black Death strikes Europe

1347 Charles IV becomes King of Bohemia

1355 Charles IV becomes Holy Roman Emperor

1492 Christopher Columbus reaches the New World

1160

1190

1220

1250

1280

1310

1340

1370

1400

1430

1460

1490

Charles Bridge

A bridge at the center of a medieval city

After the Roman Empire fell, Europe entered a long period in history called the Middle Ages. Roman lands split up into hundreds of tiny kingdoms, and many cities either disappeared or shrunk into small towns. There was now no need to construct large roads or aqueducts; and the knowledge of ancient builders almost disappeared. Slowly, however, Europeans began reestablishing the trade and prosperity of Roman times. By the 1100s, many medieval cities in Europe had become large enough and rich enough to build their own grand bridges. One such city was Prague, capital of the kingdom of Bohemia.

Medieval Prague was a flourishing city. It had a grand cathedral and palace and a large population with people from all over Europe: Germans, Czechs, and Jews. But the castle and cathedral were separated from the town by a mighty, fast-moving river called the Vltava. Around 1150, the Bohemian king Vladislaus I decided to build a stone bridge over the river to connect his castle with his people. This “Judith Bridge” survived for a time. But because the Vltava often flooded, the old bridge eventually collapsed in 1342. It was up to a new ruler, Emperor Charles IV, to build a new bridge for Prague that would last forever.

Charles’s bridge was begun in 1357 and took many decades to complete. The emperor hired an architect named Peter Parler, who designed a massive structure with 16 Roman-style arches.



About This Bridge ...

Date

1357–1402

Place

Prague, Czech Republic

Crosses

Vltava River

Type

Semicircular arch bridge

Total Length

1,692 feet
(516 meters)

Designer

Peter Parler



Charles Bridge statues

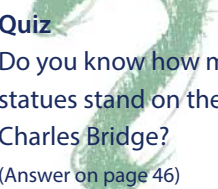
Beginning in the 1600s, elegant statues were erected along the Charles Bridge. They depict saints* and other religious figures from Christianity.

Regensburg Bridge

The Charles Bridge replaced an older structure called the "Judith Bridge," which was built in the 1100s. This earlier bridge may have looked something like Regensburg Stone Bridge (shown below), which was made at about the same time in Regensburg, Germany.

Each arch was supported by giant, wedge-shaped piers* that could withstand the river's icy waters in winter and its flooding in the spring. When complete, the bridge spanned an amazing 1,692 feet (516 meters), making it the longest and strongest bridge in medieval Europe. Parler also wanted the bridge to be beautiful, so he designed a lovely tower at the end of the bridge nearest the town. This structure was built in the Gothic* style, with a tall, pitched roof and pointed arches. Prague at the time was a very religious city, and the old tower almost looks like a church spire hovering over the Vltava.





Quiz
Do you know how many
statues stand on the
Charles Bridge?
(Answer on page 46)