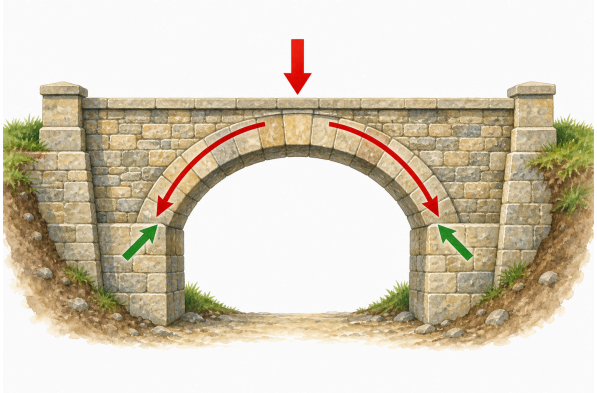
Arch bridge

Observe

Choose 1–3 tasks. Point, say or draw; writing is optional.

1 · Look

Point to the deck, arch and abutments. Do the deck and arch have the same shape?



Stone-arch section: red shows load transfer; green shows abutment reactions.

2 · Look

Follow red arrows from the crown to both ends. Find the green arrows pushing back.

3 · Choose

If the ends slide apart freely, can the arch stay supported as shown? Explain.

- [ ] Abutments matter
- [ ] Only deck shape matters

4 · Write

Find “abutment” on the knowledge card. Say it; write it if you wish.

abutment

5 · Draw

Draw an arch and two abutments. Add arrows for the downward load and end supports.

6 · Record

A part I found: ____

My explanation of the forces: ____

The picture cannot tell me: ____ (or draw/say)

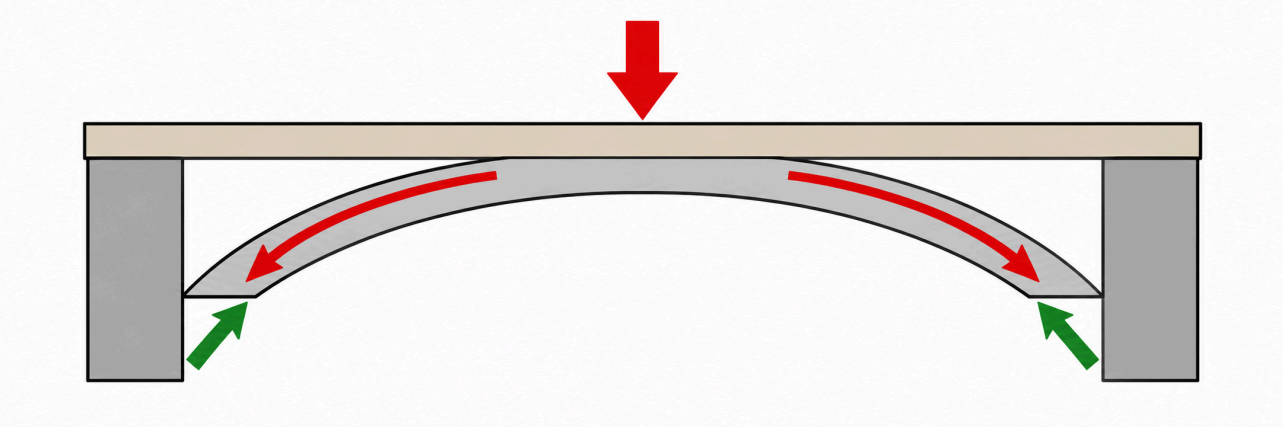
Arch bridge

Discover

How does an arch carry weight?

Bridges cross rivers, valleys and other obstacles. An arch carries load along its curve toward both ends.

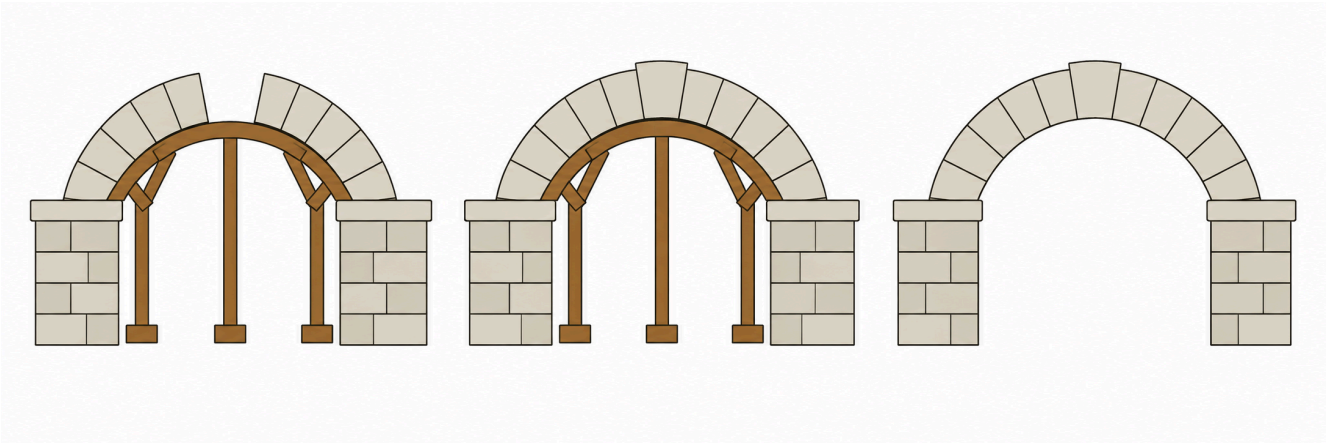
Force directions



Force diagram · not to scale

- **Deck:** above the arch
- Abutments push inward against spreading
- **Partly known:** Qualitative, not a capacity calculation
- Downward load → compressed arch → abutments
- **Diagram scope:** Generic masonry structure

Building · One traditional method



Support → **Close the arch** → **Remove support**

- **Unfinished arch:** wooden centering
- Not every method; not a building guide
- **After closure:** removal as engineering work allows

Arch bridge

Discover

Materials

- **Traditional:** stone
- **Also:** steel, concrete
- **Material + shape:** both matter

Arch / beam

- **Arch:** force along a curve
- **Beam:** spans supports
- Flat deck ≠ necessarily a beam bridge

Example • Zhaozhou Bridge



Structure illustration • not a survey

- Hebei, China; Sui dynasty
- **Small arches:** above both ends of the main arch
- **Main span:** between arch ends, not total bridge length
- Structure illustration, not a survey

- **Generic diagrams:** no specific bridge, date, dimensions or capacity
- **Arrows:** directions, not force magnitudes
- Safe public viewpoints; no climbing or load tests

Sources: PBS/NOVA • ASCE • PennDOT pp. 23, 24