



15 minutes



Grades
3–5, 6–8

Human Arch

Can you build an arch with humans—one that won't collapse?

Instructions

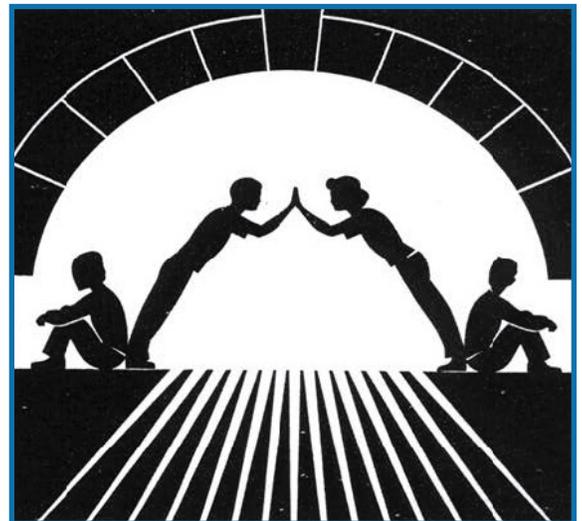
In this activity, students form an arch and consider the forces at work to keep an arch standing.

- 1** Ask two students to form an arch by placing their palms together and leaning toward each other, sliding their feet back as far as they can.
- 2** Ask a third student to gently pull down on the arch makers' arms.
- 3** Ask two more students to join the arch. Tell the class to come up with ways to make the arch stronger, and have students try each suggestion.
- 4** Test each suggestion by having the same student pull down on the arch makers' arms, as before.

Materials

PER CLASS:

- 5 students
- Floor space



Engineering & Science Connections

 Force means a push or pull on an object. Compression is a squeezing force which pushes things together. In this activity, the students' hands are creating a compression force against each other.

 The force created by the students pushing against each other travels through the arch (students' bodies) to the floor. In the same way, loads on a structural arch are transferred to their foundation. This is a very efficient way of creating stability by transferring loads.

 Engineers use arches in many different types of construction, including arch bridges, doorways, window frames, and tunnels. The Gateway Arch in St. Louis is the tallest human-made arch in the world at 630 feet high!

Guiding Questions ?

When two students are forming an arch: Where do you feel pushing or pulling? What would happen if you stopped pushing? What is holding up the arch?

When three students are involved: How difficult is it to break the arch? Where does the arch need support?

When five students are involved: Is it easier or harder to break the arch this time?

Would the arch be stronger if it was wider? Taller? Shorter?

Excerpted from Building Big Activity Guide. Building Big is a PBS television series exploring the world's greatest engineering feats. For other activities visit pbs.org/buildingbig. Funded by The National Science Foundation, National Endowment for the Humanities, The Arthur Vining Davis Foundations, the Corporation for Public Broadcasting, public television viewers, the American Society of Civil Engineers and Siemens.