

Build a Bridge

Student Instructions



Introduction

How much weight can a bridge hold? Does the building material affect the results? In this challenge, you'll design a bridge and build two models of it: one using paper and the other using aluminum foil. Then you'll test both bridges to determine which supports the most weight.

There's one engineering constraint for this challenge:

- Use only one sheet (white paper or aluminum foil) per design.

To be successful, your bridge must meet three criteria:

- be made with a single piece of material (paper or aluminum foil)
- span a distance of 6 inches
- support at least 40 pennies

Brainstorm

Think about a bridge you've seen, small or large. Consider:

- What is it used for?
- Who uses it?
- What does it look like? How long is it?
- What materials is it made of?

Before designing, civil engineers need to think about who will use the bridge and why. They need to consider how much weight the bridge needs to support and what materials they might use.

Materials

- Several sheets of plain white paper
- A piece of heavy-duty aluminum foil, trimmed to the same size as the paper (or regular foil if you don't have heavy-duty foil)
- At least 40 pennies
- Scissors
- Two books of similar thickness
- Ruler
- Lined paper to record results
- Pencil
- Tape

Your challenge is to design a bridge that can hold at least 40 pennies before collapsing.

- 1 Set up your space, placing two equally thick books 6 inches apart.
- 2 Take a look at the materials. First, you'll use paper to create bridge designs (using only one sheet of paper per design). When you have your best design, you'll recreate it using aluminum foil. Then you'll compare how the same bridge performs when it's made out of two different materials.
- 3 Sketch some designs or jot ideas, if helpful.

Build, Test, Redesign

- 1 Use one sheet of paper to build your bridge. Create a data table and predict how many pennies it will hold.

Design	My prediction	# of pennies held
Paper Bridge #1		
Paper Bridge #2		

- 2 Test it out. How many pennies did it hold before collapsing? Record your results in the table.
- 3 Consider: Why did your bridge fail? What can you do to improve your design?
- 4 Continue building paper bridges until you have one that can hold 40 pennies or more. Then recreate your winning design using the same size sheet of aluminum foil.
- 5 Test both bridges under the same conditions. Does the foil bridge hold at least 40 pennies? Which bridge holds more weight?

Reflect

- Which material built the strongest bridge? Were your results surprising? Why?
- Which bridge designs were the most successful?
- How many pennies did your winning bridge hold?

Review the success criteria. Did your bridge meet the criteria? Nice job! Share your results with a family member, teacher, or DiscoverE! You can post photos and videos on social media and tag @DiscoverEorg.