

The Bookland Bridge

Do you think that you can make a strong bridge with a half-sheet of paper? Take this bridge building challenge and find out!

Materials

- Sheet of paper (cut in half lengthwise)
- Two stacks of books of equal height
- Metric ruler
- Scissors
- Pennies

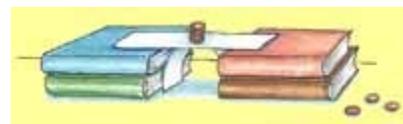
The Rules:

1. The bridge can be made from only $\frac{1}{2}$ sheet of plain notebook paper.
2. You may not use glue, tape, or any other materials.
3. You may bend, fold, or cut the paper in any way you like.
4. The two stacks of books must be at least 10 centimeters (cm) high and at least 12 cm apart.

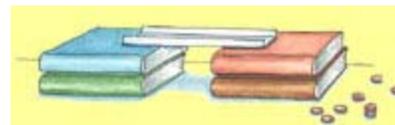
The Test:

After making your bridge, test its strength by gently stacking pennies, one at a time, in the middle of the bridge. See how many pennies your bridge can support without caving in! Here are two possible designs for bridges. See if you can create others that are even stronger!

Arched Bridge



Walled Bridge



Think about this...

There are three main types of bridges: The beam bridge, the arch bridge, and the suspension bridge. The beam bridge is the simplest, using a beam along each side of the roadway. The arch bridge uses one or more arches on which the roadway is built. But one of the most amazing bridge designs is the suspension bridge. In a suspension bridge, the roadway is actually hung from very strong cables. The cables are somewhat different depending on the bridge but they are normally made from thousands of steel wires bound tightly together. These cables can handle an incredible amount of weight since a single steel wire, only $\frac{1}{10}$ of an inch thick, can support a weight of about $\frac{1}{2}$ ton without breaking!

Where's the Chemistry?

A flat piece of paper is very easy to bend. In fact, if you hold one end, the other end just flops down on its own. But if you bend the sides up, like the walled bridge, or give it any vertical fold at all, it doesn't bend nearly as easily. That's because the vertical walls act like beams that give the bridge extra strength. A beam is helpful because it has a lot of material along its surface to resist bending.



The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".

