

## Suspension Bridges

### **What's the secret of suspension?**

A suspension bridge's cables are beautiful to look at, but they also enable the bridge to cross large spans. Make a model suspension bridge to see how it works.

### **What You Need**

- 7 drinking straws
- masking tape
- dental floss or thread
- scissors
- 4 large paper clips
- paper cup
- pennies or metal washers
- ruler

### **Make a Prediction**

After you test the strength of the beam bridge in Step 4, predict how many pennies your suspension bridge will support.

### **Try It Out**

1. Cut two short pieces of straw, each 3 centimeters (about 1.25 in.) long. For each tower, tape two straws on either side of a short piece of straw, as shown. Tape the long straws together at the top, too.



2. Tape one tower to the edge of a desk or chair. Tape the second tower to a second desk or chair of the same height.

3. Place another straw between the towers so its ends rest on the short pieces. This straw is the bridge deck (you may want to consider cutting the flexible part of the straw off). Now you have a simple beam bridge.



4. Make a load tester by unbending a large paper clip into a V-shape. Poke the ends of the paper clip into opposite sides of a paper cup, near the rim.

Use a second paper clip to hang the load tester over the bridge deck. Record how many pennies the paper cup can hold before the bridge fails.

5. Now change the beam bridge into a suspension bridge. Tie the center of a 100-cm (about 4 ft.) cable around the middle of a new straw. Place the straw between the towers. Pass each end of the cable over a tower and down the other side.

6. To anchor the bridge, wrap each end of the cable around a paper clip. Slide the paper clips away from the tower until the cable pulls tight. Then tape the paper clips firmly to the desks. Test it again.



### **Explain It**

Can you identify the forces acting on the loaded suspension bridge? Which parts of the bridge are in compression? Which parts are in tension?

### **Build on It**

Can you design and build a straw suspension bridge that spans a gap twice as wide and supports the same amount of weight? What parts of the bridge design need to change? Try it.