

CRAFT STICK BRIDGE



Courtesy of Fairport Robotics



WHAT YOU'LL NEED



HOW DOES IT WORK?

A force is a push or a pull on an object. When many forces are acting on an object all at once, this is called a system of forces.

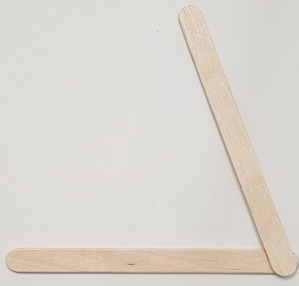
In a system of forces, there can be constants and variables. Constants are forces that don't change, like gravity. Variables are forces that do change, like wind.

The four forces that act on bridges are compression, tension, torsion, and shear. Compression is a pushing force. It pushes down on the bridge. Tension is a pulling force. It stretches the bridge. Torsion is a combination of pushing and pulling forces. It twists the bridge. Shearing is two pushing or pulling forces. It pushes or pulls the bridge in two opposite directions at the same time.

What other variable forces might push or pull a bridge?

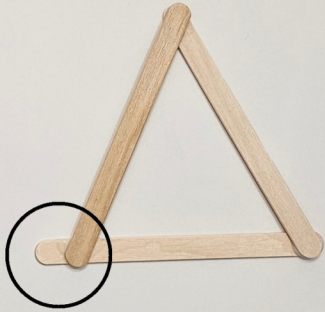
Triangles are used to build bridges. When a force is applied to the point of a triangle, it keeps its shape! That's because the two sides of the triangle are pressed down (compression) while the bottom is stretched out (tension).

STEP 1



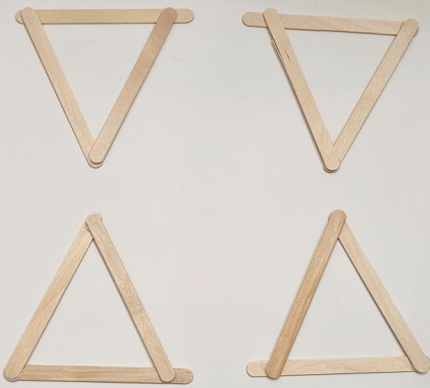
Start by looking at all of the steps. Pick someplace with enough space to work, put down paper or paper towels in case you make a mess with the glue. Once you are ready to begin, start by putting a dot of glue on one side of one craft stick. Then place the end of a second craft stick on the dot of glue.

STEP 2



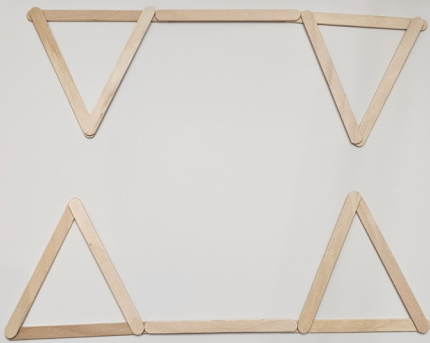
Add more glue to both ends of your next craft stick. You should create a triangle, but leave a tab at one corner. Look at the circled corner in the picture to see what your triangles should look like. Do NOT wait for your glue to dry! Wet glue will let you move the craft sticks around a bit if you need to.

STEP 3



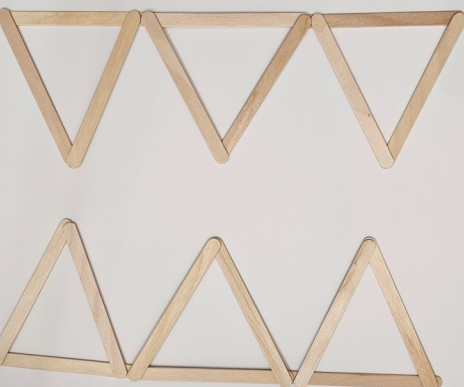
Make three more triangles. The second two triangles should be a mirror of the first two triangles. Make sure their points are pointing towards each other, and don't forget to leave tabs on all four triangles!

STEP 4

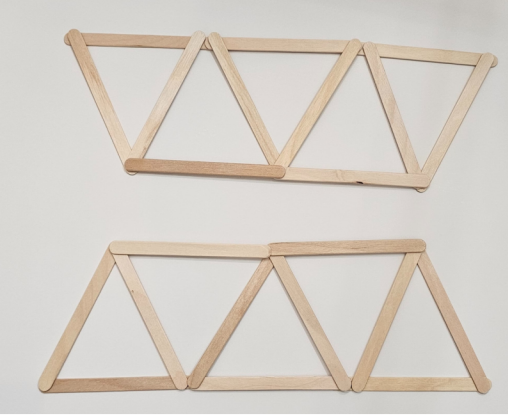


Scoot your triangles far enough apart to glue a craft stick between the triangles, onto the tabs. They should look like vampire teeth!

STEP 5

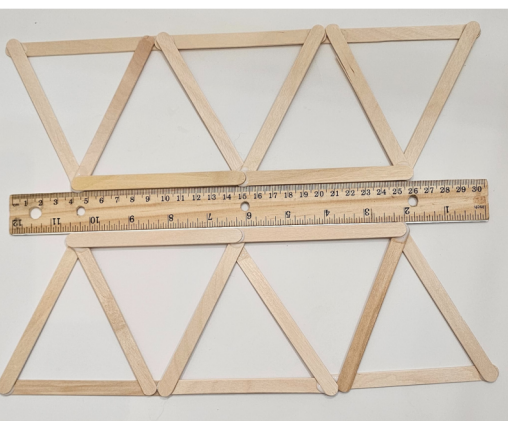


Glue two more craft sticks onto each set of triangles. Now you should have two rows with three triangles each.



STEP 6

On each row of triangles, glue two craft sticks to connect the points. These craft sticks should overlap on the middle point.



STEP 7

Place your ruler between your two rows of triangles. Gently push them against the two sides of the ruler. Make sure the four craft sticks touching the ruler sit flat against it. Then, gently slide the ruler out from between the two rows of triangles. Let them dry.



STEP 8

While the sides of your bridge dry, you can make the deck. The deck is the surface of a bridge. It's where people walk or cars drive. Start with two parallel craft sticks.



STEP 9

Add glue along the length of your two craft sticks. Then place two more craft sticks at each end, forming a square. Do NOT wait for your glue to dry! Wet glue will let you move the craft sticks around a bit if you need to.



STEP 10

Place ten more craft sticks between the two you just added. You should have twelve craft sticks glued to the original two.



STEP 11

Repeat steps eight, nine, and ten to make the second half of your bridge deck. Let both halves dry.



STEP 12

Turn the two halves of your bridge deck over. Connect the two halves with two craft sticks. Leave space between your new craft sticks and the craft sticks on the outside edges of your bridge deck. Let them dry.



STEP 13

Add glue in the gap you left in step 12. Place the sides of your bridge, short side down, into the gap. They won't stand up by themselves. You'll need to hold them in place while the glue dries. You can use tape like the picture. You can lean the sides against something heavy. Or ask an adult for help!



STEP 14

Let the glue on your bridge dry COMPLETELY before moving it. Once it has dried, flip it over and try it out! How much weight do you think it will hold?



STEP 15

There are LOTS of different ways to build a bridge! You don't have to follow these instructions. If you have an idea you want to try, build that instead, then test it out!