

## ACTIVITY!

## BUILD IT YOURSELF

## Tetrahedron Forcebuster

**SUPPLIES:** paper and pencil, ruler, 6 plastic drinking straws (not the bendy type) of 3 different colors (red, blue, green, for example), scissors, string, large sewing needle

Civil engineers rely on triangles for many constructions. It is the strongest shape. The **tetrahedron** is a shape with four triangular faces (think of the pyramids of Egypt). Test how well triangle power can resist pushing and pulling forces. Ask an adult to help you thread the sewing needle and supervise as you use it. Connect the straws tightly. They should be rigid, not loose. It is helpful if all straws meeting at one vertex have a different color. That's the point where the angles intersect.

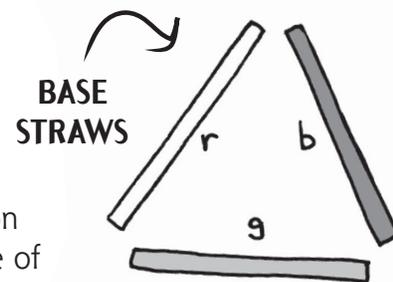
## WORDS to KNOW

**tetrahedron:** a pyramid containing four triangular faces.

1 With the paper, pencil, and ruler, draw a tetrahedron to visualize its shape and connections. You can use the picture on the next page as a guide. Notice each vertex.

2 Build a 3-D model. Put one straw of each color on the table, forming an equilateral triangle for the base of your tetrahedron.

3 Cut off a 60-inch length of string (152 centimeters) and thread it through the needle.



## DID YOU KNOW?

Alexander Graham Bell, the inventor of the telephone, invented the tetrahedron!

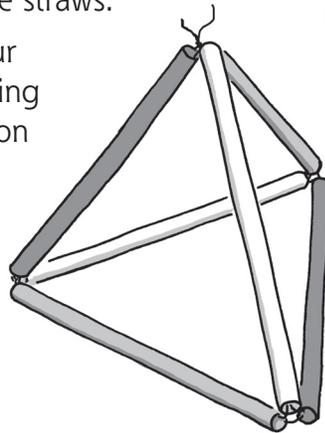


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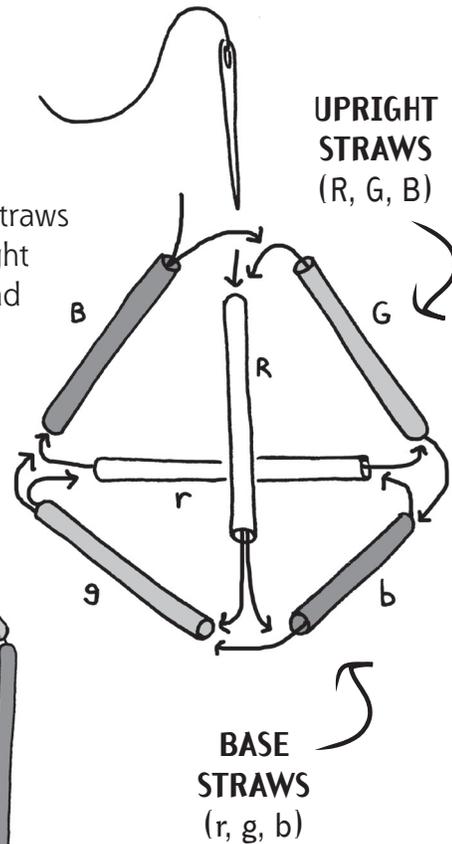
4 Hold the other three straws (one of each color) above the base straws. Use the diagram and thread pattern shown here to thread the straws and build your tetrahedron. The base straws are labeled with lowercase letters and the upright straws are capital letters. Start by threading one of the upright straws (R), then thread two base straws (g and r), two upright straws (G and R), two base straws (b and r), two upright straws (B and G), two base straws (b and g), and one last upright straw (B).

5 Make sure all of the sides are threaded tightly. Securely knot the string at the vertex to connect the straws.

6 Predict whether your structure will resist pushing and pulling forces. Tug on different connections. Does it maintain its triangular shape?



**THREAD PATTERN:**  
R-g-r-G-R-b-r-B-G-b-g-B



## TRY THIS

- Build other shapes, such as a rhombus and a cube. Compare results.
- Test different building materials including toothpicks, marshmallows, and gumdrops. How do materials impact the results?