

USC Science Outreach - Straw Bridges, Spring 2015

<u>Materials:</u>	<u>Amt per Trial:</u>
Plastic straws	30 per group
Scotch Tape	1 per group
Scissors	1 per group
Marbles	120
Basket	1
Yarn	Variable
Ruler	1

In this lesson, students will learn about bridges and identify the effective geometric shapes that make bridges strong. Following the Engineering Method, students will then apply their knowledge to plan, create, and improve upon their bridge designs.

Introduction (2 minutes):

Do they know of any bridges?

Golden Gate Bridge, Brooklyn Bridge, Viaduct Bridge, the Sydney Harbor Bridge.

Why do we need bridges?

Bridges are important modern structures that allow us to cross bodies of water, mountains, and canyons. Mention that bridges need to be strong to carry cars, people, and heavy loads from one place to another.

Lesson (5 minutes):

Today we will break up into teams of engineers to create the strongest possible bridge – completely out of straws! Before we do that, we need to:

1. ASK – How can we make the strongest possible bridge?

Ask students what are some 2-D shapes they know. Which shapes would be better for constructing the bridge?

- **Rectangles** will collapse because their sides will bend under force.
- **Arches** can take more pressure than rectangles
- **Triangles** are the strongest because they distribute forces into their sides.

Demonstrate with models that some shapes (triangles, arches, X's, and diagonal beams) are stronger because they distribute forces throughout their shapes.

2. IMAGINE – What does your bridge look like?

3. PLAN – On the back of your worksheet, spend 5 minutes designing a bridge with your group.

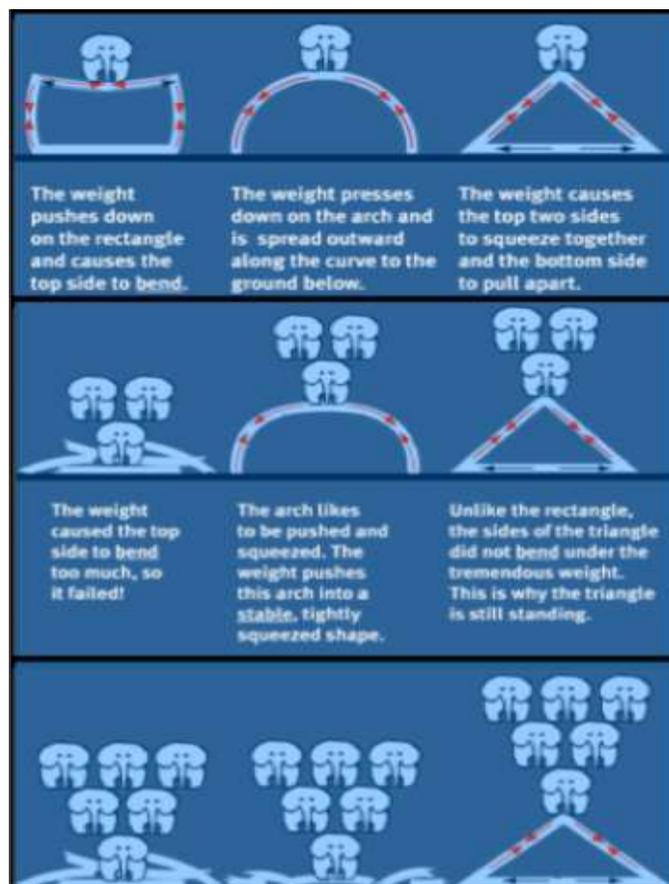
4. CREATE – Bring your bridge to life!

Creating (25 minutes):

1. Split the class into groups of 4 or 5 (depending on the # of Scouts available to help).
2. Give each group 30 straws, 1 pair of scissors, and 1 roll of tape. Each group will make 1 bridge.
3. Assign Scouts to each table to monitor progress, make suggestions, and aid creation.
4. Keep track of time!

Testing (5 - 10 minutes):

Using two desks, measure out a 6-inch gap. Use the yarn to make a weight with the Tupperware that hangs off the bottom of the bridge. Start adding marbles until the bridge collapses. You can usually start with ~10 marbles in the Tupperware.



5. IMPROVE – Are there any improvements you can make?