Build And Test A Paper Bridge

Objective
Investigate ways of creating a strong structure using only a piece of paper.

What You Need
Two wooden blocks
A sheet of paper
A number of coins

To Do and Observe
1. Set the blocks about 15 cm (6 inches) apart on a table or floor.

2. Create a paper bridge that spans the blocks and supports as many coin "cars" as possible. Fold the paper to make it stronger. You can only stack coins in the center of the roadway, not on top of the blocks. Try folding the paper in different ways to construct the strongest roadway. What other household items will your roadway hold?

3. Discuss your results and determine which structure was the strongest and why.
What's Going On
Folding the paper as if to make a paper fan makes a corrugated roadway. The folds form a series of triangles. Triangles form the strongest structures. A structure is anything that supports its own weight against gravity, plus the weight of another object. Weight provides two kinds of force: compression and tension. Compression is a push down on the structure that must be channeled to the ground. Tension is a pull that stretches the structure. Triangles support both of these forces. Compression pushes down equally on two sides of the triangle, causing the base to be pulled equally in two directions, which creates tension. The triangle is the strongest structure because all three sides bear the load. In a square, only two sides of the four bear the load. This equaling of the forces makes the triangle the strongest structure.

Steps:
1. Place 2 of the bowls about 6 inches apart and lay the sheet of paper across them to form a flat bridge.
2. Put some toy building bricks on the bridge. How many building bricks can the bridge support before it collapses?
3. Fold the sheet of paper into an accordion shape, as if you were making a paper fan. Lay the folded paper across the bowls again and test your bridge by adding building bricks one at a time. Isn't it amazing? The bridge does not collapse!