



Greek Columns

Triangle, circle, or square—which column shape is the strongest? Investigate the design decisions behind one of the Ancient Greeks' most famous and recognizable architectural structures!

**We recommend that you do this activity before "Parthenon Architecture"*

TEKS:

SCI 1/3.6: Geometry and measurement. The student applies mathematical process standards to analyze attributes of two-dimensional shapes and three-dimensional solids to develop generalizations about their properties.

SCI 1.6 B: The student is expected to distinguish between attributes that define a two-dimensional or three-dimensional figure and attributes that do not define the shape.

MAT 3.6 A: The student is expected to classify and sort two- and three-dimensional figures, including cones, cylinders, spheres, triangular and rectangular prisms, and cubes, based on attributes using formal geometric language.

SCI 5.6 D: The student is expected to design a simple experimental investigation that tests the effect of force on an object.

Materials:

- Books
- 3 pieces of copy paper
- Tape

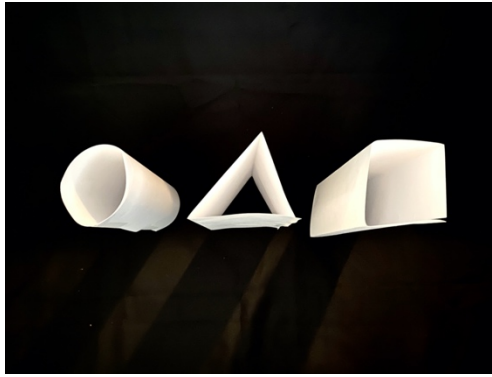
Experiment/How-To:

1. First, take some time to make a hypothesis, or, an educated guess, about which column shape you think will be the strongest: triangle, circle, or square. Once you've made your hypothesis, move on to the next steps to test it!
2. Fold one piece of copy paper into a triangle-shaped column, one into a square-shaped column, and one into a circle-shaped column, and secure the edges with tape. Use the photos below for guidance.

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3. Test the strength of each column shape by gently placing one book on top of each column. If a column holds one book, see if it will hold two books! How about three books?
4. Whichever column shape did the best job of supporting the weight of your books is the strongest!

STEM Connection:

Which column shape held the most books? During the experiment, you most likely found that the circle-shaped column was able to hold the most weight. The triangle and square columns probably collapsed pretty easily. Did this surprise you?

Columns have been used for thousands of years to help construct buildings that are *super* strong. The strongest type of column is one with a circular base. A column with a circular base is also known as a cylinder. Cylinders are able to support so much weight because they do not have any edges. This means that any weight placed on top of a cylinder, such as the books you used for testing, is evenly distributed throughout the column. When you placed books on top of the triangle or square-shaped columns, the weight went straight to the edges and corners of those shapes, causing a quick collapse.

The Ancient Greeks were known for pioneering different styles of architecture, and they used all different types of cylinder-shaped columns in their building designs. In Ancient Greece, columns were made out of materials like limestone and marble for additional strength and durability. In fact, this knowledge of geometry helped them build giant structures and expand their empire. The Greeks' use of columns was adopted by the Ancient Romans, and columns are still used to construct strong buildings today!

Career:

Geometrists study the size, shape, and position of two-dimensional shapes and three-dimensional figures. They use the measurement, properties, and relationships of angles, surfaces, and solids to develop theories and patterns about our world. They apply their findings and geometric reasoning to architecture, art, engineering, robotics, astronomy, sports, nature, and more.

Resources:

http://www.ancientgreece.com/essay/v/analysis_of_important_themes_in_greek_architec/

<https://klru.pbslearningmedia.org/resource/phy03.sci.phys.mfe.zcolumnsi/columns-finding-the-strongest-shape/#.Xz7qa9NKiBY>

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