



Paper Cup Pyramids

Learn about the architectural feat of building the gigantic pyramids of Ancient Egypt. Use your own architecture skills to create a pyramid out of just paper cups!

**We recommend that you do this activity before Tinkercad Pyramids.*

TEKS:

SCI 4.6 D: The student is expected to design an experiment to test the effect of force on an object such as a push or a pull, gravity, friction, or magnetism.

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

SCI 6.8 B: The student is expected to identify and describe the changes in position, direction, and speed of an object when acted upon by unbalanced forces.

Materials:

- Paper cups

How To:

Here's your challenge: design and build a structure that resembles an Ancient Egyptian pyramid (pictured below) using just paper cups!



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As you construct your paper cup pyramid, think about the following:

- **What part of your pyramid is largest? Smallest?** The bottom part, or base, of your pyramid is likely the widest part, while the top of your pyramid is the smallest.
- **What changes would you need to make if you built an actual pyramid?** What materials would you use instead of paper cups? How big would they need to be?
- **What types of natural forces must be considered when constructing a pyramid?** Gravity, wind, rain, erosion, and weathering and just some of the forces that act on outdoor structures.

STEM Explanation:

Over 4,000 years ago, the Ancient Egyptians built the Pyramids of Giza. These pyramids were *gigantic*. The largest one, called the Great Pyramid, was 481 feet tall and was constructed from nearly 2.3 million blocks. And each of these blocks weighed 2.5 tons... that's more than most cars! Because of its size and weight, the Great Pyramid took 20,000 people over 20 years to build. Although the paper cup pyramid you built is much smaller than the real-life Pyramids of Giza, you used some of the same physics properties during construction as the Ancient Egyptians. When building a pyramid-shaped structure, all of the forces acting on it must be balanced. A force is simply a push or pull, and one force that acts on everything all of the time is gravity. The force of gravity pulls objects toward the earth, including the cups you used to construct your pyramid. Creating a pyramid with a wide base helps ensure that the forces acting on each additional cup remain balanced. And just like the forces were balanced in your pyramid structure, structural engineers use balanced forces when they design all types of buildings so they withstand forces like gravity, compression, wind, erosion, and more!

Career Connection:

Structural engineers design and construct bridges, buildings, dams, tunnels, power plants, offshore drilling platforms, and space satellites. They research the forces that will affect the structure, and then develop a design that allows it to withstand these forces.

Resources:

<http://stayathomeeducator.com/paper-cup-pyramids-around-the-world-theme/>

<https://www.sciencefocus.com/science/how-have-the-egyptian-pyramids-lived-so-long/>

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