

Title

Tall Tall Tower

Workshop Overview

Description:

Students will learn about structures and shapes by building a simple tower. The goal will be to make the tallest tower using a limited amount of materials!

Topic Area(s)

- Structural Engineering

Grade Level: 1-6 (difficulty can be adjusted) **Duration:** 45 minutes

Learning Outcomes:

- Learn about the importance of balance in structures
- Understand that the taller structure the less stable they become
- Learn about how engineers need to consider budget when designing a building

Hook

Make a tower as tall as you can with it falling!

Background Information

Buildings used to be made of bricks and mortar. They could only go up to 10 stories because of the support problems. What made taller buildings possible was the production of long, narrow, lightweight steel beams. They are very strong and take up less space, and they are perfect for holding up tall buildings.

Skyscrapers have a steel skeleton that distributes the weight. Designing a skyscraper takes a lot more than the steel beams and deciding how many floors to build. Elevators are also part of the design. Skyscrapers have to be strong, safe and convenient for the occupants. The taller the building, the more it has to resist vibrations, like strong winds and earthquakes.

Balance is the key for any tall structure as well as a strong base! For you to build up all the way to the clouds, you should have a relatively large and strong base. Then to build up, you must have skinny, yet strong walls. Here are some cool designs on the world's tallest tower!



Center of mass is super important to balance. The center of mass of an object is the point at which weight is evenly dispersed and all sides are in balance. A human's center of gravity/mass can change as he takes on different positions, but in many other objects, it's a fixed location.

Materials

Per group of 3 students:

- Straws
- Tape
- Styrofoam cups
- Scissors (be sure to supervise any cutting)

Safety Considerations

Be careful when the tower topples over.

Procedure

1. Hand out a specific number of straws, tape, and Styrofoam cups to each group of students. Suggestion: 4 cups, 40 straws, and a measured length of tape.

2. Tell the students to build a tower as tall as the can using the given materials without it toppling over! They can manipulate the materials however they need to (cut/fold the cups/straws, etc.)
3. To make it more challenging you can add other elements to the activity. If the students find building the tower easy, set a height goal (ex. 3 feet tall) and challenge the groups to make a tower of that height with the *least* amount of materials.

Wrap-Up/Debrief

- What building strategies worked the best and why? Prompt the students by asking about the importance of a strong base.
- Why do you think they toppled over? Discuss centre of mass
- Why do we want to limit the amount of building materials? Take about how engineers have budgets, which contributes to the design