

Reach for the Sky!

Building a skyscraper takes a lot of special planning and building because they are built so high. In the activity below, you can see one of the main problems that has to be solved when building a structure high into the sky.

Materials

1. 6 Plastic cups (10 oz)
2. Tape
3. Magazine or newspaper

Procedure

1. Use 2 or 3 pieces of tape to connect 2 cups together and 4 cups together as shown.



2. Place your two structures near each other on a flat surface.
3. Stand about 1/2 meter away and use a magazine or newspaper to fan air at your structures. Continue fanning air at them until one of them falls. Stand the structures up again and repeat a few times to see which structure falls over first most of the time.
4. Untape the bottom cup from your tall structure and place about 20 pennies in the bottom of the cup. Tape it back together and repeat step 3.

Did you notice any difference in your tall structure's ability to stand up in the wind?

How do you think you could make it stand up even better?

Think about this...

The top of many tall skyscrapers actually move several feet from side to side when hit by a strong horizontal wind. Because of the way the building's parts are connected, they can sway in this way without damaging the structure. Scientists and engineers are working on different ways to reduce the sway in very tall buildings. One building in New York City has a 400-ton concrete weight on one of the upper floors. Computers run a system that shifts the weight according to the movement of the building to help reduce the sway.

Where's the Chemistry?

The taller a structure is, the more it moves when forces like wind act on it. Imagine putting one building block down on a flat surface. Next to it, you stack 20 similar blocks, one on top of the other, to build a second structure 20 times taller than the first. If you touch the one-block structure with your finger or blow on it from the side, it probably will not fall over. But if you touch the tall 20-block structure with your finger or blow on it from the side, it is more likely to fall. One of the reasons why tall buildings don't fall is that they are anchored so deeply and solidly into the earth. The Earth itself becomes the massive base of the building. As more weight is added to the base, like adding pennies to your tall cup structure, the structure is more stable and less likely to fall.



The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".

