

Week 5: Reach for the Skyscrapers

Half the fun of a backyard fort is figuring out how to build it. For inspiration, take a look at skyscrapers. Chicago is home to some of the tallest buildings in the world. In addition to their soaring height, skyscrapers need to be strong and able to withstand forces like wind. See what shapes make a structure stronger by building and testing a model of your favorite skyscraper.

Experiment

SUPER-STABLE STRUCTURE

Materials

Suggested building supplies:

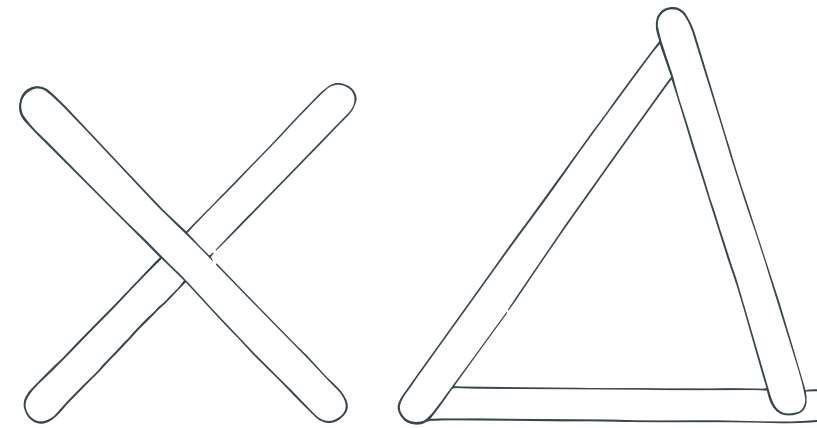
Newspaper
Tape
Pencils
Plastic cups
Popsicle sticks
Pipe cleaners
Straws
Glue
Cardstock
Rulers

Instructions

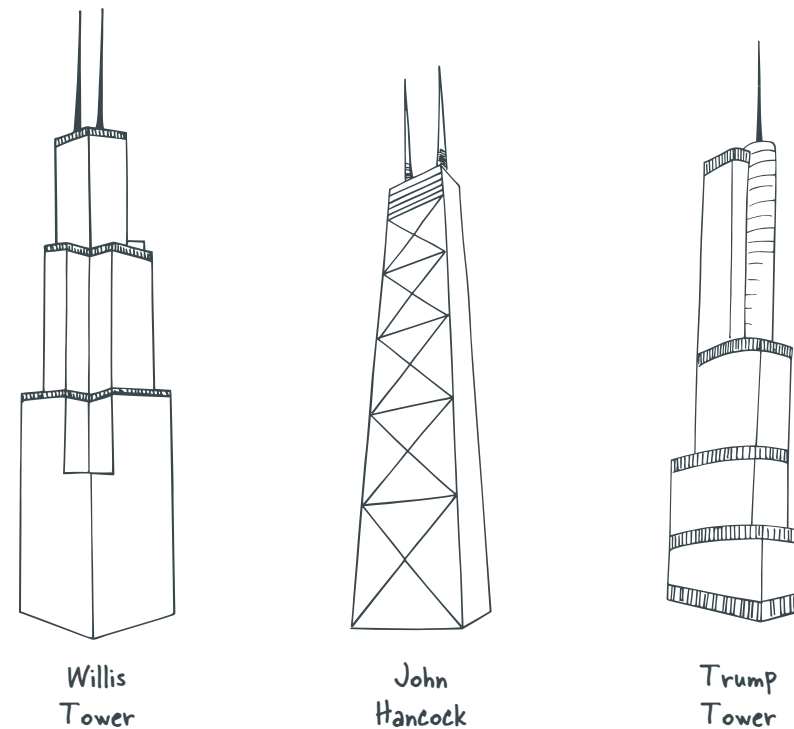
When designing a building, engineers must consider the effect of forces that can change quickly; these are called "dynamic loads". Earthquakes and wind are two examples of dynamic loads. Buildings must be flexible enough to absorb the force of wind, but not so flexible that they sway on the top floors. Earthquakes create a sudden, severe change in force, so buildings must be constructed soundly to avoid collapsing.

Your challenge is to design and build a model of your favorite skyscraper that's at least 61 centimeters tall and able to withstand winds and earthquakes. Think about what shapes will help make your building strong.

When you're done, run a couple of tests. Aim a hair dryer or fan at the building for a wind test. Gently shake the table to simulate an earthquake. And see how much weight it can hold by stacking some small objects on top, like metal washers or wooden blocks, to see what it can take.



Chicago's Architectural Inspiration



What's happening?

Buildings with a heavier base or more weight at the bottom than at the top will withstand both wind and earthquakes better. Wind speeds increase with height, so wind blows faster at the top of a skyscraper than the bottom. A heavier base makes a sturdier, more balanced building. Triangles, arches and domes are the strongest shapes used in architecture, as they can withstand forces of tension and compression.

Game on!

Challenge someone to see who can build the tallest building that passes all three tests (wind, earthquake and weight). Or make a city of skyscrapers by building several models and using them as a play scene for your toy cars, dolls or action figures.

Tips

Triangles provide great support to tall buildings.

Don't go overboard with tape! Be creative with other items that can provide support, like small sticks or straws.

More Ways to Play With Structures

Check out a mini version of downtown Chicago at MSI's *The Great Train Story* exhibit.

Explore large structures and what it takes to build them from PBS at www.pbs.org/wgbh/buildingbig/

Like this activity? You could be a ...

- Architect
- Building Inspector
- Construction Manager
- Urban Planner