



Making Straws Safe from the Shake

The Problem

It must be pretty scary to be in a house when an earthquake hits. First the light fixture on the ceiling starts to move, then drinking glasses on the shelf rattle and clink. Should you get into a doorway for protection, run outside, or hope it's going to be another "little one"?

Engineers have invented ways to make structures safer during earthquakes. Your task is to invent a seismic-safe tower. The tower must be at least 60-cm high and use only the materials your teacher gives you. You may design and use other materials to make a base for the tower to sit on.

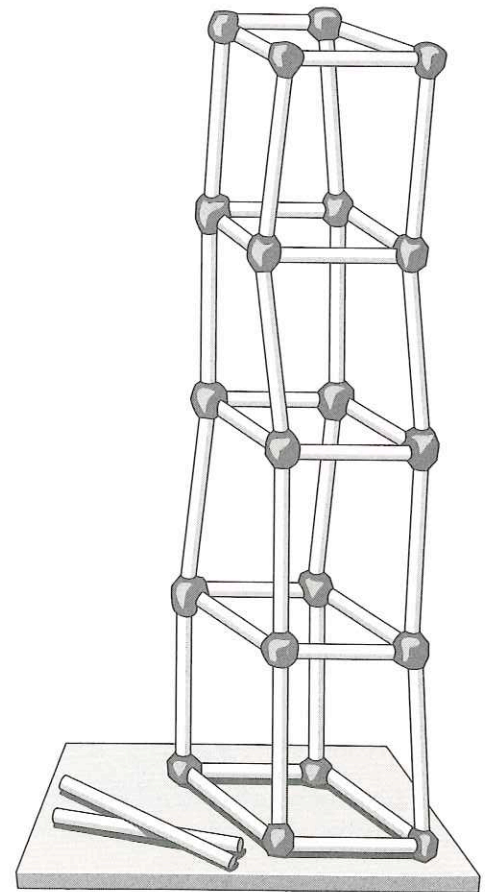
Materials

- 24 plastic drinking straws
- 50 cm of masking tape
- pan balance
- scissors
- 40-cm × 40-cm cardboard

The total mass of your tower and base can be no more than 3 kg. Work with your classmates and teacher to plan how to simulate earthquake waves to test your tower. The tests must be exactly the same for all towers.

Investigation

1. Draw a design for your tower and be sure to include measurements.
2. Draw a design for the base of your tower, including measurements. Make a list of the materials you need. Get your plan for the base approved by your teacher before you begin building.
3. Build your tower and its base. Use a pan balance to make sure the tower and base don't exceed the 3 kg weight limit.
4. Attach your tower and base to the cardboard. You may be allowed to test your tower and base on the seismic tester. After the test, plan and make improvements.
5. After you've improved your tower, submit your final tower to be tested again. Take notes on each tower that is tested in your class. Observe which design features help towers survive the seismic test.
6. Write a summary of the design features that seem to be the most important in helping towers survive the seismic test. Explain why those design features work. Write a description of how the seismic tester was like—and unlike—an earthquake.



Going Further

Are the construction techniques that you found to protect towers from earthquake-like waves the same as the designs made by real engineers? Find out whether your ideas and theirs are similar. How do engineers test their models of seismic-safe structures? Work with your school's librarian to find addresses of engineering schools to which you could write to obtain more information.