Lakeshore®

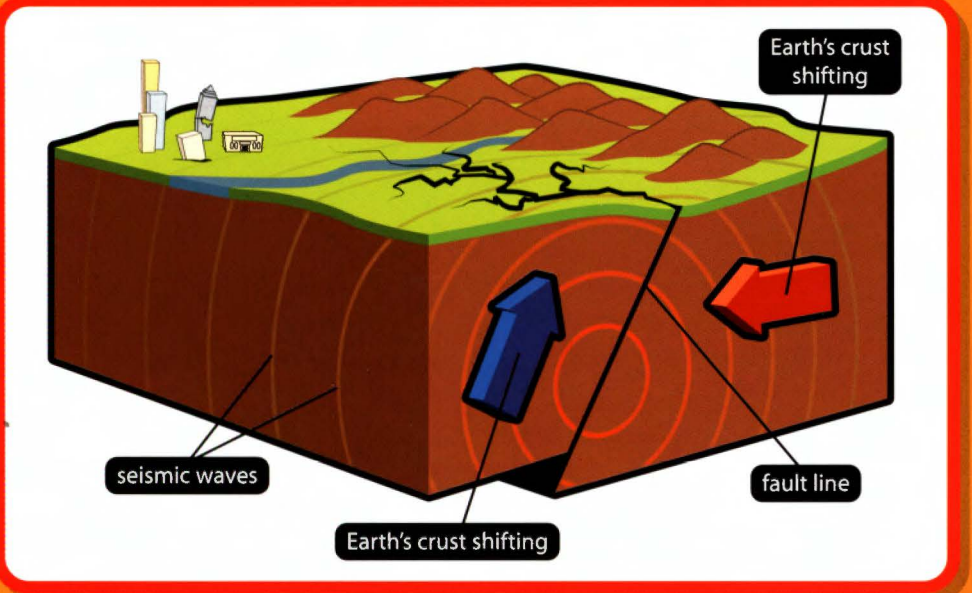
DD121

SURVIVE THE QUAKE

Engineering Kit

WHAT IS AN EARTHQUAKE?

An earthquake is a sudden shaking of the ground that can cause great destruction. Earthquakes are caused by the movement of seismic waves through Earth's crust. They usually occur along fault lines, which are places where pieces of Earth's crust are shifting in different directions.



Four "AA" batteries required.

Do not mix old and new batteries.
Do not mix alkaline, standard (carbon-zinc), or rechargeable (nickel-cadmium) batteries.

⚠ **WARNING:**
CHOKING HAZARD—Small parts.
Not for children under 3 yrs.

EARTHQUAKE ENGINEERING AND DESIGN

Earthquake engineering is a job that deals with the effects of earthquakes on structures like buildings, bridges, and towers. Earthquake engineers study an area and figure out what kind of earthquakes will probably happen in the future. Then they design structures that can withstand those earthquakes!

HOW IS EARTHQUAKE ENGINEERING USED?

Imagine if you designed a building without a roof! What would you do when it rained? Like rain, an earthquake is a natural phenomenon that engineers need to consider in their designs. But creating a building that could completely withstand any earthquake would be very expensive—and almost impossible. Earthquake engineers don't worry about keeping a building completely undamaged if a major earthquake hits. They just make sure it won't collapse!

THINK LIKE AN ENGINEER

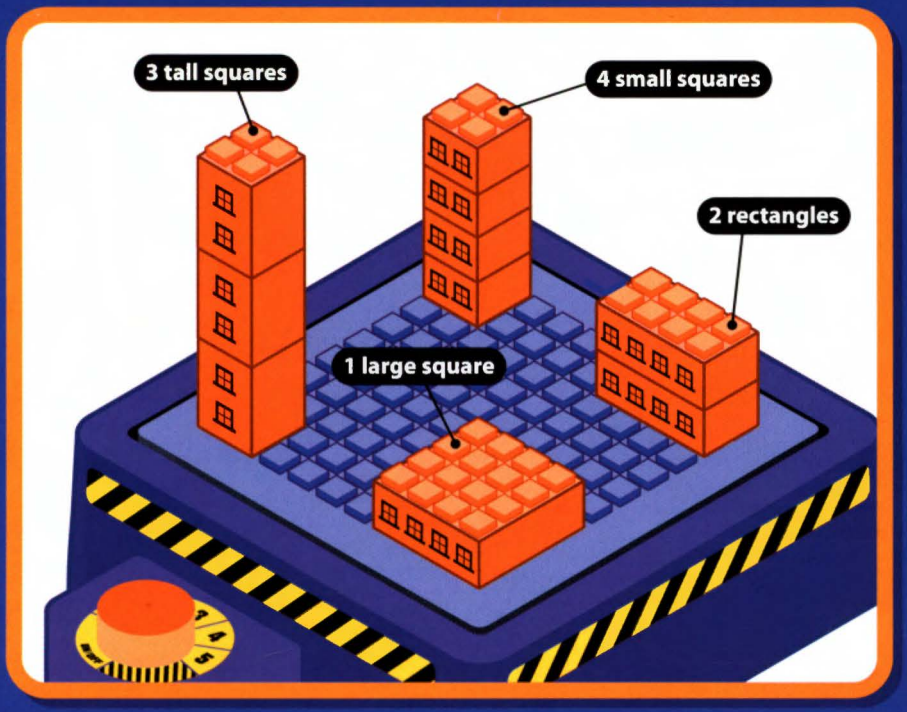
Earthquake engineers design structures to withstand the motion of a quake. Engineers come up with ideas, test them, and then use the results to modify their designs. Try out your engineering skills by using the bricks to build a structure on the tray.

Once you have built your structure, look at the orange dial on the tray. Notice the numbers 1–5 around the dial. These numbers represent the intensity of the quake, with level 5 being the strongest shake. Keep in mind that how quickly you turn the dial will affect how long your structure can survive the quake. Just as in a real earthquake, the longer the shake, the more unstable the structure can become. Now turn the dial and see what happens!

Keep reading for step-by-step instructions on how to build structures—and find out why some structures are more stable than others.

1 Try This!

Use the different brick styles to create a "city" of buildings at different heights and sizes.



Before you start the shake, think about which block structure will stay on the longest. What block structure do you think will fall first?

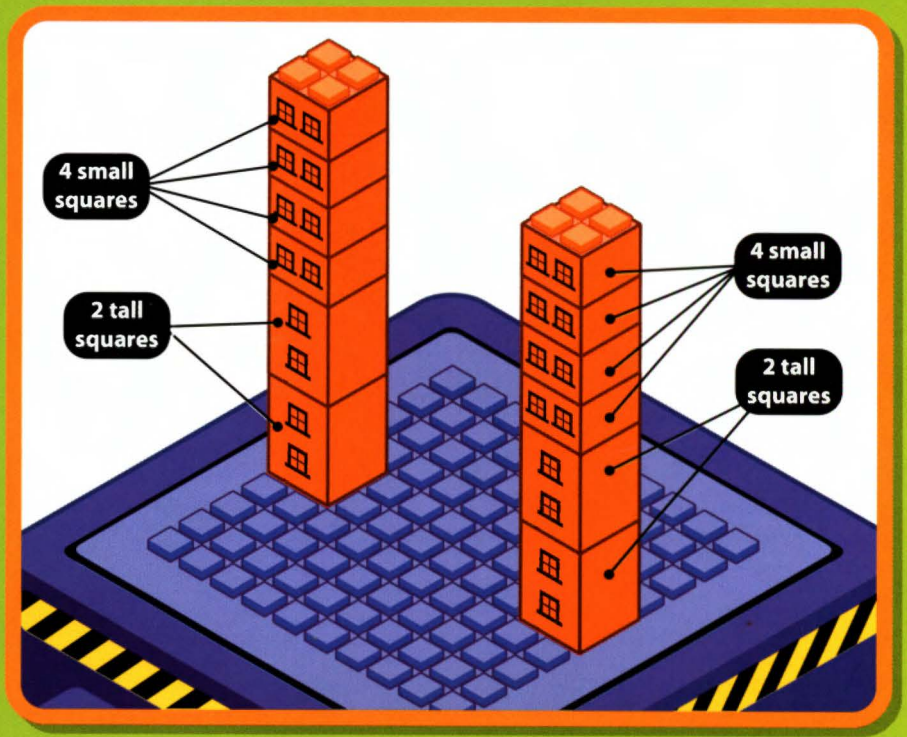
Now test your prediction by turning the dial. Start at 1, then move through each level up to 5.

What's Happening?

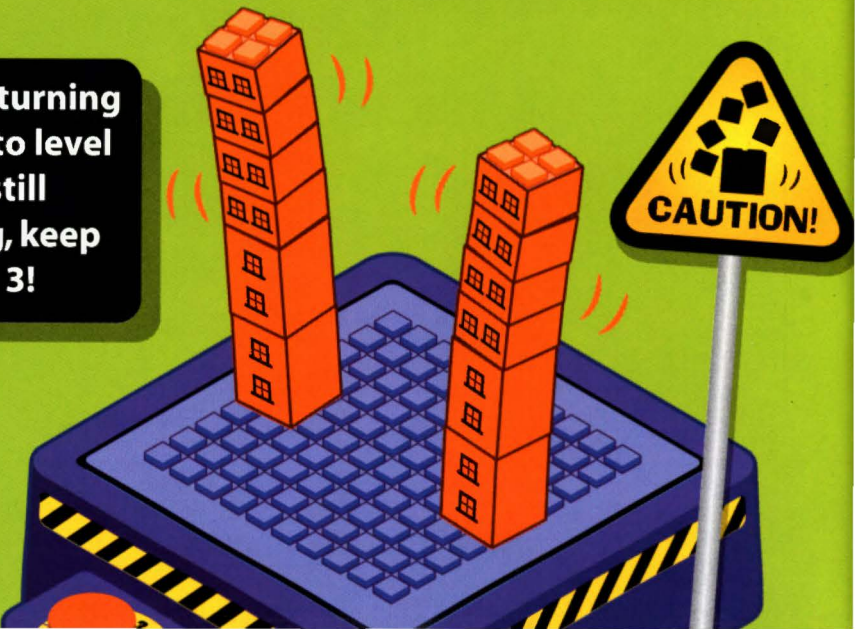
Because it's low to the ground, the large square block is the most stable. The taller a building is, the harder it is to support. That's why houses have wooden frames and skyscrapers have steel frames. Skyscrapers need to be tougher!

2 Try This!

Build two tall columns using eight small squares and four tall squares.

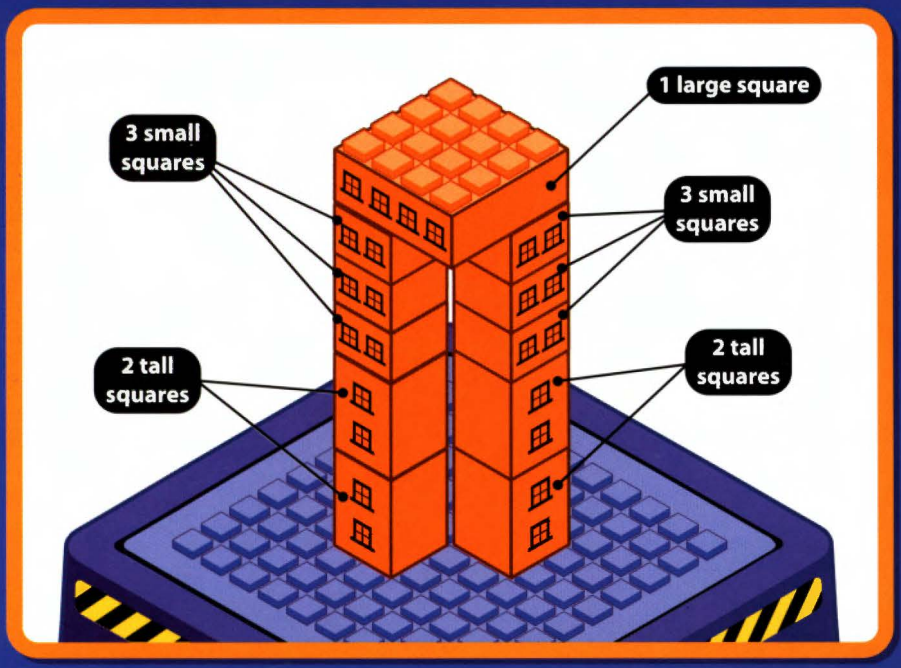


Start by turning the dial to level 2. If it's still standing, keep going to 3!



3 Try This!

Build a tall structure using four tall squares, six small squares, and one large square.



Turn the dial to level 3. Did it survive? Keep going to 4. If it's still standing, go all the way to 5!

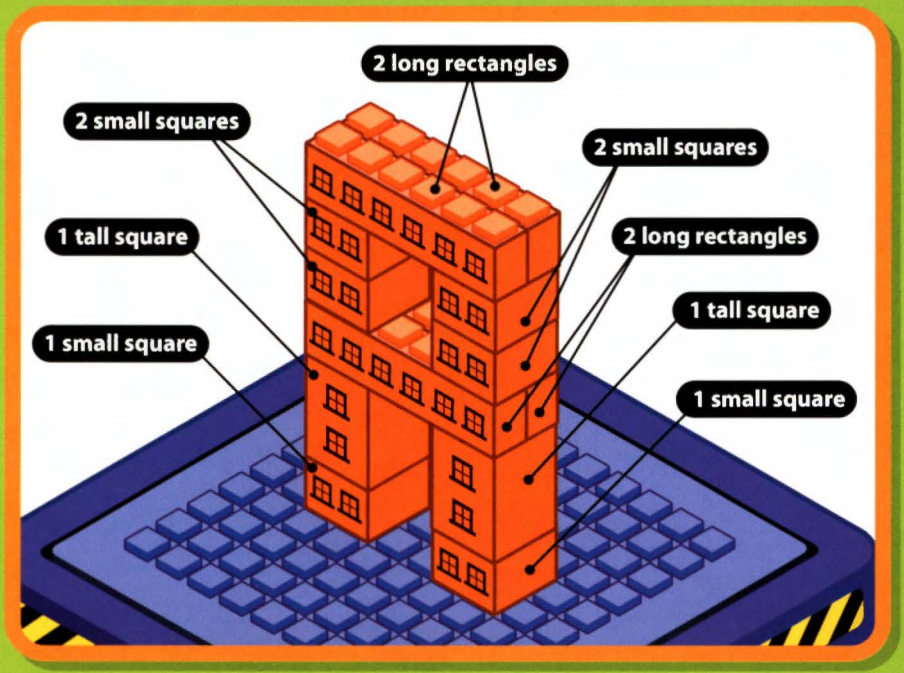
What's Happening?

Did the structure fall instantly? This structure is likely to survive longer because of how it is built. The tall columns are positioned so that they meet only at one corner. This allows them to move and sway without hitting each other. And the large square brick at the top of the structure allows the bricks to stay together as they shake.

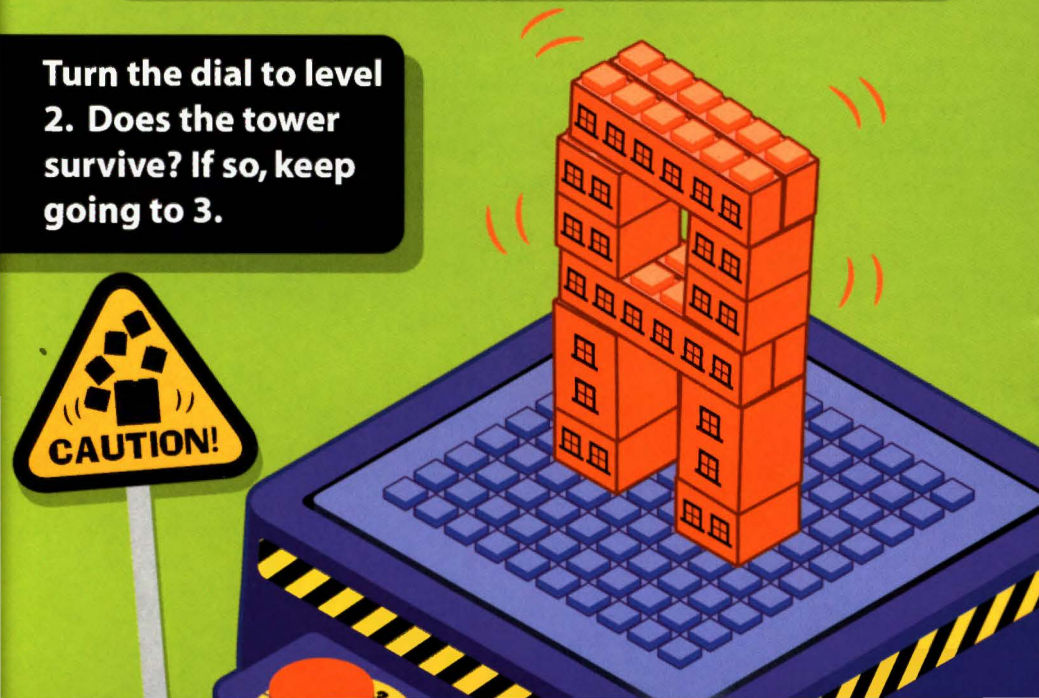
In real life, towers and skyscrapers can withstand strong winds and earthquakes—thanks to their ability to shift and sway without coming apart!

4 Try This!

Build a bridged tower structure using four long rectangles, six small squares, and two tall squares.

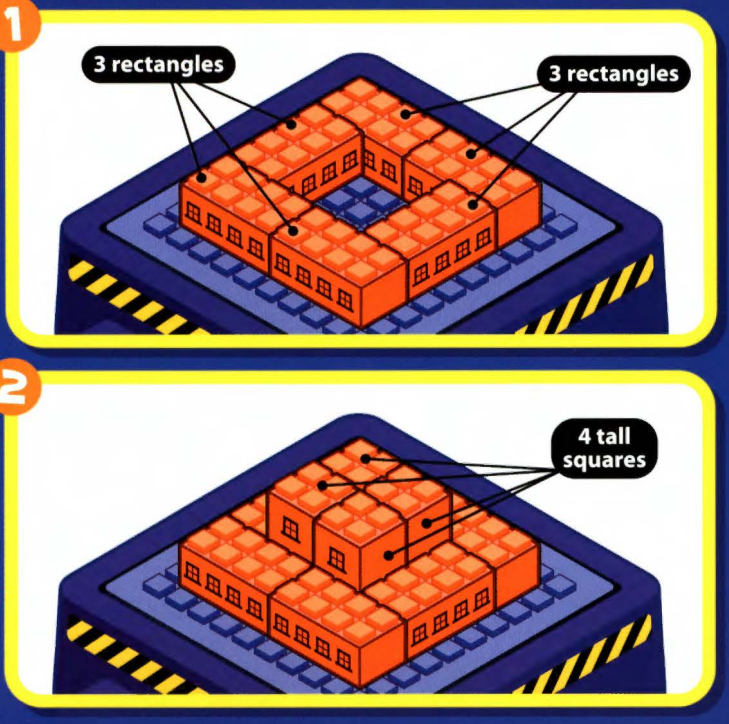


Turn the dial to level 2. Does the tower survive? If so, keep going to 3.



5 Try This!

Build a structure that is wide and low using six rectangles and four tall squares.



Turn the dial to level 3. Keep turning it up to see how high you can get.

What's Happening?

Even though the tall bricks shake and move, it takes more force to break the entire structure! What makes it so tough? The structure's base-to-height ratio is what makes it strong. It's much wider than it is tall! The wide base helps disperse the shaking throughout the structure.

In real life, giving a building a wide base is one of the best ways to make it tough enough to stand tall! Think about a pyramid. It's wide at the bottom, but gets narrower and narrower as it rises.