

Try
this

Sturdy structures

Earthquake resistant buildings

In areas where there are frequent earthquakes, engineers try to design earthquake-proof buildings which sway with the motion of the earthquake, rather than cracking and breaking. What kind of structures make for stable earthquake-proof buildings?

You will need:

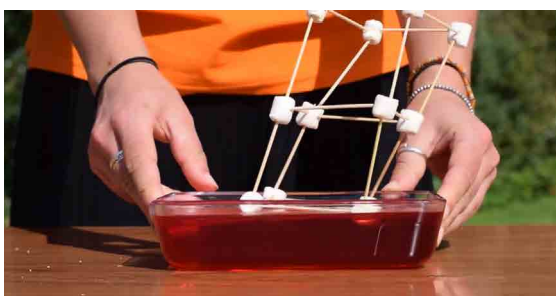
- a deep baking dish or tray approximately A4 size
- a pack of jelly
- some cocktail sticks
- a bag of mini marshmallows

What you do:

Make the jelly and pour into the dish. Leave to set. Make some 3-dimensional structures using cocktail sticks, joining corners together using marshmallows.

Place your structures on the solid jelly and slide the dish from side to side to simulate an earthquake to test how well different structures stand up.

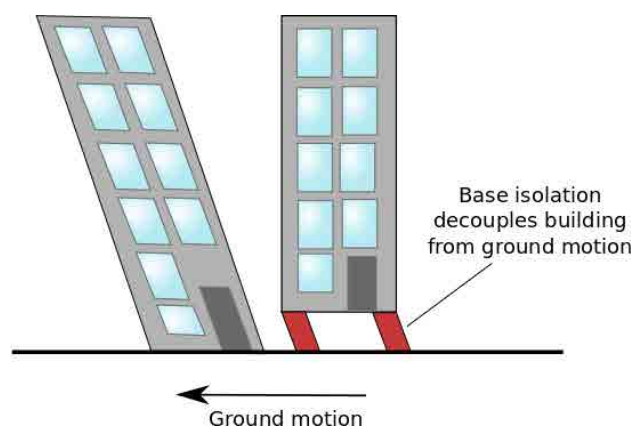
Are tall or short structures better? What shapes make the most stable structures?



What's happening?

You should find that short structures are much more stable than tall structures. This is because even though short and tall buildings shake at the same rate, the shaking motion is magnified as buildings get taller. The strongest structures are often pyramids or tapered shapes which are wider at the base and get thinner towards the top. Triangles provide very stable shapes: adding cross-bracing to form triangles can make shapes like cubes stronger.

Engineers design buildings with detached bases which are not completely fixed onto the ground. Instead they sit on top of systems of ball bearings or springs which act as shock absorbers, so that the building is free to move slightly. Then the building does not have to shake with the earthquake but can stay in the same place, and not all of the shaking is transmitted up through the building.



Why is it important?

When an earthquake occurs near a town or city it can cause lots of damage. Often it is not the magnitude of the earthquake that determines how much damage will be caused but the design of buildings. Japan experiences large magnitude earthquakes regularly but due to investments in building design and high building standard regulations most of the time there is very little damage. In contrast much smaller magnitude earthquakes can be devastating for countries with less money to spend on infrastructure. This is why the design of inexpensive earthquake-resistant buildings is so important – earthquakes don't kill people, poorly designed buildings do.

Vicky Wong is Chemistry editor of Catalyst.

Look here!

For more information about buildings with detached bases: <https://www.youtube.com/watch?v=kzVvd4Dk6sw>