

DESIGN A QUAKE-RESISTANT BUILDING

THE CHALLENGE



The main risk to life during an earthquake is the collapse of poorly built buildings. After a devastating earthquake, volunteer organisations often work with local communities, helping them to rebuild. You want to join a junior volunteer team, but first you must impress the selection panel.

Your challenge is to design and build a model of an earthquake-resistant building. You may choose the type of building: a house, a public building such as a school or perhaps an apartment block. As part of your STEM investigation, you will find out about the structure of the Earth, the cause of earthquakes, flexible buildings and important features to think about when designing earthquake-resistant buildings.

KEY UNDERSTANDINGS

This challenge will help you understand:

- The Earth has five layers: inner core, outer core, lower mantle, upper mantle and crust.
- The Earth's crust is made up of many pieces, called tectonic plates.
- Tectonic plates move against each other.
- The surface where one plate slips past another is called the fault or fault plate.
- When plates slide against each other, this creates earthquakes.
- The hypocentre is the location below the Earth's crust where an earthquake starts.
- The epicentre is on the Earth's surface, directly above the hypocentre.
- Buildings that are flexible are more likely to withstand an earthquake.

KEY SKILLS

This challenge will help you:

Make careful observations.



Transform an idea into something that can be seen.



Consider different points of view.



Develop research skills.

These buildings in Nepal collapsed due to a major earthquake. How could you make sure a building won't collapse?



KEY ACTIONS

During this challenge, you will perform the following tasks:

Find out information from eyewitnesses of earthquakes.

Experiment with different shapes and materials.

Explore ways of making a structure strong and flexible.

Design a way to create a building that can stay standing when the ground vibrates.

KEY VOCABULARY

earthquake-resistant

epicentre

fault

hypocentre

magnitude

tectonic plate

**「BIG」
「PICTURE」**

The wooden palace buildings of the Forbidden City, in Beijing, China, were built to last. They have survived more than 200 earthquakes in the past 600 years.

DESIGN THINKING STAGES

As part of your challenge, you need to follow the five-step design thinking process.

EMPATHISE

Gather information, consider points of view and identify eyewitness responses.

DEFINE

Work out the main issues that relate to buildings surviving an earthquake.

IDEATE

Come up with some creative ideas for building an earthquake-resistant building.

PROTOTYPE

Choose one or two of your ideas and create them. Spend time making changes and trying new ways to create your idea.

TEST

Check which ideas work best. Choose a final design to share.