

Summer Week 5 Geography Lesson 3

Can I identify how settlements adapt and respond to earthquakes?

Fast Five (answers on the next page):

- 1) What do the letters USA stand for?
- 2) Where do most hurricanes happen in the USA?
- 3) What is an earthquake?
- 4) Where in the USA has the most earthquakes?
- 5) Why is this the most likely place in the USA to experience an earthquake?

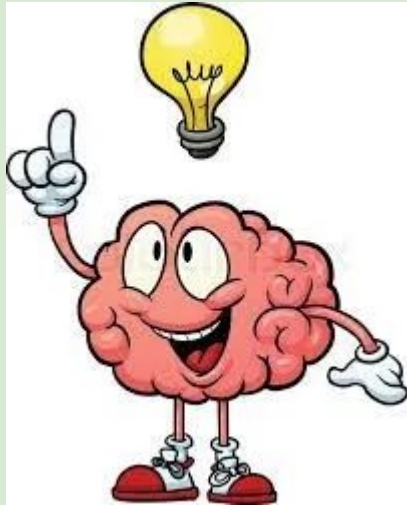
Fast Five Answers:

- 1) What do the letters USA stand for? **United States of America**
- 2) Where do most hurricanes happen in the USA (name one state)? **Florida, Louisiana, North Carolina and Texas.**
- 3) What is an earthquake? **When tectonic plates collide and cause the earth to shake.**
- 4) Where in the USA has the most earthquakes? **States along the western coast - California, Oregon and Washington.**
- 5) Why is this the most likely place in the USA to experience an earthquake? **These states are situated on top of a fault line and this is where the plates collide often.**

What is a settlement?

A settlement is a place where people live and create a community.

These can be villages, towns or cities and are spread all over the world.



We know the damage that earthquakes can cause to towns and cities. So we also know how important it is to know how to protect yourself if you live in an area that often experiences earthquakes.

Watch this video to find out how people keep themselves safe in an earthquake. Although this video is set in the USA, the steps the family take are the same as families all across the world who experience earthquakes.

<https://safeYouTube.net/w/5coC>

So, the steps that humans take in responding to earthquakes to keep safe are:

- 1) If you are inside, find a strong object to hide under (a table is best). Hold on to the table with one hand and cover your eyes with the other. If there is nothing for you to hide under, crouch down next to a wall. Make sure you are away from windows, as they might shatter.
- 2) If you are outside, crouch down on the ground and make yourself as small as you can. Stay away from any power lines or buildings, and trees.



But how have settlements changed over time to make sure they are more prepared for earthquakes?

In one of our first lessons on the USA, we saw how the death toll was worse for natural disasters that happened further back in the past. **Why do you think that is?**



- As time has passed, geographers and scientists have learnt more about how earthquakes work and how they impact settlements.
- This means that they know more about making settlements safer in earthquakes. They have been changed more recently to make sure that they do not suffer as badly from natural disasters.

Earthquake-proof buildings

Fact: More injuries to humans occur due to buildings falling down or crumbling than in the actual earthquake itself.



For this reason, scientists have worked hard to create buildings that are safer in an earthquake.

Watch this video to find out what tools scientists and engineers use to create earthquake-proof buildings:

<https://safeYouTube.net/w/qwrD>

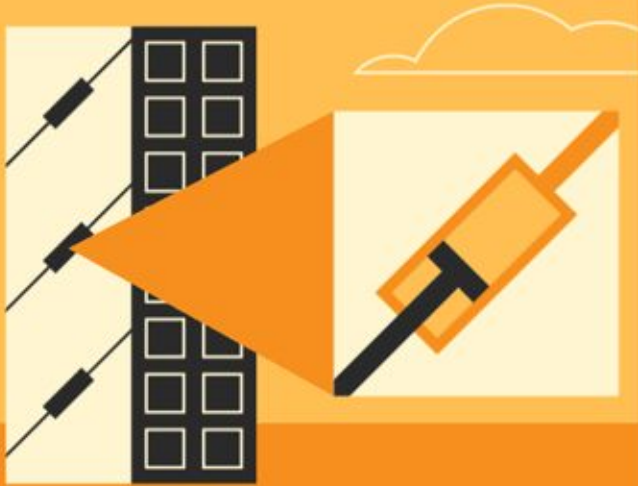
So how do you make buildings safe in an earthquake?

- 1) Create a flexible foundation. This means that the base of a building moves, but not the building itself.



- The building is constructed on top of flexible pads that isolate the foundation from the ground.
- When an earthquake hits, only the base moves while the structure remains steady.

2) Use shock absorbers (like suspension in cars or your bike) to make the impact on buildings smaller. There are different ways to do this with buildings:



Tuned dampers attached to beams use pistons and oil to convert the motion into heat and absorb shock.



A large weight and hydraulics move opposite the earthquake's movements to “dampen” or dissipate the energy.



3) Shield buildings from vibrations. This makes the shockwaves from the earthquake go around the building, not through it.

Concrete and plastic rings are placed underneath to channel shockwaves around the building.



4) Make the building's structure stronger with these techniques:



Shear walls and **cross braces** transfer movement away to the foundation



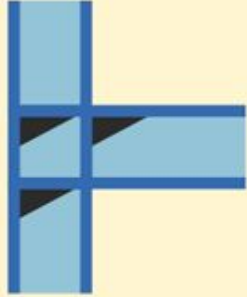
- Floor Slab
- Horizontal Frame
- Columns

Horizontal frames (**diaphragms**) distributes forces to the columns and walls.



Moment-resisting frames keep joints rigid while allowing the structure to bend

It is also important to use the right materials when building a house or building. Using these materials can make buildings safer in an earthquake:



Structural Steel

Various shapes allow material to bend without breaking



Wood

Lightweight material with good weight-to-strength ratio



Memory Alloy



Bamboo

Futuristic Materials

Potential for greater flexibility and shape retention

All of these inventions are due to geography and science!

Without the world having skilled geographers and scientists, we would not be able to build safe settlements that can experience earthquakes with little damage.



Your activity:

You will be writing an instruction text in English on how to survive in an earthquake.

So for this lesson, your activity is just to **read through the slides again** and if you want to, do a little more research on how buildings and settlements have become safer for people during earthquakes.

Don't forget to use the information you've learnt today in your instructions!

