Tall Buildings

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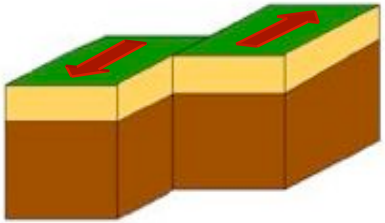
Earthquakes

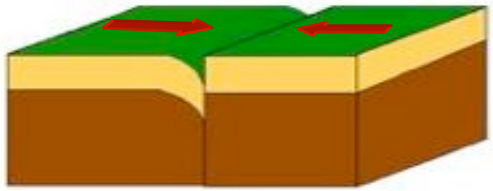
Earthquakes

- The earth is covered in a hard crust which is split into pieces called tectonic plates
- Earthquakes are caused by the movement of tectonic plates
- The tectonics plates interact with each other in different ways causing disturbance of the ground along a fault line

Types of plate movement

There are two main types of fault activity which cause earthquakes





Conservative (sliding) fault:

Plates move past each other. This is not a smooth process so earthquakes are created.

Example: San Andreas Fault

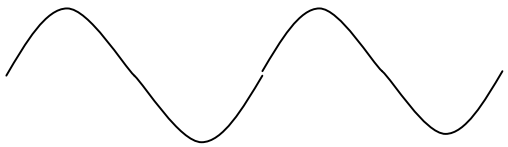
Destructive fault:

Plates move into each other pushing one down below the other. Earthquakes are created deep underground.

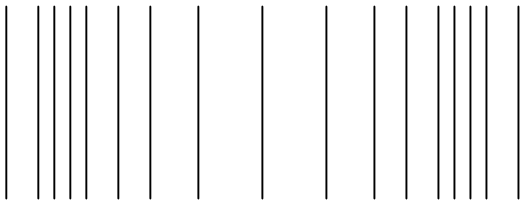
Example: Along South America: Nazca Plate and South American Plate are colliding

Waves

- There are two types of waves
- S-waves:
  - Transverse waves: displacement is 90° to the direction of motion
  - Travel through solids
  - Cannot travel through liquids



- P-waves:
  - Longitudinal waves: displacement is parallel to the direction of motion
  - Travel through liquids and solids
  - Travel faster than s-waves



Earthquakes

- The different ways affect buildings in different ways
- There are many different factors affecting building damage which include:
  - Building design
  - Soil type
  - Oscillation frequency of earthquake
  - Foundation type
  - Previous earthquake activity
  - Location of the earthquake epicentre
  - Magnitude of earthquake

Building Design

- Buildings must be designed with sufficient structural integrity.
  - This means that the structure of the building must be able to withstand normal loads, like its self weight and the weight of people and wind forces.
- To make a building stronger, bracing members, stiff materials for walls, columns etc can be used.
- To withstand earthquakes the building must be able to flex but not collapse.

Task

- Think about building types
- Construct three types of building
- Perform an earthquake test on each model building
- Determine which structure is most stable in an earthquake and why