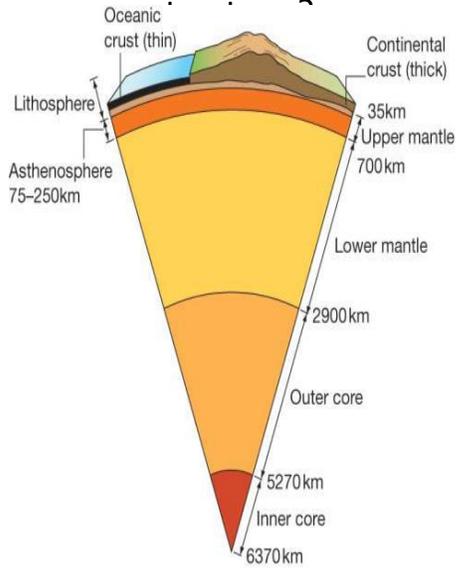


# Tectonic Hazards - GCSE

What is the earth's



## What is the theory of tectonic ?

Tectonics is a **theory** that tries to explain how the Earth is structured and what it is made up of.

- Structure of the Earth – Inner core, outer core, Mantle, Crust
- **Mantle** is liquid and it moves called Convection Currents
- **Crust** is broken up into plates
- **Plate tectonic theory** : Plates move by **Convection Currents** in the mantle. This was once believed, it is now thought that tectonic plate movement is driven by the weight of denser, heavier tectonic plates sinking into the mantle at ocean trenches. This drags the rest of the plate with it and it is called **slab pull theory**.
- These tectonic plates are moving about **very slowly**, pushed and shoved around from underneath by currents within the mantle called convection currents. The tectonic plates vary in size. The major plates include the Pacific, Eurasian, African, North American and South American, and Indo-Australian.
- The places where plates meet are called **plate margins or plate boundaries**. **Tectonic Activity at plate margins** is what causes most of the world's volcanic and earthquake activity occurs

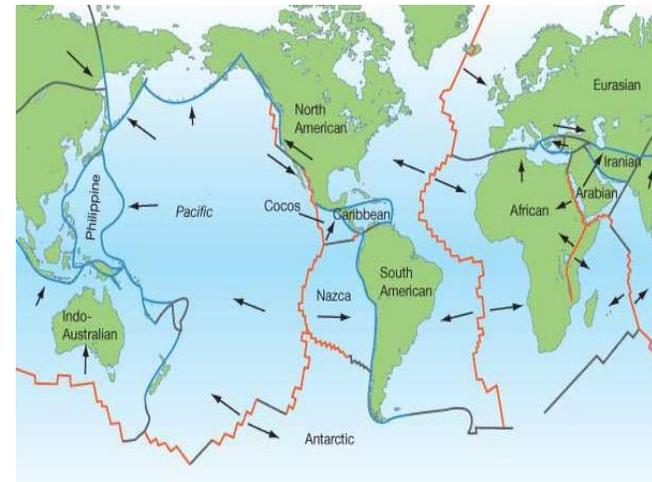
What are the different types of crust ?

- Two types of crust –
- **Oceanic** – newly, more dense, thinner (subducts)
  - **Continental** – Older, thicker, less dense (rises)

Where do they occur? The patterns.....

- **Volcanoes** are formed at Constructive and Destructive plate margins, especially around the edge of the Pacific Ocean e.g **Ring of Fire**. Also through the middle of the Atlantic Ocean called the Mid Atlantic Ridge Inc. islands Azores and Iceland.
- Sometimes away from plate margins called **Hot Spots**.
- Earthquakes occur on plate margins, especially along the western coast of North and South America. Also around the Pacific Ocean. Some earthquakes do not occur on plate margins. These are caused by human activity such as mining or oil extraction.

Boundary	Process	Formation
 <b>Destructive</b>	<p>Two plates move <b>towards each other</b> e.g along the west coast of South America. Where an oceanic plate meets a continental plate, the oceanic plate <b>subducts</b> and is forced down, into the mantle because it is more dense. Friction between the two plates, causes earthquakes. As the oceanic plate moves downwards, subducts it melts. This creates a pool of magma, which eventually breaks through the surface to form steep sided <b>composite volcanoes</b>. Eventually because of a built up of pressure which pushes magma up cracks in the crust called <b>vents</b>. The magma erupts onto the surface (where it is now called lava) forming a composite volcano. Eruptions are <b>infrequent</b> but often <b>violent</b>. Composite volcanoes have narrow bases, steep slopes and layers of ash and lava.</p> 	<b>Composite Volcanoes, Earthquakes, Fold Mountains and Ocean Trenches</b>
 <b>Constructive</b>	<p>Plates move <b>away from each other</b>, this forms a gap between plates, magma rises to fill the gap. The magma, cools, and forms a new crust. This process continues to happen. This is a <b>Shield Volcano</b>. These eruptions are frequent and non violent. The shape of these volcanoes are low rounded peaks, Wide base and gentle slopes, Layers of runny lava with little ash</p> 	<b>Shield Volcanoes</b>
 <b>Conservative</b>	<p>Two plates moving in same direction past each other at <b>different speeds and angles</b>. Plates get <b>stuck</b> due to friction. Pressure builds up over many years. Plates become <b>unstuck</b>, releases the <b>energy</b> through primary and secondary waves. Felt on surface of earth as <b>shaking</b>. No volcanoes at this plate margin, as there is no magma.</p>	<b>Earthquakes</b>



## HAZARDOUS EARTH KNOWLEDGE ORGANISER QUESTIONS

Sheet 1:

1. Name three of the four internal layers of Earth?	
2. There are two types of crust. One is oceanic crust, the other is?	
3. The movement of people from the country side to the city is called?	
4. What are plates?	
5. The movement of molten rock in the mantle is called?	
6. What is the Ring of Fire?	
7. Destructive plate boundaries are where plates move in which direction?	
8. Conservative plates move in which direction?	
9. Plates that move away from each other are called...?	
10. Where do shield volcanoes form?	

Location	Haiti (LIC)	New Zealand (HIC)	Mt St Helens (HIC)	Montserrat (LIC)
Date	January 2010,	February 2011	May 1980	June 1997
Details	M7.0. Next to capital city, Port au Prince,, Depth of focus 13km (shallow)	M6.3, Close to city of Christchurch	Major volcanic eruption (USA)	Volcanic Eruption in Montserrat (Caribbean)
Causes	Destructive plate: Caribbean & North American Plate	Destructive plate: Atlantic and Australian Plates	Destructive plate: North American Plate & Juan de Fuca Plate	Destructive plate margin: Atlantic plate and Caribbean Plate
Preparation	No earthquakes historically. No money & weak Government. No earthquake-proof buildings. No education	HIC Government – New Zealand leads the way in preparation, prediction and planning for tectonic hazards	Some initial monitoring of seismic activity prior to eruption, but, there was little data suggesting a major eruption was likely	Little preparation. Little money for prediction, planning and preparation
Primary Effects	220,000 dead, 300,000 injured, main port, airport damaged, airport damaged, along with many roads which were blocked by fallen buildings and cars, 8 hospitals in Port au Prince collapsed, government building destroyed, 1 million homeless	181 people were killed and around 2,000 people were injured. Hundreds of kilometres of water and sewage pipes were damaged 50% + of Central City buildings severely damaged including the city's cathedral which lost its spire Liquefaction (where the ground gets saturated and loses strength) caused lots of damage to roads and buildings Part (size of 20 football fields) of the country's longest glacier was broken off creating a large iceberg 80% of buildings without electricity	Minor earthquakes in late March 1980 caused a minor eruption of steam and ash. Minor eruptions daily, which caused a bulge to appear in northern side of mountain. Main eruption happened on May 18th 1980, 0830 hours. North side of mountain had been blown off, and reduced the mountain in height by 390 metres, creating a crater 3km long and 0.5km deep, ash fell on 11 US states, and circled the globe in 15 days	19 people died. 7 people were injured The capital city of Plymouth was buried under 12m of mud and ash (lahar). 20 villages and two thirds of homes destroyed by pyroclastic flows. Schools, hospitals and the airports were destroyed. Farmland was destroyed Fires destroyed some buildings
Secondary effects	2million left with no food, water contaminated due to dead bodies, Looting, Because government building destroyed no/slow response, Aid was very slow as airport, port and roads destroyed, Homeless had to move to tented camps Couldn't dispose of dead – piles of dead bodies/mass graves, power cut	Business were put out of action for long periods causing losses of income and jobs Schools had to share classrooms because of the damage to other school buildings Damage to roads through liquefaction made it difficult for people and emergency services to move around People were affected mentally by the earthquakes and needed support	61 deaths, mostly caused by poisonous gases released; several logging camps destroyed. Ash fell into rivers and raised water temperature; sediment and mud; killed all fish in lakes; Spirit Lake filled in. Floodwaters (caused by melting of ice at top of Mountain) washed away several road and railway bridges. Trees deforested in 250km2 area north of blast zone; 60km away; 10 million trees had to be replanted. Electricity supplies and telephone wires cut. Wildlife – nothing survived in blast zone.	Tourism increased after the eruption as people wanted to see the volcano. Soil fertility was improved due to volcanic ash. 8000 people moved away from the island. Some businesses closed
Immediate responses	Aid slow as port/airport damaged, airport couldn't handle the amount being delivered, American engineers arrived to help with rescue efforts, clear debris, and repair port.US sent ships, helicopters, troops, \$100 million aid, UN sent food, water purification tablets, Field hospitals set up, Haitian government moved 235,000 from Port au Prince to less damaged cities	Chemical toilets were provided for 30,000 residents Areas were zoned (green, orange, white, red) to classify damage/cost of repairs Cared for the most vulnerable people and ensured people were safe from dangerous buildings	Immediate relief and rescue efforts. Many of those in immediate danger had been evacuated prior to eruption.	<b>Shelters were built as temporary housing.</b> UK provided £17million of emergency aid. People were evacuated to the north of the island. Search and rescue for survivors.
Long term responses	Haiti dependant on overseas aid. New home still needing to be built, Needing more aid for new buildings, roads, and port.	Provided temporary housing and ensured all damaged housing was kept water tight Water and sewerage was restored for all residents by August Roads and houses were cleared of silt from liquefaction by August and 80% of roads/50% of footpaths were repaired	No significant long term aid responses. Further investment in earthquake prediction and planning technology.	<b>£41 million has been provided by the UK to rebuild docks, housing and the airport in the north.</b> <b>Montserrat Volcano Observatory set up to monitor the volcano.</b>

## Why do people live near volcanoes ?

There are a few reasons why people choose to **live close to volcanoes**. Today 1million people live in the shadow of a volcano.

1. Earthquakes and Volcanic eruptions **don't happen very often**. Not seen as a great threat.
2. They've **always lived there** – moving away would mean leaving friends and family.
3. They are employed in the area.
4. Better building design, can mean people are at less risk.
5. Between **monitoring** of volcanoes and tsunamis, enable people to receive warnings and **evacuate** before events happen.
6. People living in **poverty have** other things to think about on a daily basis like food, water and security.
7. Plate Margins often coincide with very **favourable areas** for settle such as coastal area where ports and thus jobs have developed.
8. Volcanoes can bring benefits such a very **fertile soils**, rich mineral deposits and **natural hot water (geothermal)**
9. Dramatic landscapes like Iceland create many jobs in **tourism**.

## What is risk management ?

**Prediction** attempts to forecast when and where a natural hazard will happen but this cannot be done for earthquakes.

The actions taken before a hazard strikes to reduce its impact are referred to as **protection**.

**Planning** is the action taken to enable communities to respond to and recover from natural disasters. These can be aided by monitoring which is where physical changes are recorded to help forecast where and when a natural hazard may strike.

## THE THREE P'S

## How do people protect against earthquakes ?

