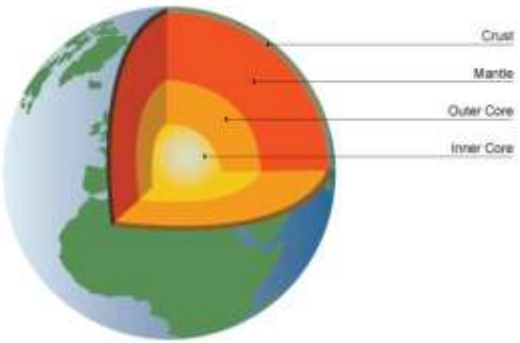
Tectonics Knowledge Organiser

Structure of the Earth

The Earth has four main layers - the **inner core**, the **outer core**, the **mantle** and the **crust**.



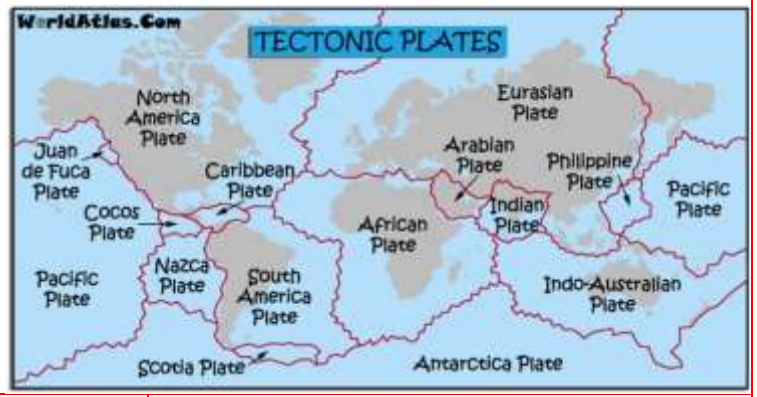
- The **inner core** is extremely hot and is a very dense solid.
- The **outer core** is 2,000 km thick and is a liquid.
- The **mantle** is semi-molten and about 3,000 km thick.
- The **crust** is the rocky outer layer; it is thin compared to the other sections, approximately 5 to 70 km thick.

Plate tectonics

Plate margin: *where two or more plates meet*

Convection currents: *movement within the Earth's mantle caused by the heat of the core*

The Earth's crust is broken up into huge slabs called plates. The plates float on the mantle and are constantly moving by **convection currents**. When these plates move, they bump into, move away from, or rub up against other plates at the **plate margins**. How these plates move in relation to other plates dictates what type of plate margin it is and helps us understand what types of hazards will occur there.



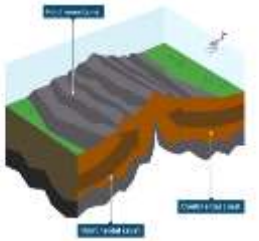
Constructive plate margin

A constructive plate margin occurs when **plates move apart**. Volcanoes are formed as magma wells up to fill the gap, and eventually new crust is formed. Earthquakes occur here also.

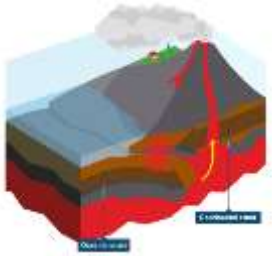
E.g. North American and Eurasian plates forming the mid-Atlantic Ridge.

Destructive plate margin

Destructive plate margins occur when tectonic plates move towards each other and collide. The effect this has depends on what kinds of plates are colliding:



- <u>If two *continental* **plates collide**</u>**,** they are both buoyant and so cannot sink into the mantle. As a result, compression forces the plates to collide and form fold mountains. **E.g.** The Indian & Eurasian plates formed the Himalayas.



- <u>If an *oceanic* and a *continental* plate **move towards each other**</u>**,** the denser oceanic plate is subducted and sinks under the continental plate and into the Earth's mantle, where it is recycled. Earthquakes, fold mountains and volcanoes occur. **E.g.** The Nazca & South American Plates.

Conservative plate margin

A conservative plate margin occurs where **plates slide past each other** in opposite directions, or in the same direction but at different speeds.

Friction is eventually overcome and the plates slip past in a sudden movement. The shockwaves created produce an earthquake.

E.g. The North American and Pacific plates forming the San Andreas Fault in California.

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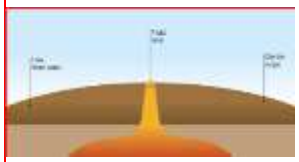
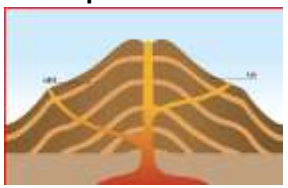
Volcanoes

Volcanoes are vents to the interior of the planet - they allow magma from the mantle to spill out as lava onto the Earth's crust. There are 2 types of volcanoes, shield and composite.



A **shield volcano** has gently sloping sides and runny lava that covers a wide area.

A **composite volcano** is steep sided and cone-shaped, it is made up of layers of ash and lava. The lava is sticky so it does not flow far.

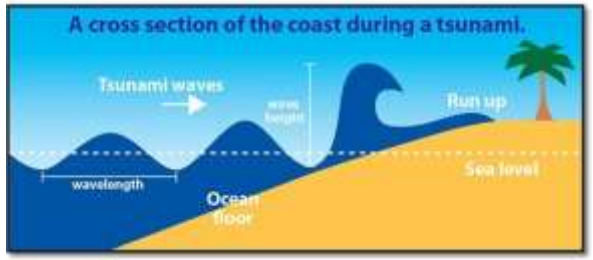


Earthquakes

Earthquakes are the sudden violent shaking of the ground. This happens because the Earth's plates are constantly moving. Sometimes, because of **friction**, plates try to move and become stuck. **Pressure** builds up because the plates are still trying to move. When the pressure is released, it sends out huge amounts of **energy** causing the Earth's surface to shake violently. The point inside the Earth's crust where the earthquake originates from is known as the **focus.** The earthquake's energy is released in **seismic** waves and they spread out from the focus. The **epicentre** is the point on the Earth's surface directly above the focus. The seismic waves are most powerful at the epicentre.

Tsunami

Tsunami is a Japanese word which means '**harbour wave**'. A tsunami is a large sea wave caused by the displacement of a large volume of water. They can be caused by earthquakes triggered by moving sections of the Earth's crust under the ocean. Tsunamis have many social, economic, and environmental impacts depending on where they hit and their size.



Case Study: Iceland

This volcano began erupting lava on 20th March 2010.
Impacts of the eruption include:

-Melting of large amounts of ice which led to flooding in Southern Iceland
-Ash from the volcano contaminated their local water supplies
-All over Europe airplanes were grounded until the air cleared
-The ash deposited iron into the North Atlantic triggering a plankton bloom

Case study: Nepal vs Japan Earthquakes

	Nepal 2015 (LIC)	Japan 2011 (HIC)
Magnitude	7.8	9.0
Death Toll	8,632	15,894
Injured	19,009	6,152
Social Impacts	Hundreds of thousands made homeless	500,000 people evacuated
Economic Impacts	Loss of tourism (a major industry in Nepal)	56 bridges and 26 railways destroyed or damaged
Environmental Impacts	Triggered several avalanches	Triggered tsunami & nuclear meltdown
Cost to rebuild	$10/ £7.8 Billion	$309/ £189 Billion

Managing hazards

There are 3 things we can do to lessen the affects of earthquakes, the 3 Ps.

Prediction - Using technology to estimate when and where we think an earthquake is going to happen. **We often know where one will happen but it is difficult to figure out when it will.**

Protection - Putting measures in place to help protect people during an earthquake. The most important and common one is **building special buildings that will not collapse.**

Preparation - This is all about getting ready for when the next one comes. It includes **special drills and practices so people know what to do, and preparing materials in advance**.