

Mountains, Earthquakes

and Volcanoes

Geography

Pine

Overview

Subject - Geography

The rigid outermost shell of the Earth (called the 'crust' and 'upper mantle') is broken up into 7 or 8 major interlocking 'tectonic plates', and numerous smaller plates. The tectonic plates move (a few centimetres a year) towards, away from, or sliding past, each other. This results in volcanoes and earthquakes at their boundaries. Converging plates (plates moving towards each other) are associated with mountain building and/or volcanoes, such as the Himalayas (India meets Asia), Andes (active volcanoes e.g. Cotopaxi) and the CircumPacific Ring ('Ring of Fire'). Subduction is when one plate is forced underneath another when they meet. At depth, the rocks in the sunken plate melt and lava is forced up through fractures, to erupt as volcanoes. Magma from the earth's mantle rises to create new crust in the gap. Tension increases along faults in the earth's crust as the plates grind together, and which sudden movement – an earthquake – relieves. The 'Ring of Fire', with all three types of plate boundary, is by far the world's most active earthquake and volcanic zone

Enquiry question

Why do volcanic eruptions and earthquakes occur?

Previous Knowledge

What should I already know?

- KS1: Our Country
 LKS2 : We are Britain, Alpine Regions
 UKS2: North America
- Physical features of the UK
 - The highest mountains in the UK
 - The Alps are one of the great European mountain ranges and are spread across eight countries: Austria, Slovenia, Switzerland, Liechtenstein, Germany, France, Italy and Monaco.
 - North America physical landscape.

Geographical skills and knowledge

What will I know or be able to do at the end of this unit?

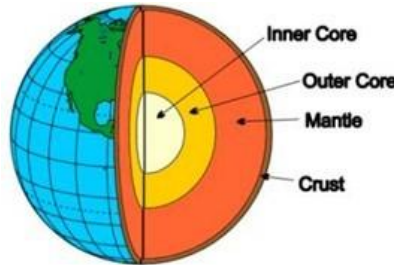
- Understand how the earth is structured.
- Understand how fold mountains are formed.
- Understand how volcanoes form.
- Know what happens when a volcano erupts.
- Know why earthquakes occur.
- Know what happens when an earthquake occurs and how can we protect against earthquakes.

Text Link

The Firework Maker's Daughter
 by Philip Pullman

The Earth's structure

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



The inner core is extremely hot (5,500°C). It is a very dense solid made from iron and nickel.

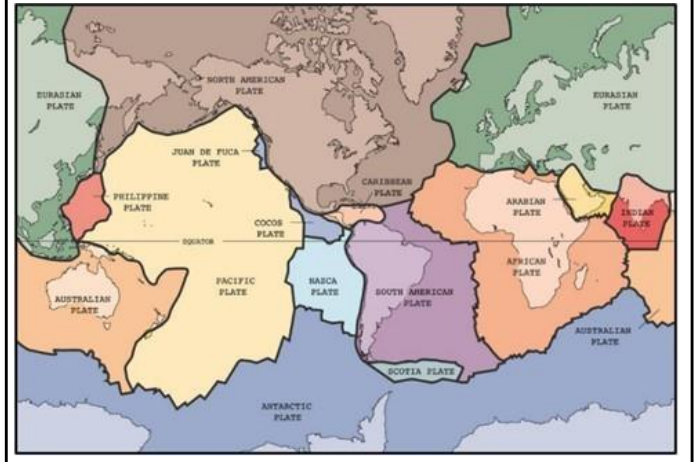
The outer core is 2,000 km thick and is a liquid.

The mantle is semi-molten and about 3,000 km thick. The closer the mantle is to the core, the more liquid it is.

The crust is the rocky outer layer. It is thin compared to the other sections, approximately 5 to 70 km thick. If the Earth was scaled down to the size of an apple, the crust would be about the thickness of the apple skin.

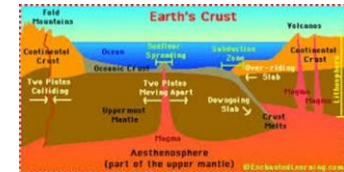
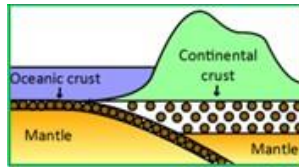
Plate Tectonics




The part of the land that is moving in the Earth's crust is called the lithosphere. The lithosphere is made up of the Earth's crust and a part of the upper mantle. It moves in big chunks of land called tectonic plates. Some of these plates are huge and cover entire continents. They are around 62 miles thick and the movement of these help with the creation of mountains, volcanoes and earthquakes. They move between 1cm-10cm per year.





The Earth's crust

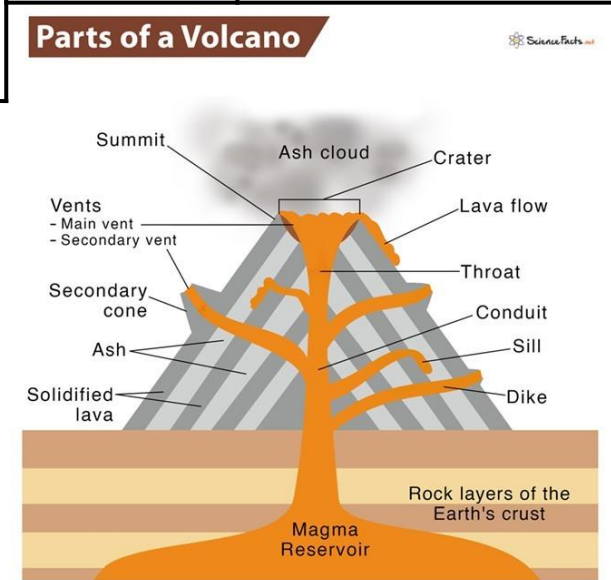
The earth's crust is broken up into plates, called tectonic plates. There are two types of tectonic plate oceanic and continental. Oceanic plates carry the oceans. They are thinner but more dense than continental plates. Continental plates carry the land. They are thicker but less dense than oceanic plates



<p>Fold mountains</p> 	Two plates push into each other (converge) and the plates start to push upwards.
<p>Fault block mountains</p> 	Two plates converge but rather than the pressure pushing the mountain upwards, a section breaks at weak points and that entire section is forced upwards.
<p>Dome mountains</p> 	Magma from the mantle pushes its way up through the crust without erupting at the surface. It then pushes the layers of rock upwards. The magma cools and becomes solid rock.

Earthquake	the sudden release of strain energy in the Earth's crust, resulting in waves of shaking that radiate outwards from the earthquake source.
Epicentre	is the place on the earth surface above where the rock broke.
Fault line	the place where two plates meet and move past each other.
Magma	molten rock that is formed in very hot conditions inside the Earth
Mountain	a large landform that rises above the surrounding land, usually in the form of a peak
Mountain ranges	a series of mountains joined together
Richter scale	measures the size of an earthquakes from zero, that's the least severe, to nine, that's the most severe.
Tectonic plates	a massive slab of rock that 'floats' on top of the mantle (and inner layer) of the Earth.
Tsunami	a giant wave caused by the ground shaking during an earthquake or a volcanic eruption under the ocean.
Volcanoes	mountains from which lava, gas, steam and ash from inside the Earth sometimes burst

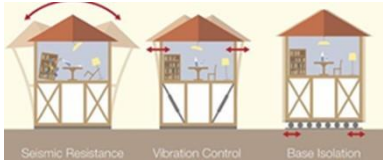
<p>Formation</p> 	Volcanoes generally form on the boundaries of the tectonic plates. Tectonic plates can move apart from each other (diverge) leaving a space for magma to erupt. If plates converge, one plate is forced underneath the other, leaving space for magma to spill out.
<p>Ring of fire</p> 	The Ring of Fire is a major area around the Pacific Ocean where many earthquakes and volcanic eruptions occur. It is a large 40,000km horseshoe shape with 452 different volcanoes along it!



Earthquake protection and preparation

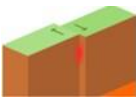

Protection

Many areas prone to earthquake hazards now use building codes. Any new building or adjustment to existing buildings must be carried out to strict guidelines to help protect people from future earthquake hazards. Protection involves constructing buildings so that they are safe to live in and will not collapse.



Preparation

In earthquake-prone countries, hospitals, emergency services and residents practise for an earthquake. They have drills in all public buildings so that people know what to do in the event of an earthquake. This helps to reduce the impact and increases their chance of survival.

Earthquakes	
<p>Formation</p> 	When tectonic plates move parallel to each other it causes friction that sticks them together. When they get unstuck, it can cause a violent jolt which causes an earthquake.
<p>Magnitudes</p> 	Shockwaves spread out from the epicentre (the strongest point of the earthquake). Magnitude, measured on a Richter scale, measures how strong an earthquake is. 1 is a small tremor and 9 is catastrophic.

Significant event

Tohoku earthquake and tsunami (2011)

On March 11, 2011, a magnitude (Mw) 9.1 earthquake struck off the northeast coast of Honshu on the Japan Trench. A tsunami that was generated by the earthquake arrived at the coast within 30 minutes, overtopping seawalls and disabling three nuclear reactors within days.

