

# The Earth's Surface

## The Earth's Layers

### The Crust

This is the outside layer and it is made up of solid rock. The oceans and continents lie on top of this.

### The Mantle

This lies under the crust and is made up of melted or molten/semi-molten rock called magma. This magma is moved around by convection currents.

### The Core

This is the centre of the earth and also the hottest part. It is made up of iron and nickel.

#### Continental Plates

Plate that have land on top of them

#### Oceanic Plates

Plates on which the ocean lies on

### Convection Currents

When magma is heated in the mantle it rises towards the crust. As it rises it cools and moves sideways. This causes friction between the plates. The magma cools and sinks back down into the mantle. This process is constantly repeated.

## Plate Boundaries

The point where two plates meet is called a plate boundary

### What happens at each of the boundaries?

Plates that **collide** with each other are called **destructive boundaries**, as the crust is destroyed. These cause fold mountains, volcanic mountains and earthquakes.

Plates that **separate** with each other are called **constructive boundaries**, as new land is created. These cause volcanic mountains, volcanic islands and mid-ocean ridges.

Plates that **slide past** each other are called **passive boundaries**. These cause earthquake activity, which results in earthquakes and fault lines.

## Volcanic Activity

### Mid-Ocean Ridges & Volcanic Islands

Hot molten rock, known as magma, rises up from the mantle through the cracks in the crust. The magma then cools, hardens and builds up, forming new land in a ridge-like shape.  
E.g. Mid-Atlantic Ridge

Some of these mountains have even risen above the surface to form volcanic islands  
E.g. Iceland

## Volcanic Mountains

Magma can also rise up from a magma chamber in the mantle, through a narrow tube in the earth's crust called a vent. When it reaches the surface, we call it lava. Lava, hot ash and rocks are thrown up into the air as the volcano erupts and an ash cloud is formed. There is a build-up of material around the vent, forming a cone shape. As more eruptions occur, layer is added to layer until a cone shaped mountain is formed, with a crater at the top from which the lava flows.

## Types of Volcano

### Active

These erupt regularly  
E.g. Mount Etna, Sicily  
E.g. Mount St. Helens, USA

### Dormant

Haven't erupted in a long time  
May erupt again  
E.g. Mount Vesuvius, Italy

### Extinct

Have never erupted in recorded history  
E.g. Croghan Hill, Offaly

## Effects of Volcanoes

### Positive

- The soils made from lava are very rich in minerals, so are very suitable for agriculture
- Tourists visit the sites of some famous volcanoes
- Hot springs, called geysers, are formed. This naturally hot water is used to generate geothermal energy to heat people's homes
- volcanoes create new land for people to live on or for farming

### Negative

- Gases, such as sulphur dioxide can poison people who live nearby and cause acid rain in the future
- A lava flow burns everything in its path
- There can be a loss of human life
- If a volcano occurs on snow-capped mountains, snow mixes with the lava to create rivers of mud, called lahars, which can destroy towns and villages

## Earthquakes

### Earthquakes are sudden tremors or vibrations in the Earth's crust

When plates collide or slide past each other, there is a build-up of pressure along what is called the fault line. The sudden release of pressure results in an earthquake.

**Focus** - the point beneath the surface where the earthquake happens

**Epicentre** - the point on land directly above the focus. It is where the earthquake is strongest on land and the most destruction will occur

**Fault Line** - the line on which two plates meet. If the two plates are colliding or sliding past each other, it is where the earthquake happens  
E.g. San Andreas fault line

**Aftershocks** - small tremors felt after an earthquake

**Seismologist** - person who studies earthquakes

**Seismograph** - a piece of equipment which measures tremors in the Earth's crust

**The Richter Scale** - a scale used to show the strength and severity of an earthquake. The scale ranges from 1 - 12. Each unit is ten times stronger than the last

## Damage caused by Earthquakes

- There is a loss of life
- Buildings are damaged or collapse
- Damage to electricity and gas supplies may cause fires
- Bridges, roads and railway lines are damaged, often making it difficult to get aid into the area
- Landslides and avalanches could be triggered, causing more death and destruction
- Damage to sewers and water supplies may cause the spread of disease
- Earthquakes can cause tsunamis. When an earthquake occurs under the sea, a tidal wave can be caused and may eventually reach the coastline, causing devastation

### How to Reduce the Damage caused by Earthquakes

- Build earthquake-resistant buildings in earthquake zones
- Study the pattern of past earthquakes to try to predict when the next one might occur

## Fold Mountains

- When an oceanic plate and a continental plate collide, the heavier oceanic plate sinks underneath the continental plate and into the mantle
- The continental plate then buckles upwards because it has nowhere else to go and fold mountains are formed
- The magma, formed from the oceanic plate melting into the mantle, can move to the surface, causing volcanoes

### Alpine

Formed 30 -35  
million years ago  
E.g. Himalayas

### Armorican

Formed 250  
million years ago  
E.g. Galtees