

Contextual Ideas

- Maps are a representation of a 3D structure so they are not always the same or to scale.
- Tectonic plates are pieces of the rocky outer layer of the Earth known as the crust.
- Plate boundaries are the edges where two plates meet.
- A fissure is a crack in the land formed by tectonic plate activity such as earthquakes.
- A geographic information system (GIS) is a source of evidence that can be used to interpret geographic data

National Curriculum Objectives

- Locate world's countries, using maps to focus on Europe (including the location of Russia) and North and South America, concentrating on their environmental regions, key physical and human characteristics, countries and major cities.
- Name and locate counties and cities of the United Kingdom, geographical regions and their identifying human and physical characteristics, key topographical features (including hills, mountains, coasts and rivers), and land-use patterns; and understand how some of these aspects have changed over time.
- Describe and understand key aspects of physical geography, including climate zones, biomes and vegetation belts, rivers, mountains, volcanoes and earthquakes, and the water cycle.
- Use maps, atlases, globes and digital/computer mapping to locate countries and describe features studied.

Information in Italics is for teachers only

What is the Earth made of?

Key Concepts

Location
Sources

Temperature

Vocabulary

Inner core
Outer core
Mantle
Molten
Magma
Crust

Tectonic plates
Oceanic crust
Continental crust
Plate boundary
Fault line

Prior Knowledge (Retrieval)

- The Earth is round (sphere) and is a very big place made up of land and water (more water than land).
- Know the names of the seven continents and identify them on a world map and globe: Asia, Africa, North America, South America, Antarctica, Europe (we live here) and Australia.
Know the five oceans of the world and identify them on a world map: Pacific Ocean, Atlantic Ocean, Indian Ocean, Southern Ocean, Arctic Ocean (listed in order of size – largest to smallest).

Substantive Knowledge

Earth is like an egg. Although an egg and Earth are different shapes and very different sizes, both an egg and the Earth have a thin crust or shell.

The Earth is made up of four main layers:

- **The inner core:** The inner core is at the very centre of the Earth and it is made of solid metals called iron and nickel. The centre of the earth is extremely hot (approximately 6100 °C).
- **The outer core:** The layer surrounding the inner core. This section is made of the same two metals, iron and nickel but they are liquids in this section. The outer core is slightly colder (approximately 4,400 °C).
- **The mantle:** This is the thickest section of the Earth and is made of molten (melted, liquid) rock called magma. The average temperature of the mantle is 3000 °C. The mantle is between the outer core and the crust.
- **The crust:** The outer layer of the Earth upon which we live. The surface of the Earth is made of solid rocks. The two main types of rock are granite and basalt (grey to black volcanic rock). This layer is not one solid piece. Just like cracked eggshell, the Earth's crust (or shell) has lots of cracks or fractures, and each piece of the earth's crust is called a 'tectonic plate'; they constantly move, but extremely slowly so we do not notice.

The Earth's crust is divided into two types: oceanic crust and continental crust.

- Oceanic crust: The oceanic crust makes up the ocean floor. It is less than 200 million years old.
- Continental crust: The continental crust is found under large land masses (continents). It is lighter than the oceanic crust but is much older.
- Some plates slide past each other, others move away from each other and some bump into each other. Sometimes these plates lock together when they meet - this is called a plate boundary or a fault line.
- Recognise tectonic plates on a world map.

What are Fold Mountains and how are they formed?

Key Concepts

Location
Sources
Landform

Vocabulary

Mountain range
Collide
Fold mountains
Ancient
Eruption

Prior Knowledge (Retrieval)

- On a map of the UK, know and locate the four countries of the United Kingdom – England, Wales, Scotland and Northern Ireland.
- The Earth is made up of four main layers: the inner core, the outer core, the mantle and the crust.
- The crust is the outer layer of the Earth upon which we live.
- The Earth's crust is divided into two types: oceanic crust and continental crust.

Substantive Knowledge

- Mountains are areas of land that are much higher than the land surrounding them. They are higher and usually steeper than a hill and are generally over 600 metres high.
- Mountains are often found together in a group called a mountain range, either on the land or in the ocean.
- Mountain ranges form when tectonic plates collide (crash).
- The tallest mountain on Earth is called Mount Everest (8,848m tall). Mount Everest is part of the Himalayas (mountain range) which are in Asia. Mount Everest is in Nepal.
- Other major mountain ranges include: the Andes in South America; the Rocky Mountains in North America and the Alps in Europe.
- Recognise mountain ranges on world map / globe.

Fold Mountains

- Fold mountains are a type of mountain.
- When two tectonic plates collide, they crumple and wrinkle like two cars in a car crash. As the tectonic plates bunch up, they form tall fold mountains. If the plates continue to move towards each other the mountains get taller.
- The Himalayas, the Andes and the Alps are examples of chains of fold mountains.
- The Eurasian plate and the Indian plate move towards each other to form the Himalayas.
- Not all mountains are formed this way.
- Other mountains - usually those that stand on their own - are created by ancient volcanoes. Ben Nevis in Scotland was once a very large active volcano. It last erupted (exploded) millions of years ago and the eruption was so violent that it caved in on itself.

The highest mountains in the United Kingdom are:

- Ben Nevis in Scotland (also the highest in the UK)
 - Scarfell Pike in England
 - Slieve Donard in Northern Ireland
 - Yr Wyddfa in Wales
- Recognise the location of mountains on a map.

3 Session Question

How are volcanoes formed?

Key Concepts		Vocabulary	
Fertile Location Sources Settlement Land use Landform Sustainability Terrain Region		Lava Active Dormant Extinct Composite Stratovolcanoes Shield Destructive Dense Subduction zone Acidic	Viscous Solidifies Constructive Mantle plumes Hot Spot Nutrient-rich Fertiliser Yield Geothermal energy Generate Global warming
Prior Knowledge (Retrieval)			
<ul style="list-style-type: none"> The Earth is made up of four main layers: the inner core, the outer core, the mantle and the crust. The crust is the outer layer of the Earth upon which we live. The Earth's crust is divided into two types: oceanic crust and continental crust (tectonic plates). When two tectonic plates collide, they crumple and wrinkle like two cars in a car crash. As the tectonic plates bunch up, they form tall fold mountains. 			
Substantive Knowledge			
<ul style="list-style-type: none"> Volcanoes are an opening in the Earth's surface and are usually found in a mountain. The opening allows gas, hot magma and ash to escape from beneath the Earth's crust in the mantle. The words magma and lava are two different things. Magma is the name given to hot liquid rock inside a volcano. Once it leaves the volcano, it's known as lava. "Volcano" comes from the Roman name "Vulcan". Vulcan was the Roman god of fire. Volcanoes are formed by the movement of tectonic plates and are often found at the meeting points of tectonic plates. They can also occur over "mantle plumes" which is an area under the rocky outer layer of Earth, called the crust. The area of Earth above these are known as "hot spots". Hot spot volcanoes occur far from plate boundaries. Volcanoes don't just occur on land. They can be found on the ocean floor and under ice caps. Other planets and moons have volcanoes, too. <p>A traditional way to classify or identify volcanoes is by their patterns of eruptions.</p> <p>Volcanoes are classified as active, dormant or extinct.</p> <ul style="list-style-type: none"> An active volcano is currently erupting or has had at least one eruption in the last 10,000 years. About 1,900 volcanoes on Earth are considered active. When there is enough pressure, the volcano erupts and materials such as lava come out of it. Most of the world's active volcanoes are found on the "Ring of Fire" (explained near to the bottom of this session). A dormant volcano is "sleeping," but it could awaken in the future. Mount Rainier in the United States is considered dormant. An extinct volcano has not erupted in the past 10,000 years. Edinburgh Castle in Scotland is located on top of an extinct volcano. <p>Volcanoes come in various shapes and sizes, but there are two main types – composite and shield which are both found along a plate boundary.</p> <p>Composite volcanoes (stratovolcanoes)</p> <ul style="list-style-type: none"> Destructive plate boundaries usually involve an oceanic plate and a continental plate. The plates move towards one another and collide. As they collide, the oceanic plate is forced beneath the continental plate creating what is known as a subduction zone. This happens because the oceanic plate is denser (heavier) than the continental plate. 			

- When the plate sinks into the mantle it melts to form magma. The pressure of the magma builds up until it bursts through the Earth's crust.

Composite volcanoes have the following characteristics:

- Acidic, sticky lava.
- Steep sides as the lava doesn't flow very far before it solidifies (hardens).
- They grow taller each time there is an eruption, when lava and ash build up in layers on the sides of the volcano.
- Alternate layers of ash and lava. For this reason, they're also known as stratovolcanoes. "Strato" means layers.
- Violent eruptions.
- Longer periods between eruptions.

An example of a composite volcano is Mount Vesuvius, which is in Italy. Mount Vesuvius is considered to be one of the most dangerous volcanoes in the world because of how close it is to the city of Naples and the surrounding towns on the nearby slopes. Recognise location of mountain on a map.

Shield volcanoes

- **Constructive plate boundaries are where two plates move away from one another.** When this happens the magma from the mantle rises up to make (or construct) new land in the form of a shield volcano.

Shield volcanoes have the following characteristics:

- Non-acidic, very runny lava.
- Gentle sides as the lava flows for long distances before it solidifies.
- No layers, as the volcano just consists of lava.
- Less violent eruptions.
- Shorter periods between eruptions.

An example of a shield volcano is Mauna Loa, on the island of Hawaii, but it was formed over a hot spot, rather than at a constructive plate margin, like other volcanoes. It is the largest active volcano on land. Recognise location of mountain on a map.

A lot of volcanic activity occurs around the Pacific Ocean. The area around the Pacific Ocean is known as the Ring of Fire which is a 40,000 km horseshoe shaped area around the edge of the Pacific Ocean. The 'ring of fire' is a group of volcanoes that are located along the plate margin of the Pacific plate. Most of the world's active volcanoes are found on the "Ring of Fire". Recognise this area on a map.

People choose to live in volcanic areas despite the risks of an eruption. Volcanoes can provide people with many benefits such as:

- Lava and ash break down to produce nutrient-rich soil which acts as a good fertiliser for soils, which results in more crops for farmers.
- Volcanoes attract many tourists, who enjoy the dramatic scenery that they produce. This means people living near can make money by selling things or offering a place to stay which helps the local economy.
- **Geothermal energy (energy from the heat of the Earth) from volcanoes can be used to run power stations and generate (create/produce) electricity. We use electricity all the time to power our phones, computers and light bulbs. This is a really good way of producing electricity because it does not release harmful gases, such as carbon dioxide, into the environment which contribute to global warming.**
- Rising magma brings valuable minerals to the surface, creating mining opportunities to make money.

Location		Fissure	
Sources		Glacier	
Settlement		Evacuate	
Land use		Perishable	
Economic Activity		Tourism	
Globalisation			
Terrain			
Region			
Prior Knowledge (Retrieval)			
<ul style="list-style-type: none">Volcanoes are formed by the movement of tectonic plates and are often found at the meeting points of tectonic plates.Volcanoes come in various shapes and sizes, but there are two main types – composite and shield which are both found along a plate boundary.Geothermal energy (energy from the heat of the Earth) from volcanoes can be used to run power stations and generate (create/produce) electricity. We use electricity all the time to power our phones, computers and light bulbs. This is a really good way of producing electricity because it does not release harmful gases, such as carbon dioxide, into the environment.			
Substantive Knowledge			
<ul style="list-style-type: none">Approximately 350 million people live within “danger range” of an active volcano. That means that around one in 20 people live in an area at risk of volcanic activity.Iceland has several volcanoes and is situated on two tectonic plates – the North American plate and Eurasian plate. Recognise Iceland on a world map / map of Europe. Know that Iceland is part of the continent Europe.			
<i>*Useful documentary: Down to Earth with Zac Efron – geothermal energy and tectonic plates (episode 1 – 11:50)</i>			
Case Study: Eyjafjallajökull volcano (stratovolcano)			
<ul style="list-style-type: none">Location: Iceland, EuropeDate: April 2010A 500 metre fissure opened up. A fissure is a crack in the land formed by tectonic plate activity such as earthquakes (children will learn about earthquakes in the next lesson).			
Effects of the eruption within Iceland:			
<ul style="list-style-type: none">Areas were flooded.Agricultural land was damaged and farms were hit by heavy ash fall.The ash poisoned animals in nearby farms.Some roads were destroyed.People were asked to stay indoors because of the ash in the air and some were asked to evacuate from the area around the volcano.			
Effects of the eruption within Europe:			
<ul style="list-style-type: none">Travel was severely disrupted as many flights were cancelled. Air operators lost millions of pounds each day.As passengers looked for other ways to travel than flying, many different transport companies were able to benefit. There was a huge increase in passenger numbers on Eurostar.Businesses lost trade.Exporters of perishable (fresh) goods from the Caribbean and Africa were badly affected.People were not able to get to work because they were stranded.The timing of the disruption was during the Easter holidays when levels of tourism (travel) are high.			
5	Session Question		
How does an earthquake occur?			
Key Concepts		Vocabulary	

Location Sources Settlement Region Landform		Friction Earthquake Geographers Tsunami Detected	Intense
Prior Knowledge (Retrieval)			
<ul style="list-style-type: none"> The outer layer of the Earth upon which we live is called the crust. The Earth's crust is divided into two types: oceanic crust and continental crust (tectonic plates). Destructive plate boundaries usually involve an oceanic plate and a continental plate. The plates move towards one another and collide. As they collide, the oceanic plate is forced beneath the continental plate creating what is known as a subduction zone. The area around the Pacific Ocean is known as the Ring of Fire. The 'ring of fire' is a group of volcanoes that are located along the plate margin of the Pacific plate. Most of the world's active volcanoes are found on the "Ring of Fire". 			
Substantive Knowledge			
<ul style="list-style-type: none"> As tectonic plates continually move in different directions over long periods of time, friction causes energy to build up. Eventually it becomes so great that the energy is released, which creates a shock wave - an earthquake. If the earthquake is beneath the ocean, it can create a series of huge waves in areas near to the ocean. This is called a tsunami. There are thousands of earthquakes across the world each day and some are so small that no one can even feel them. They can only be detected (identified) by specialist equipment. Others can be so intense (powerful) that the ground shakes violently which can create lots of damage to buildings and towns and cities. People can also be injured or killed. The moment magnitude scale is used to measure the size of earthquakes based on its strength. Many earthquakes occur around the Pacific Ocean. The boundary of the Ring of Fire is mostly subduction zones which are more likely to cause earthquakes. Subduction causes the most powerful earthquakes in the world. Earthquakes caused by subduction can lead to tsunamis. About 90% of the world's earthquakes and 15% of the world's largest earthquakes occur along the Ring of Fire. Recognise this area where earthquakes can be found on an interactive map. People who live near to the Pacific Ring of Fire, in countries such as Japan, are used to earthquakes happening. The children have earthquake drills to help them stay safe. Although there are earthquakes in the UK, they are rare and so small that most people do not feel them. Geographers and scientists have not yet found a way to accurately predict when an earthquake will happen. This means people living near a plate margin need to always be ready for an earthquake. Make reference to Turkey / Syria earthquake 2023. 			

6	Session Question
What impact can an earthquake have on human life and the surrounding environment?	
Key Concepts	Vocabulary

Location Sources Settlement Land use Economic Activity		Coastal	
Prior Knowledge (Retrieval)			
<ul style="list-style-type: none"> Know the names of the seven continents and identify them on a world map and globe: Asia, Africa, North America, South America, Antarctica, Europe (we live here) and Australia. Know the five oceans of the world and identify them on a world map: Pacific Ocean, Atlantic Ocean, Indian Ocean, Southern Ocean, Arctic Ocean (listed in order of size – largest to smallest). Friction caused by moving tectonic plates causes energy to build up. Eventually it becomes so great that the energy is released, which creates a shock wave - an earthquake. If the earthquake is beneath the ocean, it can create a series of huge waves in areas near to the ocean. This is called a tsunami. 			
Substantive Knowledge			
<p>Japan has a long history of earthquakes and volcanic activity. Recognise Japan on a world map. Know that Japan is part of the continent Asia. Know that the Pacific Ocean is East of Japan.</p> <p>Case Study: Tohoku Earthquake and tsunami</p> <ul style="list-style-type: none"> Location: Japan, Asia Date: 11/03/2011 <p>Immediate effects:</p> <ul style="list-style-type: none"> 16,000 people died 4,000 people missing Many buildings and homes destroyed <p>Secondary effects:</p> <ul style="list-style-type: none"> Tsunami wave that reached approximately 29m tall caused terrible flooding which also destroyed lots of buildings, homes and roads. Problems with travel and farming <p>Immediate responses:</p> <ul style="list-style-type: none"> Search and rescue teams cleared roads and rescued people Water, food, medical care and tents provided Tsunami warnings were issued People in coastal (seaside) cities fled the area <p>Long-term responses:</p> <ul style="list-style-type: none"> Continued training, education and earthquake drills Rebuilding buildings, roads, houses Build earthquake-resistant buildings that sway with the shock waves rather than fall down <p>The earthquake is often referred to in Japan as the Great East Japan Earthquake. Recognise the location of the earthquake in relation to Japan.</p>			