Ocean Academy Poole
an Aspirations Academy
Self-Worth | Engagement | Purpose

Learning Journey Map

Year: 4 Term: Spring 2

Subject: Geography Topic: Mountains

Driving Question: How can we solve survival problems using our knowledge of volcanoes?

Power Skill: Critical Thinking - Problem Solving & Creativity: Create a comic strip which demonstrates a solution for surviving a volcanic eruption.

National Curriculum Learning Objectives

- describe and understand key aspects of mountains and volcanoes.

Key Vocabulary

mountain	hill	mountain range	Ben Nevis	Snowdon
Scafell Pike	Mount Everest	Tectonic plate	erosion	

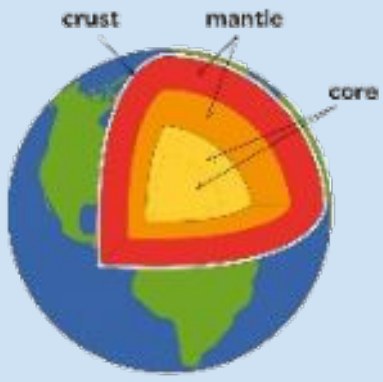
Key Learning

What are mountains and volcanoes?

A mountain is a geological landform that rises above the surrounding land. Typically, a mountain will rise at least 1,000 feet above sea level. The tallest mountain in the world, Mount Everest in the Himalayas, rises above sea level by 29,036 feet (8,848m). Small mountains (below 1,000 feet) are usually called hills.

How are mountains and volcanoes formed?

Mountains are most often formed by movement of the tectonic plates in the Earth's crust. The Earth's surface – the crust - is made of different sections called plates (like a cracked egg shell). Tectonic plates are pieces of the rocky outer layer of the Earth known as the crust. These plates are constantly moving, and volcanoes, earthquakes and sometimes mountains are found at the plate boundaries. Tectonic plates move very slowly. It can take millions and millions of years for mountains to form. There are eight major plates. Great mountain ranges, like the Himalayas, often form along the boundaries of these plates.



The Earth's plates are constantly moving; on average, this movement is between 1 and 10 cm per year. Convection currents in the mantle cause the tectonic plates to move. The mantle is made of molten rock (magma). As the magma moves, so do the plates above.

Thinking Point
What is it that causes the plates to move?



Occasionally, two plates move closer to each other, or converge; this creates intense pressure, causing the plates to buckle and form a mountain.

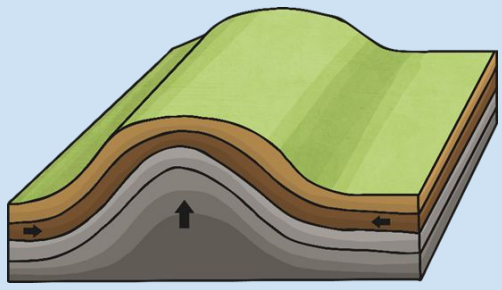
Fold mountains, fault-block mountains and dome mountains are generally formed within the main body of the plate (central).

Volcanic mountains are generally formed on the plate boundaries.

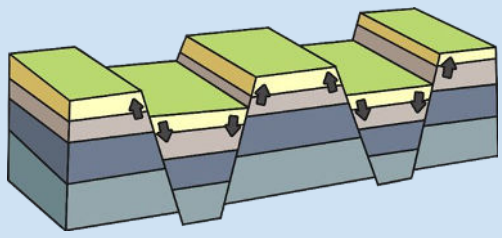
Fieldwork
Explore how volcanologists use fieldwork to analyse and predict volcanic eruptions, using Iceland as a recent example.

Resources:
Globe, atlas, .

Key Learning



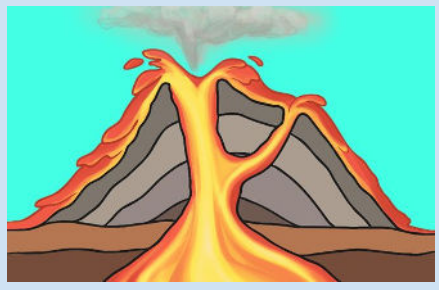
FOLD MOUNTAINS: are the most common type of mountain.
As two plates move towards each other they buckle and the crust pushes upwards, forming a mountain. Fold mountains are generally formed between 40-50 million years ago, which is geologically-speaking, young. They are often high with steep faces. Examples of fold mountains include The Himalayas, The Andes, The Rockies and The Alps.



FAULT-BLOCK MOUNTAINS: are formed when two plates move towards each other.
Rather than the crust folding under the pressure of the moving plates, it cracks along lines of weakness called fault lines. The crust then breaks into blocks, some of which are pushed upwards to form mountains or downwards to form valleys. An example of a fault block mountain range is the Sierra Nevada in Eastern California, USA.



DOME MOUNTAINS: are the result of a great amount of molten rock (magma) pushing its way up under the Earth's crust. Without actually erupting onto the surface, the magma pushes up the crust which then bulges upwards. Eventually, the magma cools and forms hardened rock.
An example of a dome mountain range is the Black Hills in South Dakota, USA.



VOLCANIC MOUNTAINS: are formed when molten rock (magma), deep within the earth, erupts and piles upon the surface. Magma is called lava when it breaks through the earth's crust.
When the ash and lava cools, it builds a cone of rock upon the crust. Over long periods of time and multiple eruptions, rock and lava pile up, layer on top of layer to form a mountain. Examples of volcanic mountains are Mt. Vesuvius in Naples, Italy, Mt. Etna in Sicily, Italy and Mt. St. Helens in Washington, USA.

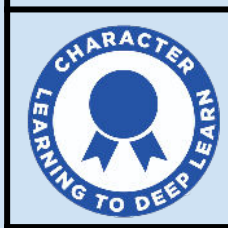
<u>Living near a volcano</u>
Volcanoes can be active, dormant or extinct. There are 500 active volcanoes in the world and, on average, 25 volcanoes erupt every year. Some active volcanoes are erupting lava, ash and toxic gases on a continual basis. However, 600 million people live on, or near to, active volcanoes: that is one in ten of the world's population.

People choose to live near volcanoes because they believe that the advantages outweigh the disadvantages. Most volcanoes are safe for long periods of time in between eruptions and volcanoes that erupt frequently are usually considered, by the people who live nearby, as being predictable.

<u>The advantages</u>
1. Near volcanoes, the soil is fertile and rich in minerals which is good for agriculture/farming: Volcanic rocks are rich in minerals which, over time, breaks down and nourishes the soil which is great for growing crops and farming animals. In Naples, Italy, in an area that surrounds Mount Vesuvius, the soil is rich because of two large eruptions 35,000 years and 12,000 years ago. The area is intensively farmed and produces a wide variety of vegetation such as grapes, citrus trees, herbs, tomatoes and flowers.
2. The presence of metals and minerals: Sulphur is extremely valuable because it is used to make a wide range of products. It can be extracted from the vents of active volcanoes to be sold. Furthermore, magma rising deep from inside the earth contains a large range of precious metals and minerals. Tin, lead, copper, gold, silver and diamonds can all be found in volcanic rocks (igneous rocks).
3. Geothermal energy can be harnessed to produce electricity and sell: 'Geo' means 'of the earth' and 'thermal' means 'heat'. Therefore, Geothermal energy is the heat that naturally occurs underground in volcanic areas. In many cases, this geothermal energy is evident in the form of hot springs and geysers (fountains of hot water that shoot out from a spring). In other cases, this hot water is stored deep underground and is used in power plants to make electricity. The heat from underground water is used to drive turbines and to produce electricity. Geothermal energy is a sustainable energy source as the heat from the earth will not be exhausted.
In addition, geothermal energy releases less carbon dioxide into the atmosphere than burning fossil fuels to produce electricity.
4. Tourism - volcanoes attract millions of visitors every year: Whether they are active, dormant or extinct, volcanoes make for popular tourist attractions and attract millions of visitors every year.

<u>The disadvantages</u>
1. The destruction of homes, livelihood and danger of death: Everything in the path of advancing lava will be surrounded, buried or ignited. Lava can reach temperatures of 1000˚c. Many homes and businesses are destroyed because the intense heat in the volcanoes close vicinity can set everything on fire. Lava moves quickly at the peak (top) of a volcano. At lower lying areas, it travels relatively slowly (between 1km and 10km per hour). At this speed, lava can be out run. However, deaths still occur when people choose to watch the lava flows and then find that their escape routes have been cut off.
2. The release of poisonous gases into the air: Volcanoes can emit large quantities of gas on a regular, sometimes constant, basis. The volume of gas expands as it leaves the volcano and can rise tens of kilometres into the atmosphere and spread great distances. Different volcanoes release gases in different quantities. However, the 3 main gases are water vapour, carbon dioxide and sulphur dioxide. Carbon dioxide is heavier than air, so the gas may flow into low-lying areas in great concentrations which can be lethal. Sulphur dioxide has a pungent 'bad egg' odour. It can irritate the eyes, nose, throat and skin and can cause permanent lung damage.
3. Ash: Ash can bury vegetation and soil and can choke people. Falling ash can also turn daylight into complete darkness.
While we often think of ash as soft and fluffy, volcanic ash is hard and abrasive. It does not dissolve in water, can be corrosive and can even conduct electricity when wet.

Power Skills

	Create diagrams, models, and maps to explain mountain formations and volcano structures.
	Evaluate the advantages and disadvantages of living near mountains and volcanoes, using real-world examples.
	Develop empathy and resilience by exploring how communities adapt to living in mountainous and volcanic environments.
	Work collaboratively on global research and case studies such as the Ring of Fire and Mount Vesuvius.
	Explain geographical processes such as plate tectonics and volcanic eruptions using precise vocabulary, diagrams, and maps.