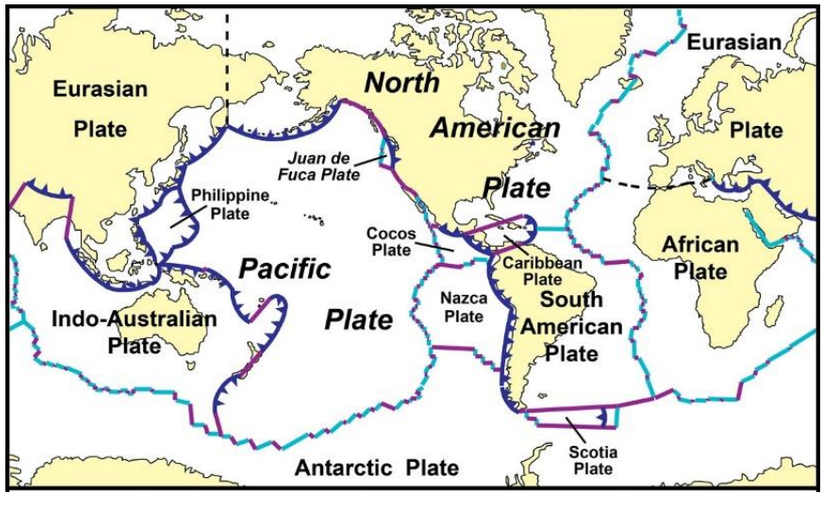
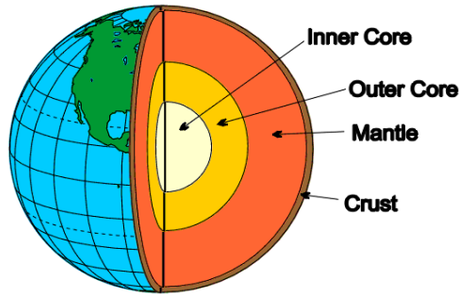
Explosive Nature

YEAR 5 | AUTUMN 2



OVERVIEW

The Earth has a structure that consists of four distinct layers: the crust, the mantle, the inner core and the outer core. The crust and the top of the mantle are divided into tectonic plates that cover the Earth's surface (shown to the left). These move very slowly, around a few centimetres per year. Volcanoes and earthquakes are formed where two of these plates meet. Events such as these can have dangerous and even deadly consequences for humans who live nearby. A volcano is an opening in the Earth's surface that allows gas, magma and ash to escape the Earth's crust.



4.5 billion
Age of the Earth in years

7
The number of main tectonic plates

4000-5000
The temperature of the Earth's core in degrees Celsius

12
The number of volcanoes that erupt, on average, every day

7.6
The deepest distance, in miles, that humans have ever drilled into the Earth.

KEY PLACES

Mount Vesuvius

Only active volcano on the European mainland (Italy). Erupted in 79 AD, destroying city of Pompeii.

Anak Krakatoa

Only active volcano on the European mainland (Italy). Erupted in 79 AD, destroying city of Pompeii.

Mount Tambora

The explosion of Mount Tambora is the largest ever recorded by modern humans, ranking a 7 on the Volcanic Explosivity Index (VEI)

Yellowstone Caldera

A 'supervolcano' located beneath Yellowstone National Park in the US. Has produced VEI 8 eruptions in the past

Kilauea (Hawaii)

Kīlauea is an active shield volcano in the Hawaiian Islands. Historically, it is the most active of the five volcanoes that together form the Big Island of Hawaii.

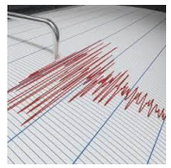
KEY VOCABULARY

SEISMOLOGY

The study and prediction of earthquakes

PYROCLASTIC FLOW

Rocks, lava fragments, ash and gases expelled during volcanic eruptions



MAGNITUDE

Scale used to measure the size of earthquakes (used to be called Richter)

VISCOUS/VISCOSITY

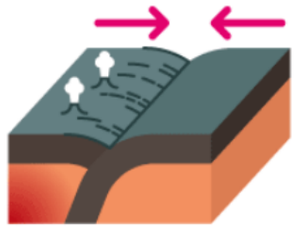
Having a thick, sticky consistency between solid and liquid - that lava is viscous!

FERTILE

Land capable of producing lots of vegetation or crops

TYPES OF PLATE BOUNDARIES

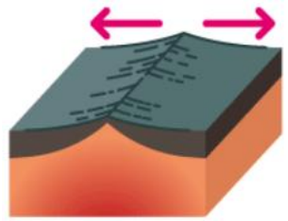
What happens when the large plates of Earth's outer shell move?



Where plates crash together, one dives (or is "subducted") beneath the other, causing pressure to build and volcanoes to erupt.

Sometimes called a 'convergent' boundary.

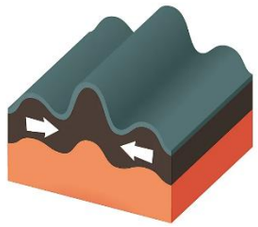
DESTRUCTIVE



Volcanic eruptions and shallow earthquakes are common where plates rip apart.

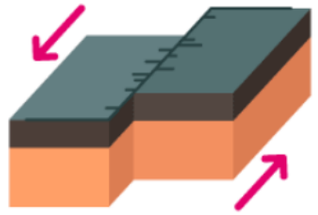
Sometimes called a 'divergent' boundary.

CONSTRUCTIVE



Two continental plates collide – neither can sink, so they crumple together and produce fold mountains. No volcanoes here.

COLLISION



Earthquakes occur where one plate slides laterally past another.

Sometimes called a 'transform' boundary.

CONSERVATIVE

FACTS

The word volcano comes from ‘Vulcan,’ the Roman god of fire.

Approximately 350 million people live within “danger range” of an active volcano – that’s 1 in 20 that live in an area at risk of volcanic activity

Other planets and moons have volcanoes, too! The largest volcano in our solar system is Olympus Mons, found on Mars.

The loudest sound in recorded history was made by a volcano called Krakatau – when it erupted in 1883 it released 200 megatons of energy (the same as 15,000 nuclear bombs).

ERUPTION TYPES

Effusive Eruption

Effusive eruptions occur when hot, runny magmas reach the surface. Gases escape easily as the magma erupts, forming lava that flows downhill quite easily.

Effusive eruptions build up gently-sloping shield volcanoes like Hawaii.

Explosive Eruption

Explosive eruptions occur where cooler, more viscous magmas reach the surface. Gases cannot escape as easily, so pressure builds up until gas explosions blast rock and lava fragments into the air.

Lava flows are thick and sticky so do not flow downhill as easily: this leads to steeply-sloping

HOW DO TSUNAMIS WORK?

INITIATION

During initiation, a large set of ocean waves are caused by any large and sudden disturbance of the sea surface, most commonly earthquakes but sometimes also underwater landslides.

SPLIT

In the split stage, the initial set of waves is split into two, one set that travels out into the deep ocean and another that travels toward a nearby coast.

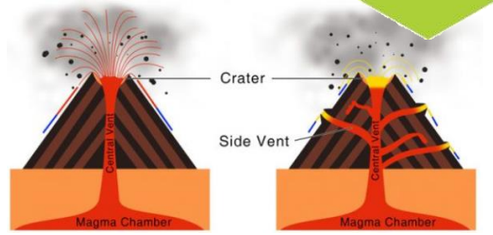
AMPLIFICATION

In stage three the height of the tsunami increases.

RUN-UP

The peak of the tsunami hits the shore (run-up is the term used to describe the measurement of the height of the water on shore). Once on land, part of the tsunami is reflected back into the ocean and the other part is trapped in waves that travel back-and-forth near the shore.

TYPES OF VOLCANO



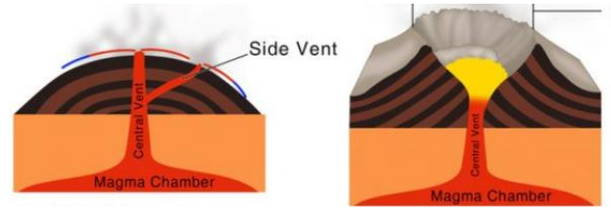
CINDER CONE

Most common type. Cone shape – caused by explosive eruptions from a single vent.

The lava cools quickly and falls as cinders that build up around the vent forming a cone shape, leaving a crater at the

COMPOSITE

Also referred to as strato-volcanoes; can have a cluster of vents and the eruptions are highly explosive and dangerous



SHIELD

Huge, gently sloped volcanoes. The eruptions are not explosive; the lava oozes out of a central vent and spreads far, building a dome shape like a warrior’s shield.

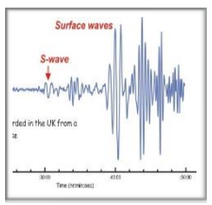
LAVA DOME

These are relatively small, circular mounds formed as the lava is too viscous to flow, which makes it pile over and around the vents.

EVIDENCE: PRIMARY SOURCES

HOW CAN WE KNOW HOW THIS HAPPENS?

Maps

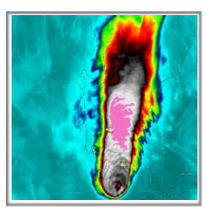


Data

Photographs

Art

Newspapers



Satellite Imagery

Google Maps

Guided tour through the lava vents of a volcano

Virtual Earthquake

Analyse seismograms and find the epicentre of an earthquake.

Oak Academy

Mountains, volcanoes and earthquakes lessons and quizzes

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