MSN 2020

T3

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Tectonic hazards

Geography Knowledge Organiser

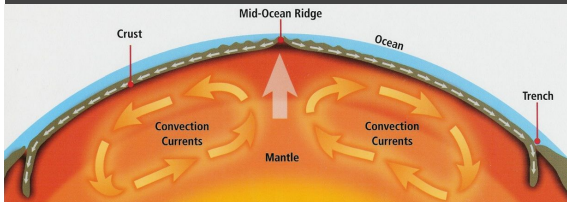
3.1.1 - Tectonic processes and landforms

Tectonic plates

The earth is made up of a series of layers. The outer layer is called the crust. This is made of 2 different types:

Continental Crust (which is on average 35km thick)
Oceanic Crust (which is much thinner, between 6-8km)

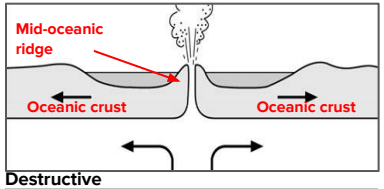
Convection currents



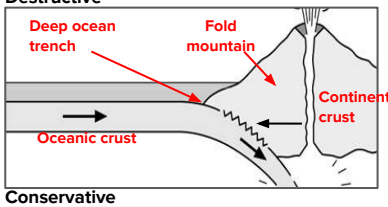
Heat from the core causes **convection currents** in the mantle and these currents slowly move the plates

Tectonic boundaries

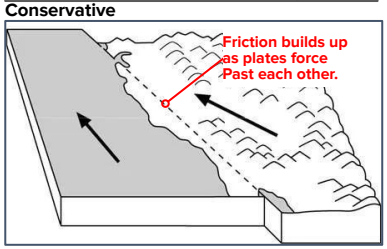
Constructive



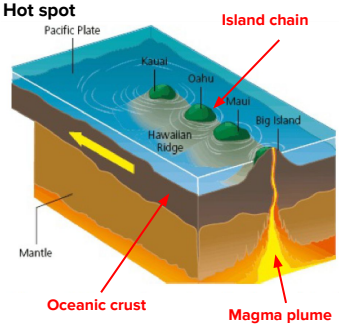
Destructive



Conservative



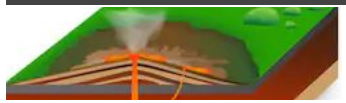
Hot spot



1. Intense radioactivity in the Earth's interior creates a large column of magma (known as a magma plume)
2. The plume rises, melting and pushing through the crust above
3. The plume lies in a fixed position under the plate – as the plate move over it, a series of new volcanoes are created along the plate

3.1.1 - Tectonic processes and landforms

Volcanic landforms



Shield volcano characteristic
Low profile
Wide base
Thin runny lava
Made up of layers of lava
Frequent and gentle eruptions

Stratovolcano characteristic
High profile
Narrow base
Thick, slow lava
Made up of layers of mainly ash
Infrequent and violent eruptions

Feature	How it is formed	Found at
Ocean trench	Where subduction takes place	Destructive
Fold mountain	Continental crust is crushed and folded upwards	Destructive
Ocean ridge	As lava cools a ridge is formed under the sea	Constructive
Rift valley	Where 2 continental plates pull apart	Constructive
Caldera	A large depression or crater formed by large stratovolcanoes or supervolcanoes	Destructive & hotspot
Cinder cone	Bowl shaped crater of a shield volcano	Constructive
Lava tube	Under the ground, basic lava develops a hard crust through which lava flows	Constructive
Geysers	Water in the ground heated by the magma explodes onto the surface	Destructive & hotspot

3.2.1 - Tectonic impacts

Volcano effects

MONTSERRAT 1995-7

Health
- Ash clouds caused breathing problems
- 19 deaths
- 100s injured

Infrastructure
- The capital, Plymouth, has been covered in layers of ash and mud
- Lahars have destroyed large areas urban areas
- The only airport was destroyed

Economy
- Farmland abandoned (significant unemployment)
- Prevented tourism so tourism economy suffered
- Capital city is abandoned and rebuilt in the north

Earthquake effects

HAITI 2010

Health
- 250,000 people died.
- 300,000 people were injured.
- Cholera spread through temporary camps

Infrastructure
- Airport and port damaged
- 30,000 buildings collapsed
- Hospitals and medical centres were destroyed

Economy
- Damage to the main clothing industry
- Tourist industry will take years to recover
- Infrastructure damaged reduced trade, imports and exports

Tsunami effects

SOUTHEAST ASIA 2004

Health
- Over 220 000 deaths
- 650 000 injured
- 5-6 million needing emergency aid

Infrastructure
- 1,000s of railway lines, roads, bridges and airports were destroyed
- Hospitals within 30mi of the coastline were destroyed
- Water supplies contaminated

Economy
- Fishing industry devastated
- Tourism, dropped 80%
- Reconstruction cost billions of pounds

Vulnerability to tectonic hazards

Physical factors

Duration - the longer a hazard lasts the more severe the impact
Predictability -hazards that hit with no warning have a larger impact

Volcanoes

Lava flows - Molten rock flows down the side of a volcano (Local)
Lahars - Volcanic mudflows consisting of a mixture of ash and water (Local)
Pyroclastic flow - Burning clouds of gas and ash (Local)
Ash clouds - Ash thrown into the atmosphere (Regional/National/Global)

Earthquakes

Magnitude - the stronger the hazard the more severe the impacts

Human factors

Wealth - poor people are less able to withstand disasters and recover from it
Education - where populations are able to read and write, written messages can be used to spread warning or give advice about how to cope
Governments - can support education and and can pass building regulations
Age - children and the elderly are more vulnerable
Health - healthy people are more able to cope
Population density - the more people living in the area the more that will be affected
Time of the day - e.g. earthquakes in rush hours have a more devastating effect
Emergency services - richer countries have well trained and well resourced response

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3 . 2 . 2 - Tectonic management

Earthquakes are difficult to predict but there are some monitoring techniques:
- Laser beams can detect plate movement
- A seismometer is used to pick up vibrations in the earth's crust. These can lead up to an earthquake

Monitoring Techniques used to predict volcanic eruptions include:
- Remote sensing. Satellites monitor gas emissions and thermal imaging can work out the temperature within the volcano.
- Seismometers can pick up movements in the earth which sometimes occur before an eruption.

Tsunami warning system:
- Following the 1960 Chilean earthquake the Pacific countries decided to set up the Pacific Tsunami Warning System (PTWS).
- This is a network of seismometers and ocean buoys that detect earthquakes and ocean movements.
- Warnings are then given to local centres, which warn local people using the TV, radio, text messages and sirens.

Hazard planning strategies

Hazard Mapping highlights areas affected by or vulnerable to earthquakes, volcanoes and tsunamis so planning and money can be targeted at these areas
New building technology can also reduce the impact of earthquakes. Often they are built to absorb the energy and withstand the earth's movement
Emergency planning:

- An exclusion zone can be set up around a volcano
- Lava flows can be diverted
- Emergency services can be trained and given the equipment needed
- People put together emergency kits which include first aid items, blankets etc.

Home study questions

DEVELOPING

Describe how a hot spot creates island arcs **[2 marks]**

Compare the differences between shield volcanoes and stratovolcanoes **[4 marks]**

SECURING

Analyse the distribution of the 3 different plate boundaries around the world (3 . 1 . 1) **[6 marks]**

Explain how tsunamis impact the health and infrastructure of a country **[6 marks]**

MASTERING

'Human vulnerabilities are responsible for more deaths than the physical risks associated with tectonic hazards' **To what extent** do you agree with this statement? **[8 marks]**

Explain how tectonic hazards are managed **[4 marks]**

CHALLENGE

Research the responses to the 3 hazard case studies (Montserrat, Haiti and SE Asia) and add these to the space below

Explain how tsunamis are a secondary effect of earthquakes