

# Geography

## People and the planet



### Natural Hazards

Knowledge and Assessment Organiser

Student name: .....



**What are the causes, effects and responses to tectonic hazards in rich and poor countries?**

# Contents

<b>Big Question and Small Question breakdown</b>	
<b>Essential knowledge</b>	
<b>Question stems</b>	
<b>Genre map</b>	
<b>Articles for wider reading and flipped learning</b>	



## Did you know...?

Volcanoes are ruptures in the earth's crust. Volcanoes allow hot lava, volcanic ash and gasses to escape from a magma chamber below the earth's surface. The earth has volcanoes because the crust is broken up into 17 pieces (or tectonic plates). The tectonic plates float on the hotter and softer layer in the mantle. Where there are gaps between the tectonic plates, or weak spots in the crust volcanoes can form.

# Big Question

## What are the causes, effects and responses to tectonic hazards in rich and poor countries?

### Small Question

1. What is the structure of the earth?

### Small Question

2. How do convection currents work?

### Small Question

3. Where are the world's plate margins?

### Small Question

4. What processes occur on the world's plate margins?

### Small Question

5. What is the structure of a volcano?

### Small Question

6. What hazards are caused by volcanoes?

### Small Question

7. Where were the primary and secondary effects of volcanoes in Africa and Iceland?

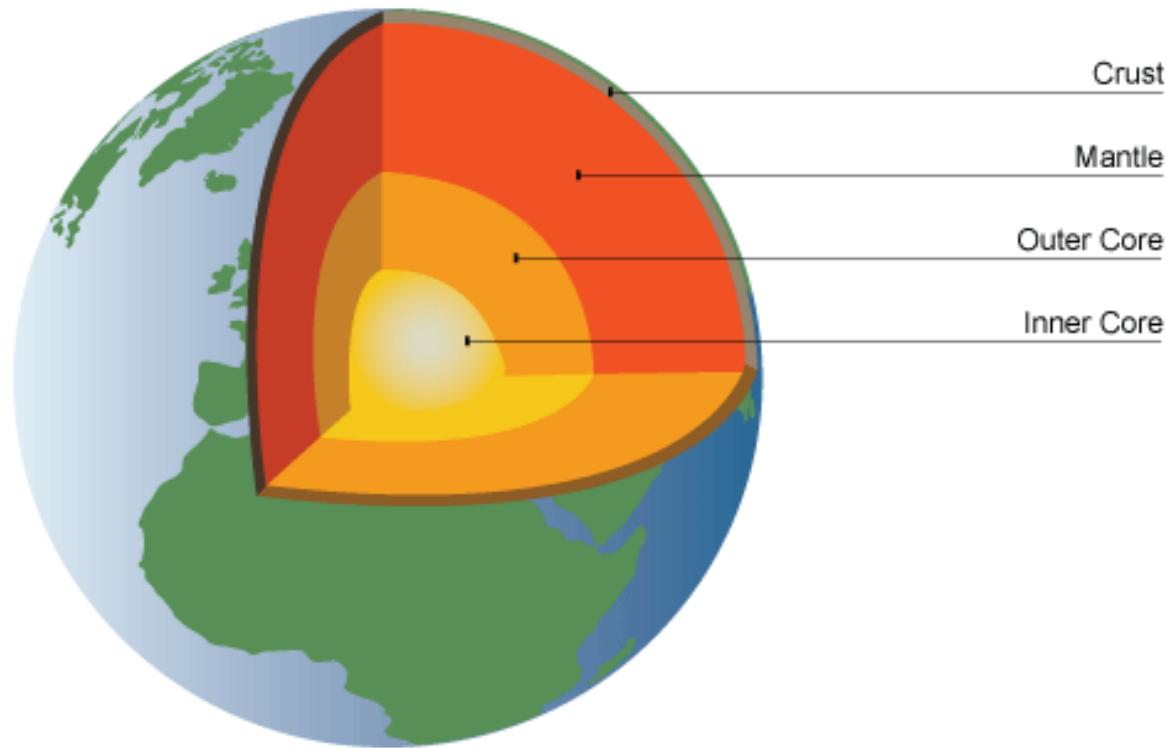
### Small Question

8. Are primary effects more significant than secondary effects?

### Small Question

9. How can the effects of volcanoes be reduced?

# Essential knowledge: structure of the earth



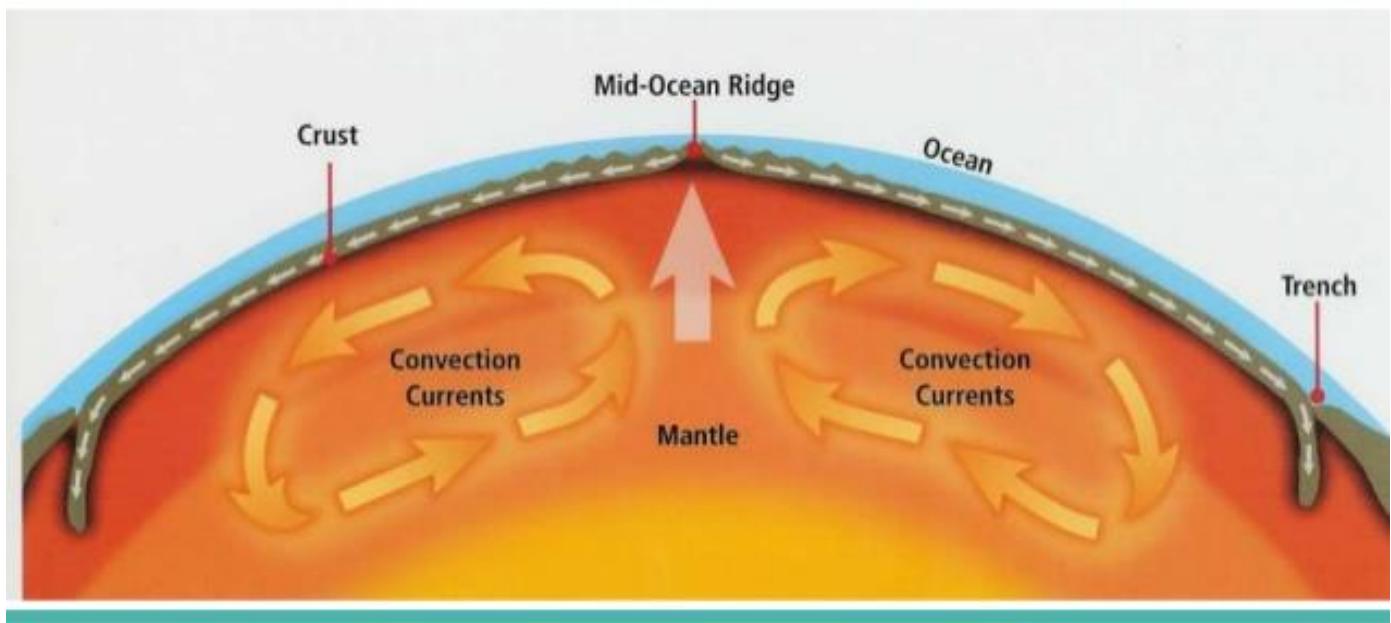
## Structure of the earth

<u>Inner core</u> <ul style="list-style-type: none"><li>• This is the hottest rock</li><li>• Solid iron and nickel</li><li>• 1500 miles thick</li><li>• Hot as the sun's surface</li></ul>	<u>Outer core</u> <ul style="list-style-type: none"><li>• Hot liquid iron and nickel.</li><li>• 1400 miles thick.</li><li>• It creates a magnetic field that protects us from the sun.</li></ul>
<u>Mantle</u> <ul style="list-style-type: none"><li>• The mantle is thickest layer.</li><li>• It is made of semi-molten rock.</li><li>• 1900 miles deep.</li><li>• 85% of the earth's weight.</li><li>• Iron and magnesium.</li></ul>	<u>Crust</u> <ul style="list-style-type: none"><li>• This is the thinnest layer. 3-25 miles thick</li><li>• It is the outermost layer.</li><li>• It is made of solid rock.</li></ul>

Did you know...?

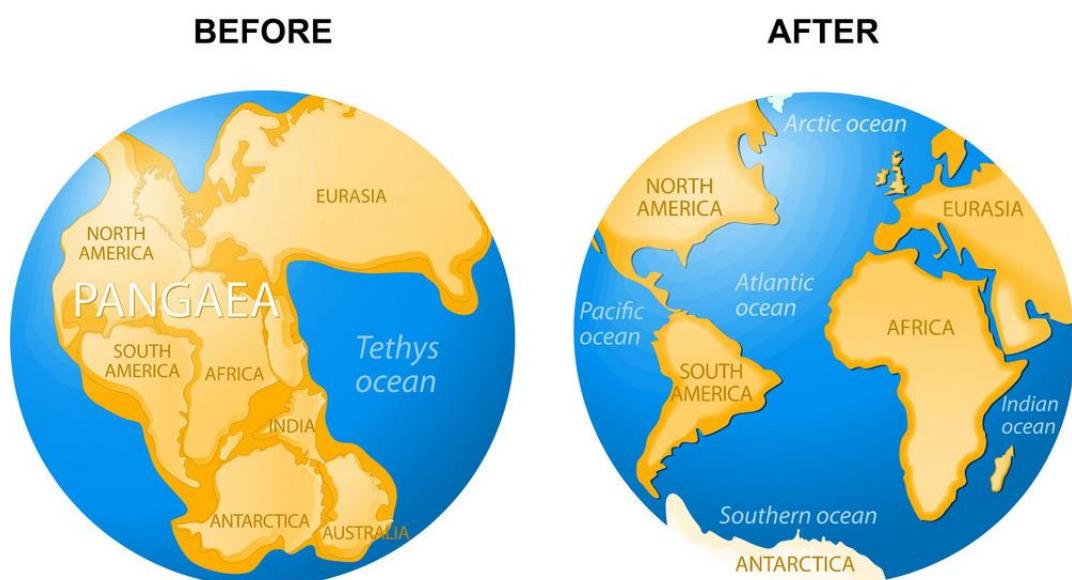
Scientists believe that the earth was formed at roughly the same times as the sun and other planets round 4.6 million years ago.

# Essential knowledge: How do convection currents work?



## Did you know...?

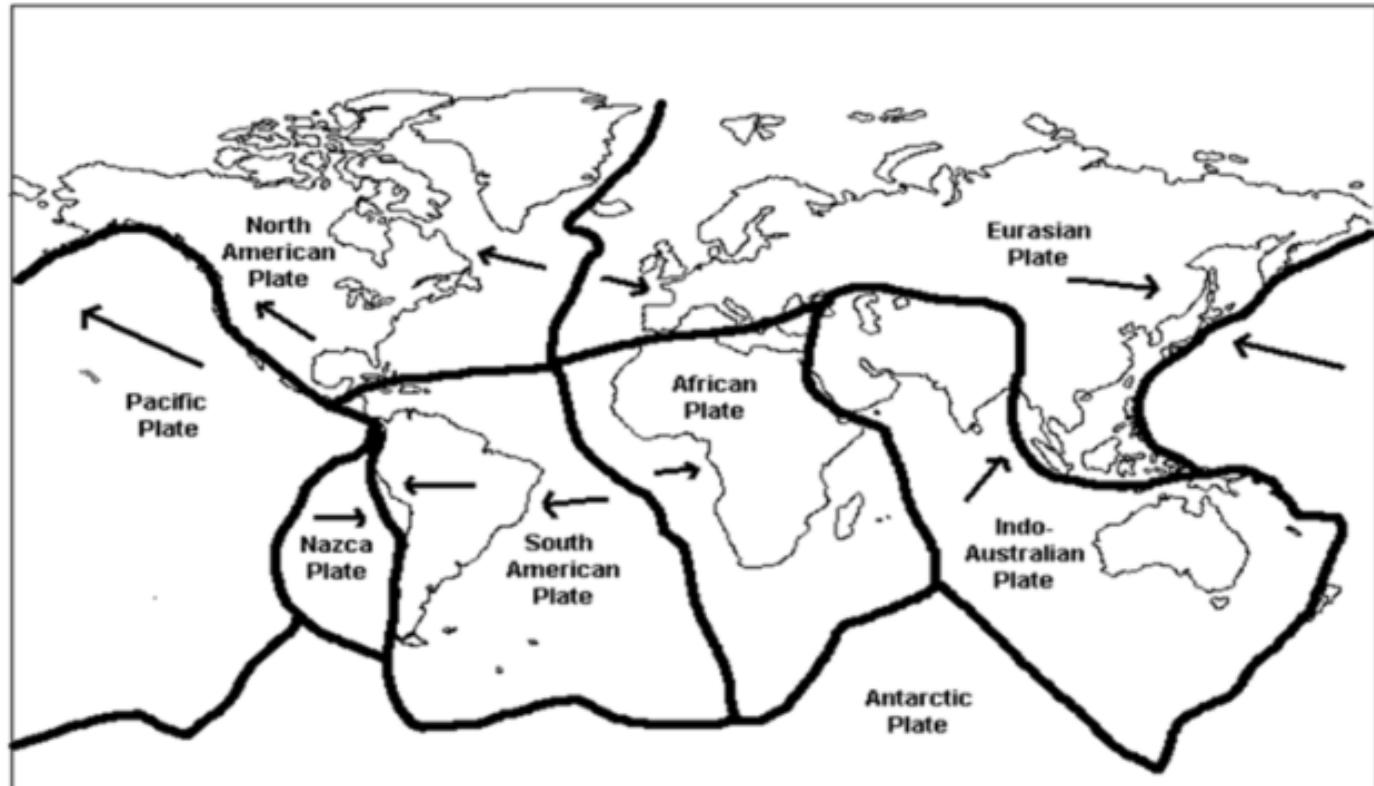
The core heats rock in the mantle, as it is the hottest layer. Hot rock in the mantle then rises. Near the top of the mantle the rock spreads in two directions, which drags the crust above it. Eventually the warmer rock cools and begins to fall back to the core. The processes of rock being heated and cooled is a continuous cycle that doesn't stop. Convection currents therefore make the continents move, as the earth's crust floats on the mantle. This process is called continental drift.



# Essential knowledge: where are the world's plate margins?

Did you know...?

The earth's crust is not one single piece. The earth's crust is broken up into **many different pieces**. The earth's crust is broken up into large slabs. These large slabs or chunks are called **tectonic plates**. Due to **convection currents**, the earth's tectonic plates **move** in many different directions. The tectonic plates can move towards each other, slide past each other and move away from each other.

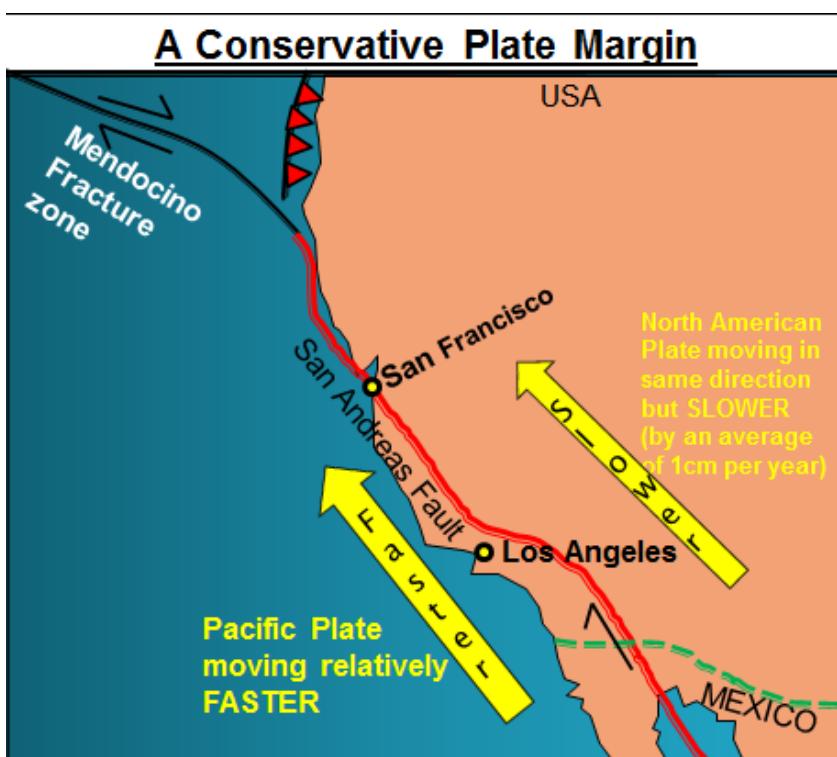
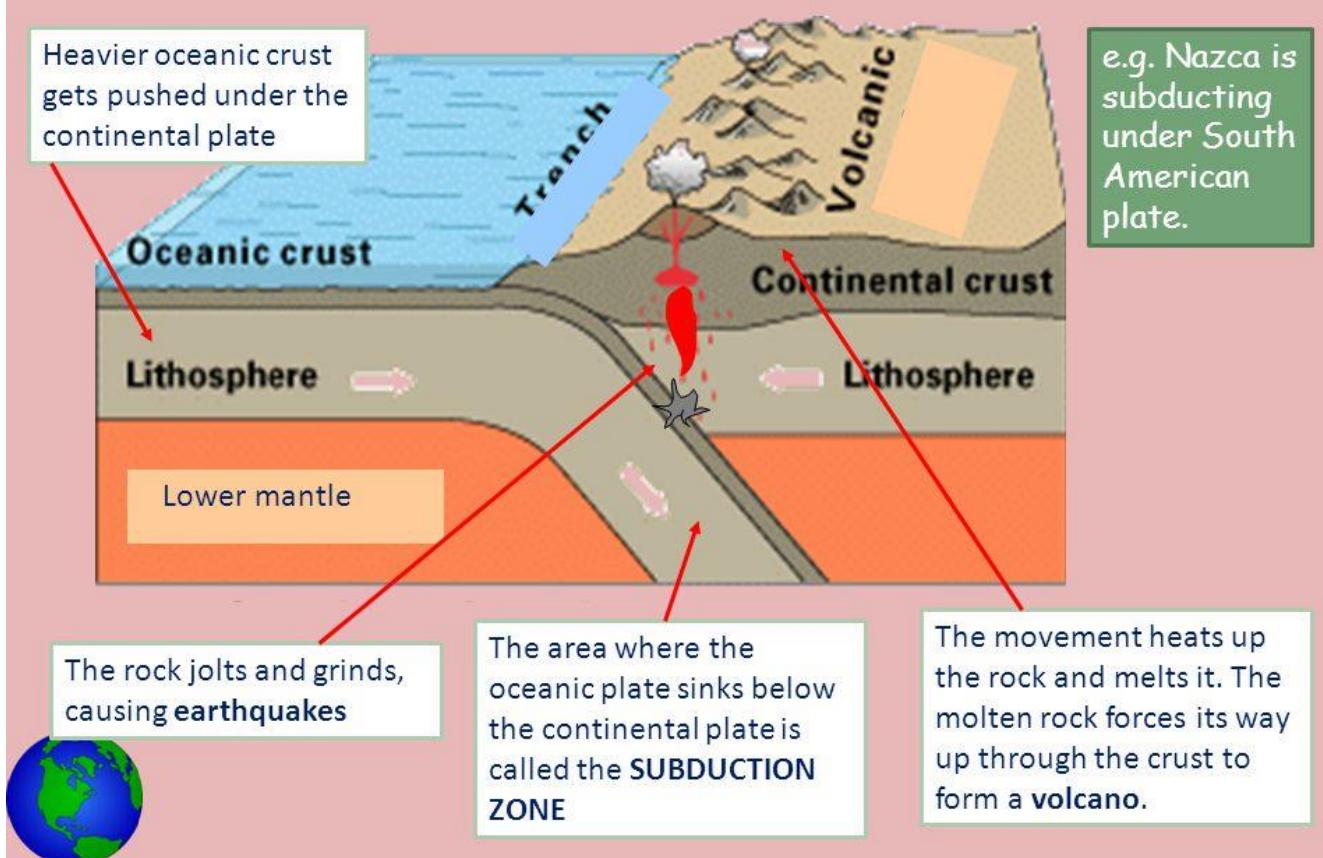


## Thinking point

Do you think the location of plate margins will affect the location of earthquakes and volcanoes? Why?

# Essential knowledge: what process occur on the worlds plate margins?

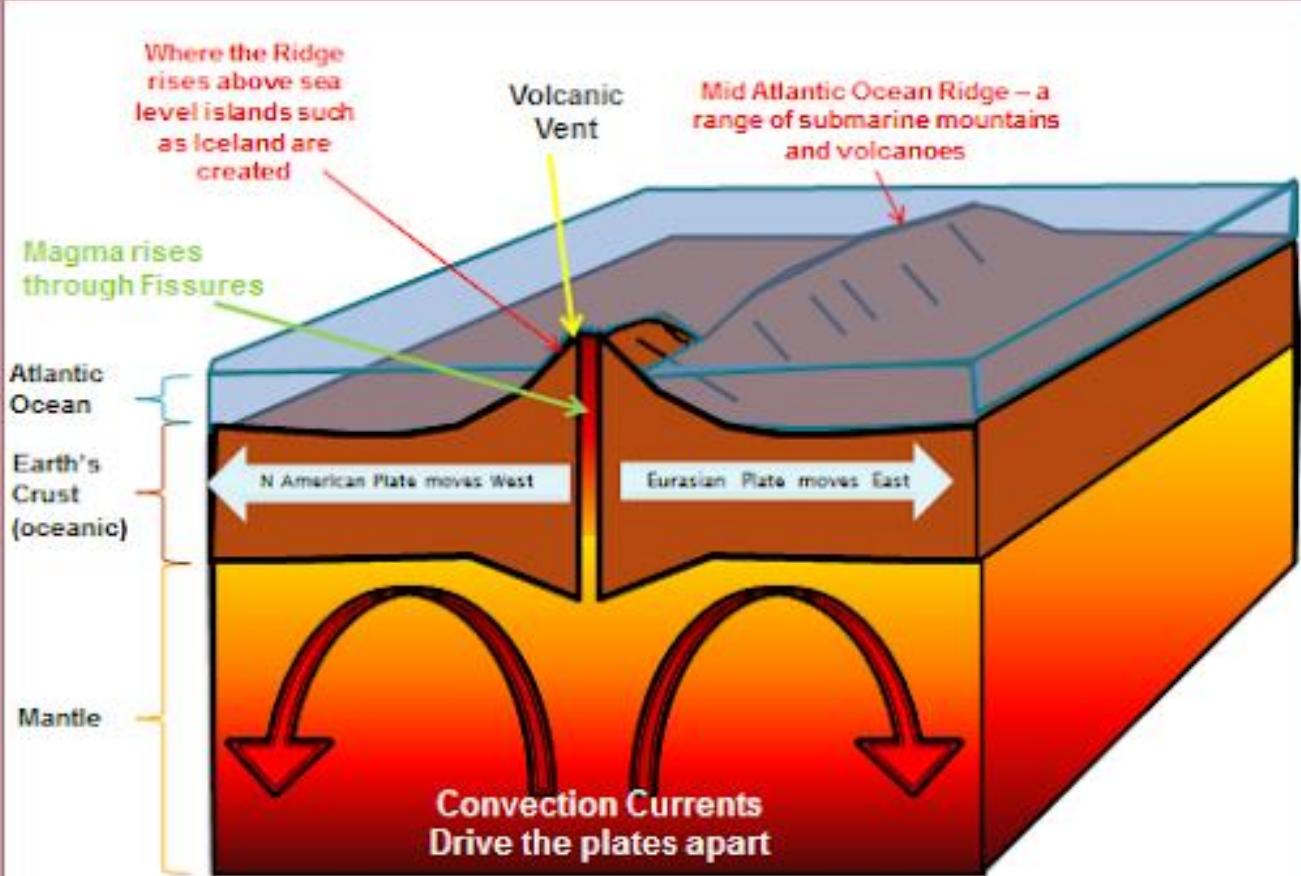
## Key facts: Destructive plate boundary



### Thinking point

Which out of the three types of plate margins do you think will produce the most dangerous tectonic hazards? Why?

Do you know any examples of the three types of tectonic plates, and where they are located?

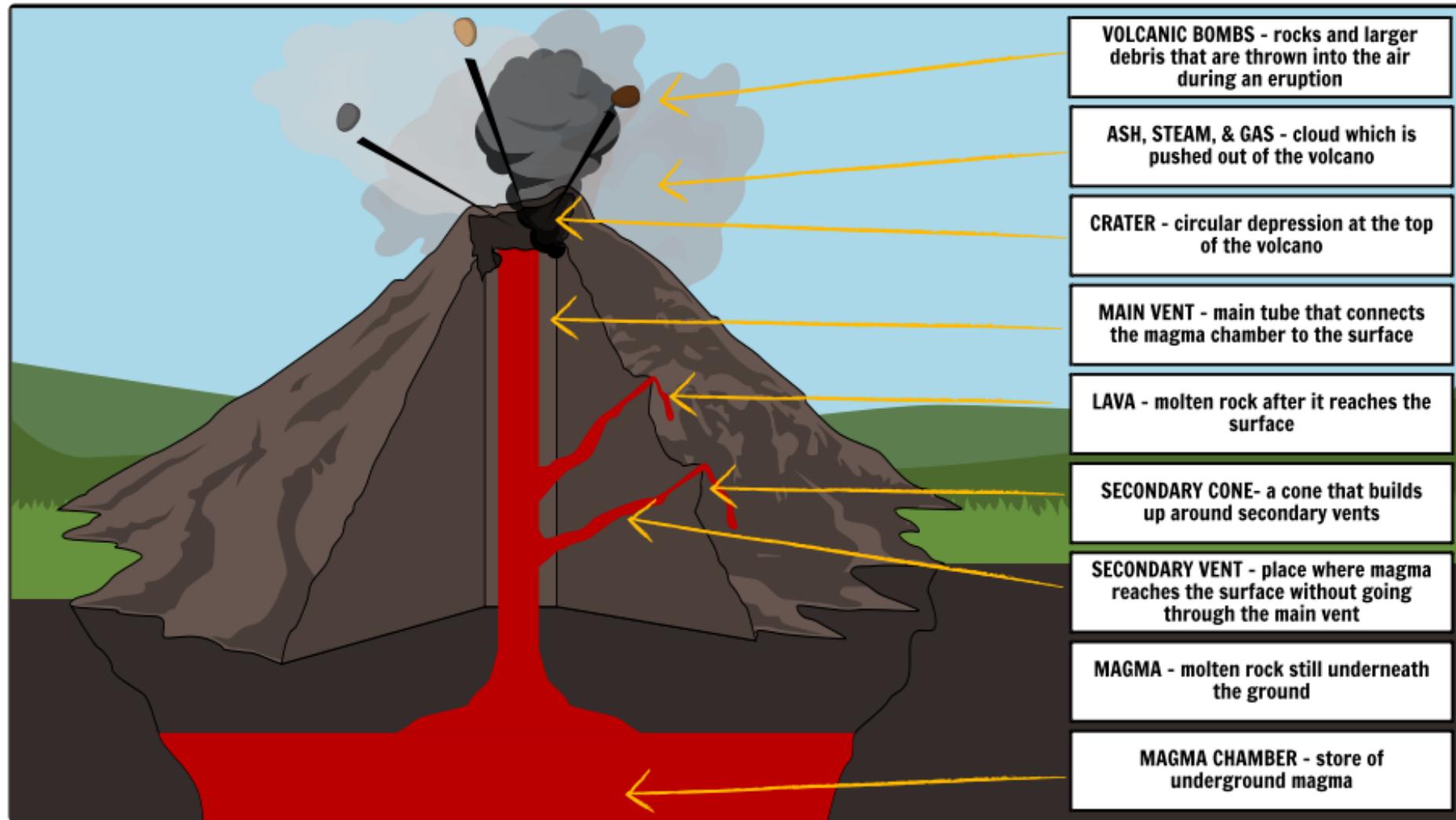


### A constructive or DIVERGENT plate margin

Did you know...?

The earth's crust moves very, very slowly. They move at a rate about two inches every year. This is about the same rate of which your finger nails grow. The movement of the plates are responsible for all tectonic hazards, like earthquakes, volcanoes, mountains and tsunamis.

# Essential knowledge: what is the structure of a volcano?



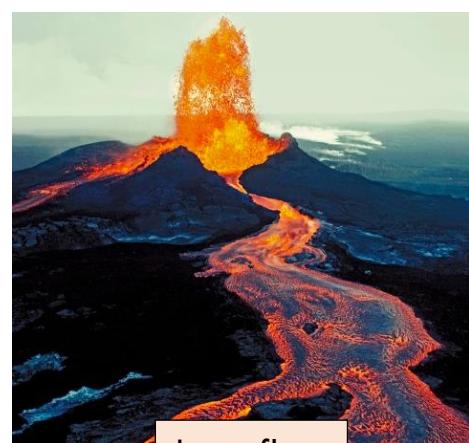
Did you know...? Volcanoes have created more than 80% of our planet's surface. If volcanoes didn't emit gasses, we would not have an atmosphere and therefore would not exist.

# Essential knowledge: what hazards are caused by volcanoes?

Hazard	Description
Pyroclastic flow	Hot clouds of gases and ash race down the sides of the volcano at speeds of 200mph.
Lava flow	Can reach up to 1000°C. They move slowly, however they will burn everything in their path.
Lahars	When water mixes with volcanic ash, it causes devastating mudslides that can reach speeds of 60mph.
Ash clouds	The ash can cause suffocation and will lead to many health problems
Volcanic Gas	Can be poisonous to inhale and it can kill humans, animals and vegetation.
Volcanic bomb	Stones/ hot rock thrown into the air from a volcano.



Pyroclastic flow



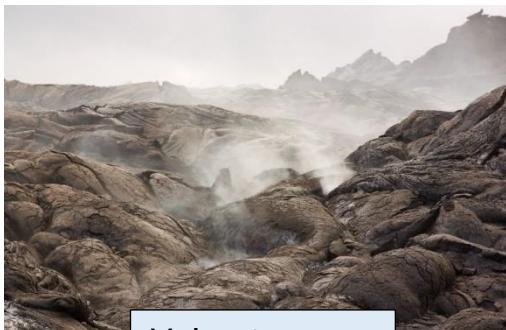
Lava flow



Lahars



Ash cloud



Volcanic gas



Volcanic bomb

# Essential knowledge: what were the primary and secondary effects of the volcano in Africa?

## Causes

The volcanic eruption occurred in 2002, where a lava flow spread into the village of Goma. The volcano is located on a constructive plate margin, where many fissures emit lava.



### Did you know...?

Volcanoes have serious economic consequences. The most expensive volcanic eruption to ever occur cost approximately \$1 billion. The volcano that caused the eruption in Columbia in 1985, is not a large volcano, but caused major mud and lava flows causing widespread damage.

## Effects

Primary effects	Secondary effects
12,500 homes were destroyed by the lava.	People lost their business and jobs.
45 people died in the first two days.	Aid agencies struggled to travel along the roads as they had been damaged.
Lava covered 15% of the city and destroyed 30% of the city.	As gasses were released from the volcano, this created acid rain. People then had no clean drinking water and farmers and cattle were also affected.
14 nearby villages were also destroyed.	Diseases like cholera spread because people didn't have adequate sanitation.

# Essential knowledge: what were the primary and secondary effects of the volcano in Iceland?

## Causes

The volcanic eruption occurred in 2010. The volcano is also located on a constructive plate margin, there were many hazards including lava flows, ash clouds and flooding.

### Thinking point

Do you think the effects (social, environmental and economic) of volcanoes and earthquakes are worse in Low Income Countries (LIC'S) or High Income Countries (HCS)? Why?

Could you use examples from the two case studies in class?



## Effects

Primary effects	Secondary effects
The ash cloud stopped airplanes flying into and out of Europe, causing major travel disruptions.	The ash contaminated local drinking supplies.
Loss of tourism meant there was losses of £5-6 million per day.	Farmers were warned not to let their sheep drink the water supplies due to high fluoride levels.
700 people had to be evacuated due to the flooding caused from melting ice caps.	Roads around the volcano were shut down for a long time.
No one died in Iceland, but people had to wear masks due to the ash cloud.	Kenya's economy lost £2.8 million as it could not sell fresh fruit to Europe.

# **Essential knowledge: are primary effects more significant than secondary effects?**

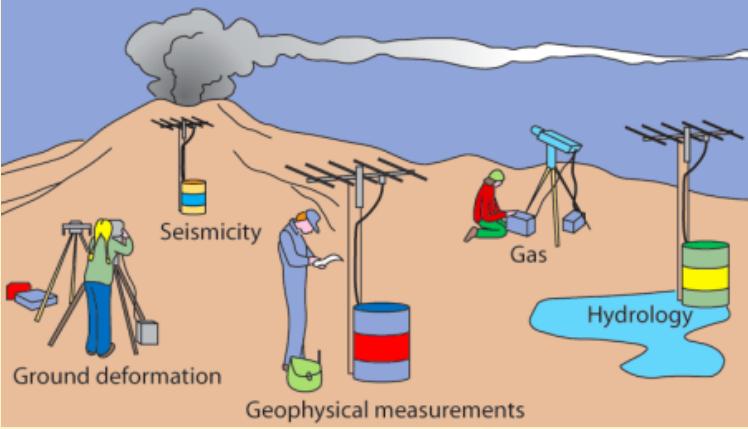
<b>Secondary effect in Africa</b>	<b>Why is the effect significant?</b>
People lost their business and jobs.	This is significant as it means people cannot earn money, to start rebuilding homes for example.
350,000 people were dependent on aid months after the eruption	This is significant as people were not able to be independent. If people were dependent on aid, this means for months after they did not have food, water and medical care.
Cholera spread because people did not have sanitation facilities.	This is significant as people should always have access to clean drinking water and showers, so they don't get ill.

<b>Primary effect in Africa</b>	<b>Why is the effect significant?</b>
Homes were destroyed by the lava flows	This is significant as people will not have a home to live in. It can be expensive and time consuming to rebuild homes.
45 people died in the first two days.	This is significant as volcanoes can be predicted, so people should be safe living near to volcanoes. No one should therefore die.
14 nearby villages were destroyed.	This is also significant as people in Goma would have to travel even further to be safe from the volcanoes way.

## **Thinking point**

- | Are there any reasons why primary and secondary effects of volcanic eruptions might not be so bad?
- | What do you think is worse, the primary or secondary effects? Why?

# Essential knowledge: How can the effects of volcanoes be reduced?

	<b>Monitoring</b>	<b>Prediction</b>	<b>Protection</b>
	<p><b>Monitoring:</b> Using equipment to look for warning signs.</p> 	<p><b>Prediction:</b> Looking at patterns to see when future events might occur.</p> <p>Minor earthquakes will normally occur before an earthquake.</p>	<p><b>Protection:</b> Designing buildings that are hazard-resistant</p>
Volcanoes	<ul style="list-style-type: none"><li>• Volcanoes will emit more gasses before they erupt.</li><li>• The ground will change shape as the magma chamber fills up (ground deformation).</li><li>• Water under the ground will move.</li></ul>		 <ul style="list-style-type: none"><li>• Volcano proof houses don't exist!</li><li>• Lava diversion channels and earth embankments can be used to divert magma away from important places like cities.</li><li>• Water cannon have been used to slow down the movement of lava in Iceland.</li></ul>

# Question Breakdown

<b>Identify...</b>	<b>Describe...</b>	<b>Explain how / why...</b>	<b>To what extent?</b>	<b>Do you agree?</b>
<b>1 mark</b>	<b>2 or 4 marks</b>	<b>2, 4 or 6 marks</b>	<b>6 marks / 9 marks</b>	
<p>This question requires you to identify a feature, process or characteristic. All you have to do is state the answer.</p> <p>E.G. Identify the magma chamber.</p>	<p>Make sure you say what you see!</p> <p>E.G describe the causes of a volcanic eruption.</p>	<p>Here, you have to show your knowledge as well as understanding. Say what you see and then explain why you can see it or why something is happening.</p> <p>Using the word “because” is crucial.</p> <p>Remember to check how many marks it is worth. That determines how many points you need to include.</p> <p>E.G. Describe the processes on a destructive plate margin.</p>	<p>These questions are asking if you agree, usually with a statement they provide.</p> <p>For example:</p> <p>‘Primary effects of a volcanic eruption are more dangerous than the secondary effects’ Do you agree with this statement?</p> <p>You have to agree and disagree for these questions, so explain how both primary and secondary effects are bad for the people, environment and the economy. You will need to include case study specifics to access Level 3 marks (7+). You also need a conclusion in which you decide which side of the argument you agree with and why.</p>	

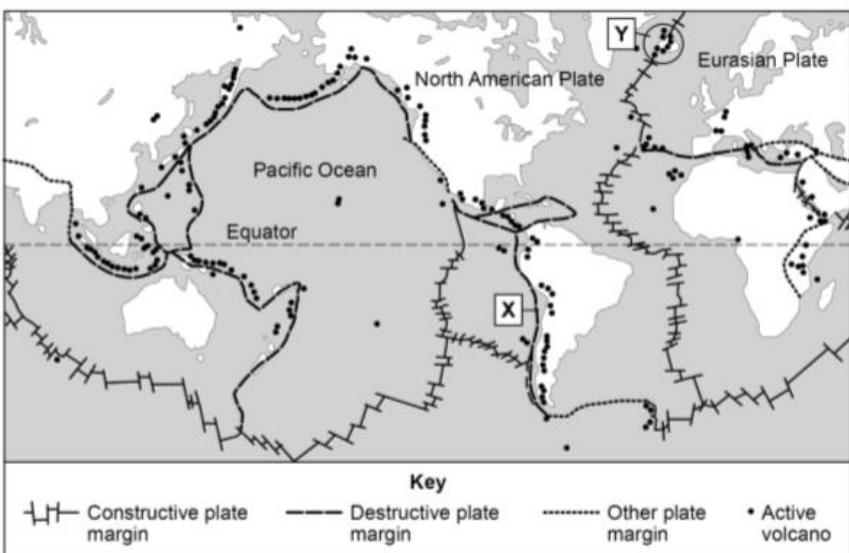
# Geography Genres



Genre	Recount	Describe	Explain	Evaluate	Justify
Definition	This requires you to recall key information	This is where you highlight in detail key processes or landforms, for example	Give reasons for processes and landforms	Explain the advantages and disadvantages of the response to a process	Make a decision and give your reasons or opinion for doing so
Useful tips	Use lots of key words	Include a number of examples using detailed evidence to support points	Use the word ‘because’ to provide reasons for the points made	Use the phrases, “this worked well because” or “this was important because”. Link your evaluation back to the original context.	Use knowledge you have gained to explain and give examples as to why you have made your decision.

Study **Figure 1**, a world map showing plate margins and active volcanoes.

**Figure 1**



## Skills Questions

**0 | 1 . 1** Using **Figure 1**, which **one** of the following statements is true?

Shade **one** circle only.

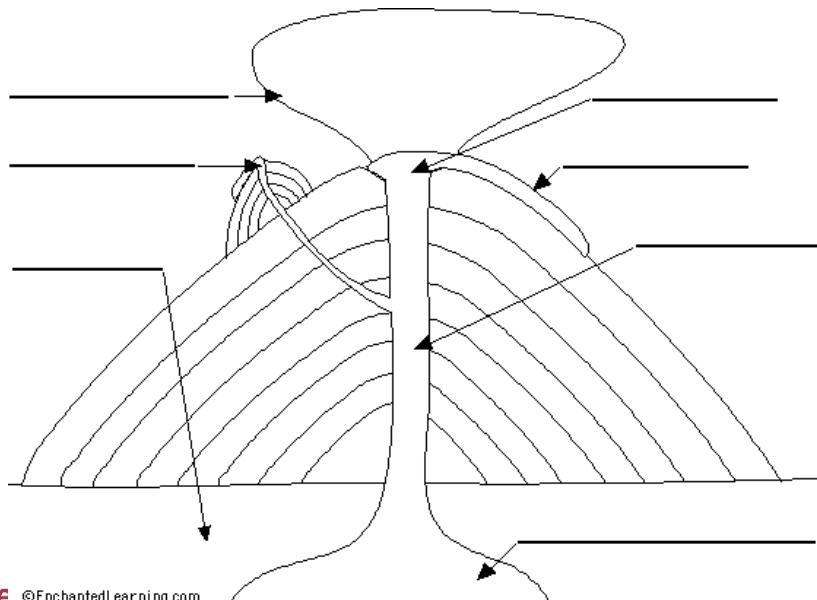
**A** All active volcanoes occur in lines along plate margins.

**B** There are more active volcanoes along constructive margins than destructive margins.

**C** There are many active volcanoes around the edge of the Pacific Ocean.

**D** Active volcanoes are found along the eastern side of North and South America.

[1 mark]



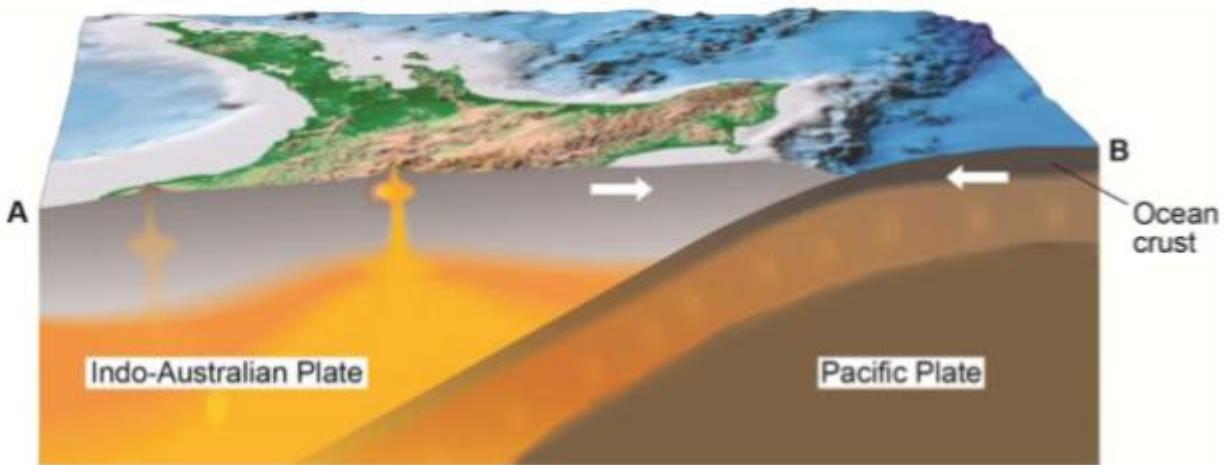
**Study figure 2, a cross section of a volcano.**

**Label the parts of the volcano. 7 marks.**

## Student Responses

**Study figure 2, a block diagram of a cross section of a tectonic plate boundary in New Zealand.**

Figure 2



**Using figure 2, explain why both volcanoes and earthquakes occur in New Zealand (6 marks)**

The following example has some good bits but is far from being great. How can it be improved?

- 1 The two tectonic plates will move toward each other due to convection currents in
- 2 the mantle below the earth's crust. As the two plates move towards each other,
- 3 friction builds up. The build of friction will create the earthquake. As the plates
- 4 melt, this creates magma full of gas. This gas and magma will force its way
- 5 through the plates, creating a volcano.

# **Choose a volcanic event you have studied in class.**

## **Assess the extent to which primary effects are more significant than secondary effects.**

### **(9marks + 3 SPaG)**

The following example has some good bits but is far from being great. How can it be improved?

- 1 The tectonic event I have studied is the eruption that occurred in Iceland in 2010.
- 2 The primary effects were very significant for the economy, as the volcano
- 3 erupted a huge amount of ash into the sky. The ash cloud stopped planes flying
- 4 all over Europe. This cost the airplanes company a lot of money.
- 5 The primary effects were also significant socially as many people had to be
- 6 evacuated. But some other volcanoes has worst secondary effects on the people
- 7 as no one died in Iceland.
- 8 The secondary effects were also significant on the economy all around the world.
- 9 Kenya lost a lot of trade, as it could not sell fresh fruit to Europe.
- 10 In conclusion, both the primary and secondary effects were very significant for
- 11 the economy in Iceland, and other countries in the world. The primary and
- 12 secondary effects on the people were not so significant.

# Articles for Wider Reading and Flipped Learning

1. BBC Bite size- The earths structure and tectonic plates.

<https://www.bbc.co.uk/bitesize/guides/zvhv4wx/revision/1>

2. Seneca learning- Select KS3 geography- chapter 8- Earthquakes and volcanoes.

<https://app.senecalearning.com/classroom/course/e076bd9c-75b6-4095-a600-d2a84b0dd81f/section/65d21d76-5850-4c5a-8114-4ab838d1822f/session>

3. BBC Bite size- A good website for an overview of the Nyiragongo volcanic eruption.

<https://www.bbc.co.uk/bitesize/guides/zvnbkqt/revision/3>

4. Geo Active Online- A fact file on the Nyiragongo earthquake

<https://www.queenelizabeths.derbyshire.sch.uk/wp-content/uploads/sites/5/2019/08/Geography-The-Nyiragongo-Volcano.pdf>

5. BBC Bite size- A good website for an overview of the Iceland Eruption

<https://www.bbc.co.uk/bitesize/guides/zpf9mnb/revision/8>

6. A geo fact file on the Iceland eruption 2010

[https://www.crawshawacademy.org.uk/Academic-Calendar-2018-19/Post\\_16\\_Bridging\\_tasks/Geography\\_264\\_volcano\\_A\\_Level.pdf](https://www.crawshawacademy.org.uk/Academic-Calendar-2018-19/Post_16_Bridging_tasks/Geography_264_volcano_A_Level.pdf)