



INTRODUCTION TO TECTONIC HAZARDS

INTRODUCTION TO TECTONIC HAZARDS

- If you have not studied tectonic hazards at GCSE, BBC Bitesize is a good starting point to work through before you complete the activities :

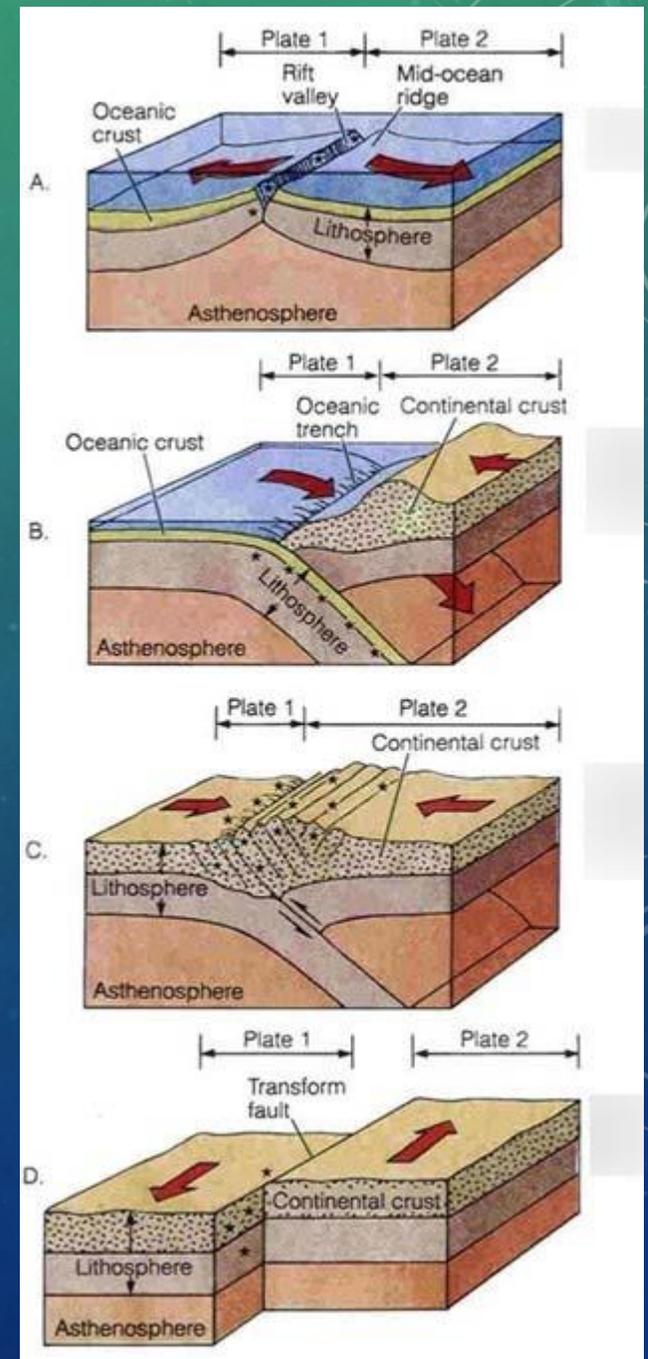
<https://www.bbc.co.uk/bitesize/guides/zwcfxsg/revision/1>

- Tectonic hazards are those caused by earthquakes and volcanoes
- They are only hazards when they affect peoples lives, or livelihoods, if no one is affected it is a natural event



PLATE TECTONICS

- Tectonic hazards mainly occur close to the world's plate boundaries
- There are 4 main types of plate boundary as show in the diagrams:
 - I. Constructive (A)
 - II. Destructive (B)
 - III. Collision (C)
 - IV. Conservative (D)
- At each type of plate boundary the crustal plates are moving in different directions
- This causes a range of different processes and landforms



TASKS

Complete questions 1 to 4 on the worksheet

Tectonic Hazards

1. There are lots of features and processes you should be aware of from GCSE. Complete this key term mix and match to help refresh your memory of them.

Term	Definition
Diverging plate margin	The point on the Earth's surface directly above the focus of an earthquake.
Converging plate margin	A fast-moving current of hot gas, ash and volcanic tephra which moves down volcano at around 100 km/h.
Conservative plate margin	The solid outer part of the Earth, combining the crust and the upper mantle.
Seismometer	The point inside the Earth's crust where the pressure from an earthquake is released.
Magnitude	The area of the mantle where a descending plate <u>melts</u> .
Pyroclastic flow	A series of waves generated by an undersea earthquake, volcano or tsunami which have a very long wavelength and so surge onshore when they reach the coast rather than breaking.
Lahar	Where two plates move away from each other, magma is able to reach the surface, creating new crust.
Magma	The part of the mantle, below the lithosphere, where the rock is semi-molten.
Liquefaction	Where plates move past each other. Tend to be characterised by the build-up of pressure.
Epicentre	An instrument used to measure the movement of the ground.
Focus	Rock fragments that are ejected from a volcano. If they are more than 64 mm, they are called bombs or blocks.
Tsunami	Points within the middle of a tectonic plate where plates meet and erupt.
Lithosphere	When two plates move together, crust is either destroyed (if one plate is oceanic crust) or thrust upwards as fold mountains (if continental plates meet).
Asthenosphere	The amount of energy released by a tectonic event.
Convection currents	A violent mudflow or debris flow made from a volcano, as well as soil and vegetation, which is ejected from the volcano.
Hotspot	The change of surface rocks and soil from an earthquake.
Subduction zone	The movement of hot material in the mantle then starts to cool and return towards the surface as plates to move.
Tephra	Molten, liquid rock found below the Earth's surface.

2. In the table below, create a fully labelled diagram for each plate margin. There is a word box at the bottom; some of the words can be used more than once.

Plate margin	Diagram
Constructive	
Destructive	
Collision	
Conservative	

Keywords to include on the diagrams:
 subduction zone, magma chamber, earthquake foci, plate movement (needs an arrow), new land created, crust melting, rising magma, fold mountains, oceanic crust, continental crust, ocean ridge, rising magma, volcano, ocean trench, Benioff zone, convection currents

VOLCANIC EXPLOSIVITY INDEX

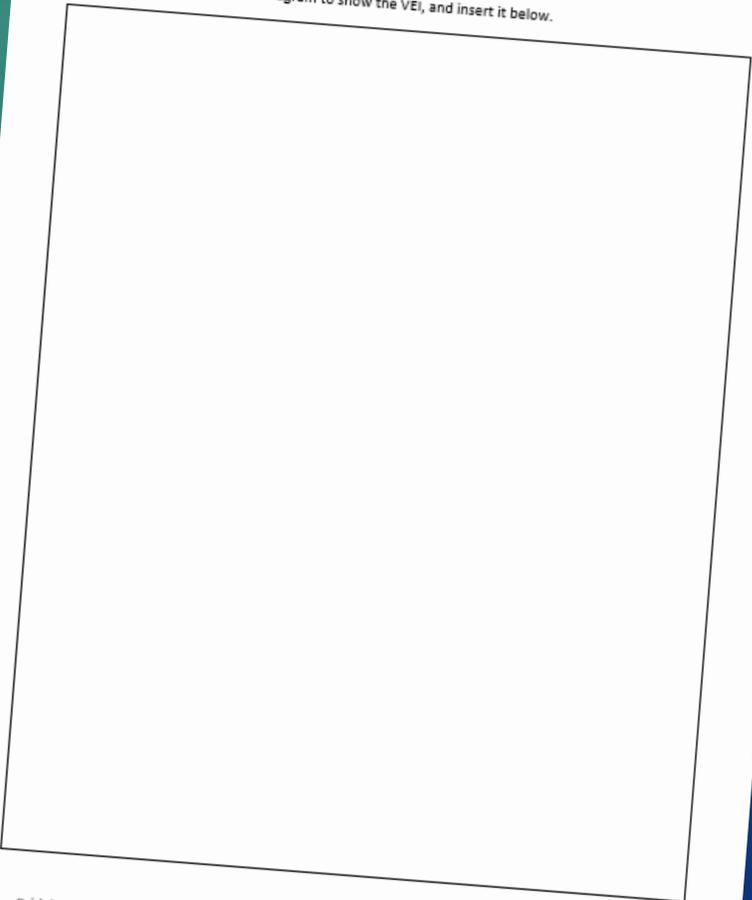
- Just like earthquakes can be measured by the Richter scale, volcanoes can be measured with the Volcanic Explosivity Index or VEI
- 0 is a non-explosive eruption and 8 is a highly explosive eruption
- The scale also looks at the amount of ash and tephra that is erupted, the height it reaches in the sky and how long the eruption lasts

Task: complete question 5 using the USGS website to find out more about the VEI

5. The volcanic explosivity index (VEI) is used to describe the magnitude of volcanic eruptions on a scale from 0 (non-explosive) to 8 (extremely large). In the twenty-first century, the largest eruption so far has scored 5 on the scale. This is a logarithmic scale (each level on the scale increases by a factor of 10). A number of factors are used to decide the scale:

- a. Volume of material ejected (if less than 10,000 m³ is ejected, it scores a 0 on the scale)
- b. The height that the ejected volcanic material reaches
- c. How long the eruption lasts
- d. Qualitative terms such as gentle, explosive

Use the USGS website to get a diagram to show the VEI, and insert it below.



Bridging the Gap: GCSE to A Level Page 5 of 7 © Zig Zag Education, 2020

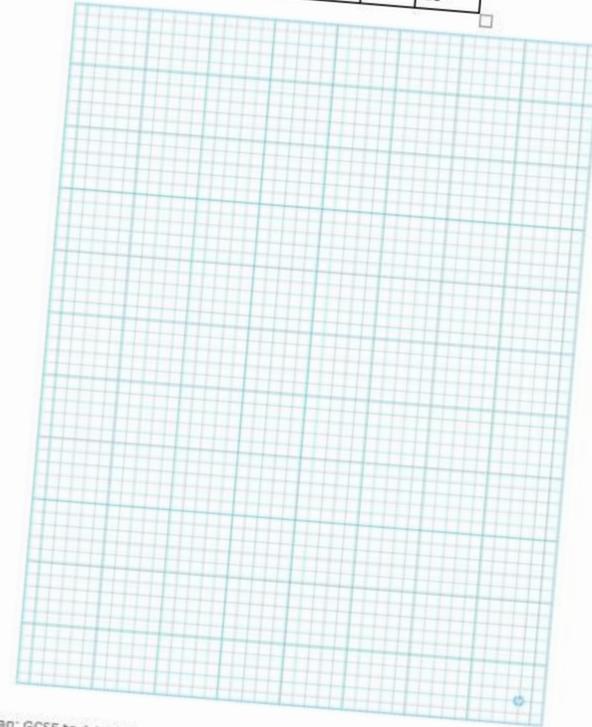
ANALYSING DATA

- You will be expected to be able to use techniques to analyse data and look for patterns or trends.
- This could be by presenting information on graphs or carrying out calculations such as mean, median or mode

Task: analyse the VEI information in question 6 to see if there is a link between how explosive an eruption is and how many people are killed

6. The table below shows the VEI index for some of the eruptions of the twenty-first century and the deaths they caused.
a. To see whether there is a correlation between VEI and death rate, scatter graph the results and look for a correlation

Location	VEI	Deaths
Mt Nyiragongo 2002	1	14
Chaitén 2008	4	1
Eyjafjallajökull 2010	4	0
Mt Merapi 2010	4	353
Puyehue-Cordón Caulle 2011	5	0
Mt Sinabung 2014	2	15
Mt Ontake 2014	3	63
Volcán de Fuego 2018	3	190
Anak Krakatoa 2018	3	426
Stromboli 2019	2	1
White Island 2019	2	21
Taal 2020	4	39



PRIMARY AND SECONDARY HAZARDS

- Primary tectonic hazards are those directly caused by the an earthquake or a volcano
- For a volcano this would be lava, gas or ash for example
- For an earthquake it would be the ground shaking
- Secondary hazards are those which result from a change in the environment caused by volcanoes or earthquakes
- For a volcano and an earthquake this could cause the secondary hazard of a tsunami
- Other secondary hazards of volcanoes are lahars (or mudflows) and floods
- Secondary hazards of earthquakes are landslides and liquefaction (when the ground becomes more fluid)

Lava flow in Iceland 2021



A building that has sunk in to the ground due to liquefaction



PRIMARY AND SECONDARY HAZARDS

Essay question task: complete question 7

To what extent do secondary hazards cause greater impacts than primary hazards? (12 marks)

Things to consider:

- *Discuss volcanoes and earthquakes (Remember tsunamis can be a secondary hazard of both these hazards.)*
- *How deadly are the different hazards?*
- *How frequently do the different hazards occur?*
- *Short-term or long-term impact?*

***Remember:** with a 'to what extent' question you must present both sides of the argument, but make sure you have an opinion; There really is no right or wrong answer to this question!*

Lava flow in Iceland 2021



A building that has sunk in to the ground due to liquefaction

