Volcanoes & tectonic plates

Lesson Map: http://esriaustralia.com.au/education/SpatialActivity13

Engage

Where do volcanoes occur?

➔ Click on the lesson map URL above to open the lesson map. It shows the global distribution of volcanoes.

? What do you notice about the distribution of volcanoes? *[They often occur in a line or chain]*

? Why are volcanoes distributed in this way? *[Plate boundaries]*

Explore

How are tectonic plates moving?

➔ In the Details pane, under the heading Content, tick the checkbox to turn on the layer called Plate Boundaries. Leave the World Volcanoes layer on.

➔ Open the Legend, and identify the type of plate movement at each boundary.

? Where do volcanoes most commonly occur? *[Along plate boundaries – specifically converging boundaries]*

? What is the anomaly to this trend? *[Some volcanoes occur in the middle of plates, away from boundaries]*

– Volcanoes that occur away from plate boundaries are called hotspot volcanoes. This results from high heat and low pressure at the base of the lithosphere, which results in melting rock. Magma rises to form a volcano.

Explain

How are volcanoes different?

➔ Open the Legend and investigate the different types of volcanoes.

- *Caldera volcanoes are large volcanic crates, caused by explosions, or the collapse*

Download student worksheet here.

Time
20 minutes

Activity
Investigate different types of volcanoes, and how volcanic activity is influenced by plate boundaries.

Learning Outcome
Students will be able to:

- Investigate spatial patterns of volcanic activity
- Understand the different types of volcanoes
- Analyse the relationship between different plate boundaries and the type of volcano that occurs there

ACARA Curriculum Link

Year 8 Geography – Unit 1: Landforms and landscapes

ACHGK048 | ACHGK053 | ACHGS057| ACHGS058 | ACHGS059

Year 9 Science – Earth and space sciences

ACSSU180 | ACSIS166 | ACSUS169 | ACSIS174

Senior secondary Curriculum – Earth and Environmental Science – Unit 1: Introductions to Earth systems

ACSES099 | ACSES098 | ACSES100 | ASES087 | ACSES089

of surface rock into a magma chamber below

- *Cinder cone volcanoes are the cone-shaped peaks with dramatic volcanic eruptions*
- *Composite volcanoes, or stratovolcanoes, are conical in shape and constructed from multiple eruptions*
- *Fissure vents erupt along several sites of a linear fracture. There is no explosive eruption, rather a 'curtain of fire'*
- *Shield volcanoes are broad, dome-shaped volcanoes. Eruptions are characterized by fluid lava, which contributes to the gentle sloping sides of the volcano*

➔ Open the Bookmarks tab, and select the Hawaiian Islands.

? Think about the characteristic of a volcanic hotspot. Why would this result in only shield and fissure vents? *[Both shield and fissure vents are characterized by a slower release of lava, which would cool to build island landmasses as the plate moves over the hotspot]*

? Click on the Bookmark to view Mauna Loa. What does the volcanoes shape imply about the type of eruption that occurred there? *[Broad peak suggests runny, low-viscosity lava that released slowly]*

? Click on the Bookmark to view Mt Rainier. What does the volcanoes shape imply about the type of eruption that occurred there? *[High peak implies a violent eruption of thick, viscous lava that has cooled quickly]*

Extend

Do volcanoes happen differently across different plate boundaries?

? Zoom into a divergent boundary. Where do volcanoes occur in relation to the boundary? *[Directly over the fault]*

? Zoom into a convergent boundary. Where do volcanoes occur in relation to the boundary? *[On one side only]*

➔ Using the search bar, find the Aleutian Islands. This chain of islands and volcanoes only occurs on the North-American side of the boundary, and not within the Pacific Plate.

? Why would this occur? *[At converging boundaries, the heavier plate subducts under the lighter plate. This creates a deep trench, which rises through the crust,*

Acknowledgements:

This lesson map uses data sourced from an Esri GeoInquiry.

Accompanying lesson material has been amended to align with the Australian National Curriculum.

Teacher Feedback:

To share your feedback on this, or any Spatial Activity, please contact education@esriaustralia.com.au

resulting in a series of volcanoes called a volcanic arc. Arcs create islands and continental mountain ranges.]

Next Steps:

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