

Lesson 2: Volcanoes (Physical Geography)

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Learning Objectives:

- Explore the physical geography of Japan.
- Know about and be able to name the Earth's layers.
- Explore how volcanoes are formed and why they erupt.

Curriculum Links:

National Curriculum in England for **Geography** KS1 and KS2:

- Place knowledge: Understand geographical similarities and differences through the study of physical geography of a region. Understand the processes that give rise to key physical geographical features of the world, how these are interdependent and how they bring about spatial variation and change over time.
- Describe and understand key aspects of physical geography (in the context of volcanoes).

National Curriculum in England for **Science** KS2:

- Properties and changes of materials: Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

National Curriculum in England for **Art** KS2:

- Ensure that all pupils become proficient in... sculpture and other art and craft techniques.

See the National Curriculum for further details:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/425601/PRIMARY_national_curriculum.pdf

Keywords:

Tectonic plates, crust, mantle, core, lava, seismic activity.

Resources:

Presentation: Volcanoes

Worksheet: Task 1 (True or False)

NB: In addition, you will need to provide the following resources for the erupting volcano activity:

Cardboard base, plastic bottles, newspapers, PVA glue, scissors, masking tape, paint and brushes, bicarbonate of soda, vinegar, washing up liquid, red food colouring. If you have limited time, see the paper cone alternative by National History Museum (link provided below).

Websites:

American Museum of Natural History's 'Plates on the Move' game:

<https://www.amnh.org/explore/ology/earth/plates-on-the-move2/game>

BBC Newsround: <https://www.bbc.co.uk/newsround/62289233>

Natural History Museum's Paper Cone Volcano: <https://www.nhm.ac.uk/discover/how-to-make-a-volcano.html>

Starter

- **Slide 1:** Remind pupils that in their previous lesson they learned the names of Japan's four main islands and capital city. Talk to your partner (TTYP): Can you still remember? Reveal answers on the screen.
- Explain that in today's lesson we will learn about a landmark on the island of Honshu. It is symbol of Japan, its tallest mountain, an iconic and sacred volcano – Mount Fuji.

Estimated Time: 2 minutes

Introduce Learning

- **Slide 2:** Introduce the Learning Objectives, explaining any key words as necessary. Explain that physical geography is the study of the Earth's natural features, such as rivers, mountains and oceans, etc. Mount Fuji is an important feature in Japan's physical geography for what it tells us about the geography of Japan as a whole. It is also important culturally and spiritually in Japan, as we will discover.
- **Slide 3:** Known as *Fujisan* or *Fujiyama* in Japanese, Mount Fuji is a volcano around 60 miles south-west of Tokyo. Even though it has not erupted in more than 300 years, it is still considered an active volcano. This is because it is in a region with lots of seismic activity. TTYP: What do you know about volcanoes? Allow pupils to share their knowledge with a partner, then ask for volunteers to feedback what they know.
- **Slide 4:** Mount Fuji is a sacred site for Japanese people - a place for pilgrimage, and a home for the spirits of ancestors and kami (the divine beings, spirits, or forces of nature of the Shinto religion).
- **Slide 5:** For centuries, Mount Fuji has inspired Japanese artists and writers, being the subject of poems, epic sagas and paintings, such as the famous Views of Mount Fuji by Katsushika Hokusai.
- **Slide 6:** Today, Mount Fuji and the surrounding area are popular destinations for hiking, camping and for people to enjoy being in the outdoors.

Estimated Time: 10 minutes

Task 1

- **Slide 7:** Send pupils to their tables with the Task 1 worksheet. Explain that they must discuss each statement in a small group to decide which they think are true and which are false. Ask groups to feedback their ideas and justify their answers.
- Reveal that each answer is true. Ask pupils if they are surprised by this. If so, what are they surprised by and why?

Estimated Time: 10 minutes

Extend Learning

- **Slide 8:** Explain that we know that Mount Fuji is a volcano, so now let's investigate what a volcano is and what Japan's volcanoes tell us about its geography.
- **Slide 9:** Use the illustration to show that the earth is made up of three different layers: the crust, the mantle and the core. A volcano is a vent, or hole, in the crust that releases lava, rock fragments and gases from the mantle.
- **Slide 10:** Say that most volcanoes form when tectonic plates, which are huge sections of the Earth's crust, collide, rub, or move apart from each other. When the plates collide, magma is squeezed out through the Earth's crust as lava, creating mountainous, volcanic regions. Because four different tectonic plates all meet at Japan, the Pacific, Philippine, Eurasian, and North American plates, this explains why Japan has so many volcanoes and why it has earthquakes so frequently.
- Visit the American Museum of Natural History's ['Plates on the Move'](#) game to see a map of the world's tectonic plates and highlight Japan's location at the convergence of multiple plates. Click on the marker above Japan on the map to explore how plates are moving there.
- **Slide 11:** Japan has over 100 active volcanoes, meaning 10% of the world's active volcanoes are in Japan. If you include non-active volcanoes, Japan has 440 volcanoes. While some, like Mount Fuji, have not erupted in hundreds of years, some erupt frequently. Japan's most active volcano is Sakurajima in southern Kyushu and there are frequent eruptions of various sizes.

- Watch the short BBC Newsround video and read the article about a Sakurajima eruption in July 2022.

Estimated Time: 10 minutes

Task 2

- Due to the need to let the papier-mâché dry and then allow the paint to dry, this activity will take several sessions. If you have limited time, see the simpler paper cone version (link provided under Resources heading) or prepare one model only to demonstrate the science experiment.
- **Slide 12 – Slide 17** Introduce today's task and show the resources needed. Pictures of each stage are in the presentation and step-by-step instructions are provided on the slide notes, as well as below. Please note that the resources you need will depend on whether you want each child to build their own volcano or if you will ask them to work in small groups building larger volcanoes. For the former, each child will need a 200ml bottle, while for the latter each group will need a 2l bottle.

Erupting Volcano - Step-by-Step Instructions

1. Cut out a base from corrugated cardboard. This can be any shape, although a circle lends itself well to recreating Mount Fuji. Sticky tape can be used instead of masking tape, but the papier-mâché might not attach so well.
2. Create the papier-mâché mixture by adding 1-part PVA to 2-parts water in a bowl. Prepare the newspaper by ripping into strips. Dip the paper strips into the glue mixture quickly to avoid getting them too wet and put on top of the volcano structure. Keep adding strips until the entire structure is covered with 2 or 3 layers of paper. Remind pupils not to cover the mouth of the bottle! Once the entire structure is covered and there are no gaps, leave until fully dry.
3. Next, paint the volcano. You might want to show pupils some images of Mount Fuji and challenge them to recreate what they see. Once painted, leave it to dry.
4. Conduct the eruption somewhere easy to clean up, like outside on the playground. The amount of bicarbonate of soda and vinegar you need for an effective eruption will depend on the size of the bottle used. Therefore, it is recommended to do a test run before doing the activity with your class to get the correct amount. As a guide, the correct measurements for a 200ml bottle are 1 tbsp

bicarbonate of soda, 1 tbsp washing up liquid (with 2 tbsp water added), ½ cup vinegar and 1 tbsp red food colouring.

5. First, combine the bicarbonate of soda and washing up liquid in a small bowl, then add the water and mix thoroughly. Pour this mixture into the mouth of the bottle. In a small cup, mix together the vinegar and food colouring. Then, when ready, pour the vinegar mixture into the bottle. Wait for the eruption and watch how the lava flows. If the class has made several volcanoes, you may want to experiment with different amounts of bicarbonate and vinegar and see how this effects the volcano's eruption.
- After the experiment ask pupils why they think the vinegar and bicarbonate of soda react in this way when they are mixed. Explain that we have created a chemical reaction by mixing an acid (vinegar) and an alkali (bicarbonate of soda). The vinegar causes the bicarbonate of soda to transform into water and carbon dioxide, a gas, which is released during the reaction to give the bubbling effect. The washing up liquid traps those bubbles so it flows over the volcano like real lava.

Estimated Time: Due to the need to let the papier-mâché and then the paint dry, this activity will take several sessions.