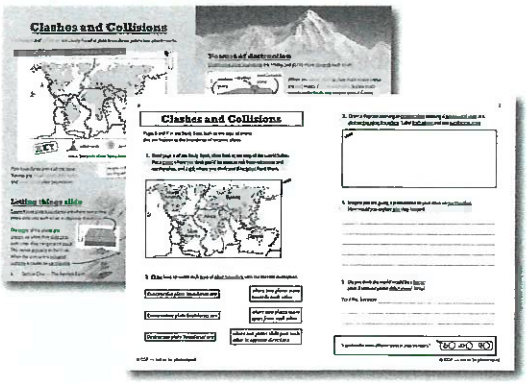
Clashes and Collisions

Study Book (pages 6-7)



Activity Book (pages 6-7)

National Curriculum Aims

Describe and understand volcanoes and earthquakes, including being able to:

- describe the different types of plate boundaries,
- understand how different types of plate boundary give rise to earthquakes and volcanoes,
- use maps to investigate the physical features of plate boundaries around the world.

Introduction

It can be difficult to visualise the different types of plate interactions, so it may be useful to do the first 'Extra Activity' (below) with pupils as you discuss the different types of boundaries.

Tectonic plates moving towards one another at destructive plate boundaries can create fold mountains. The pressure of the plates colliding causes the crust to fold and push upwards. This led to the formation of the Alps and the Himalayas, and is still happening in these mountain ranges today. (You can illustrate this process for pupils by pushing two towels towards each other on a flat surface and showing how they fold when they meet.)

Answers to Activity Book Questions

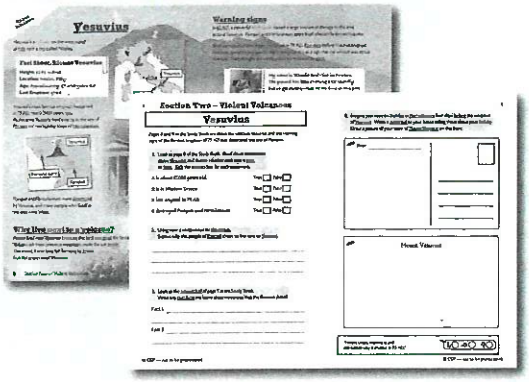
1. Cross — any appropriate answer, i.e. a place on a plate boundary with many volcanoes and earthquakes.
   Tick — any appropriate answer, i.e. a place that is far away from any plate boundaries.
2. Constructive plate boundaries are — where two plates move apart from each other.
   Conservative plate boundaries are — where two plates slide past each other in opposite directions.
   Destructive plate boundaries are — where two plates move towards each other.
3. Pupils' drawings should show a portion of the oceanic plate under the continental plate. Pupils should have labelled the point where the oceanic plate is forced under the continental plate as the subduction zone.
4. E.g. earthquakes happen when one tectonic plate slides past or collides with another one. As the plates move, they can get stuck. This causes pressure to build up. When the plates move again, this pressure is released suddenly, causing an earthquake.
5. Either yes or no with any appropriate explanation. E.g. *Yes, because* we would have fewer natural disasters as there wouldn't be earthquakes or volcanic eruptions.

Extra Activities

- Use two gym mats to demonstrate the types of plate boundary. For conservative boundaries, put the mats side by side and move them slowly in opposite directions. For destructive boundaries, move them towards each other, pushing one under the other as they meet (the subduction zone). For constructive boundaries, move the mats apart. Ask pupils to discuss how the movement of the mats relates to real plate boundaries.
- One piece of new evidence that supported the theory of plate tectonics was that climbers who reached the summit of Mount Everest in the 1950s and 1960s brought back rock samples that contained marine fossils. Using the information in the introduction, discuss with pupils why finding marine fossils at the top of Mount Everest supports the theory of plate tectonics. Pupils could write a diary entry in the character of a scientist from the 1950s who studied the rock samples, describing their feelings when they discovered that the rocks contained marine fossils.

Vesuvius

Study Book (pages 8-9)



Activity Book (pages 8-9)

National Curriculum Aims

Describe and understand volcanoes, including being able to:

- describe a volcanic eruption,
- understand what causes volcanic eruptions,
- understand that there are signs that can help scientists predict a volcanic eruption.

Introduction

Mount Vesuvius is a volcano that lies on the western coast of Italy, very close to the city of Naples. It has erupted many times, although its eruptions have varied greatly in size and impact. It last erupted in 1944, and is currently going through a quiet period — though it will almost certainly erupt again at some point in the future.

The eruption of Vesuvius in 79 AD is one of the most famous volcanic eruptions in history. It buried the nearby settlements of Pompeii and Herculaneum under a thick layer of ash and volcanic debris.

Answers to Activity Book Questions

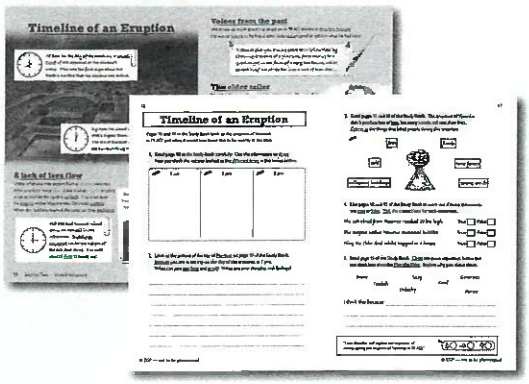
1. True — False — False — True
2. E.g. the people of Pompeii chose to live next to Vesuvius because the volcanic ash made the soil fertile / good for farming.
3. *Fact 1:* The movement of tectonic plates is what causes volcanoes.
   Fact 2: Some volcanoes, like Vesuvius, are on subduction zones (which can cause a build up of magma and then an eruption).
4. Any appropriate answer and drawing. Their postcard should reference the small earthquakes that occurred in the days leading up to the eruption. They could also talk about what makes Herculaneum a good holiday town, or mention that the land around Vesuvius was used for farming. Their picture should show a gently sloping mountain, like the pictures on page 8 of the Study Book. It might include buildings or fields to show the towns and farmland nearby. It should not show the volcano erupting.

Extra Activities

- Provide pupils with photos of other volcanoes in Italy, e.g. Etna, Stromboli and Vulcano, and ask them to plot these on a map. Ask pupils to make a poster about one of these volcanoes. They could include a timeline of its eruptions, the type of material it erupts and whether it is active or dormant. Pupils could also note how it has affected the people who live nearby, such as the benefits of tourism or damage from an eruption.
- Show pupils an online video of the newsreels showing the eruption of Vesuvius that occurred in 1944 and then ask them to write a newspaper article about the event. They could include eye-witness accounts, scientific explanations, or the eruption's relevance to the Second World War.
- Talk to pupils about the fact that Pompeii was a prosperous city, full of shops selling locally grown food and crafts. Ask pupils to imagine that they are shopping in the city on the day before the eruption. Divide the class into small groups to role play a shopkeeper and customers who are experiencing the minor earthquakes before the eruption of Vesuvius. What might they say to each other about the earthquakes? Would they be scared or worried? Would the shopkeeper be worried about their shop?

Timeline of an Eruption

Study Book (pages 10-11)



Activity Book (pages 10-11)

National Curriculum Aims

Describe and understand volcanoes, including being able to:

- describe the effects of a volcanic eruption,
- describe and understand the timeline of an eruption.

Introduction

This topic uses a contemporary eye-witness account to describe the sequence of events that took place during the eruption of Vesuvius in 79 AD.

After teaching pupils about Pliny the Younger's letters, you could discuss with them if they think these letters are a trustworthy source for information about the eruption, or if there is any reason why they may be limited in their reliability and/or usefulness.

Answers to Activity Book Questions

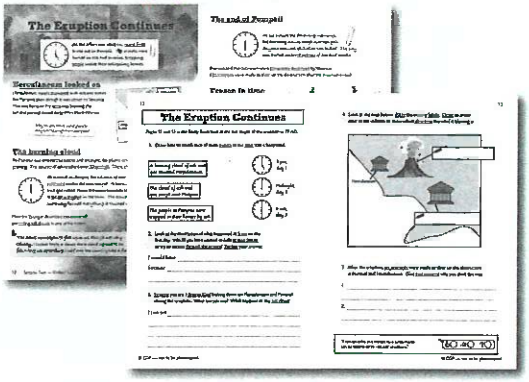
1. Any appropriate drawings relating to the descriptions on page 10 of the Study Book.
2. Any appropriate answer drawing on information from the Study Book and pupils' own ideas. E.g. they might talk about being able to see the huge ash cloud over Vesuvius, the sky going dark, smelling smoke or ash, and hearing the volcano rumbling. They might say they would feel scared, or wonder if the Gods were angry.
3. Pupils should have coloured: fires, collapsing buildings, toxic fumes.
4. True — True — False
5. Any three adjectives with an appropriate explanation.

Extra Activities

- During the eruption, houses collapsed under the weight of the ash and rock. Show some images of houses in Pompeii, pointing out the key features of their structures (e.g. pillars, central courtyard). Challenge pupils to make the strongest model building possible in groups of four, using only six sheets of A4 paper and sticky tape. Test how strong the models are by carefully pouring different amounts of sand over them.
- Read pupils the extract below from the letters of Pliny the Younger as he witnessed the eruption of Vesuvius: "*The sea seemed to roll back upon itself, and to be driven from its banks by the convulsive motion of the earth; it is certain at least the shore was considerably enlarged, and several sea animals were left upon it. On the other side, a black and dreadful cloud, broken with rapid, zigzag flashes, revealed behind it variously shaped masses of flame...*" Ask pupils to draw, paint or make models to illustrate this description.
- Read pupils the extract below from the letters of Pliny the Younger: "*My mother now besought, urged, even commanded me to make my escape at any rate, which, as I was young, I might easily do; as for herself, she said, her age and corpulency rendered all attempts of that sort impossible; however, she would willingly meet death if she could have the satisfaction of seeing that she was not the occasion of mine.*" Ask pupils to create a short drama about this story and perform it for their classmates.

The Eruption Continues

Study Book (pages 12-13)



Activity Book (pages 12-13)

National Curriculum Aims

Describe and understand volcanoes, including being able to:

- describe the effects of a volcanic eruption,
- understand that a settlement can be destroyed by a volcanic eruption.

Introduction

The eruption of Vesuvius in 79 AD buried Pompeii in over 5 metres of ash and rubble and Herculaneum in 20 metres, preserving them exactly as they were at the time of the eruption. Because of this, modern excavations of them have given archaeologists lots of information about what life was like in Italy during the Roman Empire.

Answers to Activity Book Questions

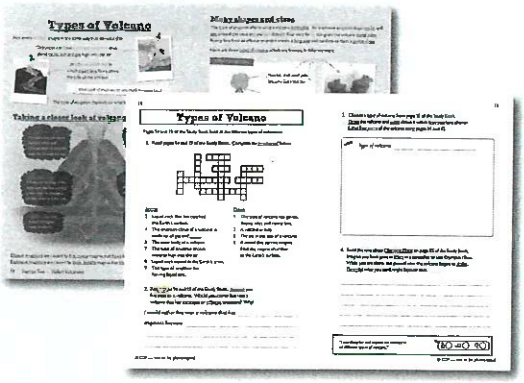
1. A burning cloud of ash and gas covered Herculaneum. — Midnight, day 2
   The cloud of ash and gas swept over Pompeii. — 6 am, day 2
   The people in Pompeii were trapped in their homes by ash. — 5 pm, day 1
2. Any appropriate answer. E.g. *I would have* tried to escape through the streets *because* I wouldn't want to get trapped in my house. / *I would have* stayed in my house *because* I'd want to avoid falling pumice stones.
3. Any appropriate answer relating to the ash cloud falling over Herculaneum and then Pompeii.
4. *From top to bottom:* Vesuvius, Pompeii.
   The arrow to show the direction of the wind should point south-east (from Vesuvius towards Pompeii).
5. Any appropriate answers. E.g. everyone was killed so there was no one left to clear up the destruction / there was too much damage.

Extra Activities

- Explain to pupils that some of what we know about life in Pompeii comes from signs and graffiti found on the walls of buildings around the city. Challenge them to use a beginners' Latin book or the internet to learn how to say some basic phrases in Latin. For example, challenge them to learn how to say "Hello. My name is _____ and I am _____ years old." Then ask them to introduce themselves to a friend in Latin.
- Show the class aerial photographs of the ruins of Pompeii and Herculaneum and discuss what the buildings were used for (e.g. temples, theatres, shops, baths and houses). You could show the pupils artefacts that were found in some of the buildings to provide clues. Pupils could label what the different buildings were for on maps of the two settlements, or make their own models of objects that were found in the buildings.
- Pupils could create a drama or dance about the destruction of Pompeii. They could begin by doing everyday activities such as shopping or talking with friends. Then the volcano erupts, the ash cloud rises into the sky and pumice stones start to fall. Ask the pupils how they would feel about the events happening around them and how they would respond. The performance could be set to music and may be in slow motion so pupils can focus on expressing their emotions through facial expressions and body movements.

Types of Volcano

Study Book (pages 14-15)



Activity Book (pages 14-15)

National Curriculum Aims

Describe and understand volcanoes, including being able to:

- describe the key features of a volcano,
- describe different types of volcano,
- understand how volcanoes are formed.

Introduction

Before teaching this topic, you could ask pupils whether they've seen any volcanoes in real life or in documentaries. If they have, get them to describe what shape the volcanoes were and/or what happened when how they erupted.

As there is a lot of new vocabulary on these pages in the Study Book, it might be useful to familiarise pupils with the key words before starting the Activity Book pages.

Answers to Activity Book Questions

1. Across: 2 Lava, 4 Ash, 5 Cone, 7 Explosive, 8 Magma, 9 Effusive.
   Down: 1 Shield, 3 Vesuvius, 5 Crater, 6 Vent.
2. Any appropriate answer. E.g. *I would rather live near a volcano that has* explosive *eruptions because* I wouldn't have to worry about the lava flow.
3. Any appropriate drawing of a stratovolcano, shield volcano or a cinder cone with four correct labels.
4. Any appropriate account. E.g. Lava starts to flow down the sides of Olympus Mons from its crater. The lava is hot and runny because Olympus Mons is a shield volcano. The lava is flowing quickly towards us so we get back in the spaceship and set off again, just as the lava reaches the place where we landed.

Extra Activities

- Pumice is formed when lava filled with bubbles of volcanic gas is cooled quickly. Put pupils in small groups and give them a pumice stone to observe closely with a magnifying glass. Ask them to sketch the stone and make predictions about: a) how much it weighs, b) whether it will float on water, and c) how hard it is (can it be scratched by other hard objects?). Then get them to test their predictions.
- In small groups, pupils could make a papier-mâché volcano. To do this, take an empty 500 ml plastic bottle and put it in the centre of a square of thick cardboard. Scrunch up some newspaper and place it around the bottle in a cone shape, using masking tape to keep the newspaper in place. Cover the whole structure with papier-mâché, then leave it to dry. Paint with acrylic paint and then cover with a clear, waterproof varnish. To make the lava, put four teaspoons of bicarbonate of soda in the bottle and add 150 ml of warm water mixed with red food colouring. Add vinegar to make the volcano erupt. Make sure to leave plenty of space around the volcano for the 'lava' to flow into. (Video demonstrations of this process can be found online.)
- Get pupils to research volcanic activity on other planets and moons in our solar system (examples with either past or current volcanic activity include Mars, Venus, Io, Triton and Enceladus). Split pupils into groups and give each group one planet or moon to investigate. They could finish by giving short presentations to the rest of the class, describing the planet or moon they were investigating, including whether its volcanoes are active or extinct and what is/was released during the eruptions.