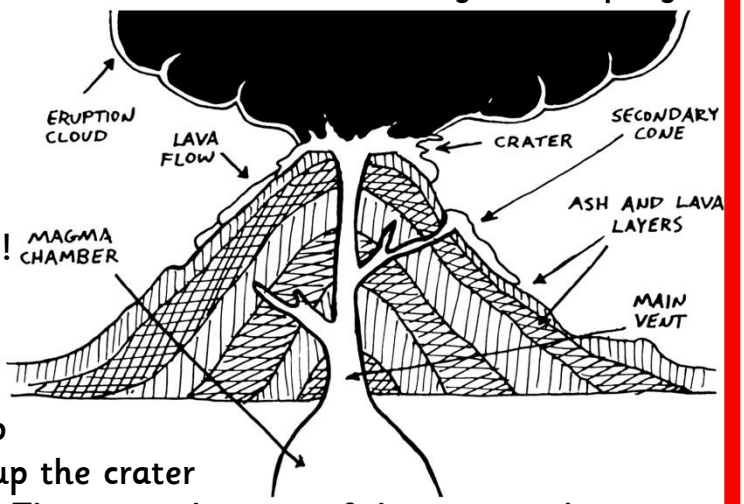
Beginner

Volcanoes

Active Volcanoes

There are 500 active volcanoes around the world. This means that they could erupt at any time! 60 will erupt each year! 10 volcanoes could be blowing their top right now!

Erupting Volcanoes



Why does this happen? Deep below the ground it is hot. So hot it can melt rock! This melted rock is called magma. Volcanoes happen when magma finds gaps in the Earth's surface. It collects inside the magma chamber. This is deep below the volcano. The magma moves up the crater pipe, and pushes its way to the surface. Then it gushes out of the vent at the top. When magma hits the surface we call it lava.

Types of Volcanoes

Not all volcanoes erupt in the same way! Some make a hot, runny lava that runs down the sides of the volcano. Some shoot hot ash, lava and rocks high into the air. Some have tall slopes with a crater on the top. These make big explosions! Lava, rock and ash explode out of the volcano.

Deadly Volcanoes

Volcanoes can be deadly! Lava flows can knock down buildings and set fire to things. Ash can cover the land and make it hard to breathe. Gas gets blasted out and makes the air poisonous. Mudflows slide down the slopes, ripping houses and trees from the ground.

Dormant and Extinct Volcanoes

Not all volcanoes are about to erupt. Dormant volcanoes are said to be sleeping, but they could erupt again. Extinct volcanoes have not erupted for a very long time.

Powerful Volcanoes

Beginner

Just one volcano can affect the whole planet. In 1815, a volcano in Indonesia erupted. This volcano sent gas and ash shooting high into the air. Wind spread the gas and ash around the world. The lack of sun made it hard for plants to grow. Lots of people died because there was no food.

Measuring Volcanoes

Scientists can tell if a volcano is about to erupt. Special equipment is used to help them. It can measure how much gas is building up inside a volcano. They also check for vibrations in the ground. We cannot stop volcanoes erupting, but if we know it is about to happen, people have time to escape.

Helpful Volcanoes

Lots of people live near active volcanoes. They face danger at all times! These people know how to use volcanoes to make their lives better. They grow crops in the rich volcanic soil. The heat from the ground is used to power and warm their homes. Lots of people come to visit famous volcanoes. This makes jobs for the local people.

Did You Know?

Lava erupts at temperatures of up to 1200°c.
There are even volcanoes under the sea!
Volcanoes have been discovered on Venus and Mars.

Glossary

crater pipe	a tube connecting the magma chamber to the surface
magma chamber	hollow space under the ground where magma collects
vent	an opening in the Earth's surface allowing molten rock and gas to escape
vibrations	a shaking movement from side to side

Sue Chattoe

Beginner

Volcanoes

How many active volcanoes are there around the world? (AF2)

What is magma? (AF2)

Why are lava flows dangerous? (AF2)

A. They make the air poisonous.

B. They make it hard to hard to breathe.

C. They knock down buildings and set fire to things.

Name one way a volcano can help the people who live by them. (AF2)

Would you like to live by a volcano? Explain your answer. (AF6)

What is the job of a glossary? (AF4)

Beginner

Volcanoes

How many active volcanoes are there around the world? (AF2) There are 500 active volcanoes around the world.

What is magma? (AF2) Magma is melted rock.

Why are lava flows dangerous? (AF2)

A. They make the air poisonous.

B. They make it hard to hard to breathe.

C. They knock down buildings and set fire to things.

Name one way a volcano can help the people who live by them. (AF2) The soil is good for growing crops. The hot ground can heat and power homes. Tourists bring money to the area.

Would you like to live by a volcano? Explain your answer. (AF6) Various answers. Encourage children to link answers to information they have read in the text.

What is the job of a glossary? (AF4) A glossary explains the meaning of tricky words.

Easy

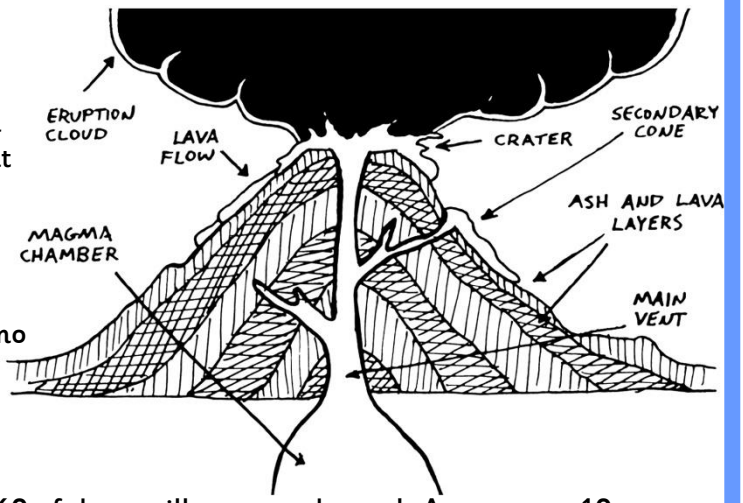
Volcanoes

What is a Volcano?

A volcano is an opening on the Earth's surface, where liquid rock shoots out from under the ground. They can appear as cone-shaped mountains or as wide sloping hills. There are even volcanoes under the sea! Volcanoes have helped to shape much of the Earth's surface.

Why do they happen?

The ground beneath your feet is not as solid as you would think! The surface of the Earth is like a giant 3D jigsaw puzzle. These enormous puzzle pieces fit together tightly. Deep below the ground it is hot, hot enough to melt rock! Melted rock is called magma. When a gap appears between the puzzle pieces, the magma can bubble through and a volcano is born.



Why do volcanoes erupt?

There are 500 active volcanoes around the world! 60 of these will erupt each year! As many as 10 volcanoes could be blowing their top right now! An eruption happens when magma collects inside the magma chamber. This is found deep below the volcano. The magma moves up the crater pipe, then forces its way to the surface. Then it gushes out of the vent at the top. When magma hits the surface it is called lava.

Are all volcanoes the same?

Volcanoes erupt in different ways! Shield volcanoes make a hot, runny lava. This flows from the volcano's vents and pours over a big area. This makes volcanoes which have gentle slopes. When a cinder cone volcano erupts, hot ash, lava and rocks shoot high into the air. Cinder cone volcanoes have tall, steep slopes with a crater on the top. A stratovolcano is made by big, blasting explosions. Lava, rock and ash explode out of the volcano. These layers coat the sides of the mountain.

Why are volcanoes so deadly?

Lava flows – These are very dangerous. They knock down buildings, bury objects and set light to things. Most lava flows move slowly, so people and animals have a good chance of escaping.

Ash – This settles like snow over large areas. It makes it hard for people and animals to breathe.

Gas – Dangerous gases get blasted out of an erupting volcano, harming people, plants and animals.

Lahars – These mudflows slide down the slopes, ripping houses and trees from the ground.

Pyroclastic flow – This flow of boiling gas and ash moves at terrifying speeds. It destroys anything that gets in the way.

Active, dormant or extinct?

If a volcano is about to erupt, or is actually erupting now, we say that it is active. Dormant volcanoes are said to be sleeping, but they could erupt again. Extinct volcanoes have not erupted for a very long time.

Easy

How deadly can a volcano be?

It is hard to believe, but just one volcano can affect the whole planet. In 1815, a volcano in Indonesia erupted. This volcano sent gases and ash shooting high into the air. Wind helped to spread the gases and ash around the world. The lack of sun made it very hard for plants to grow. Thousands of people died from lack of food or illness.

Can we tell when a volcano will erupt?

Scientists who study volcanoes have a special name. They are called volcanologists. They use equipment to tell them if an eruption is about to happen. They measure how much gas is building up inside a volcano. They also check for vibrations in the ground. Old lava flows can tell scientists how big past eruptions were, and when they happened. We cannot stop volcanoes erupting but if we know it is about to happen, people can escape to safety.

Lots of people live near active volcanoes. They could face danger at any time! These people have learned to use volcanoes for their own good. They grow crops in the rich volcanic soil. The heat from the ground is used to power their homes. Water is pumped into the ground, and the hot rocks heat it up. The hot water is used to keep homes warm, and the steam is used to make electricity. Volcanoes can also bring lots of visitors to an area. The Roman city of Pompeii, where Mount Vesuvius erupted in AD 79, attracts lots of visitors a year. This provides jobs for the local people.

Did you know?

Lava erupts at temperatures of up to 1200°c.
Volcanoes have been discovered on Venus and Mars.
Mount Etna in Italy is Europe's highest active volcano.

Glossary

crater pipe	a tube connecting the magma chamber to the surface
magma chamber	hollow space under the ground where magma collects
vent	an opening in the Earth's surface allowing molten rock and gas to escape
vibrations	a shaking movement from side to side

Sue Chattoe

Easy

Volcanoes

How many active volcanoes are there around the world? (AF2)

What is magma? (AF2)

Why are lava flows dangerous? (AF2)

A. They make the air poisonous.

B. They make it hard to hard to breathe.

C. They knock down buildings and set fire to things.

What is this ? called? Why is it used? (AF4)

What is the name of a scientist who studies volcanoes? (AF2)

Name one way a volcano can help the people who live by them. (AF2)

Would you like to live by a volcano? Explain your answer. (AF6)

What is the job of a glossary? (AF4)

Easy

Volcanoes

How many active volcanoes are there around the world? (AF2) There are 500 active volcanoes around the world.

What is magma? (AF2) Magma is melted rock.

Why are lava flows dangerous? (AF2)

A. They make the air poisonous.

B. They make it hard to hard to breathe.

C. They knock down buildings and set fire to things.

What is this ? called? Why is it used? (AF4) A question mark. So we know that a question is being asked and an answer is needed.

What is the name of a scientist who studies volcanoes? (AF2) A volcanologist.

Name one way a volcano can help the people who live by them. (AF2) The soil is good for growing crops. The hot ground can heat and power homes. Tourists bring money to the area.

Would you like to live by a volcano? Explain your answer. (AF6) Various answers. Encourage children to link answers to information they have read in the text.

What is the job of a glossary? (AF4) A glossary explains the meaning of tricky words.

Tricky

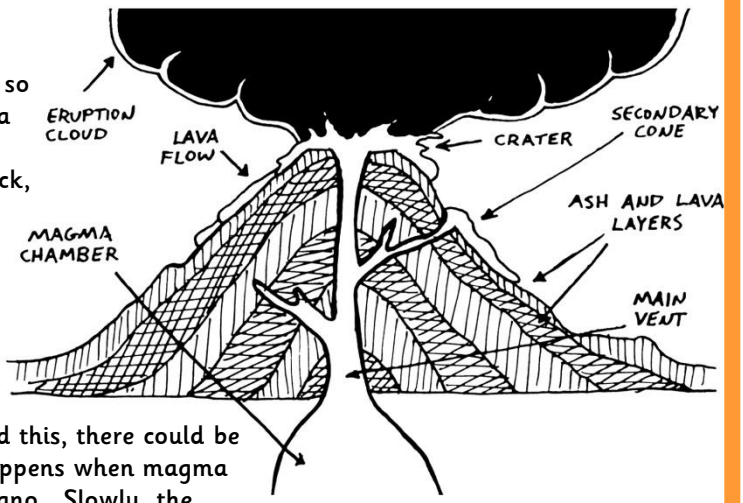
Volcanoes

What is a Volcano?

A volcano is an opening on the Earth's surface, where liquid rock shoots out from under the ground. They can appear as cone-shaped mountains or as wide sloping hills, some even occur under the sea. Volcanoes have helped to shape much of the Earth's surface.

Why do they happen?

Is the ground beneath your feet solid? You would think so wouldn't you! However, the surface of the Earth is like a giant 3D jigsaw puzzle. These enormous puzzle pieces, known as tectonic plates, fit together tightly. Melted rock, called magma, forms under this layer and when a gap appears between the pieces (plates) the magma is able to bubble up through the gap, as a volcano.



Why do volcanoes erupt?

There are 500 active volcanoes around the world and about 60 of these will erupt each year. Even as you read this, there could be at least 10 volcanoes blowing their top! An eruption happens when magma collects inside the magma chamber, deep below the volcano. Slowly, the pressure builds up and the magma rises up the crater pipe to the surface. Eventually it gushes upwards, forcing its way out. Once magma has escaped the volcano, it is called lava.

Did you know that not all volcanoes are the same?

What kind they are, depends on how they erupt! Shield volcanoes produce a hot, runny lava, which flows from the volcano's vents. The lava spreads over a wide area, helping to create a gently sloping volcano. When a cinder cone volcano erupts, hot ash, lava and rocks shoot high into the air, creating tall, steep slopes with a crater on the top. A stratovolcano is made by big, blasting explosions. Lava, rock and ash explode out of the volcano, coating the sides of the mountain.

So what makes a volcano so deadly?

Lava flows – These are extremely dangerous. They can knock down buildings, bury objects and set light to things. However, most lava flows travel slower than walking pace, so people and animals have a good chance of escaping.

Ash – This can be deadly. It feels like finely crushed glass, and is often scorching hot. This settles over large areas, making it difficult for people and animals to breathe.

Gas – Dangerous gases get blasted out of an erupting volcano, creating a poisonous environment.

Lahars – These devastating mudflows are caused by hot volcanic materials mixing with water, snow or ice on volcanic slopes. They slide down the slopes, ripping houses and trees from the ground.

Pyroclastic flow – When large amounts of ash and gas explode out of the volcano, deadly pyroclastic flows can occur. Temperatures inside the flow can reach hundreds of degrees Celsius. These deadly flows of boiling gas and ash, travel at terrifying speeds, destroying everything in their path.

Active, dormant or extinct?

An active volcano is one which is erupting now, or seems likely to erupt soon. Scientists say that an active volcano must have erupted during the last 10,000 years. A dormant volcano could be described as sleeping, because it is still active, but not erupting at the moment. If a volcano has not erupted during the last 10,000 years, then it can be called extinct, however experts can't be completely sure that it will never erupt again!

Tricky

How deadly can a volcano be?

It is possible for just one volcano to have a big impact on the Earth and its climate. The eruption of Tambora, a volcano in Indonesia, is a good example of this. In April 1815, Tambora erupted. The ash column from Tambora reached a height of 43 kilometres. Wind helped to spread the ash and gases around the world. The following year, 1816, was known as 'the year without a summer'. The lack of sun and harsh conditions made it very difficult for crops to grow. Thousands of people died from lack of food or illness.

Can the power of an eruption be measured?

The power of an eruption is measured on the VEI scale. This stands for Volcanic Explosivity Index. Scientists measure the amount of material erupted from a volcano, and the height of the ash column. The VEI scale is made up of 8 stages in total, with stage 1 being a 'gentle' eruption and stage 8 being classed as a 'mega colossal' eruption! Scientists believe that a VEI 8 eruption happens once every 100,000 years. These are called super-eruptions! The last super-eruption happened over 74,000 years ago, when the eruption of Toba, in Indonesia, nearly ended all human life. So when and where will the next super-eruption happen? Yellowstone National Park in the USA may be next! It has seen three super-eruptions over the last two million years!

Can we predict when a volcano will erupt?

Scientists who study volcanoes are called volcanologists. They use special equipment to measure how much gas is building up inside a volcano. This can warn them that an eruption is about to happen. Scientists also measure vibrations in the ground, which occur just before an eruption. The study of old lava flows help provide evidence of how large past eruptions were, and how often they occurred. Scientists cannot prevent volcanoes from happening, but they can predict when a volcano might erupt and with what force, helping people to escape in time!

Can volcanoes help us?

Millions of people live near active volcanoes. They live with the constant threat of an eruption occurring at any time. However, there are many benefits to living close to a volcano. Volcanic soil is ideal for growing crops. The heat from the ground can also be used to power homes. Power stations pump water into the ground, allowing the hot rocks to heat it up. The hot water is used to heat homes, whilst the steam is used to generate electricity. This power source is used very successfully in Iceland. Volcanoes can also boost tourism in an area. The Roman city of Pompeii, buried during the eruption of Mount Vesuvius in AD 79, attracts 2.5 million tourists a year, providing lots of jobs for local people.

Did you know?

Lava erupts at temperatures of up to 1200°c.
About 60 million years ago, an underwater volcano poured out so much lava it made new land - we know this land as Iceland!
Volcanoes can even be found in space! Astronomers have discovered volcanoes on Venus and Mars.
Mount Etna in Italy is Europe's highest active volcano.

Glossary

climate	the weather conditions in an area over a long period of time
crater pipe	a tube connecting a magma chamber to the surface
generate	to produce or create
magma chamber	hollow space underground where magma collects
poisonous	a substance capable of causing illness or death
vent	openings in the Earth's surface that allows molten rock and gases to escape

Sue Chattoe

Tricky

Volcanoes

What is the surface of the Earth like? (AF2)

How many active volcanoes are there around the world? (AF2)

What is magma? (AF2)

Are all volcanoes the same? (AF3)

Why are lava flows dangerous? (AF2)

A. They make the air poisonous.

B. They make it hard to hard to breathe.

C. They knock down buildings and set fire to things.

How did the volcano Tambora, manage to affect so much of the Earth? (AF3)

What is a VEI 8 eruption classed as? (AF2)

What is the purpose of a subheading? (AF4)

What is the name of a scientist who studies volcanoes? (AF2)

Identify two ways a volcano can help the people who live by them. (AF2)

Would you like to live by a volcano? Explain your answer. (AF6)

What is the purpose of a glossary? (AF4)

Tricky

Volcanoes

What is the surface of the Earth like? (AF2) The surface of the Earth is like a giant 3D Jigsaw puzzle.

How many active volcanoes are there around the world? (AF2) There are 500 active volcanoes around the world.

What is magma? (AF2) Magma is melted rock.

Are all volcanoes the same? (AF3) No, because they erupt in different ways and this tells us what type they are.

Why are lava flows dangerous? (AF2)

A. They make the air poisonous.

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How did the volcano Tambora, manage to affect so much of the Earth? (AF3) Due to a combination of the height of the eruption (43km) and the winds helping to spread the ash and gas around the world.

What is a VEI 8 eruption classed as? (AF2) Mega colossal.

What is the purpose of a subheading? (AF4) A subheading tells you what the information below it is all about. They also help you to find the information you need quickly.

What is the name of a scientist who studies volcanoes? (AF2) A volcanologist.

Identify two ways a volcano can help the people who live by them. (AF2) The soil is good for growing crops. The hot ground can heat and power homes. Tourists bring money to the area.

Would you like to live by a volcano? Explain your answer. (AF6) Various answers. Encourage children to link answers to information they have read in the text.

What is the purpose of a glossary? (AF4) A glossary explains the meaning of tricky words.

Brainbox

Volcanoes

What is a Volcano?

A volcano is an opening which occurs on the Earth's surface, where molten (liquid) rock is spewed out from under the ground. They can appear as cone-shaped mountains or as wide sloping hills, some even occur under the sea. Volcanoes have helped to shape much of the Earth's surface.

Why do they happen?

Is the ground beneath your feet solid? You would think so wouldn't you! However, the surface of the Earth is like a giant 3D jigsaw puzzle. These enormous puzzle pieces, called tectonic plates, fit together tightly. The magma, which forms under this layer, or crust, is under so much pressure it is almost solid. As the plates move, the pressure is released, allowing the magma to melt and bubble up through the gap, as a volcano.

Why do volcanoes erupt?

There are 500 active volcanoes around the world and approximately 60 of these will erupt each year. Even as you read this, there could be at least 10 volcanoes blowing their top! An eruption happens when magma collects inside the magma chamber, deep below the volcano. Magma is lighter than the surrounding rock, so it begins to rise to the surface. Whilst rising through the crater pipe and vents, bubbles begin to form. Slowly, the pressure builds up and the magma and gas (dissolved in the magma) gush upwards, forcing its way out. When the magma hits the surface, it becomes known as lava.

Did you know that not all volcanoes are the same?

What kind they are, depends on how they erupt! Shield volcanoes produce a hot, runny lava, which flows from the volcano's vents. The lava spreads over a wide area, helping to create a gently sloping volcano. Their eruptions are known as *Hawaiian eruptions*. When a cinder cone volcano erupts, hot ash, lava and rocks shoot high into the air, creating tall, steep slopes with a crater on the top. These eruptions are called *Strombolian eruptions.* A stratovolcano is made by big, blasting explosions. First, lava shoots out and coats the mountain. Next comes the rock and ash, followed by more lava. This pattern continues, helping to build up the layers of lava, rock and ash. This destructive eruption is known as a *Plinian eruption (*named after Pliny the Elder, who died helping people escape the eruption of Mount Vesuvius in AD 79).

So what makes a volcano so deadly?

Lava flows – These are extremely dangerous. They can knock down buildings, bury objects and set light to flammable materials. However, most lava flows travel slower than walking pace, so people and animals have a good chance of escaping.

Ash – This can be deadly. It feels like finely crushed glass, and is often scorching hot. This settles over huge areas, suffocating people and animals.

Gas – Carbon dioxide and sulphur dioxide are examples of gases which can be blasted out of an erupting volcano. As carbon dioxide is heavier than air, it can settle in low-lying areas, creating a poisonous environment. Sulphur dioxide causes acid rain and air pollution.

Lahars – These devastating mudflows are caused by hot volcanic materials combining with water, snow or ice on volcanic slopes. These unstoppable mudflows slide down the slopes, ripping houses and trees from the ground.

Pyroclastic flow – When large amounts of ash and gas explode out of the volcano, deadly pyroclastic flows can occur. Amazingly, temperatures inside the flow can reach hundreds of degrees Celsius. These destructive flows of boiling gas and ash, travel at terrifying speeds, destroying everything in their path. The pyroclastic flow from Mount Pelée in 1902, completely destroyed the town of Saint-Pierre, in Martinique. Almost every person in the town perished.

Brainbox

Active, dormant or extinct?

For a volcano to be classed as active, it is either erupting now, or is likely to erupt soon. According to scientists, an active volcano must have erupted during the last 10,000 years. A dormant volcano on the other hand, could be described as sleeping, because it is still active, but not currently erupting. If a volcano has not erupted during the last 10,000 years, then it can be classified as an extinct volcano, however experts can't be completely sure that it will never erupt again!

How deadly can a volcano be?

We tend to think that volcanoes only affect areas in close proximity to it, however, it is quite possible for a single volcano to have a huge impact on large sections of the Earth and its climate. This was proved to be true in April 1815, when the Indonesian volcano Tambora erupted. The ash column from Tambora reached a staggering height of 43 kilometres. Wind helped to spread the ash and gases around the world. The following year, 1816, was known as 'the year without a summer'. North America, northern Europe and China suffered frosts and snowstorms throughout the months of May and June. Crops failed and thousands of people starved, or were so weakened that they succumbed to diseases. Over 90,000 people died.

Can the power of an eruption be measured?

The power of an eruption is measured on the VEI scale, otherwise known as the Volcanic Explosivity Index. This is based on the amount of material erupted from a volcano, and the height of the accompanying ash column. The VEI scale is composed of 8 stages in total, with stage 1 being a 'gentle' eruption and stage 8 being classed as a 'mega colossal' eruption! Tambora had a VEI of 7 (super-colossal), Mount Vesuvius had a VEI of 4, meaning 'cataclysmic'! Scientists believe that a VEI 8 eruption happens once every 100,000 years. These are called super-eruptions! The last super-eruption occurred in Indonesia, over 74,000 years ago, when Toba erupted - its effects nearly wiped out the human population. So when and where is the next super-eruption due? A prime suspect is Yellowstone National Park in the USA, which has seen three super-eruptions over the last two million years!

Can we predict when a volcano will erupt?

Scientists, called volcanologists, monitor volcanoes in the hope of predicting future eruptions. An analysis of gases can tell them many things, for example, an increase in sulphur dioxide may indicate that fresh magma may be near the surface, meaning an eruption could be imminent. Scientists also use a seismograph to measure movements in the ground, which occur before an eruption. This technology helped predict eruptions at Mount Redoubt, Alsaka, in 1989 and at Popocatapeti near Mexico City in 2000. It is also important to study old lava flows, as they can provide evidence of the frequency and size of past eruptions. Scientists cannot prevent volcanoes from happening, but they can predict when a volcano might erupt and with what force, helping people to escape in time!

Can volcanoes help us?

Brainbox

Millions of people live near active volcanoes, meaning that one in ten people living in the world today are at risk of dying, or being injured if an eruption were to occur. However, there are many benefits to living within proximity of a volcano. Volcanic soil is very fertile, making it ideal for growing crops. In addition to this, heat energy from the Earth (geothermal energy) can also be harnessed to power villages and towns. Power stations pump water into the ground, where it becomes heated by the extremely hot rocks. The resulting hot water is used to heat homes, whilst the steam is used to drive turbines and generators in order to create electricity. Geothermal energy is the second largest source of energy in Iceland. The Roman city of Pompeii, buried after the eruption of Mount Vesuvius, attracts 2.5 million tourists a year, which helps boost the local economy.

Did you know?

Lava erupts at temperatures of up to 1200°c.
About 60 million years ago, an underwater volcano poured out so much lava it made new land - we know this land as Iceland!
Volcanoes can even be found in space! Astronomers have discovered volcanoes on Venus and Mars.
Mount Etna in Italy is Europe's highest active volcano.

Glossary

acid rain	rain made acidic by the mixing of sulphur in the air
carbon dioxide	a gas which is absorbed by plants but dangerous in large amounts
crater pipe	a tube connecting a magma chamber to the surface
crust	the outermost solid layer of the Earth, between 5 and 50 kilometres thick
generator	a machine that converts one form of energy into another
economy	the system of how money is made and used within a particular country or region
magma	melted rock beneath the Earth's surface that becomes lava when it flows out of a volcano
magma chamber	hollow space underground where magma collects
seismograph	an instrument that measures vibrations within the Earth's surface
sulphur dioxide	a gas which smells of rotten eggs, it causes acid rain and can make it difficult to breathe
turbine	a machine for producing power in which a rotor fitted with blades is made to revolve
vent	openings in the Earth's surface that allows molten rock and gases to escape

Volcanoes

Brainbox

What is the surface of the Earth like? (AF2)

How many active volcanoes are there around the world? (AF2)

What is magma? (AF2)

Where is the magma chamber found? (AF2)

Are all volcanoes the same? (AF3)

Which volcanoes have Strombolian eruptions? (AF2)

Why are lava flows dangerous? (AF2)

A. They make the air poisonous.

B. They make it hard to hard to breathe.

C. They knock down buildings and set fire to things.

D. They move at terrifying speeds.

Why is 'blasted' a good word to describe how gases can be erupted out of a volcano? (AF5)

How did the eruption of Tambora in 1815, manage to affect so much of the Earth? (AF3)

Why do you think so many people died after Tambora erupted? (AF3)

Write down two other words which mean the same as 'succumbed'. (AF5)

What is a VEI 8 eruption classed as? (AF2)

When is the next super-eruption due? (AF3)

What is the purpose of a subheading? (AF4)

Why is the work of a volcanologist so important? (AF3)

Identify three ways a volcano can help the people who live by them. (AF2)

Brainbox

In what way does tourism boost the economy in Pompeii? (AF7)

Would you like to live by a volcano? Explain your answer. (AF6)

What is the purpose of a glossary? (AF4)

Brainbox

Volcanoes

What is the surface of the Earth like? (AF2) The surface of the Earth is like a giant 3D Jigsaw puzzle.

How many active volcanoes are there around the world? (AF2) There are 500 active volcanoes around the world.

What is magma? (AF2) Magma is melted rock.

Where is the magma chamber found? (AF2) Deep below the volcano.

Are all volcanoes the same? (AF3) No, because they erupt in different ways and this tells us what type they are.

Which volcanoes have Strombolian eruptions? (AF2) A cinder cone volcano.

Why are lava flows dangerous? (AF2)

A. They make the air poisonous.

B. They make it hard to hard to breathe.

C. They knock down buildings and set fire to things.

D. They move at terrifying speeds.

Why is 'blasted' a good word to describe how gases can be erupted out of a volcano? (AF5) The word blasted makes you think of sudden, loud and noisy explosions, which helps the reader understand how gas is erupted.

How did the eruption of Tambora in 1815, manage to affect so much of the Earth? (AF3) Due to a combination of the height of the eruption (43km) and the winds helping to spread the ash and gas around the world.

Why do you think so many people died after Tambora erupted? (AF3) Due to the sun being blocked out for a long period of time, and the unusually cold temperatures, crops failed so there was no food for people to eat. Many died from lack of food, or became very weak, meaning they were more likely to catch illnesses and die.

Write down two other words which mean the same as 'succumbed'. (AF5) Various answers e.g. yielded, gave way, surrendered.

What is a VEI 8 eruption classed as? (AF2) Mega colossal.

When is the next super-eruption due? (AF3) In the next 26,000 years.

What is the purpose of a subheading? (AF4) A subheading tells you want the information below it is all about. They also help you to find the information you need quickly.

Why is the work of a volcanologist so important? (AF3) Their findings help them predict when a volcano might be about to erupt. This gives people more time to escape, meaning more lives could be saved.

Identify three ways a volcano can help the people who live by them. (AF2) The soil is good for growing crops. The hot ground can heat and power homes. Tourists bring money to the area.

Would you like to live by a volcano? Explain your answer. (AF6) Various answers. Encourage children to link answers to information they have read in the text.

In what way does tourism boost the economy in Pompeii? (AF7) Various answers e.g. Tourists pay to stay in hotels and eat in cafes, they buy souvenirs etc.

What is the purpose of a glossary? (AF4) A glossary explains the meaning of tricky words.

Brainbox

Expert

Volcanoes

What is a Volcano?

A volcano is an opening on the Earth's surface, where molten (liquid) rock is spewed out from under the ground. They can appear as cone-shaped mountains or as wide sloping hills, some even occur under the sea. Volcanoes have helped to shape much of the Earth's surface.

Why do they happen?

Is the ground beneath your feet solid? You would think so wouldn't you! However, the surface of the Earth is like a giant 3D jigsaw puzzle. These enormous puzzle pieces, called tectonic plates, fit together tightly. The magma, which forms under this layer, or crust, is under so much pressure it is almost solid. As the plates move, the pressure is released, allowing the magma to melt and bubble up through the gap, as a volcano.

Why do volcanoes erupt?

There are 500 active volcanoes around the world and about 60 of these will erupt each year. Even as you read this, there could be at least 10 volcanoes blowing their top! An eruption happens when magma collects inside the magma chamber, deep below the volcano. Slowly, the pressure builds up and the magma rises up the crater pipe to the surface. Eventually it gushes upwards, forcing its way out. Once magma has escaped the volcano, it is called lava.

Did you know that not all volcanoes are the same?

What kind they are, depends on how they erupt! Shield volcanoes produce a hot, runny lava, which flows from the volcano's vents. The lava spreads over a wide area, helping to create a gently sloping volcano. Their eruptions are known as *Hawaiian eruptions*. When a cinder cone volcano erupts, hot ash, lava and rocks shoot high into the air, creating tall, steep slopes with a crater on the top. These eruptions are called *Strombolian eruptions.* A stratovolcano is made by big, blasting explosions. Lava, rock and ash explode out of the volcano, coating the sides of the mountain. This destructive eruption is known as a *Plinian eruption (*named after Pliny the Elder, who died helping people escape the eruption of Mount Vesuvius in AD 79).

So what makes a volcano so deadly?

Lava flows – These are extremely dangerous. They can knock down buildings, bury objects and set light to flammable materials. However, most lava flows travel slower than walking pace, so people and animals have a good chance of escaping.

Ash – This can be deadly. It feels like finely crushed glass, and is often scorching hot. This settles over huge areas, making it difficult for people and animals to breathe.

Gas – Carbon dioxide and sulphur dioxide can be blasted out of an erupting volcano. As carbon dioxide is heavier than air, it can settle in low-lying areas, creating a poisonous environment. Sulphur dioxide causes acid rain and air pollution.

Lahars – These devastating mudflows are caused by hot volcanic materials combining with water, snow or ice on volcanic slopes. They slide down the slopes, ripping houses and trees from the ground.

Pyroclastic flow – When large amounts of ash and gas explode out of the volcano, deadly pyroclastic flows can occur. Temperatures inside the flow can reach hundreds of degrees Celsius. These destructive flows of boiling gas and ash, travel at terrifying speeds, destroying everything in their path. The pyroclastic flow from Mount Pelée in 1902, completely destroyed the town of Saint-Pierre, in Martinique. Almost every person in the town died.

Active, dormant or extinct?

Expert

An active volcano is one which is erupting currently, or seems likely to erupt soon. Scientists state that an active volcano must have erupted during the last 10,000 years. A dormant volcano could be described as sleeping, because it is still active, but not erupting at the moment. If a volcano has not erupted during the last 10,000 years, then it can be classified as an extinct volcano, however experts can't be completely sure that it will never erupt again!

How deadly can a volcano be?

We tend to think that volcanoes only affect nearby towns and villages, however it is possible for just one volcano to have a big impact on the Earth and its climate. In April 1815, the Indonesian volcano Tambora erupted. The ash column from Tambora reached a staggering height of 43 kilometres. Wind helped to spread the ash and gases around the world. The following year, 1816, was known as 'the year without a summer'. North America, northern Europe and China suffered frosts and snowstorms throughout the months of May and June. Crops couldn't grow so thousands of people starved, or became so weak that they caught diseases. Over 90,000 people died.

Can the power of an eruption be measured?

The power of an eruption is measured on the VEI scale. This stands for Volcanic Explosivity Index. This is based on the amount of material erupted from a volcano, and the height of the ash column. The VEI scale is made up of 8 stages in total, with stage 1 being a 'gentle' eruption and stage 8 being classed as a 'mega colossal' eruption! Tambora had a VEI of 7 (super-colossal), Mount Vesuvius had a VEI of 4, meaning 'cataclysmic'! Scientists believe that a VEI 8 eruption happens once every 100,000 years. These are called super-eruptions! The last super-eruption happened in Indonesia, over 74,000 years ago, when Toba erupted. This eruption nearly wiped out the human population. So when and where will the next super-eruption happen? Yellowstone National Park in the USA may be next, as it has seen three super-eruptions over the last two million years!

Can we predict when a volcano will erupt?

Scientists who study volcanoes are called volcanologists. They use special equipment to measure how much gas is building up inside a volcano. They know that an increase in sulphur dioxide may mean that fresh magma is near the surface, so an eruption could happen soon. Scientists also measure vibrations in the ground, which occur just before an eruption. The study of old lava flows help provide evidence of the frequency and size of past eruptions. Scientists cannot prevent volcanoes from happening, but they can predict when a volcano might erupt and with what force, helping people to escape in time!

Can volcanoes help us?

Millions of people live near active volcanoes. They live with the constant threat of an eruption occurring at any time. However, there are many benefits to living close to a volcano. Volcanic soil is very fertile, making it ideal for growing crops. The heat from the ground can also be used to power homes. Power stations pump water into the ground, allowing the extremely hot rocks to heat it up. The hot water is used to heat homes, whilst the steam is used to drive turbines and generators in order to make electricity. This power source is used very successfully in Iceland. Volcanoes can also boost tourism in an area. The Roman city of Pompeii, buried during the eruption of Mount Vesuvius, attracts 2.5 million tourists a year, providing a good source of income for the local people.

Did you know?

Expert

Lava erupts at temperatures of up to 1200°c.
About 60 million years ago, an underwater volcano poured out so much lava it made new land - we know this land as Iceland!
Volcanoes can even be found in space! Astronomers have discovered volcanoes on Venus and Mars.
Mount Etna in Italy is Europe's highest active volcano.

Glossary

acid rain	rain made acidic by the mixing of sulphur in the air
carbon dioxide	a gas which is absorbed by plants but dangerous in large amounts
crater pipe	a tube connecting a magma chamber to the surface
crust	the outermost solid layer of the Earth, between 5 and 50 kilometres thick
generator	a machine that converts one form of energy into another
income	the amount of money received in exchange for goods or services
magma	melted rock beneath the Earth's surface that becomes lava when it flows out of a volcano
magma chamber	hollow space underground where magma collects
sulphur dioxide	a gas which smells of rotten eggs, it causes acid rain and can make it difficult to breathe
turbine	a machine for producing power in which a rotor fitted with blades is made to revolve
vent	openings in the Earth's surface that allows molten rock and gases to escape

Expert

Volcanoes

What is the surface of the Earth like? (AF2)

How many active volcanoes are there around the world? (AF2)

What is magma? (AF2)

Where is the magma chamber found? (AF2)

Are all volcanoes the same? (AF3)

Why are lava flows dangerous? (AF2)

A. They make the air poisonous.

B. They make it hard to hard to breathe.

C. They knock down buildings and set fire to things.

D. They move at terrifying speeds.

Why is 'blasted' a good word to describe how gases can be erupted out of a volcano? (AF5)

How did the eruption of Tambora in 1815, manage to affect so much of the Earth? (AF3)

Why do you think so many people died after Tambora erupted? (AF3)

What is a VEI 8 eruption classed as? (AF2)

What is the purpose of a subheading? (AF4)

What is the name of a scientist who studies volcanoes? (AF2)

Identify two ways a volcano can help the people who live by them. (AF2)

How do you think the people of Pompeii make money from tourism? (AF7)

Would you like to live by a volcano? Explain your answer. (AF6)

What is the purpose of a glossary? (AF4)

Expert

Volcanoes

What is the surface of the Earth like? (AF2) The surface of the Earth is like a giant 3D Jigsaw puzzle.
How many active volcanoes are there around the world? (AF2) There are 500 active volcanoes around the world.

What is magma? (AF2) Magma is melted rock.

Where is the magma chamber found? (AF2) Deep below the volcano.

Are all volcanoes the same? (AF3) No, because they erupt in different ways and this tells us what type they are.

Why are lava flows dangerous? (AF2)
A. They make the air poisonous.
B. They make it hard to hard to breathe.
C. They knock down buildings and set fire to things.
D. They move at terrifying speeds.

Why is 'blasted' a good word to describe how gases can be erupted out of a volcano? (AF5) The word blasted makes you think of sudden, loud and noisy explosions, which helps the reader understand how gas is erupted.

How did the eruption of Tambora in 1815, manage to affect so much of the Earth? (AF3) Due to a combination of the height of the eruption (43km) and the winds helping to spread the ash and gas around the world.

Why do you think so many people died after Tambora erupted? (AF3) Due to the sun being blocked out for a long period of time, crops failed so there was no food for people to eat. Many died from lack of food, or became very weak, meaning they were more likely to catch illnesses and die.

What is a VEI 8 eruption classed as? (AF2) Mega colossal.

What is the purpose of a subheading? (AF4) A subheading tells you what the information below it is all about. They also help you to find the information you need quickly.

What is the name of a scientist who studies volcanoes? (AF2) A volcanologist.

Identify two ways a volcano can help the people who live by them. (AF2) The soil is good for growing crops. The hot ground can heat and power homes. Tourists bring money to the area.

Would you like to live by a volcano? Explain your answer. (AF6) Various answers. Encourage children to link answers to information they have read in the text.

How do you think the people of Pompeii make money from tourism? (AF7) Various answers e.g. Tourists pay to stay in hotels and eat in cafes, they buy souvenirs etc.

What is the purpose of a glossary? (AF4) A glossary explains the meaning of tricky words.

Genius

Volcanoes

What is a Volcano?

A volcano is an opening which occurs on the Earth's surface, where molten (liquid) rock is spewed out from under the ground. They can appear as cone-shaped mountains or as wide sloping hills, some even occur under the sea. Volcanoes have helped to shape much of the Earth's surface.

Why do they happen?

Is the ground beneath your feet solid? You would think so wouldn't you! However, the surface of the Earth is like a giant 3D jigsaw puzzle. These enormous puzzle pieces, called tectonic plates, fit together tightly. The magma, which forms under this layer, or crust, is under so much pressure it is almost solid. As the plates move, the pressure is released, allowing the magma to melt and bubble up through the gap, as a volcano.

Why do volcanoes erupt?

There are 500 active volcanoes around the world; approximately 60 of these will erupt each year. Even as you read this, there could be at least 10 volcanoes blowing their top! An eruption happens when magma collects inside the magma chamber, found approximately 1 to 10 kilometres below the volcano. Magma is lighter than the surrounding rock, so it begins to rise to the surface (imagine a cork floating on water). Magma is not just molten rock. It also contains water and gases. So as it rises through the crater pipe and vents, bubbles of gas begin to form. Slowly, the pressure builds up and the magma gushes upwards, forcing its way out. When the magma hits the surface, it becomes known as lava.

Did you know that not all volcanoes are the same?

What kind they are, depends on how they erupt! Shield volcanoes produce a hot, runny lava, which flows from the volcano's vents. The lava spreads over a wide area, helping to create a gently sloping volcano. Their eruptions are known as *Hawaiian eruptions*. When a cinder cone volcano erupts, hot ash, lava and rocks shoot high into the air, creating tall, steep slopes with a crater on the top. These eruptions are called *Strombolian eruptions.* A stratovolcano is made by big, blasting explosions. First, lava shoots out and coats the mountain. Next comes the rock and ash, followed by more lava. This pattern continues, helping to build up the layers of lava, rock and ash. This destructive eruption is known as a *Plinian eruption (*named after Pliny the Elder, who died helping people escape the eruption of Mount Vesuvius in AD 79).

So what makes a volcano so deadly?

Lava flows – These are extremely dangerous. They can knock down buildings, bury objects and set light to flammable materials. However, most lava flows travel slower than walking pace, so people and animals have a good chance of escaping.

Ash – This can be deadly. It feels like finely crushed glass, and is often scorching hot . After blasting into the air, the eruption plume settles over huge areas, suffocating people and animals.

Gas – Carbon dioxide and sulphur dioxide are examples of gases which can be blasted out of an erupting volcano. As carbon dioxide is heavier than air, it can settle in low-lying areas, creating a poisonous environment. Sulphur dioxide causes acid rain and air pollution.

Lahars – These devastating mudflows are caused by hot volcanic materials (such as ash, soil and rock) combining with water, snow or ice on volcanic slopes. These unstoppable mudflows slide down the slopes, ripping houses and trees from the ground.

Pyroclastic flow – When large amounts of ash and gas explode out of the volcano, deadly pyroclastic flows can occur. Amazingly, temperatures inside the flow can reach hundreds of degrees Celsius. These destructive flows of boiling gas and ash, travel at terrifying speeds, obliterating everything in their path. The pyroclastic flow from Mount Pelée in 1902, completely destroyed the town of Saint-Pierre, in Martinique. Almost every person in the town perished!

Active, dormant or extinct?

For a volcano to be classed as active, it is either erupting now, or is likely to erupt soon. According to scientists, an active volcano must have erupted during the last 10,000 years. A dormant volcano on the other hand, could be described as sleeping, because it is still active, but not currently erupting. If a volcano has not erupted during the last 10,000 years, then it can be classified as an extinct volcano, however experts can't be completely sure that it will never erupt again

Genius

How deadly can a volcano be?

We tend to think that volcanoes only affect areas in close proximity to it, however, it is quite possible for a single volcano to have a huge impact on large sections of the Earth and its climate. This was proved to be true in April 1815, when the Indonesian volcano Tambora erupted. The ash column from Tambora reached a staggering height of 43 kilometres. Wind helped to spread the ash and gases around the world. The following year, 1816, was known as 'the year without a summer'. North America, northern Europe and China suffered frosts and snowstorms throughout the months of May and June. Crops failed and thousands of people starved, or were so weakened that they succumbed to diseases. Over 90,000 people died.

Can the power of an eruption be measured?

The power of an eruption is measured on the VEI scale, otherwise known as the Volcanic Explosivity Index. This is based on the amount of material erupted from a volcano, and the height of the accompanying ash column. The VEI scale is composed of 8 stages in total, with stage 1 being a 'gentle' eruption and stage 8 being classed as a 'mega colossal' eruption! Tambora had a VEI of 7 (super-colossal), Mount Vesuvius had a VEI of 4, meaning 'cataclysmic'! Scientists believe that a VEI 8 eruption happens once every 100,000 years. These are called super-eruptions! The last super-eruption occurred in Indonesia, over 74,000 years ago, when Toba erupted – it brought the human race to the brink of extinction. So when and where is the next super-eruption due? A prime suspect is Yellowstone National Park in the USA, which has seen three super-eruptions over the last two million years!

Can we predict when a volcano will erupt?

Scientists, called volcanologists, monitor volcanoes in the hope of predicting future eruptions. An analysis of gases can tell them many things, for example, an increase in sulphur dioxide may indicate that fresh magma may be near the surface, meaning an eruption could be imminent. Scientists also use a seismograph to measure movements in the ground, which occur before an eruption. This technology helped predict eruptions at Mount Redoubt, Alsaka, in 1989 and at Popocatapeti near Mexico City in 2000. Of vital importance, is the study of old lava flows. They provide evidence of the frequency and size of past eruptions. Although scientists cannot prevent volcanoes from happening, if they can predict when an eruption is imminent, lives may be saved.

Can volcanoes help us?

Millions of people live near active volcanoes, meaning that one in ten people living in the world today are at risk of dying, or being injured if an eruption were to occur. However, there are many benefits to living within proximity of a volcano. Volcanic soil is incredibly fertile, making it ideal for growing crops. In addition to this, heat energy from the Earth (geothermal energy) can also be harnessed to power villages and towns. Power stations pump water into the ground, where it becomes heated by the extremely hot rocks. The resulting hot water is used to heat homes, whilst the steam is used to drive turbines and generators in order to create electricity. Geothermal energy is the second largest source of energy in Iceland. The Roman city of Pompeii, buried during the eruption of Mount Vesuvius, attracts 2.5 million tourists a year, which helps boost the local economy.

Fact or myth?

Eruptions were once thought to be the work of gods, in fact the word volcano originates from Vulcan, the Roman god of fire. People believed that erupting volcanoes were a sign that the gods had been angered. Pele, the Hawaiian goddess of volcanoes, is believed to live on Mount Kilauea in Hawaii. Mount Kilauea is the most active volcano on Earth; it has been erupting since 1983! It is said to produce volcanic glass in the shape of droplets and thin strands, thought to represent the tears and hair of Pele. Mount Fuji (an example of a stratovolcano) is the highest mountain in Japan and is also considered to be one of the world's most beautiful volcanoes. It is worshipped as a holy place, tempting many to make pilgrimages to the summit.

Genius

Did you know?

Lava erupts at temperatures of up to 1200°c.

About 60 million years ago, an underwater volcano poured out so much lava it made new land - we know this land as Iceland!

Volcanoes can even be found in space! Astronomers have discovered volcanoes on Venus and Mars.

Mount Etna in Italy is Europe's highest active volcano.

Glossary

acid rain	rain made acidic by the mixing of sulphur in the air
carbon dioxide	a gas which is absorbed by plants but dangerous in large amounts
crater pipe	a tube connecting a magma chamber to the surface
crust	the outermost solid layer of the Earth, between 5 and 50 kilometres thick
generator	a machine that converts one form of energy into another
economy	the system of how money is made and used within a particular country or region
magma	melted rock beneath the Earth's surface that becomes lava when it flows out of a volcano
magma chamber	hollow space underground where magma collects
seismograph	an instrument that measures vibrations within the Earth's surface
sulphur dioxide	a gas which smells of rotten eggs, it causes acid rain and can make it difficult to breathe
turbine	a machine for producing power in which a rotor fitted with blades is made to revolve
vent	openings in the Earth's surface that allows molten rock and gases to escape

Genius

Volcanoes

What is the surface of the Earth like? (AF2)

How many active volcanoes are there around the world? (AF2)

What is magma? (AF2)

Where is the magma chamber found? (AF2)

Are all volcanoes the same? (AF3)

Which volcanoes have Strombolian eruptions? (AF2)

Why are lava flows dangerous? (AF2)

A. They make the air poisonous.

B. They make it hard to hard to breathe.

C. They knock down buildings and set fire to things.

D. They move at terrifying speeds.

Why is 'blasted' a good word to describe how gases can be erupted out of a volcano? (AF5)

How did the eruption of Tambora in 1815, manage to affect so much of the Earth? (AF3)

Why do you think so many people died after Tambora erupted? (AF3)

Write down two other words which mean the same as 'succumbed'. (AF5)

What is a VEI 8 eruption classed as? (AF2)

When is the next super-eruption due? (AF3)

What is the purpose of a subheading? (AF4)

Why is the work of a volcanologist so important? (AF3)

Identify some of the clues which tell a volcanologist that an eruption may be imminent. (AF3)

Genius

Identify three ways a volcano can help the people who live by them. (AF2)

In what way does tourism boost the economy in Pompeii? (AF7)

Would you like to live by a volcano? Explain your answer. (AF6)

Where does the name volcano come from? (AF2)

Why might people think the goddess Pele is real? (AF7)

What is the purpose of a glossary? (AF4)

Genius

Volcanoes

What is the surface of the Earth like? (AF2) The surface of the Earth is like a giant 3D Jigsaw puzzle.

How many active volcanoes are there around the world? (AF2) There are 500 active volcanoes around the world.

What is magma? (AF2) Magma is melted rock mixed with gas and water.

Where is the magma chamber found? (AF2) Deep below the volcano.

Are all volcanoes the same? (AF3) No, because they erupt in different ways and this tells us what type they are.

Which volcanoes have Strombolian eruptions? (AF2) A cinder cone volcano.

Why are lava flows dangerous? (AF2)

A. They make the air poisonous.

B. They make it hard to hard to breathe.

C. They knock down buildings and set fire to things.

D. They move at terrifying speeds.

Why is 'blasted' a good choice of words to describe how gases can be erupted out of a volcano? (AF5) The word blasted makes you think of sudden, loud and noisy explosions, which helps the reader understand how gas is erupted.

How did the eruption of Tambora in 1815, manage to affect so much of the Earth? (AF3) Due to a combination of the height of the eruption (43km) and the winds helping to spread the ash and gas around the world.

Why do you think so many people died after Tambora erupted? (AF3) Due to the sun being blocked out for a long period of time and the unusually cold temperatures, crops failed so there was no food for people to eat. Many died from lack of food, or became very weak, meaning they were more likely to catch illnesses and die.

Write down two other words which mean the same as 'succumbed'. (AF5) Various answers e.g. yielded, gave way, surrendered.

What is a VEI 8 eruption classed as? (AF2) Mega colossal.

When is the next super-eruption due? (AF3) In the next 26,000 years.

What is the purpose of a subheading? (AF4) A subheading tells you what the information below it is all about. They also help you to find the information you need quickly.

Genius

Why is the work of a volcanologist so important? (AF3) Their findings help them predict when a volcano might be about to erupt. This gives people more time to escape, meaning more lives could be saved.

Identify some of the clues which tell a volcanologist that an eruption may be imminent. (AF3) An increase in sulphur dioxide suggests that fresh magma may be near the surface and vibrations in the ground often occur before an eruption.

Identify three ways a volcano can help the people who live by them. (AF2) The soil is good for growing crops. The hot ground can heat and power homes. Tourists bring money to the area.

Would you like to live by a volcano? Explain your answer. (AF6) Various answers. Encourage children to link answers to information they have read in the text.

In what way does tourism boost the economy in Pompeii? (AF7) Various answers e.g. Tourists pay to stay in hotels and eat in cafes, they buy souvenirs etc.

Why might people think the goddess Pele is real? (AF7) The volcano erupts volcanic glass which people think are her tears and hair.

Where does the name volcano come from? (AF2) The word volcano originates from Vulcan, the Roman god of fire.

What is the purpose of a glossary? (AF4) A glossary explains the meaning of tricky words.