Slide 3

Volcanoes are openings in the Earth’s rocky surface which allow hot molten (melted) rock, ash and gas to escape from below the surface a bit like a chimney.

Q: What do geologist call this red hot rock that can sometimes erupt from a volcano? A: Lava

Q: how hot do you think lava can be? A: Lava can get to temperatures above 1100°C – water boils at only 100°C so you do not want to get too close to hot lava!

Volcanoes are not always erupting – they can be active, dormant or extinct

Active volcanoes are volcanoes that are either currently erupting or known to have erupted recently (geologists work on very long timescales so ‘recently’ means within the last 10,000 years!)

Dormant volcanoes are volcanoes that are ‘asleep’ – they are still thought to be active and could erupt again but they haven’t done so in the last 10,000 years

Extinct volcanoes are volcanoes that will never erupt again because their supply of magma has run out and turned into solid rock.

The UK has many extinct volcanoes including Helvellyn in the Lake District, Arthurs Seat in Edinburgh, Ben Nevis in Fort William and Snowdon in north Wales

Slide 5

Volcanoes are not just holes in the surface of the Earth, if we slice into a volcano we can what happens underground.

Deep underground beneath the volcano, magma (which is what geologists call lava that hasn’t erupted yet) collects in large pools known as magma chambers. As more and more magma is added to the magma chamber, the pressure increases and causes the rock around the magma chamber to crack.

The hot liquid magma, which is lighter than the surrounding rock, rises upwards through conduits or cracks in the crust and erupts on land through a volcanic vent.

Magma that reaches the Earth’s surface erupts as lava. Ash, gas and steam can also erupt from the volcano. Sometimes when a volcano erupts it can blow the top off the volcano creating a bowl shaped crater.

Have ch guess some of the labels that link to the diagram

Ash steam and gas – material erupted from a volcano

Lava - erupted magma

Magma chamber - pool of magma below the volcano

Crater - created when an eruption blows the top off a volcano

Geysers - vent that shoots steam and boiling water into the air

Sills - flat sheets of igneous rock formed underground rather than erupting from a volcano

Volcanic bombs - lumps of rock and blobs of lava ejected by the volcano,

Conduit - channel which magma travels through

Main vent - main opening in the ground surface

Slide 7

Not all eruptions are the same. There are two types of eruption that can happen from a volcano called effusive and explosive. The type of eruption effects what will be erupted.

If the magma is runny and doesn’t have many gas bubbles, then the volcano will erupt gently, what geologists call effusively, lava can spray up as a fountain or flow gently from the volcano as a lava flow

If the magma in the magma chamber is sticky and has lots of gas bubbles trapped within it, then the volcano will erupt violently making a big cloud of ash and gas above the vent.

Q: What happens when you shake a fizzy drink? A: It explodes!

Fizzy drinks contain carbon dioxide gas under pressure and this is what makes the fizzy. When a bottle of fizzy drink is shaken, lots of extra bubbles of carbon dioxide gas are created. These extra bubbles want to get out of the bottle so when you unscrew the cap, the bubbles explode out of the bottle taking the fizzy drink with it. This is what happens in explosive eruptions – the bubbles of gas trapped within the magma explode out of the volcano taking rock fragments, lava and ash with it.

Slide 8

Watch the two videos – lava from Kilauea (‘Kil-ah-way-ah’) volcano in Hawaii showing an effusive eruption and ash clouds from Eyjafjallajokull (‘ey-yah-fyel-lah-yo-kul’) in Iceland showing an explosive eruption.

There are two main types of lava that come out of a volcano during an effusive eruption, Pahoehoe pronounced ‘pah-hoey-hoey’ and ´A´a pronounced ‘ah-ah’.

Pahoehoe and ʻaʻa are both Hawaiian words that are used by geologists to describe these kinds of lavas.

Pahoehoe forms from slowly flowing lava and has a smooth or ropey surface when it hardens into rock.

’A’a forms from fast flowing lava and has a rough, rubbly surface with jagged blocks when it hardens into rock.

Slide 9

Q: What do you notice about the plate boundaries on the map? A: Most of the volcanoes on Earth are located near the plate boundaries

In fact over 75% of active volcanoes on Earth are found around the edge of the Pacific plate in a region known as the Pacific Ring of Fire

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Slide 10

The Pacific Ring of Fire shows the region around the Pacific plate where most of the volcanoes on Earth are found

Q: Are all of the volcanoes close to plate boundaries? A: no - point out Hawaiian islands in middle of Pacific plate

Slide 11

There are 3 ways in which we can get volcanoes on Earth: places where plates are moving away from each other, places where plates are moving towards each other and places where the mantle is extremely hot.

When two plates are moving away from each other this is called a constructive plate boundary.

When these plates pull apart the mantle below melts and forms pockets of hot liquid magma. This magma, which is lighter than he surrounding rock, rises up to fill in the gap and erupts on the sea floor as underwater volcanoes.

The Mid Atlantic Ridge is an example of a constructive plate boundary on Earth, it is actually a huge chain of under water volcanoes. Iceland which is located on the Mid Atlantic ridge has around 30 active volcanoes an more than 100 extinct volcanoes.

Slide 12

Most volcanic activity occurs at plate boundaries, however sometimes volcanoes can form in the middle of plates far away from any plate boundary.

These volcanoes for example those which make up the Hawaiian islands likely form due to ‘hot spots’, areas of super-heated rocks in the Earth’s mantle, which cause magma to rise and erupt as lava on the ocean floor, creating underwater volcanoes. Eventual when enough lava has erupted these volcanoes breach the surface and become volcanic islands.

Over millions of years, plates move like conveyor belts above the stationary mantle hot spots creating chains of volcanic islands like the Hawaiian Islands in the Pacific ocean.

Slide 13

Earth’s Shield volcanoes form from gentle (effusive) eruptions of runny lava. Because it’s so runny, this lava can travel a long way before it solidifies into rock and creates wide, sloping volcanoes in the shape of a shield.

Kilauea and Mauna Loa on the Big Island of Hawaii are good examples of shield volcanoes as well

Slide 14

Composite volcanoes are formed when you have an explosive eruption and the lava cools very, very quickly, forming very steep slopes; like Mt Fuji in Japan.

Slide 17

Volcanic eruptions are a natural hazards. This means that they are natural events that might harm people and the environment.

Q: What might happen to the people who live near a volcano when it erupts?

There are many ways in which volcanoes can be dangerous:

Lava flows are not usually dangerous to people because they move quite slowly which means that people can usually get out of the lava flows path. However lava flows can burn down and cover any buildings that happen to be in their path.

In cold countries such as Iceland volcanoes often have ice caps and glaciers. The heat from erupted lava can melt the snow and ice in these ice caps and cause floods.

Volcanic ash is the most common volcanic hazard. Volcanic ash is made from tiny fragments of rock and glass it can get inside aeroplane engines and clog them up causing the engines to fail, it can also poison water supplies and farmland and cause breathing problems in humans and other animals.

 Large ash clouds can block out the sun and can sometimes travel so far that it effects weather all over the Earth, when Mount Pinatubo erupted in 1991 ash lowered the Earth’s temperature by 0.5°C for a whole year!

Pyroclastic flows occur when an ash column from an explosive eruptin collapses and starts to flow down the sides of a volcano. Pyroclastic flows are a mixture of extrmemly hot ash, gas and rock fragments, and can be deadly. They can race down the sides of a volcano at speeds of up to 1000kmph and temperatures more than 400°C instantly boiling and crushing anything in their path including people, animals and plants.

Volcanic gas - magma is molten rock containing dissolved gases, these gases are released to the atmosphere during an eruption. Most of the gas in magma is water vapour which is generally harmless however other gases such as carbon dioxide, fluorine, chlorine and hydrogen sulfide, can be extremely harmful to humans and other animals.

Lake Nyos, is a lake in a volcanic crater in Cameroon, West Africa. The magma beneath the lake contains a lot of carbon dioxide gas which seeps into the lake from below. In 1986 over 100,000 tons of carbon dioxide spilled out of the lake and flowed silently down a valley. The gas spread through three villages where over 1700 people lived and caused them all, and over 3000 cattle, to suffocate from lack of oxygen.

Lahars are a type of mud flow caused when volcanic ash and other volcanic debris mixes with water. Lahars flow like water, have a similar texture to wet concrete, and can be 60-70°C . They may not be as hot as pyroclastic flows however they are extremely destructive. Lahars can bulldoze and bury anything in their path.

Volcanic eruptions can also cause rock falls, landslides, earthquakes and tsunamis so they can be extremely dangerous natural hazards.

Slide 18

Hundreds of millions of people around the world choose to live very near and even on the slopes of active volcanoes. Some major cities have even been built close to active volcanoes. Popocatapetl is a volcanic mountain less than 50 miles from Mexico City in Mexico which is home to almost 9 million people.

Q: Why might people choose to live near volcanoes when there are so many risks?

People choose to live near volcanoes because for them the positives outweigh the negatives.

Volcanic ash and lava are rich in minerals so over time they break down to provide valuable nutrients for the soil. This creates very fertile soil which is good for growing fruit and vegetables. The regions around Mount Vesuvius in Italy are particularly well-known for growing grapes, tomatoes and other vegetables in the rich volcanic soils.

Volcanoes create beautiful landscapes. They are important tourist attractions for many countries because they can attract millions of visitors every year. This generates tourism jobs for local people (tourist guides, shops, hotels, restaurants etc.) and brings in money to the country or region.

Volcanic areas be sources of heat energy from the Earth – geothermal energy. The heat from underground steam is a type of renewable energy and can be used to drive turbines and produce electricity, or to heat water supplies that are then used to provide household heating and hot water. In Iceland 85% buildings are heated by geothermal energy and 25% of the nations electricity is generated from geothermal energy.

Important minerals such as zinc, lead, tin, copper, silver and gold can be found in volcanic rocks. Hot gasses escaping through vents of active volcanoes also bring minerals to the surface, particularly the mineral sulfur which is a chalky yellow colour and often smells of eggs! Mount Ijen in Indonesia is known having a lot of sulfur, so much so that the volcano actually glows blue at night (sulfur is yellow in colour but when it burns, which it does when it meets the oxygen in the air, it does so with a blue flame). Locals collect the sulfur at the volcano crater and carry it down the mountain where they sell it for around 8 US cents per kilogram.

People might not be able to afford to leave their homes to move to somewhere with less risk of eruptions. Even when people can afford to leave the area they may be attached to their homes and not want to leave as their families have lived there for generations.