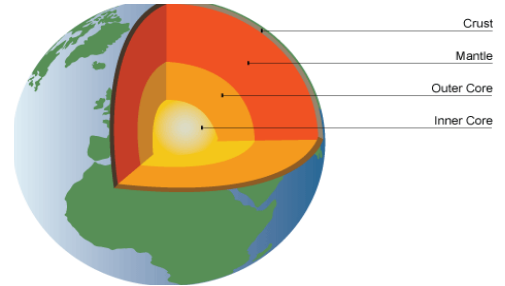


# CHAPTER 4=THE EARTH'S SURFACE

## The earth's crust

- the earth is made up of 3 different layers
- The crust=is the outside layer made up of solid rock
- the mantle=is made up of liquid magma that is hot and constantly moving.
- The core=this is the centre of the earth and the hottest part
- innercore=is solid and so is the crust and its hotter than the outer core
- outercore=is liquid.



-Magma=is hot liquid rock and it's constantly moving it's made up of sections called plates.there's 2 types of plates: (1)oceanic and (2)continental plates.

## •Convections currents=>force

•Plate tectonics=is the plates of the earth's crust that are always moving because of convection currents in the magma

## 2 types of crust

(1)oceanic crust = is covered with water,heavier than continental.its solid and the plates are always moving.

•oceanic plates=(1)pacific plate (2)Nazca plate (3)west and south american plates

(2)continental crust=is solid and the plates are always moving

•continental plates= (1)african plate (2)South american plate (3)Eurasian plate (4)North american plate (5)jindo-australian plate

## Constructive plate boundaries

•this is when 2 plates separate eg (1)the nazca plate and the eurAsian plates (2)South american and african plate

•new land/ocean floor is formed basalt forms BASALT PLATEAU eg antrim derry plateau then you get a mid atlantic ridge and a Mid ocean ridge.When the 2 plates separate the continental/oceanic crust gets stretched and gets thinner eventually fissures form.magma pours through these fissures and cools quickly on ocean floor forming Mid ocean ridge eg mid atlantic ridge.

## Destructive plate boundaries

•is when 2 plates collide for eg the Nazca and the south american.the old land/ocean floor is destroyed.the edge of the oceanic plate is subducted under the edge of the continental plate they then buckle ,melts and rises to form Fold mountains eg the Andees.when 2 plates collide you can get (1)fold mts (2)volcanoes (3)earthquakes (4)avalanches

## Passive plate boundaries

•is when 2 plates slide past each other eg Nazca and the Pacific plate that all happens due to the convection currents .new oceanic/continental crust is neither created nor destroyed.earthquakes form eg San Andreas Fault.

Pangaea=a continental crust that got broken down by convection currents.

Pacific ring of fire=place where you get loads of volcanoes

FEED=Volcanoes

feature/landform=

Volcano

example=mount etna

explain=

•a volcano is a vent through which magma from the mantle comes to the surface and forms a cone shaped volcanic mountain.

•volcanoes are linked to plate tectonics this is a theory which states that the plates of the earth's crust are constantly moving because of convection currents in the magma.

•volcanoes occur at constructive and destructive plate boundaries.at constructive plate boundaries 2 plates separate due to convection currents.you separate the continental and oceanic crust gets stretched and becomes thinner and eventually fissures form.layers of lava build up on ocean floor and form mid ocean ridges eg mid atlantic ridge.Basalt plateau eg antrim derry plateau.magma pours through fissures and forms a lava fissure eruption. At destructive plate boundaries 2 plates collide by convection currents.the crust gets destroyed edge of oceanic plate get subducted into mantle it will melt and rise and then burn a vent through continental crust forming a lava vent eruption.example of oceanic plate getting subducted was the china and indian plate that gave the himalayas mts.eg the pacific ring of fire in japan is a place with loads of volcanoes eg mount saint helens USA.

Diagram=(draw your own diagram)

•active volcano=mount etna,mount helens

•dormant volcano= mount vesuvius italy

•extinct volcano=mount fuji,croghan hill co.offaly

Positive/social and economic impacts on how we interact with volcanoes

### (1)iceland=geothermal energy

Volcanic rocks are very hot and they heat up the water without causing global warming and releasing fossil fuels. They have a very cheap energy source that is renewable and environmentally friendly. 90% of houses in Iceland use geothermal energy. 30% of electricity is generated from volcanic activity and they reduce the amount of fossil fuels produced. It's sustainable. It's cheap and attracts lots of factories into their country and governments of Iceland don't have to import fossil fuels which means they can use their money for other things like good infrastructure like roads, cycle paths, and facilities.

### (2)tourism

Iceland has loads of tourists. Tourists visit geysers, climb active volcanoes they like to go to outdoor pools/spas like the Blue Lagoon. Tourists then spend lots of money in hotels, drinks in bars. The business owners must pay tax and VAT to the government. The government has money for essential services like hospitals. Tourism creates employment. Direct jobs like waitresses, chefs and indirect jobs like farmers to sell food to cafes and restaurants.

### (3)agriculture

Self-sufficient in food. They have a lot of glasshouses from geothermal energy. The country gets richer as there to import less fossil fuels and this is more sustainable.

### Negative effects of volcanoes

- (1) lava flows burns everything in its path
- (2) if volcanoes occur on snow capped mountains snow mixes with lava and creates lahars which destroys towns and villages
- (3) release gases like sulphur dioxide and acid rain.

### Earthquakes=japan gets loads

- earthquake=is the sudden shaking/tremors of the earth's crust/ocean floor.

### FEED=earthquakes

earthquakes(subduction zone=when 2 plates collide SAN ANDREAS FAULT)

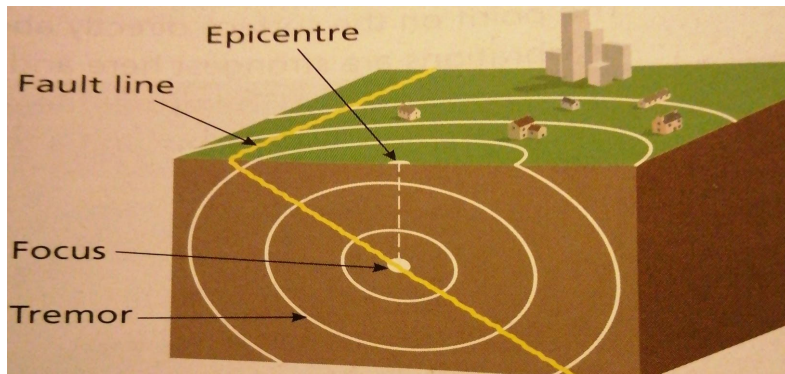
### Example=

Pacific Ring of Fire and San Andreas Fault

### explain=

- earthquakes form at destructive plate boundaries and passive plate boundaries(subduction zones)
- they form at destructive plate boundaries when 2 plates collide the edge of oceanic plate is subducted the edges of the 2 plates build up then seismic energy is produced by friction. eventually the stored energy is too great and waves of seismic energy travel to the epicentre. All energy is stored underground in the focus. plates can be continental and continental or continental and oceanic but if 2 oceanic plates collide an earthquake on the ocean floor results as a Tsunami.
- Earthquakes occur at passive plate boundaries when 2 plates slide past each other which creates friction then seismic energy then gets stored underground in the focus. seismic waves break and travel to the epicentre.
- Before earthquakes minor tremors called foreshocks happen and after earthquakes there are aftershocks.

### Diagram=



Aftershocks = after  
foreshocks = before.

### Factors affecting Earthquakes

- (1) developed countries, slowly developed countries
- (2) strength on richter scale
- (3) the closer the focus to epicentre the more damage is done
- (4) epicentre nearest city.

### Damage caused by earthquakes

- (1) there is a loss of life
- (2) buildings are damaged or collapse
- (3) damage to electricity and gas supplies may cause fires
- (4) bridges, roads and railway lines are damaged often making it difficult to get aid into the area.
- (5) landslides and avalanches could be triggered causing more death and destructions.
- (6) Earthquakes can cause tsunamis. when an earthquake occurs under the sea, water can be displaced, making a huge wave called a tidal wave. this may eventually crash onto the coastline causing devastation.

### How to reduce damage caused by earthquakes

- (1) build earthquake resistant buildings in earthquake zones
- (2) study the pattern of past earthquakes to try to predict when the next one might occur.

### Economic impact/reduce damage of the occurrence of earthquakes

#### (1) the main way earthquakes cost money are Earthquake proof buildings

- You get automatic shutters outside windows and sensors on windows all glass will fall into buildings and not the streets. buildings would be evacuated.
- foundations of buildings like e.g. rollers sway as supposed to collapse with tremors could also be built on solid bedrock then it won't turn liquid. the liquid is coming from burst water pipes. we can also use concrete which will absorb seismic energy.

#### (2) to prevent fires/water damage coming from gas/electricity pipes

- putting gas/water/electricity cables deep down underground cost a lot of money because concrete is expensive.
- make sure to use fire resisting material and water sprinkles. lost money to reduce occurrence of earthquakes.

### RICHTER SCALE MEASURES EARTHQUAKES

INSTRUMENT=SEISMOGRAPH

SEISMOLOGIST=A PERSON WHO STUDIES EARTHQUAKES

## Fold mountains

Feed=

feature/landform=fold mountains

Example =himalayas mts or the Alps

explain=•Fold mountains relate to plate tectonics which are the plates of the earth's crust that are in constant motion due to convection currents in magma.

•fold mountains only form at destructive plate when 2 plates collide one of the plates must be continental then plates buckle and rises and forms fold mountains you get mid ocean ridges on constructive plate boundaries

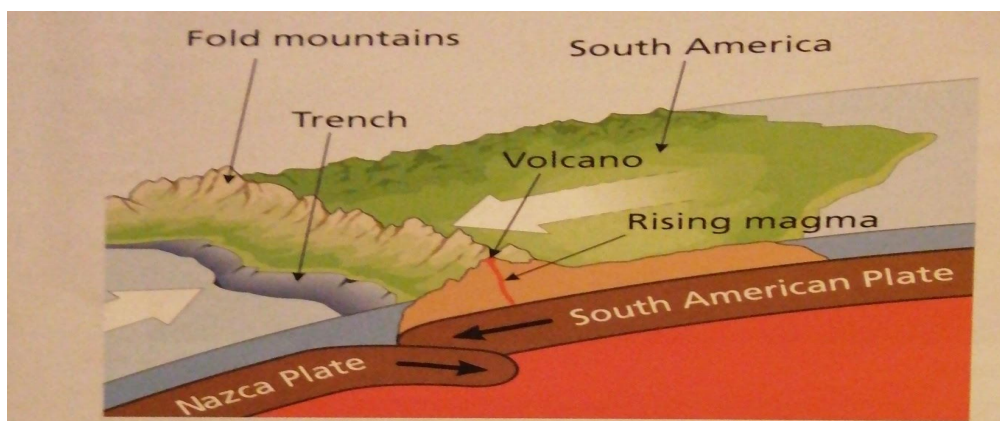
•the Andes mountains are an example of fold mountains they were forced by the Nazca plate colliding with continental plates the south american plate.

•when 2 continental plates collide they buckle upwards forming fold mts eg himalayas where india and australian plate colliding with eurasian plate.

•when continental and oceanic plate collide the edges of the oceanic plate gets subducted and the edge of continental plate buckles forming fold mts eg andes mts. edges of oceanic plate melts, rises and forms a volcano

•Fold mountains trigger earthquakes, volcanoes and avalanches.

Diagram=



•anticline=is an upfold

•syncline=downfold.

## Periods of Folding

(1)caledonian fold mts(ireland)=400 million years ago eg wicklow mts

(2)armorican fold mts(ireland)=250 million years ago eg galtees mts munster

(3)alpine fold mts=35 million years ago e.g. Alps,Himalayas.

Economic impact/advantage of how we interact with the occurrence of Fold mts

### (1)tourism

- people go to hillwalking,hiking like in galtees co tipperary in the alps they go skiing.tourists spend lots of money like for accommodation,food,taxi etc,
- the companies then pay taxes the taxes go to the government .The government spends that money on better infrastructure like roads,motorways;tourism creates employment.direct and indirect jobs like tour guides ,shop assistants and waitresses.

### (2)forming and forestry=fold mts

- The mountains are very suitable for sheep farming. You got meat from sheep,wool.sell lamb.
- plant trees the government pays you money for planting trees on mts.you then sell the trees like paper huge amounts of cardboard,furniture,fuel and trees take in the carbon dioxide in.

## EXAM QUESTIONS-TO STUDY

## SAMPLE ANSWERS TO QUESTIONS

EXAMPLE OF A NATURAL DISASTER=great kanto 1923 earthquake

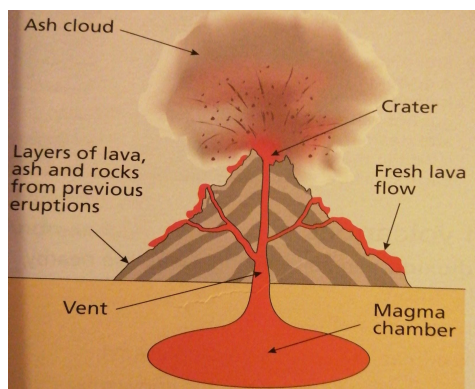
WHERE IT HAPPENED=japan

LONG-TERM RESPONSES=

- the long term responses to this earthquake that has occurred were that about 48% of all homes in tokyo were destroyed or classified as inhabitable that has resulted in over 1.38 million people becoming homeless because of this disaster.there were extreme economic losses of over between \$800 million to \$1.2 trillion dollars.it killed over 140,000 people and the town.they had to rebuild everything like roads,infrastructure and houses.japan had received aid from 30 countries which is known as emergency aid of over 22.11 million yen which is equal to about 34 billion yen today.the united states,united kingdom and china immediately donated enormous amounts of money to help japan.

SHOW AND LABEL EACH OF THE FOLLOWING ON YOUR ACTIVE VOLCANO DIAGRAM

•MAGMA CHAMBER • CONE •VENT •CRATER •ASH CLOUD



WRITE A REPORT DESCRIBING SOME OF THE NEGATIVE IMPACTS OF VOLCANIC ERUPTION

A volcanic eruption had occurred destroying everything the lava burned out everything in its path. the volcano affected people's health really bad toxic gases like sulphur dioxide and acid rain got released into the air they were breathing. the volcano had occurred on a snow-capped mountain which resulted in a lahar because of the snow mixing with the lava that lahar had then destroyed the towns and villages in that area. people were killed. it cost thousands or even millions to repair the damage that has been done.

### EXPLAIN WHAT A TSUNAMI IS AND HOW THEY ARE FORMED

Tsunamis are caused by earthquakes when an earthquake occurs under the sea the water displaced making huge waves called a tidal wave that wave then eventually crashes onto the coastline causing devastation. lots of damage is done destroying buildings and people.

### DESCRIBE WHAT IS MEANT BY EACH OF THE FOLLOWING

FOCUS=Is the point beneath the surface when the earthquake occurs,

SHOCKWAVES=a compressional wave caused by a shock like from an earthquake.

EPICENTRE=is the point on the surface directly above the focus

FAULT LINES=the build up of pressure along when plates are colliding or sliding past each other

### DISASTER CAUSED BY HUMAN ACTIVITY=CHERNOBYL

#### WHERE IT HAPPENED=PRIPYAT, UKRAINE

#### CAUSES=

It was caused by human error by serious mistakes made by the plant operators in the nuclear power station in soviet union. it is the worst disaster yet of history of nuclear power generation and has been caused by human activity. the steam explosion and fires from the disaster had released 5% of radioactive reactor core into the environment with the deposition of radioactive materials in many parts of europe. the effects of the environmental disaster were tragic. lots of people died within a few weeks of the accident about 31 people had died from steam explosion exposure to radiation and thermal burns. that accident had been also responsible for about 20,000 cases of thyroid cancer amongst individuals who were under the age of 18 years of age. the chernobyl affected humans with severe psychological or mental health problems. in a study it has shown that people exposed to radiation from chernobyl have high anxiety levels and were more likely to report unexplained physical symptoms and poor health.

### WRITE A REPORT DESCRIBING SOME OF THE NEGATIVE EFFECTS OF A NAMED EARTHQUAKE THAT YOU HAVE STUDIED

The earthquake great kanto 1923 in japan is one of the worst earthquakes ever.it had caused a lot of damage with a magnitude of 7.9 which destroyed tokyo and killed 140,000 people.the earthquake had lasted for about 14 seconds long enough to destroy every single building.it caused economic losses of over between \$800 billion to \$1.2 trillions dollars.this earthquake had also caused a 40 foot high tsunami.A series of towering waves swept away thousands of people.48% of all homes in Tokyo were destroyed or classified as inhabitable.it resulted in over 1.38 million people becoming homeless by this disaster the whole city tokyo which is the capital was swept away.

## NAME AND DESCRIBE 2 BENEFITS OF VOLCANIC ERUPTIONS

EXAMPLE OF A VOLCANIC ERUPTION =mount fuji

### BENEFIT 1=GEOTHERMAL ENERGY

The volcanic rocks are very hot and they heat up the water without causing global warming and releasing fossil fuels.they have a cheap energy source.that is renewable and environmentally friendly.90% of all houses in iceland use geothermal energy.30% of all electricity is generated from volcanic activity they reduce fossil fuels produced.its sustainable,cheap and attracts a lot of factories in their country and government of iceland don't have to import fossil fuels can spend money on infrastructure.

### BENEFIT 2=TOURISM

Iceland has loads of tourists.tourists visit geysers,climb active volcanoes they like to go to outdoor pool etc.tourists spend lots of money in hotels,drinks in bars.the business owners must pay tax and vat to the government.government has money for essential services like hospitals.tourism creates employment.direct jobs like waitresses ,chefs and indirect jobs like farmers to sell food to cafes and restaurants.

### ONE POSITIVE IMPACT OF A VOLCANO

One positive impact of a volcano is agriculture. Self Sufficient in food.they have a lot of glasshouses in Iceland because of geothermal energy that was generated by volcanoes.the country gets richer as they've to import less fossil fuels and this is also sustainable and good for the environment.

### HOW ASH CLOUDS CAUSES VOLCANIC ERUPTION

The ash clouds of the volcano can cause breathing problems and damage of lungs.inhaling large amounts of ash and volcanic gases can cause a person to suffocate the ash particles can scratch the surface of skin and eyes causing inflammation.

## NOW ANSWER THE FOLLOWING QUESTIONS



- (1) explain how fold mountains are formed with the aid of a diagram  
(2) explain how volcanoes are formed at convergent boundaries (another name for destructive plate boundaries)

Explain how fold mountains are formed with the aid of a diagram

How volcanoes are formed at convergent boundaries

**Learning outcome=**

1. Describe the formation and global distribution of volcanoes, earthquakes and fold mountains in the context of plate tectonics and structure of the earth.
2. Describe the economics and social impacts of how we interact with the occurrence of volcanoes, earthquakes, and fold mountains.