GATEWAY 1: Why are some areas prone to tectonic hazards?

What is a natural hazard?

- **A natural azard** is a naturally occurring event that threatens human lives and causes damage to property.
- **Tectonic hazards** are caused by plate movements when continental crusts and ocean floors move.
    - They can include earthquakes or volcano eruptions.
- **Climate hazards** are caused by severe and extreme weather and climate conditions.
    - They can include floods or storms.

Internal structure of the earth

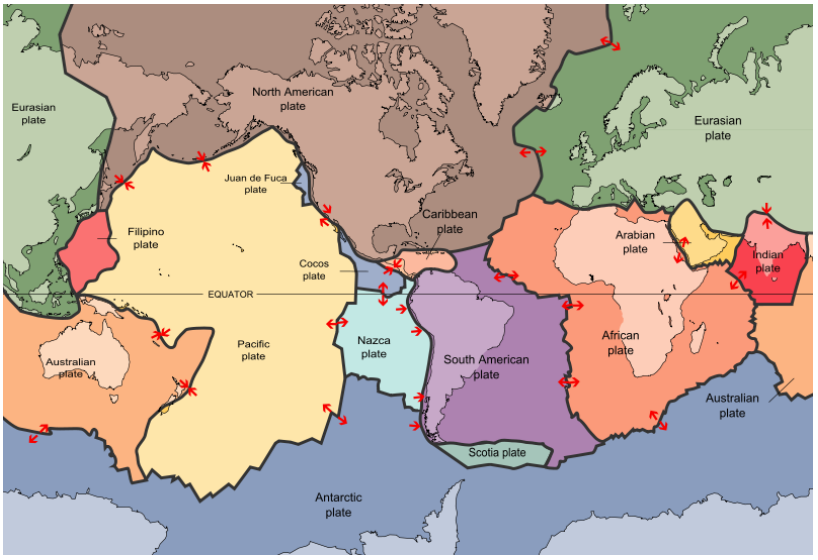
Crust Lithosphere = Crust + Uppermost Mantle	**Oceanic**	**Continental**
Location	• Beneath deep oceans	• Beneath Earth's continental land masses and under shallow seas close to continent
Thickness	• Between 5 - 8 km	• Between 35 - 70 km
Density	• Heavy, dense.	• Lighter rock.
Minerals	• Mainly basalt.	• Granite
Age of Rock	• Less than 200 million years old.	• Wide range from very recent to 4 billion years old.

Mantle	**Upper Mantle**	**Lower Mantle**
• 800C to 3000C • 2900km thick • Mostly solid rock that flows under high temperature and pressure.	• Layer of solid rock + asthenosphere	• Solid rock

Core	**Outer core**	**Inner Core**
• Central part of Earth • 3500km thick • 3000C to 5000C	• Mainly liquid • 2100 km thick	• Solid • 1400 km thick

What are tectonic plates?

- Tectonic plates are solid slabs of rocks which are made up of the continental crust or oceanic crust or both, attached on its underside to the upper part of the mantle.
- Edges of these plates are called plate boundaries.
- Important plates are, **NA Plate, SA Plate, Pacific Plate, African Plate, Eurasian Plate, Indo-Australian Plate, Antarctic plate**



How and why do plates move? ***FAQ***

- Tremendous heat found in Earth's core causes rocks in mantle to melt and become magma.
- Liquid mantle material, called magma, is intensely heated and expands, rising up.
- Rising and spreading lava pulls the plates apart, causing them to diverge as they are dragged along and move away from each other.
- Then the magma cools and sinks, pulling the plates along.
- The sinking mantle material heats up again as it nears the core, creating a convection current and causing the whole process to repeat.

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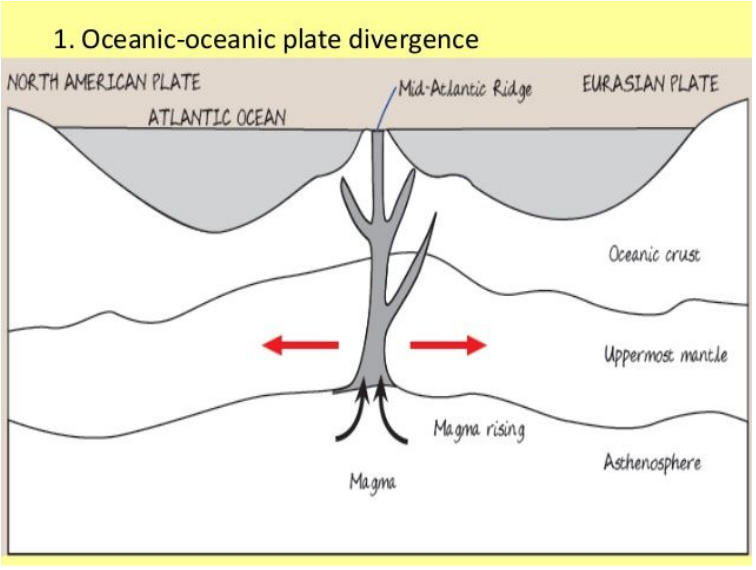
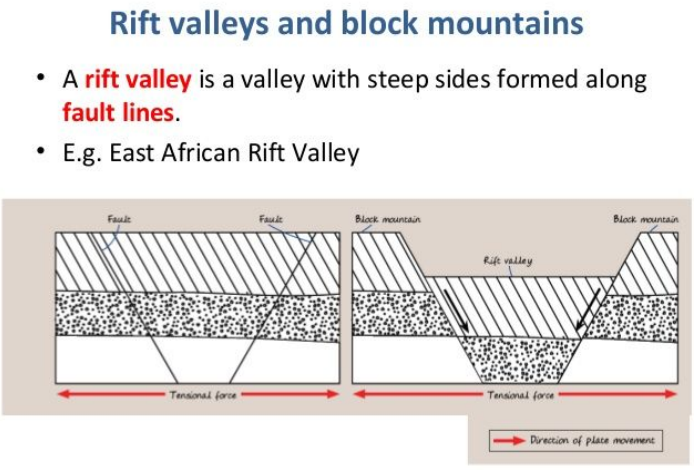
Different types of plate boundaries

Divergent plate boundaries

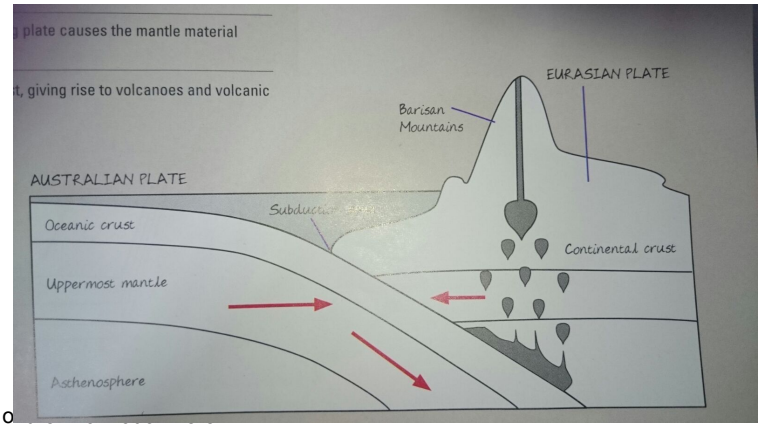


- **Oceanic-oceanic plate divergence**
  - Associated landforms are **mid-ocean ridges** and **volcanic islands.**
    - **Mid-Atlantic Ridge** where the **North American and Eurasian plates diverge.**
    - **Iceland** and the **Azores** examples of volcanic islands formed.
  - As the two oceanic plates move apart, they form fractures at the plate boundary.
  - The magma wells up from the zone of divergence, cools and solidifies to form a ridge of new seafloor known as a mid-oceanic ridge.
  - The plate boundary where divergence occurs is called a constructive plate boundary.
  - As the plates move apart, the ridges move away from the spreading zone and new ridges are formed.
  - Therefore, the youngest ridges are closest to the spreading zone and oldest are further away from it.
  - The rows and rows of ridges spread out from the zone of divergence in a process known as **seafloor spreading**, creating new seafloor.
  - At various points along the mid-oceanic ridge, magma may build up and solidify to form undersea volcanoes.
  - When these volcanoes grow above sea level, they form **volcanic islands** like the Azores.
- **Continental-continental plate divergence**
  - Associated landforms are **rift valleys and block mountains.**
    - **East African Rift Valley** is an example of a rift valley formed by the divergence of the Nubian and Somalian boundaries of the African plate.
  - When two continental plates diverge, the rocks at the boundary start to stretch and fracture due to tensional forces, creating normal faults.
  - The land between the two plates move apart and a central block of land between two parallel faults can sink downwards, creating a rift valley.
  - This process also creates **block mountains**, a block of land with steep slopes but usually with a flat top, as the surrounding land sinks downwards, causing it to be left standing higher than the surrounding land.



Convergent plate boundaries

- **Oceanic-continental plate convergence**
  - Associated landforms are **oceanic trenches**, **fold mountains** and **volcanoes**.
    - **Peru-Chile Trench and Andes Mountains** formed by the subduction of the oceanic Nazca plate into the continental South American plate.
    - **Sunda Trench, Barisan Mountains** formed by the subduction of the oceanic Australian plate into the continental Eurasian plate.
  - Oceanic plate is thinner and denser, while continental plate is thicker and lighter.
  - As a result, the oceanic plate subducts under the continental plate
  - Downward movement of the plate can be violent, producing seismic shocks known as earthquakes as the friction created between the two moving rock masses accumulates and is suddenly released.



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- The downward movement of the oceanic plate dips into the mantle and may produce a long and deep oceanic trench
    - Peru-Chile trench off the South American coast caused by the subduction of the Nazca plate into the S.A plate.
- Downward movement of oceanic plate may cause the melting of mantle material above it, which produces magma.
- The magma escapes through any breaks or fractures, and when it escapes through vents in the surface, it forms a volcano.
- When continental plate rides over the oceanic plate, its edges and sediments near the edge are compressed and folded to form fold mountains

- **Oceanic-oceanic plate convergence**
    - Associated landforms are **oceanic trenches** and **volcanic islands**.
        - **Mariana Trench** and **Mariana Islands** caused by the subduction of the denser Pacific plate into the less dense Philippine plate.
    - When two oceanic plates collide, the denser oceanic plate will subduct under the less dense oceanic plate.
    - A deep ocean trench is formed at the point of subduction.
    - The subducted oceanic plate causes the mantle material above it to melt and form magma.

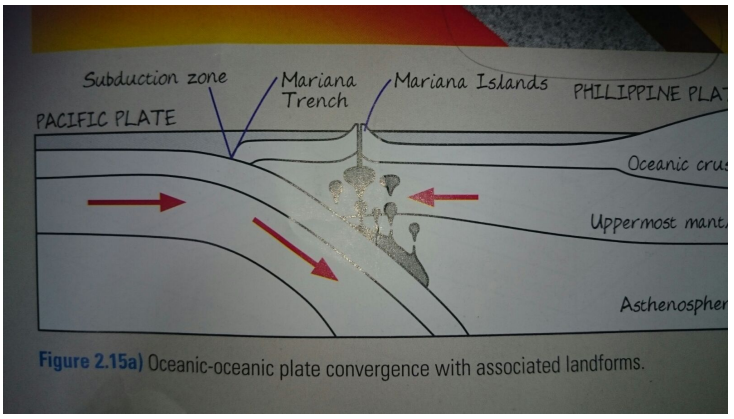
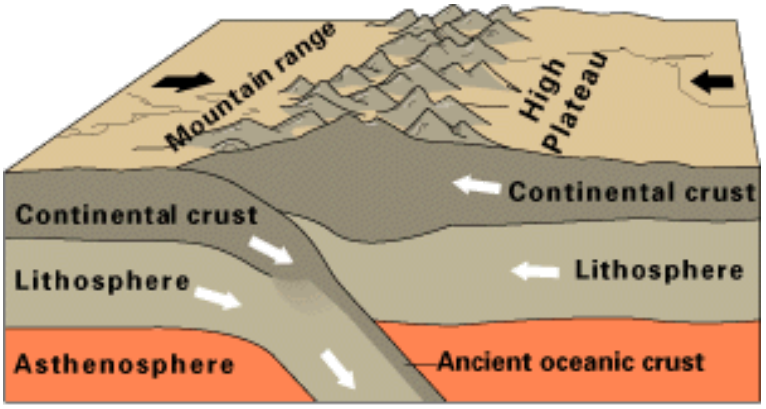


Figure 2.15a) Oceanic-oceanic plate convergence with associated landforms.

    - This magma then rises through the crust and forms volcanoes, eventually, a chain of subduction volcanoes is formed.
    - Earthquakes may also occur due to the accumulation in tensile stress due to continuous friction between the two plates being suddenly released as seismic energy.

- **Continental-continental plate convergence**
    - Associated landforms are **fold mountains.**
        - **Himalayas in Northern India** are formed by the convergence of the Indian plate into the Eurasian plate.
    - When two continental plates collide, due to their similar densities they do not subduct and instead merely push into each other.
    - The resultant compressional force creates immense pressure which causes the rocks to buckle and fold, resulting in the formation of fold mountains.
    - There is no volcanic activity as there is little to no subduction of plates.



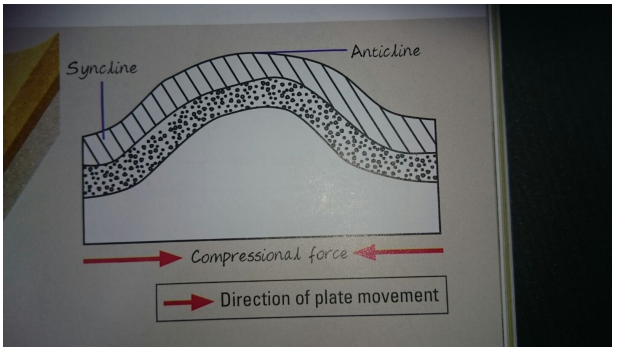
Continental-continental convergence

Transform plate boundaries

- **Transform plate boundary**
    - Associated landforms are **transform faults.**
        - **San Andreas faultline** caused by the Pacific and North American plates sliding past one another.
    - At a transform plate boundary, two plates slide past each other.
    - This sliding action causes them to grind against each other and experience friction.
    - This friction accumulates as tensile energy which can be suddenly released as seismic energy in the form of earthquakes.

GATEWAY 2: What landforms and associated tectonic phenomena are found at plate boundaries?
Why are some landforms found at different plate boundaries and how are they formed?o
Fold mountains

- **Fold mountains** are formed along convergent plate boundaries.
- When plates converge and collide, the resultant compressional force creates immense pressure which causes the rocks to buckle and fold in a process known as **folding.**
- In a folded rock layer, the upfold is called the anticline and the downfold is called the syncline.
    - A way to memorise it is Xinmin is a shitty school, so Synclines go down.



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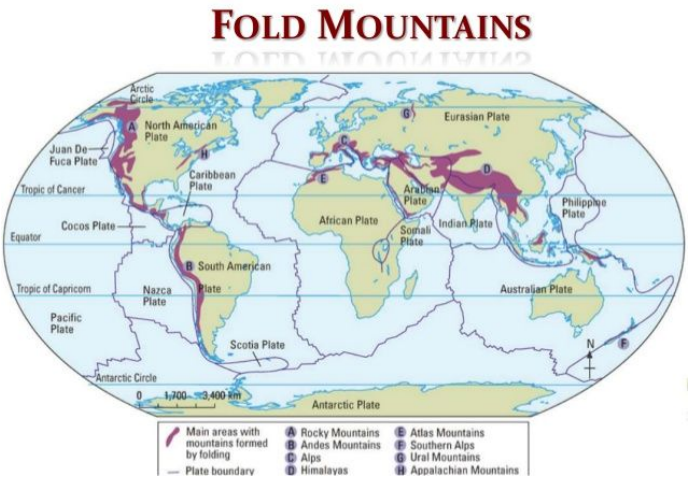
Distribution of fold mountains

- Usually found near convergent plate boundaries.
- **Circum-Pacific Belt**
    - Andes and Rockies in Western America
    - Southern Alps in New Zealand
- **Eurasian-Indonesian Belt**
    - Atlas Mountains in North Africa
    - Alps in South Europe
    - Himalayas in Northern India
    - Miscellaneous fold mountains in South East Asia



Formation of various fold mountains

- **Andes in Western Coast of South America (Peru, Chile, etc)**
    - Andes formed at the convergent plate boundary where the Nazca plate subducts into the South American plate.
    - Thinner and denser Nazca plate subducts into the thicker and lighter South American plate.
    - Continental South American plate rides over Nazca plate exerting compressional force on seafloor sediments and forming them into fold mountains like the Andes.
    - The subducted Nazca plate causes mantle material above it to melt, producing magma which rises through the fractures to form subduction volcanoes such as Nevado del Ruiz.
- **Himalayas in Northern India, Tibet, Nepal etc**
    - Himalayas formed by compression of two continental plates, the Indo-Australian plate with the Eurasian plate.
    - As both continental plates have relatively same densities, there is little to no subduction although one is thrust under the other for a short distance.
    - Their edges and the sediments between them were buckled and folded and as no plate subducts under another, greater and immense folding and uplifting of the sediments result in the Himalayan fold mountains which are taller than regular oceanic-continental fold mountains as a result.

Rift valleys and block mountains

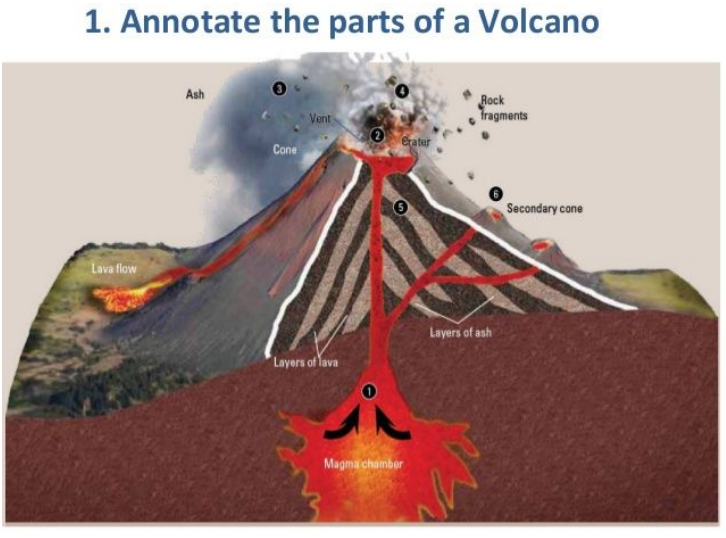
- When two continental plates diverge, the rocks at the boundary start to stretch and fracture due to tensional forces, creating normal faults.
- The land between the two plates move apart and a central block of land between two parallel faults can sink downwards, creating a rift valley.
- This process also creates **block mountains**, a block of land with steep slopes but usually with a flat top, as the surrounding land sinks downwards, causing it to be left standing higher than the surrounding land.

Distribution of rift valleys and block mountains

- Usually found near divergent plate boundaries.
- **East African Rift Valley** is an example of a rift valley formed by the divergence of the Nubian and Somalian boundaries of the African plate.

Volcanoes

- A **volcano** is a landform formed by magma ejected from the mantle onto the earth's surface.
- It is fuelled by a **magma chamber** which is a reservoir of molten rock beneath the earth's crust, usually found below active volcanoes
- A **vent** is an opening in the earth's surface with a pipe leading into a magma chamber allows magma to flow out and onto the earth's surface.
- The upward movement of magma both in the earth's crust and onto the earth's surface is known as **vulcanicity**.



Formation of a volcano

- At divergent or convergent plate boundaries where there is subduction, magma is able to rise and seep into the magma chamber from the mantle.

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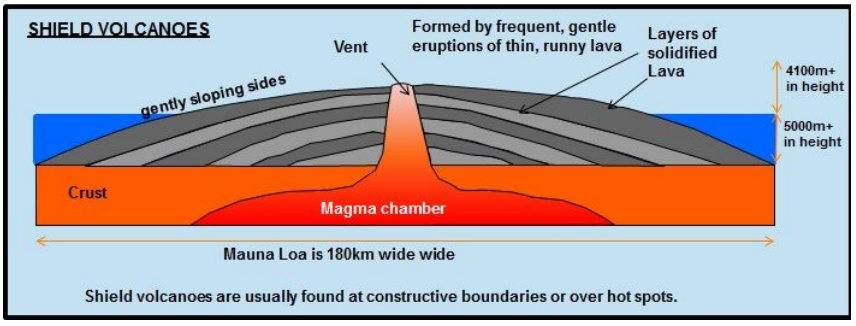
- The amount of pressure in the chamber builds up, giving rise to a volcanic eruption which causes magma to be ejected onto the earth's surface as lava.
- Eruptions produce pyroclasts, lava and ash which build up around the vent. Successive eruptions eventually build up on one another and form a volcano.
- Eventually, this forms a volcanic cone with a bowl-shaped opening called the crater.
- The summit of a volcano may also be blown off during an explosive eruption, causing the sides of the crater to collapse inwards and form a large depression known as a caldera.
- Sometimes if the main vent is blocked, magma is forced to find a new exit route to the surface eventually causing it to erupt and build a secondary cone of newer volcanic material.

Shield volcanoes

- Shield volcanoes have gently sloping sides and a broad summit.
- They are formed where low-silica lava has been ejected.
- Low-silica lava flows easily and spreads out over a large area before solidifying.
- The lava does not trap much gas so eruptions are not usually explosive.
- Normally located near divergent plate boundaries where magma can just rise directly from the mantle.



- An example of a shield volcano is Mount Washington in America.

Stratovolcanoes

- Stratovolcanoes develop from successive eruptions of lava and pyroclasts.
- **Pyroclasts** are ash, rock fragments and volcanic bombs ejected during a volcanic explosion
- After the initial eruption of pyroclasts, the subsequent eruption of lava covers the pyroclasts and prevents it from being eroded away.
- Over time, this creates a high volcano with a slightly concave profile.
- Secondary cones may also appear on a stratovolcano if the main cone is blocked.
- An example of a stratovolcano is Mount Pinatubo.

Classification of volcanoes based on their characteristics

Characteristics	Stratovolcanoes	Shield volcanoes
Viscosity of lava	• High viscosity lava • High silica content • Viscous lava that traps gas easily • Spreads out over a small area before solidifying	• Low viscosity lava • Low silica content • Does not trap gas • Spreads out over a large area before solidifying
Type of material ejected	• High silica lava, pyroclasts, gases, ash, rock fragments and volcanic bombs • Lahars	• Low silica lava, ash, gases
Strength of eruption	• Explosive and often violent	• Eruptions not often explosive as it does not trap gases.
Profile of volcano	• Tall with a smaller base • Steep, concave slopes • Presence of secondary cones	• Short with a large base • Gentle slopes • Only one main cone • Broad summit
Examples of volcanoes	• Mount Mayon in Philippines	• Mount Washington in America

Distribution of volcanoes

- Volcanoes are distributed along **active plate boundaries.**
  - **Convergent plate boundaries**
    - **Circum-Pacific Belt (Ring of Fire)**
    - **Andes to Rockies to Alaska to Japan to Philippines to Indonesia to New Zealand**
  - **Divergent plate boundaries**
    - **Mid Atlantic Ridge**
    - **East African Rift Valley**
- Volcanoes are also found at **geologic hotspots.**
  - **Hawaii** is one such geologic hotspot. Mauna Loa is fed by the geologic hotspot.

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- **Mount Erebus** in Antarctica is another geologic hotspot.

Active, dormant, extinct volcanoes

- **Active volcanoes** are volcanoes which erupts all the time like **Mount Mayon.**
- **Dormant volcanoes** are volcanoes which could erupt but has not for a long time like **Mount Fuji.**
- **Extinct volcanoes** are volcanoes that have not erupted since historic times.

Risks of living in volcanic areas

- **Massive destruction by volcanic materials** caused by the lava and pyroclasts ejected.
  - Pyroclastic flows, especially those of low-silica lava, are dangerous as they can destroy anything in their path.
  - Volcanic bombs of heated rocks can fall in areas surrounding the volcano and cause damage to property.
  - The eruption of Nevado del Ruiz in the Andes created lahars which engulfed the town of Armero and killed more than 20,000 people.
- **Pollution** which can disrupt human activities over large distances.
  - In 2010 when Eyjafjallajokull erupted, travel by air was disrupted over large swathes of Europe because the volcanic particles made it unsafe to operate aircraft.

Benefits of living in volcanic areas

- **Fertile soil** allows for favourable agricultural conditions.
  - Indonesia is full of fertile volcanic soil, which explains how it is able to continuously sustain such a large population.
- **Precious stones and minerals** created by geological processes.
  - Stones like diamonds can be sold as jewellery or for industrial processes.
  - Such stones are often foudn in the old volcanic rocks of Kimberly, South Africa.
- **Tourism** is popular in volcanic areas because they offer many varieties of activities to participate in.
  - Hot springs are common in Japan because it is located along an active plate boundary and hence a lot of people visit Japan for the hot springs.
- **Geothermal energy** from geologic hotspots along volcanic areas.
  - Iceland has many geothermal electricity plants and as a result this heats over 70 percent of homes in Iceland.

GATEWAY 3: How do people prepare for and respond to earthquakes?

What are earthquakes?

- An earthquake is a vibration or tremor at the earth's surface caused by a sudden release of energy stored in the rocks found along the fault lines.

Process of an earthquake

- Plates converge, diverge or slide past one another, creating a slow buildup of stress on the rocks found on either side of the fault.
- This energy is stored in earth's crust and eventually when the rocks cannot contain the pressure and energy anymore, this energy is released as seismic waves as the rocks slip in the form of an earthquake.
- Energy radiates away from the point of sudden energy release, also known as the **focus** (below **epicentre**), as shockwaves.
- Shockwaves reach **epicentre** on surface of earth.
- Rocks break up and move in a series of sudden jerks.
- The stress within the ground may cause several smaller earthquakes to happen along the fault lines. These are known as **aftershocks.**

Focus vs Epicentre

- **Focus** is the source of the earthquake where seismic waves radiate out from.
- **Epicentre** is the point on earth's surface directly above the focus, where seismic waves are the strongest.

Deep-focus vs shallow-focus earthquake

- **Deep-focus earthquakes** have their focus at 70-700 km below the earth's surface.
  - They typically have lesser impact on land as the seismic waves have to travel through more rocks and as such lose more energy.
- **Shallow-focus earthquake** have their focus in the upper 70km of the earth's crust.
  - They typically have more severe impacts on land as vibrations and seismic waves do not have to travel as much through rocks and as such impact the land with more energy.

How do you measure the strength of an earthquake?

- The Richter Scale is a logarithmic scale used to measure the strength of earthquakes.
  - Each magnitude up is 10 times greater than the previous magnitude.
- Seismographs are used to record the seismic waves.
- Spring-mounted weight moves up and down when tremors are detected.
- Ink markers records the motions of the ground and make vertical markings on a piece of graph paper.

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- The amplitude corresponds to the intensity of the earthquake.

Factors affecting the extent of earthquakes

- **Population density** of an area may affect the damage caused. Dense, urban areas are more heavily impacted than sparse rural landscapes. Therefore an earthquake in a city may be more disastrous than one in a rural town.
- **Level of preparedness** of a population can affect the damage done by an earthquake. Having evacuation plans, trained rescue workers and a range of action plans reduces the damage caused by earthquakes.
- **Distance from epicentre** affects strength of earthquake, which affects the amount of damage it can cause to buildings. If an area is closer to the epicentre of an earthquake, it is more likely to sustain heavy damage than one further away.
    - The earthquake in Christchurch, New Zealand in 2011 was especially deadly because of this as the epicentre was located only a few kilometres away from the city centre.
- **Magnitude of earthquake** obviously affects extent of earthquakes as stronger earthquakes can damage more buildings due to increased shaking.
- **Time of occurrence** can affect the damage caused by an earthquake. If an earthquake occurs at night, people have a lesser chance of surviving as they are sleeping.
    - In Taiwan in 1999 a lot of people died during an earthquake because it occurred late in the night.
- **Type of soil** affects the damage done, especially to buildings as loose and unconsolidated soil can lead to liquefaction of the ground.

Distribution of earthquake zones

- Earthquake zones are distributed along **active plate boundaries,** however they occur more frequently at **convergent plate boundaries.**
    - **Convergent plate boundaries**
        - Pacific Ring of Fire
            - **Tohoku Earthquake in Japan 2011**
    - **Divergent plate boundaries**
    - **Transform plate boundaries**
- Earthquakes can also occur away from plate boundaries, although this is less rare**.**
    - **Earthquake in Sichuan 2008**

Risks associated with living in earthquake zones

- **Tsunamis** which are unusually large sea waves can be formed.
    - Tsunamis can be formed through various ways like the movement of the sea floor, an explosive underwater volcanic eruption and a landslide above sea level which displaces water.
        - The formation of a tsunami starts when seismic energy from an offshore earthquake forces out a mass of seawater.
        - The tsunami waves may start at a height of 1m with wavelengths of 100 to 150 km and as such can pass by undetected.
        - On reaching shallower water, greater frictions slows the waves and forces them to increase in height.
        - At this point of impact on the close, the tsunami could be travelling at speeds of 30 to 50km/h and reach heights of about 15m.
        - Sometimes the sea also recedes from the coast before advancing onshore. If the sea recedes, it only does so minutes before the tsunami hits the shore.
    - They travel long distances and can impact coastal areas far away from the epicentre of the earthquake.
    - For instance, during the Boxing Day Disaster in 2004 even though the earthquake's epicentre was in Indonesia, areas as far away as India were affected by the tsunamis.
- **Disruption of services** can occur as the jerks in land may disrupt pipes and electricity lines, disrupting the supply of electricity, gas and water.
    -
- **Landslides** may cause widespread destruction
    - Earthquake off coast of Peru triggered landslides which engulfed town of Ranrahirca.
- **Destruction of properties**
    - Tohoku earthquake created a tsunam iwhich travelled up to 10 kilmoetres insland, causing extensive damage and ofrcing people to flee from their homes.
- **Destruction of infrastructure**
    - **After the Kobe Earthquake in 1995,** entire sections of the Kobe freeway collapsed, hindering transport by land.
- **Loss of lives**
    - 2008 Sichuan earthquake resulted in 100,000deaths.

How do people respond to earthquakes?

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Preparedness measures

- Preparedness measures are measures people put in place to cope with earthquakes before they have occurred.

Strategy	Implementation	Successes	Limitations
Land use regulation	• Land use regulation are a set of rules implemented to prevent developments in certain areas, especially those which are in high-risk areas for natural hazards such as tsunamis and liquefaction.	• In California, USA all new building developments are not allowed to be built across fault lines or at areas with risk of liquefaction. • This has reduced the risk of structural collapse during earthquakes, reducing rebuilding costs.	• Negative is that these may often need to be carried out in areas which is already developed or privately owned. In some cases they will try to buy out the land but these strategies are costly plus owners may not want to sell land.
Infrastructure	• Infrastructure needs to be developed with advanced engineering to withstand the vibration associated with an earthquake.	• Effective building design can reduce the collapse of buildings and minimise the damage caused by an earthquakes. • One example of this can be the tuned mass dampener in the Taipei 101 as it is built to withstand the earthquakes by reducing the natural resonance of the building so that the earthquake does not cause as much damage. • As a result, the Taipei 101 has successfully withstood multiple earthquakes and even typhoons which have shaken the region despite its large size.	• However, this makes it so that the buildings cost more to build and maintain.
Emergency drills	• Emergency drills are a form of preparedness measure where people practise the steps to take when an earthquake occurs. • This creates awareness among the population and reduces levels of panic and irrational behaviour during an event.	• As a result of widespread public education campaigns and earthquake drills in Japan such as the annual Disaster Prevention Day on 1st September where people are taught how to react in the event of an earthquake, Japan is better able to deal with the constant earthquakes and minimise casualties.	• However, they are often designed based on the most serious earthquake that has ever struck a region. In the case of the Tohoku Earthquake most of these protocols were inadequate in preventing the devastation of affected areas. • Furthermore, these are only effective if there is enough time for them to evacuate. Earthquakes are hard to predict therefore there is insufficient time.
Earthquake monitoring and warning systems	• Earthquakes can be monitored by studying the history of when and where earthquakes have occurred. • This provides an estimation for which areas have higher risks of suffering from earthquakes and allows for planning to be done with that information.	• In Japan, earthquake motion sensors are installed on many roads and bridges, allowing for the occurrence of an earthquake to be predicted. • They can also be used to estimate damage to bridges, railways and other such infrastructure.	• However, earthquake sensors are expensive to obtain, install and use. • An earthquake usually occurs only seconds after a warning is sounded, hence there is not enough time to evacuate. • It is difficult to give accurate warnings if multiple earthquakes occur close to one another.
Tsunami monitoring and warning systems	• Tsunami monitoring devices help predict tsunamis and are often linked to warning systems.	• Hawaii in the United States has a sophisticated network of sensors and warning systems to monitor and warn people of possible tsunamis. • This results in a lowered casualty rate as people have adequate time to evacuate from their homes.	• However, these sensors are prone to giving false alarms when the waves are high. • There is also little time to evacuate when an approaching tsunami is detected unless tsunami sensors are set up further offshore.

Short term responses

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- Strategies that are put into place immediately after an earthquake to last for weeks after the occurrence of an earthquake.

Strategy	Implementation	Successes	Limitations
Search and rescue	• Search and rescue refers to the quick location and freeing of people trapped under collapse buildings.	• Survivors are found after being trapped for a couple of weeks without food, reducing casualty rate of the earthquake. • After the Tohoku Earthquake in 2011 in Japan, sniffer dogs and heat sensors were successfully deployed and rescued many who were trapped.	• However, rescue workers only have a limited time of 72 day and hours or three days to find trapped survivors as without food and water, they are unlikely to survive after 3 days. • Rescue workers had a great limited time of 3 days to search through two entire towns after earthquake in Tohoku in 2011.
Emergency, food and medical supplies	• Emergency, food and medical supplies refers to the creating of injured and giving of clean drinking water to survivors to prevent dehydration and spread of diseases	• The provision of immediate aid helps survivors continue with their lives. • After Afyon earthquake the Turkish Red Crescent society responded by delivering 20k tents, 50k blankets and 3k heaters to region. • This helps with the immediate recovery after the earthquake as people have a place to live until areas are rebuilt.	• However, medical supplies food and water may not be sufficient and this may cause social unrest. • For instance, in the Haitian Earthquake in 2010, looting and fighting broke out as people fought for food and medical supplies.

Long term responses

- Strategies that are put into place immediately after an earthquake to last longer periods of time after an earthquake.

Strategy	Implementation	Successes	Limitations
Rebuilding of infrastructure	• Rebuilding of infrastructure refers to the rebuilding of infrastructure and amenities to be better improved on after a disaster.	• Authorities often develop stricter building codes to ensure infrastructure is restored at a higher safety level than before. • After Kobe Japan Earthquake 1995, Japan spent billions developing technology to build more earthquake-resistant buildings, saving billions more in the long run in saved the costs.	• Reinforced buildings while go stood against earthquakes may not necessarily be protected against tsunamis. • Many of Chile's buildings are earthquake resistant but the coastal areas suffered massive damage from a tsunami when an earthquake struck in 2010.
Provision of health care	• Provision of health care refers to the health options such as long-term counselling for the trauma incurred during an earthquake.	• Problems can be identified and addressed early • After Christchurch earthquake, 2011, significant anxiety and depression problems were noted within the general population, resulting in greater no. of health workers being deployed in the area.	• Improving health options such as restoring the resilience of people after an earthquake can be very challenging. • For example, many survivors of Haitian earthquake continue to lack access to basic necessities.

Notes by some weirdo called Conrad Soon.. I don't guarantee the full accuracy of the information here.
Special thanks to Mrs Wong, the most wholesome and pure Geography ahma.