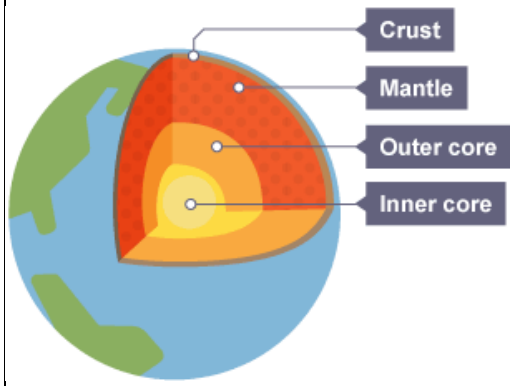
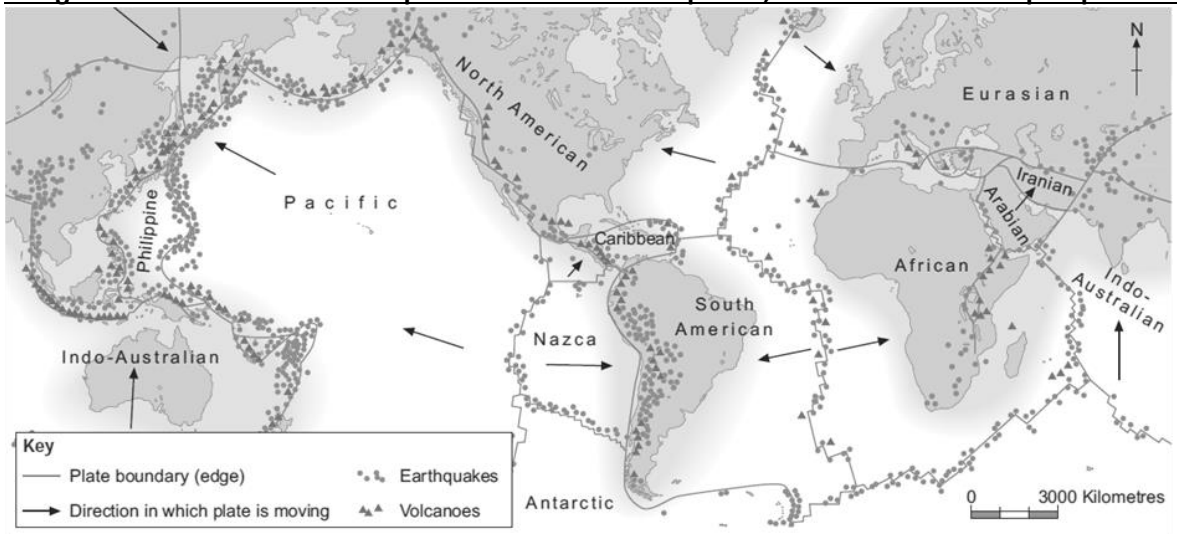
Geography GCSE: Paper 1 question 1

The challenge of natural hazards: Tectonic hazards

1. Natural hazards pose major risks to people and property	**Natural hazard:** a natural event that threatens people, or has the potential to cause damage, destruction and death **Types of natural hazard:** • Tectonic hazards: caused by the movement of tectonic plates • Weather hazards: caused by conditions in the atmosphere **Hazard risk:** the change that a natural hazard may take place and cause damage to society. **Factors afffecting hazard risk** • Nature of the hazard: how large it is, how wide an area is affected • Vulnerability: how many people are in the area, how close do they live to the hazard • Capacity to cope: are buildings well protected, can people evacuate, is the country rich enough to recover quickly?
2. Earthquakes and volcanic eruptions are the result of physical processes. *Layers of the earth*  	**<u>The globals distribution of earthquakes and volcanic eruptions, and their relationship to plate margins</u>**  **Plate tectonics theory -** The crust is broken up into large slabs called tectonic plates. These plates float on the semi-molten rock of the mantle and are moved around by *convection currents.* **Continental crust**: sections of crust which are thick (30-50km) but light and old. Cannot be destroyed. **Oceanic crust**: sections of crust which are thinner (5-10km) but dense and younger. **Slab pull:** The process of older, denser sections of crust subducting (sinking) into the mantle and pulling sections of new, light crust with it. **Ridge push:** lava erupts to create crust as plates move apart. As it cools, it pushes down the slop of the ridge, pushing the plates even further apart.

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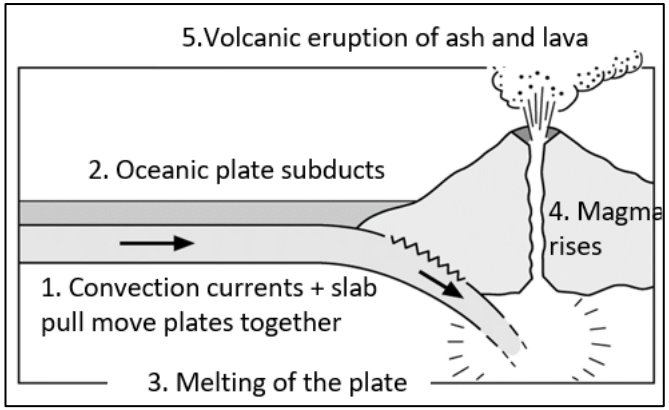
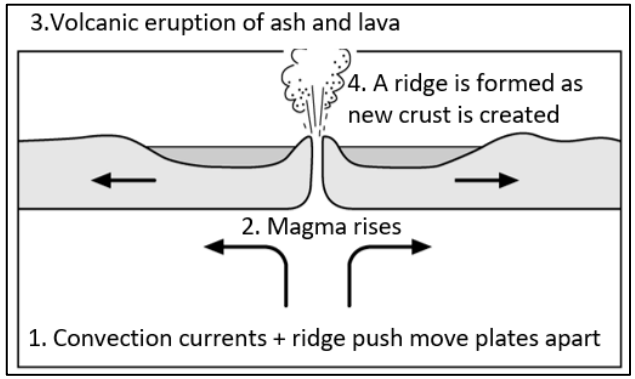
3. **Physical processes taking place at different types of plate margin (constructive, destructive and conservative) that lead to tectonic hazards like earthquakes and volcanic activity.**

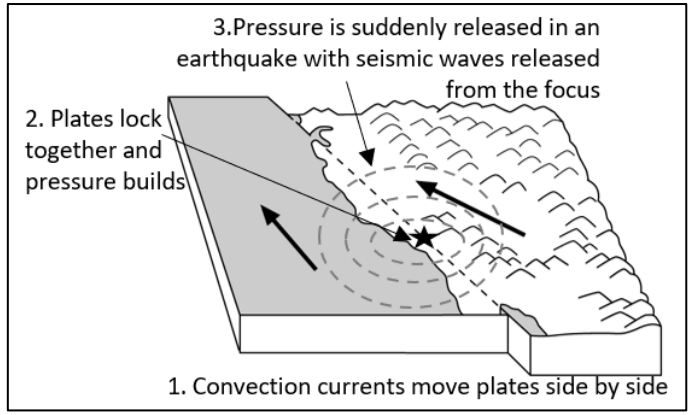
Destructive → ← two plates are move together. = earthquakes and volcanoes
e.g. Nazca and South American plates



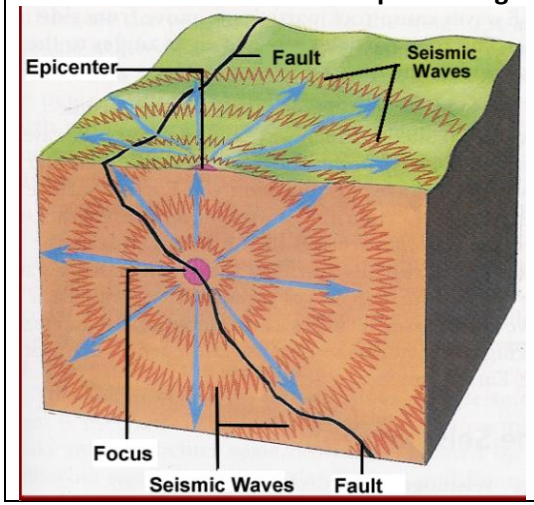
Constructive ← → two tectonic plates move way from each other. = volcanoes + very small earthquakes
e.g. North American and Eurasian plate



Conservative ↑↓ two tectonic plates slide past each other = earthquakes
e.g. Pacific and North American plate



4. Earthquakes occur at constructive, destructive and conservative plate margins.



An earthquake = a sudden or violent movement within the Earth's crust followed by a series of shocks.
Seismic waves = the vibrations of the crust's movement during an earthquake
Focus = the point in the earth's crust where seismic waves begin. Seismic waves are strongest and cause most damage nearest to the focus.
Epicentre = the point on the surface of the earth's crust directly above the focus.
the damage done by the earthquake 1 (very little damage) -12 (total destruction)

<u>Cause of earthquakes</u>

1. Convection currents and slab pull move plates together at a destructive boundary / convection currents move plates alongside each other at a conservative boundary
2. As the plates move past each other they lock together so tension builds between them.
3. Suddenly, this pressure is released so the earth's crust vibrates and seismic waves are released. This is an earthquake.
4. The seismic waves spread out from the focus.
5. At a constructive plate boundaries, as convection currents pull plates apart tension builds up in the plates.
6. Suddenly, the tension is released as seismic waves from the focus of the earthquake.

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5. The effects of, and responses to, a tectonic hazard vary between areas of contrasting levels of wealth: named examples	**Primary effects**: Impacts caused directly by the natural hazard **Secondary effects**: The after-effects that occur as indirect impacts of a natural event, the knock-on effects of primary impacts. **Immediate responses**: The reaction of people as the disaster happens and in the immediate aftermath **Long term responses**: Later reactions that occur in the weeks, months and years after the event		
	Example	Christchurch, New Zealand, 2011. 6.3 on the Richter scale	near to Capital Port-au-Prince, Haiti, 2010, 7 on Richter scale
	Plates	Indo-Australian and Pacific plates – destructive margin	Caribbean and North American plates – conservative margin
	Primary effects	• 185 people were killed • 3129 people were injured • 6800 people received minor injuries • 100,000 properties were damaged, and the completely destroyed 10,000. • $28 billion of damage was caused • Roads, water and sewage pipes were damaged • the cathedral spire collapsed	• 230 000 deaths • 300 000 injured • 100,000 houses destroyed. • Squatter settlement collapsed • Houses of over 1.3million people were destroyed • Factories like Palm Apparel Closed • Half of schools in Port-au-Prince damaged • $8 Billion of damage was caused.
	Secondary effects	• 2200 people in temporary housing • schools were closed for two weeks • Economic decline: 50 to 100 years for the economy to recover • Loss of income from tourism	• Cholera outbreak killing over 8000 people • few hospitals open and emergency services overstretched • Loss of income from tourism • 1 million still living in camps 1 year after the quake.
	Immediate responses	• $6-7 million of international aid • rescue crews from UK, USA and Australia, provided support • 30,000 residents were provided with chemical toilets	• Rescuing people helped by US Marines • mass graves for dead • camps for homeless set up by the UN, • some violence and looting due to delays in aid distribution
	Long term responses	• 10,000 affordable homes were constructed • Water and sewage were repaired within 5 months • The New Zealand government provided temporary housing • Many NGOs provided support, including Save the Children • Canterbury Earthquake Recovery Authority was created to organise rebuilding the and to change planning laws and regulations.	• $330million given by the EU • the World Bank waived debt repayments for 5 years, international aid organisations rebuilding • $1.1 billion collected by charities cash for work schemes • some refugees moved to the Dominican Republic

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		• 1/5 of the population migrated from the city	

6. Reasons why people continue to live in areas at risk from a tectonic hazard.	**The advantages of living near volcanoes:** • Fertile soils e.g. around Vesuvius where much of Italy's tomato crop is grown. • Geothermal power is often a cheap and clean source of power – e.g. Iceland • Usually, there are sufficient signs to move to safer places, so while property could be as risk injury is less likely e.g. Mount Pinatubo in the Philippines in 1991 was the 2nd largest eruption in the 20th century but only 300 died because of mass evacuation of the area. • People have lived in the area for many years and are confident that there won't be a severe eruption. • Tourism e.g. in Uganda, the volcanic region around Mt Elgon or Mt Vesuvius near Naples in Italy. **The advantages of living in earthquake zones:** • Many earthquake areas are close to the coast – the climate is good, fishing and farming are easy. • Many of these places like Japan get daily earthquakes and they have learnt to deal with them. They cause little or no damage as they adjust building methods for example. • The big ones are very infrequent – 1906 and 1989 in San Francisco, so people believe they can manage
7. Management can reduce the effects of a tectonic hazard. **How monitoring, prediction, protection and planning can reduce the risks from a tectonic hazard.**	**Monitoring:** Recording physical changes, such as earthquake tremors around a volcano, to help forecast when and where a natural hazard might strike. *[seismometers to detect tremors, tiltmeters to detect bulges in volcanoes, monitoring of sulphur dioxide levels]* **Prediction**: Attempts to forecast when and where a natural hazard will strike, based on current knowledge. This can be done to some extent for volcanic eruptions, but less reliably for earthquakes. Prediction then allows people to evacuate and move belongings. **Planning:** Actions taken before a disaster so people know how to respond e.g. emergency evacuation plans, information management, communications and warning systems. **Protection:** Actions taken before a hazard strikes to reduce its impact, such as improving building *design [automatic shut off switches to gas and electricity supplies to prevent fires following earthquakes, rubber shock absorbers, interlocking bricks/steel frame, shatter proof windows to help buildings withstand earthquakes.]*