Tectonics (Volcanoes) Knowledge Organiser

Key Words:

Tectonic Plates: the earth's surface is broken into large pieces, like a cracked eggshell. The pieces are called tectonic plates.

Plate boundary/ margin: where tectonic plates meet. There are 3 types a) divergent b) convergent, c) conservative

Crust: outer layer of the earth's surface

Core: layer that is in the centre of the Earth

Mantle: Layer that is above the core and below the crust

Volcano: a mountain or hill, typically conical, having a crater or vent through which lava, rock fragments, hot vapour, and gas are or have been erupted from the earth's crust.

Convergent: when plates move towards each other

Divergent: when plates move away from each other

Convergent: when plates slide past each other.

Magnitude: of an earthquake (how much the ground shakes), an expression of the total energy released.

Management: the controlling and planning of something e.g. volcanic eruption.

Primary effect: the direct impact of an event, usually occurring instantly.

Secondary effect: the indirect impacts of an event, usually occurring in the hours, weeks, months or years after the event.

What is the earth's cross section and what are the layers of the earth?

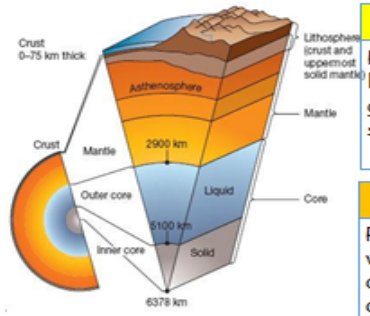
Layer		Physical State	Composition	Temperature (°C)
Crust	Continental	Solid	Granite	1000
	Oceanic (sea)		Basalt	
Mantle	Upper	Solid	Silica-based	1000-4000
	Lower	Liquid		
Core	Outer Core	Liquid	Iron/Nickel	4000-5000+
	Inner Core	Solid		

The upper mantle is further divided into 2 layers:
Lithosphere- crust and upper mantle 80-10km thick broken into plates.
Asthenosphere- denser upper mantle 100-300km deep

What are the main crust types?

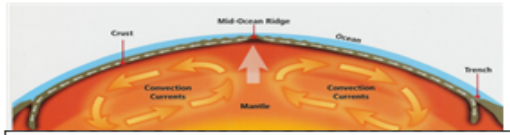
Continental crust (granitic)
- thicker
- older
- lighter/less dense
- 35 km thick

Oceanic crust (basaltic)
- thin
- younger
- heavier/more dense
- 6-8km thick



How do the earths tectonic plates move?

1. Residual heat and radioactive decay in the core generates heat which passes through the molten liquid rock in the mantle in circular currents.
2. As it heats up and becomes less dense it rises then as it cools and hits the lithosphere it spreads out and sinks towards the core (like a lava lamp).



What are the different types of hazards and their causes?

Volcanoes mainly occur in lines along plate margins. Volcanic eruptions are (measured on the Volcanic Explosivity Index **VEI**) can cause **earthquakes**. **Earthquakes** can occur on conservative plate margins. The point below the surface is called the **FOCUS**, the point on the ground above the **FOCUS** is called the **EPICENTRE**. Destructive margins account for 90% of the World's earthquakes. Some **volcanoes** occur away from plate margins at **hotspots** and some **earthquakes** occur miles from plate margins. **Tsunamis** are destructive oceanic waves caused by under sea earthquakes and volcanic eruptions creating waves that can travel up to 900km/h.

What are the different types of plate

Divergent/ Constructive

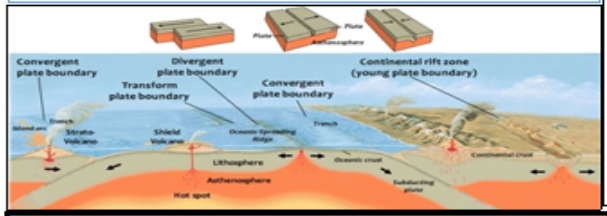
Rising magma in opposite directions moves plates apart leaving cracks allowing magma from the mantle to fill the gap, erupts onto the surface and cools as new land or a shield volcano. E.g. Mid-Atlantic Ridge. Earthquakes can

Convergent/ Destructive

Rising magma in the same direction causes plates to converge. The denser oceanic plate sinks beneath the less dense, granitic continental plate (subduction) creating a deep oceanic trench. The oceanic plate sinks into the mantle and melts creating composite volcanoes E.g. Nazca plate and South American plate. Sudden movements can cause earthquakes or when two plates of equal density collide fold mountains are formed.

Conservative

Rising magma causes plates to slide past each other or in the same direction as each other. No crust is destroyed or created. Earthquakes occur along these faults when pressure builds along the boundary although volcanoes do



Mt Saint Helens,1980 Case Study:

Location: Mount St Helens erupted on the 18th May 1980 in Washington State USA. It is part of the Cascade Range Mountains. This was a catastrophic eruption, the biggest and worst eruption ever to hit the USA. Causes: Mount St. Helens is a volcano which lies near to a convergent plate boundary where the small Juan de Fuca Plate is being subducted underneath the North American Plate. The magma produced in the melting rises up through the North American Plate via crack, forming Mount St. Helens. The trigger was a magnitude 5 earthquake underneath Mount St. Helens on the 18th of May at 8:32am. This caused a bulge on the North face of the volcano to become unstable and collapse as an avalanche. The volcano then went to erupt ash and produce pyroclastic flows – currents of hot gas and ash.

Effects : 400 metres was blown off the top of the mountain and a one mile horse shoe-shaped crater was left that was 500m deep.

57 people died - most of whom were outside of the evacuated zones. Ash clogged up car engines and farm machinery. The cost of ash damaged to farmers crops and machinery totalled £100 million. 15cm of ash fell causing traffic chaos and airline flights to be cancelled.

What are the different types of Volcano ? Volcanoes vary in shape and size. They are formed where molten rock from the magma chamber erupts onto the surface through a vent. Molten rock is called magma below the surface but when it erupts on to the surface it becomes lava. As well as lava volcanoes throw out ash, cinders, pumice, dust gases and steam from its crater. They are classified depending on what type of plate boundary they occur on:

	Shield (divergent)	Composite (convergent)	Hotspots (divergent)
Shape	Low, flat, gentle slopes	Steep sided, layers of ash	Low, flat, gentle slopes
Magma/ lava type	Basaltic magma, fluid, flows very quickly	Granitic/andesitic magma. Viscous, flows slowly, hard-	Basaltic magma, fluid, flows very quickly
Eruption	Frequent, gentle erup-	Infrequent, explosive	Frequent, gentle erup-
Example	Kilauea, Hawaii	Montserrat, Caribbean	Mauna Loa, Hawaii

Tectonics (Earthquakes) Knowledge Organiser

Key words:

Earthquake- a sudden release of energy which causes the ground to vibrate.

Focus- where the earthquake starts within the ground

Epicentre: point on the earth's surface above the focus.

seismic waves- is a **wave of energy** that travels through the Earth

Magnitude: of an earthquake (how much the ground shakes), an expression of the total energy released.

Tsunami: a large wave which is created when an earthquake occurs under the sea.

Richter Scale: a logarithmic scale which measures the magnitude of an earthquake.

Seismometer: an instrument that measures the magnitude of an earthquake.

Aftershocks: is a smaller earthquake that follows a larger earthquake, in the same area of the main **shock**, caused as the displaced crust adjusts to the effects of the main **shock**

Why do most earthquakes occur at convergent plate boundaries?

Earthquakes occur along plate boundaries and are a sudden movement of the earths crust. Over 90% occur at convergent boundaries where stresses build up in the subduction zone until eventually the rock fractures along a fault and the energy is released as a n earthquake. The point where the energy if released is called the focus and the point on the earths surface directly above this point where most force is felt is called the epicentre. Earthquakes also occur on conservative boundaries and smaller ones on divergent boundaries. The impact earthquakes have is dependent on a number of factors including the depth of the focus, the population density, the time of day/week, the degree of preparation and vulnerability.

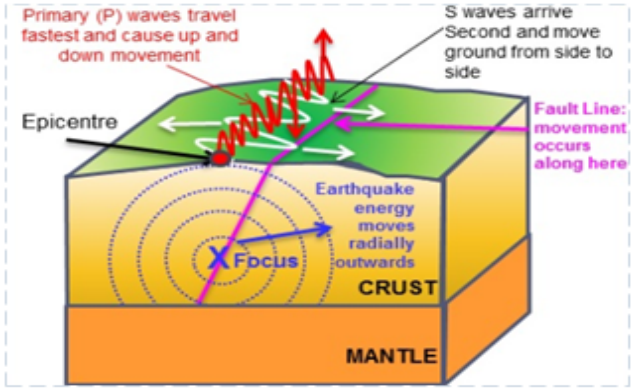
How are earthquakes measured?

Earthquakes are recorded using seismometers and the magnitude is then given according to the Richter scale with a value of 1-10 (logarithmic Scale).

What is a Tsunami?

Earthquakes beneath the sea bed can generate a tsunami. Tsunamis are waves that travel up to 900km/h, with a wavelength of over 200km. In the open ocean a wave height is less than 1m, but as the wave approaches the coast the wave height increases up to 30m., when a tsunami hits, it creates a very powerful flood, pushing several kilometres inland.

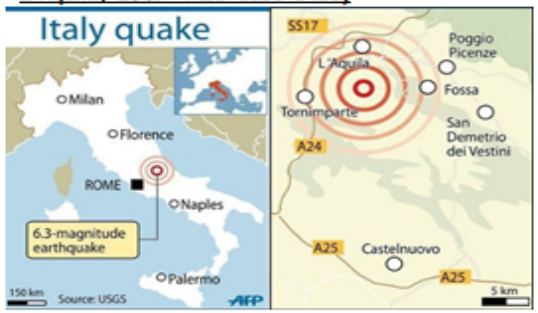
What are the features of an earthquake



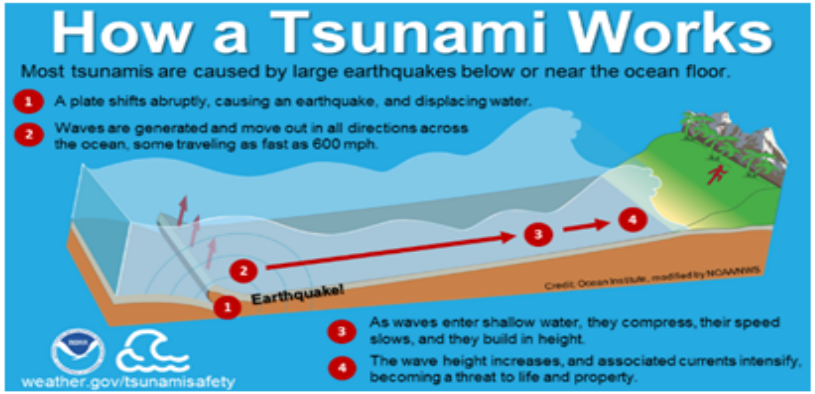
Haiti Earthquake, 2010- LIC Case Study

	Earthquake—Developing country Port-au-Prince, Haiti
Facts	- January 2010, - epicentre 10 miles from Port-au-Prince - 7.0 on the Richter scale - 316,000 people died - 3 million people in total were affected.
Primary impacts	- Shanty towns crumbled)250,000 houses) - 30,000 businesses buildings collapsed - port and major roads were damaged - Rubble from buildings blocked roads and rail links.
Secondary impacts	- 2011 people still lived in temporary homes. - Est. 1 in 5 jobs were lost. - Damaged air, land and sea transport - Looting and violence - relief camps had no electricity, running water, or sewage disposal - diseases were spreading (cholera).
Responses	- rescue and medical teams were sent. - EU gave $330 million - World Bank waived debt repayments for 5 years. - 23 major charities collected $1.1 billion - Dominican Republic which neighbours Haiti offered support. - USA took control of aid efforts

L'Aquila, 2009- HIC Case Study



	Earthquake—Developed country L'Aquila Italy
Facts	-April 6th 2009 - focus depth 9.6km - 6.3 on the Richter scale - 308 people died - 1500 + injured, 65000 homeless
Primary impacts	-L'Aquila Hospital's new wing, which opened in 2000 suffered extensive damage and had to be closed. , a dormitory at the university of L'Aquila collapsed. The village of Paganica was badly damaged, many streets were impassable due to fallen masonry. Damage to between 3,000 and 11,000 buildings in the medieval city of L'Aquila
Secondary impacts	Around 40,000 people who were made homeless by the earthquake found accommodation in tented camps and a further 10,000 were housed in hotels on the coast. Powerful aftershocks, some only slightly weaker than the main shock (6.1), were felt throughout the following 2 days, hampering rescue efforts and causing more damage. The broken water pipes in Paganica caused a landslide.
Responses	Camps were set up for homeless people with food, water and medical care. Mortgages, Gas and electricity bills were suspended. Red Cross set up a field kitchen providing 10 000 meals every day. Government paid for 100% of building reconstruction.



	Tsunami—Developed country Japan, 2011
Facts	-March 11th 2011 - earthquake magnitude of 9.0MW - 15,897 deaths - 6,157+ injured, 2,533 missing
Primary impacts	Reclaimed land in Tokyo suffered liquefaction. More than 1000 buildings damaged in Tokyo by liquefaction
Secondary impacts	Over 1700 people drowned from the Tsunami, more than half the victims were 65 and over 127,000 buildings collapsed. 2000 roads, 56 bridges, and 26 railway lines along the coast of Honshu were destroyed. Fukushima Nuclear power plant went into meltdown
Responses	Advanced warnings of the tsunami gave people time to get outside or reach higher ground. The Pacific tsunami warning system warned coastal communities in Japan