Y10 Geography Knowledge Map. (Unit 1: Living with the physical environment. Section A: The challenge of natural hazards. Part 1 of 3: Tectonic Hazards)

What are natural hazards? What is the tectonic theory?
A natural event that threatens to cause harm to people and the environment.
Geological hazards (volcanic, avalanche)
Atmospheric hazards (hurricanes, tornadoes)
Flooding
Two key points:

1. It has to be formed *naturally*.
2. It has to have negative effects on people *and* the environment.

Hazard risk: is the chance or probability of being affected by a natural event.

There are several factors that have led to an increase in the number of people at risk from natural events.

- Urbanisation
- Poverty
- Climate change
- Farming

OCEANIC	CONTINENTAL
• More dense. • Younger. • Thinner. • Mostly basalt.	• Less dense. • Older. • Thicker. • Mostly granite.

Structure of the Earth:
Inner Core / Outer Core / Mantle / Crust.
Convection Currents:
Heat from the core causes **convection currents** in the mantle. These currents slowly move the crust around. In some places the crust is destroyed. In other places new crust is formed.
Where do volcanoes and earthquakes happen?
Mostly occur in long belts that follow the plate margins, for example, the edge of the Pacific Ocean (Pacific Ring of Fire). There is also a belt of volcanoes in the middle of the Atlantic Ocean (Mid-Atlantic Ridge).
Hotspots: the crust is thin and magma is able to break through to the surface. Hawaiian Islands in the Pacific Ocean are a good example.

Plate Boundaries
A **destructive** plate boundary occurs when oceanic and continental plates move together. The oceanic plate is forced under the lighter **continental plate**. Friction causes melting of the oceanic plate and may trigger earthquakes. Magma rises up through cracks and erupts onto the surface. An example of a destructive plate boundary is where the Nazca plate is forced under the South American Plate. ***Produces composite volcanoes.***
Collision plate boundary form when two continental plates collide. Neither plate is forced under the other, and so both are forced up and form fold mountains.
A **constructive** plate boundary occurs when plates move apart. Volcanoes are formed as magma wells up to fill the gap, and eventually new crust is formed. An example of a constructive plate boundary is the mid-Atlantic Ridge. ***Produced shield volcanoes.***
A **conservative** plate boundary occurs where plates slide past each other in opposite directions, or in the same direction but at different speeds. Friction is eventually overcome and the plates slip past in a sudden movement. The shockwaves created produce an **earthquake**. This occurs at the San Andreas Fault in California.

Magma = under ground
Lava = above ground

Shield Volcanoes

- Constructive plate margins
- Magma is hot and fluid
- Magma will flow a long way before cooling
- Broad and flat shield volcanoes

Composite Volcanoes

- Destructive plate margins
- Steep sided
- Eruptions often and very violent and explosive
- Lava is sticky and doesn't flow far before cooling

Earthquakes
Earthquakes are vibrations caused by earth movements at plate margins (edges) and at major fault lines (cracks in the earth's surface).
They can occur at all major plate margins but the most severe earthquakes are normally found at CONSERVATIVE and DESTRUCTIVE margins.
The point inside the **crust** where the pressure is released is called the **focus**. The point on the Earth's surface above the **focus** is called the **epicentre**. Earthquake energy is released in **seismic waves**. These waves spread out from the **focus**. The **waves** are felt most strongly at the **epicentre**, becoming less strong as they travel further away.

Effects of earthquakes LEDC – Case Study Nepal (see class notes for more)
25th April 2015, 7.9 Richter Scale, Epicentre was 50 miles from Nepal's capital Kathmandu. Destructive plate margin. Indo-Australian Plate is colliding with the Eurasian Plate at a rate of 45mm a year.
Earthquake was shallow, just 15km below the surface. Resulted in severe ground shaking and widespread landslides and avalanches. Damage was caused hundreds of kilometres away in India, Tibet and Pakistan.
Primary Effects:9000 deaths, 20000 injured, over 8 million affected, 3 million homeless, electricity and water supplies, sanitation and communications affected. 1.4 million people needed food, water and shelter in the days and weeks after. 7000 schools destroyed and hospitals overwhelmed. International airport become congested as aid arrived. 50% of shops destroyed, affecting food supplies and people's livelihoods. Cost of damage estimated over US$5 billion.
Secondary Effects: Landslides, avalanches blocked roads affecting aid. Avalanche on Mt.Everest killed 19 people. Avalanche in Langtang region left 250 people missing. Landslide blocked the Kali Gandaki River, many people evacuated incase of flooding.
Immediate Responses: Search and rescue teams, water and medical support arrived quickly from countries such as UK, India and China. Field hospitals set up.
Long Term Responses: Homeless people rehouses. Road repaired and landslides cleared. Over 7000 schools to be rebuilt or repaired. Stricter controls on building codes. Repairs to Mt.Everset base camp and trekking routes by August 2015, encouraging tourists to come.

Effects of earthquakes MEDC – Case Study Chile (see class notes for more)
3 minutes of shaking. 27th February 2010. 8.8 Richter Scale. Destructive Plate Margin. Nazca Plate is moving beneath the South American Plate.
It was followed by a series of smaller aftershocks.
Because the earthquake occurred out to sea, tsunami warnings were issued as waves raced across the Pacific Ocean at speeds of up to 800km per hour.
Primary Effects:500 people killed and 12000 injured. 800,000 people affected. 220,000 homes, 4,500 schools, 53 ports, 56 hospitals and other public buildings destroyed. Port of Talcahuanao and Santiago airport badly damaged. Much of Chile lost power, water supplies and communications. Cost of the earthquakes estimated US $30billion.
Secondary Effects: 1500km of roads damaged, mainly by landslides – remote communities cut off for many days. Several coastal towns devasted by tsunami wave. Several Pacific countries struck by tsunami – warnings prevented loss of life. A fire at a chemical plant near Santiago – the area had to be evacuated.
Immediate Responses: Emergency services acted swiftly. International help needed to supply field hospitals, satellite phones and floating bridges. Temporary repairs made to the important Route 5 north-south highway within 24 hours, enabling aid to be transported. Power and water restored to 90% of homes within 10 days. A national appeal raised US$60 million – enough to build 300,000 smaller emergency shelters.
Long Term Responses: A month after the earthquake Chile's government launched a housing reconstruction plan to help nearly 200,000 households affected by the earthquake. Chile's strong economy, based on copper exports, could be rebuilt without the need for much foreign aid. The president announced it could take 4 years for Chile to fully recover from the damage to buildings and ports.

Living with the risk

- Earthquakes and volcanic eruptions don't happen very often. They are not seen as a great threat in most people's lives.
- Better building design can withstand earthquakes so people feel less at risk.
- More effective monitoring of volcanoes and tsunami waves enable people to receive warnings and evacuate before events happen.
- Fault lines associated with earthquakes can allow water supplies to reach the surface. This is particularly important in dry desert regions.
- Volcano can bring benefits such as fertile soils, rocks for building, rich mineral deposits and hot water.
- Some people may not be aware of the risks of living close to a plate margin.
- Plate margins often coincide with very favourable areas for settlement, such as coastal areas where ports have developed.
- People living in poverty have other things to think about on a daily basis – food, water, money, family and security.

Iceland
Lies on Mid-Atlantic Ridge – a constructive plate margin. Earthquakes are common. Over 320,000 people live in Iceland. They have 1 million people visiting each year.
Tectonic activity poses a threat, the people in Iceland consider it to be a low risk. This is due to effective scientific monitoring and awareness of the potential danagers. It brings huge benefits:

- Geothermal energy is used to generate 25% of the country's electricity.
- Iceland has a dramatic landscape (waterfalls/volcanoes and mountain glaciers) has become a huge draw for tourists.
- Volcanic rocks used for construction.
- Hot water from within the Earth's crust provides heat and hot water for nearly 90% of all buildings in Iceland.

Three P's
Monitoring – using scientific equipment to detect warning signs of events such as volcanic eruption.
Prediction – using historical evidence and monitoring, scientists can make predictions about when and where a tectonic hazard may happen.
Protection – designing buildings that will withstand tectonic hazards.
Planning – identifying and avoiding places most at risk.