Examine how the tectonic cycle helps to explain the global distribution of one of the following:

- **Fold mountains.**

The earth's crust (lithosphere) is split into huge slabs of rocks called plates that float on semi-molten rock of the upper mantle (asthenosphere). There are seven major plates and several minor plates. Plates move because of the process of convection within the mantle. When hot magma rises from the core, it hits the lithosphere to spread out horizontally and cool, causing it to increase in density and to sink back down towards the core, only to push hotter magma up to restart the cycle. Fold mountains occur at destructive plate boundaries when rocks are compressed together and bent upwards. They do not break when plates collide as they are subjected to tremendous heat and pressure and become more flexible. This process is called orogeny.

When an oceanic plate collides with a continental plate, the oceanic plate is pushed underneath the continental plate by the process of subduction. This is because the ocean plate is much heavier than the continental plate, as it is formed from heavier rocks such as basalt containing magnesium and silica and it also has the weight of the sea pushing down on it. While the continental plate is made from lighter rocks containing silicon and aluminium.

As the oceanic plate descends into the mantle at the subduction zone, it forms an ocean trench such as the Peru-Chile trench, these trenches are the deepest part of the ocean. However, as the continental plate keeps moving forward into the oceanic plate it continues to be buckled upwards into a fold mountain. As the Nazca plate collides with South America plate, the Ande mountains form with the height of 6900 metres in South America.

During the caledonian folding 450 million years ago, the Continental American plate collided with oceanic Eurasian plate . The pressure from these foldings came from the South-East and North-West, so the mountain ranges tend to run in a South-Westerly to North-Westerly direction. An example of the these mountains would be the Wicklow mountains, with the highest point of

925 metres called Lugnaquilla. When these mountains formed, they were as high as the present day Alps but due to weathering and erosion, they have been worn down, exposing a granite batholith. The batholith formed when the oceanic eurasian plate melted as it was subducted under the continental American plate. The melted plate then was pushed into the earth's crust, forming the leinster batholith. This batholith is the biggest in western europe, covering and area of 120 kilometers squared.

The Armorican folding occurred 250 million years ago when the African and Eurasian plate collided. The collision caused compression from the south, causing the layers of sedimentary rock (limestone and sandstone) to be buckled into huge folds.The mountain ranges run in an East-West alignment in the province of Munster, with the highest peak of 1039 metres called Carrantuohill. An anticline is the upward part of the fold, an example would be the comeragh mountains. While a syncline is the downward part of the fold, for example, the Blackwater valley which the river Lee runs through. The Limbs are the sides of the fold. Ireland was further from the point of collision then during the caledonian folding so the mountains formed during this folding were much smaller.

If two continental plates collide, they both push upwards forming fold mountains. The Indian and Eurasian plate collide to form the Himalayan mountain range. The Himalayan mountain range has the highest mountain peak in the world - Mount Everest with a height of 8848 metres.

Examine how the tectonic cycle helps to explain the global distribution of one of the following: • Earthquakes

The theory of tectonic states that the lithosphere is broken into seven major plates and several minor plates. Plates are huge slabs of rocks that float on semi-molten rock of the upper mantle (asthenosphere) and are moved around by slow but powerful convection currents. An earthquake can be said to be a vibration within the earth's crust, caused by rocks snapping suddenly to release energy along a plate boundary. The plate boundary can either be destructive, constructive or transverse, leading to earthquakes being distributed across the globe.

Earthquakes commonly occur at destructive plate boundaries, where plates collide and crust is destroyed. These are called earthquake zones. When a heavier oceanic crust collides with a lighter continental crust, the heavier oceanic crust is pushed under the continental plate in the process of subduction. An example of a subduction zone would be the Nazca plate being subducted under the South American plate. As the convection current continues to pull the plate down into the mantle, it may become jammed against rocks of the opposing plate. Pressure will continue to build as the rock is pulled downwards. Eventually, the stress becomes so great the rocks will snap along the fault line and release built-up, stored energy. This is called elastic rebound. The energy is released as seismic waves that radiate towards the surface. Where the seismic waves originate from is called the earthquake's focus. The epicentre is the area directly above the focus; it is where the earthquake is at its strongest. Many of these earthquakes are deep focused meaning that the energy is released at depths exceeding 300 km within the earth crust. These earthquakes are most common at subduction zones. However, sometimes they are intermediate earthquakes - earthquakes that occur at depths of 70-300 km within the crust.

As plate slips past each other, they cause shallow focus earthquakes, where the earthquakes occur within 70 km of the surface. They tend to be more destructive than deep focused, as they occur closer to the surface. In California, USA, the Pacific plates moves northwestwards at a rate of 6cm a year whilst the North American moves the same direction at a rate of only 1 cm a year. Tension builds as rocks become slammed against each other. When rocks do snap, the plates

lurch past each other releasing shockwaves. According to the US geological survey the greatest earthquake to occur in this area was Fort Tejon, with a magnitude of 7.9 in San Francisco.

Plates separate at constructive boundaries and new crust is formed. The rocks snap as the plates split along fault lines causing the earth to tremor. These earthquakes are common along the Mid Atlantic Ridge, where the North American plate separates from the Eurasian plate.

Examine how the tectonic cycle helps to explain the global distribution of one of the following: • Volcanoes

Volcanoes' geographical locations can be where plates collide and diverge. However, sometimes they can be found in the middle of plates at hotspots far from any plate boundary. There are about 120 known hotspots in the world. A hot spot is when a narrow column of extra hot molten magma, called a plume, rises up towards the earth's crust. The crust becomes weakened by the pressure of the rising magma and forces its way up to the surface. This kind of volcanic activity causes volcanic island to form such as the Hawaiian islands. An example of such a volcano would be Mauna loa on the main island of Hawaii which is still active. In time, the plate will move over the area of the hot plume and new volcanoes will form. The old ones will eventually become extinct as the plate continues to move away.

The crust is broken up into huge slabs of rocks called plates, there are seven major plates and several minor plates. The plates float on semi-molten rock of the lower mantle and are moved around by slow but powerful convection currents of magma beneath them. Constructive plate boundaries occur where plates separate and new crust is formed. Volcanoes can be found here. As the plates separate, cracks and fissures occur within the crust. Super hot (1000 degrees), basic lava with a low silica content emerges and flows out quickly over a large surface, often creating shield volcanoes. As the American plate diverges from the Eurasian and African plate, the magma builds up a mid-atlantic ridge. These plates are continuously separating and volcanic activity is constantly heightening the volcanic mountains. Many of these mountains have been heightened so much they are now islands. Iceland is an example of such. Iceland is 18-20 million years old and has the active volcano St.Helens.

Volcanoes also occur at destructive plate boundaries, where two plates collide and crust is destroyed as a result. On the western edge of South America, the continental South American plate collides with oceanic Nazca plate. The heavier oceanic plate pushes under the lighter continental plate in the process of subduction. As the oceanic plate begins to be forced into the mantle it begins to melt. The now melted plate is still under tremendous pressure, and it forced into the mantle until it is forced to the surface. Th volcanic eruptions are violent as the acidic lava

has a high silica content as well as many trapped gases and streams within it. However, this liquid cools very quickly and does not spread out quickly, it forms many cone shaped volcanoes. For example, the Licanbars near the west coast of America.

Where the oceanic Pacific plate subducts under the oceanic Atlantic, a horse shoe shaped zone 40,000 km long of volcanoes forms . It is called the pacific fire. It has 452 volcanoes, with 75% of the world's active volcanoes.