Q: '*Explain how the study of plate tectonics has helped to understand the global distribution of volcanoes'* (2008 Q2 B.)

Volcanoes occur where plates of the crust move collide or separate). A fountain or a plume of hot material can cause a volcano as well. These cause hot material from the mantle to rise to the centre of a plate at a location called a hotspot.

Molten rocks (magma) from the mantle forces its way through weakness in the crust (faults, plate boundaries and rifts) towards the surface because of plate tectonics (convection currents).

The earth is covered in a thin, solid crust. The lithosphere is broken into 16 major slabs called plates. Plates are being constantly moved around by convection currents in the mantle.

As the plates move around the earth, landforms such as volcanos, rift valleys and fold mountains form at the plate margins and fault lines.

Convergent, transverse and divergent plate boundaries exist where plates move towards each other, slide past or move away from each other. This movement of plates is called plate tectonics.

Oceanic plates are thinner, only 6-12 km thick, made with dense, heavy rock like basalt. MAde of silicon and magnesium rich rock as a result they are more dense than continental plates.

Continental plates are 40-60km thick, made with lighter rocks such as granite. Silicon and aluminium rich rocks make up these plates.

At a constructive plate boundary (where crust is made), magma rises through the gap between the separating plates and forms volcanic mountains. Mount St. Heleca, Iceland is an example.

The volcanos at constructive plate boundaries are, for the most part found under the ocean, this is because the majority of constructive plate boundaries are 2 ocean plates pulling apart.

The convection current under 2 plates have to be moving in opposite directions, this causes the plate floating above to move away from each other.

The movement causes faults (cracks) in the crust, this weak points are then attacked by the magma forcing its way up from the mantle. As this process continues, it results in magma reaching the surface and cooling, causing the formation of new crust.

In the underwater setting, this formation of new crust is called seafloor spreading and volcanic ridges can be seen along these fault lines. Iceland is an island that was created this way, the ridge rose out of the ocean.

At destructive plate boundaries, where plate is destroyed, volcanos are also found. For example Mount Fuji, Japan.

Because continental plates are lighter, when a continental plate and an oceanic plate collide. The oceanic subducts., Creating a trench. Trenches mark subduction zones and volcanic fold mountains such as Mount St. Helens was created like this as the continental plate crumples.

As the plates fold, cracks and faults occur in the crust, the mantle rises through the cracks in the crust until it reaches the surface through a **vent** to form volcanic island arcs.

Volcanic island arcs are curved chains of volcanic islands which mark the subduction zone of 2 plates.

Hot spots can occur in the middle of crustal plates. It is a weakened area that is not a fault line. This weakened area of crust can not take the pressure of the up rising magma underneath it, the magma as a result forces its way through the fault, to the surface.

This type of tectonic activity causes volcanic islands to form such as the Hawaiian Islands. These islands are formed in such a way that the most recent islands still have active volcanos.

As plates move over the mantle plume, new volcanos form. The existing one gradually becomes less active and extinct as plate moves away from the hotspot.