

## Explain the influence of tectonic activity on the development of the Irish landscape.

30 marks

The theory of plate tectonics states that the earth's crust is broken into 14 to 21 lithospheric plates that move around on convection currents which circulate within the asthenosphere. Thermal convection currents, which rise from the core, cause the plates to move. As these currents rise they cool, flow sideways and sink (a convection cell). This lateral movement drags the lithospheric plates (made up of oceanic and continental crust) along with it to form a variety of different plate boundaries on the surface (see plate boundary sample answer).

In relation to the Irish landscape, plate tectonics has had a major influence. Around 850 million years ago, prior to the formation of the supercontinent Pangea, the north west of Ireland and Scotland were part of the North American plate which lay close to the equator. Through the movement of the crust due to convection currents, the ocean between the North American region, which the north west of Ireland was a part of at the time, and the Eurasian region containing the rest of Ireland at the time, had closed and the two plates had collided. Ireland had become one landmass. This collision of the plates resulted in folding, faulting, metamorphism and volcanic activity. The Caledonian orogeny (which simply means '*fold mountain building*' period) is associated with the collision of these American and Eurasian plates. This collision was so intense that many of the rocks were also faulted and during this period magma welled up and intruded into the faults which were being created. Ireland's igneous and metamorphic rocks were formed at this time. These '*Caledonian*' mountains include the mountains of the west and north-west of Ireland such as the Twelve Pins and the Dublin and Wicklow mountains in the east. The Leinster Batholith is a '*pluton*' (an area of magma cut off from the mantle and cools over a period of time) that was formed when tectonic plates collided during the Caledonian folds.

Also, about 250 million years ago, the Eurasian and African plates collided to create pressure coming from the south of Ireland and created the '*Munster-Ridge*' Valley of the southern half of Ireland. Ireland had now become a part of the super-continent Pangea. Between 200 million years ago and 140 million years ago, Ireland then continued to drift northwards as Pangea broke up, towards its current location. As the pressure was coming from the south during this time, the mountains trend from east to west, and rivers which flow through this area were '*captured*' by the synclines (downfolds) in Cork/Kerry.

Finally, about 65 million years ago, the European and American plates began to split apart creating a constructive plate boundary, which we now know as the Mid-Atlantic ridge. The Atlantic Ocean was born leading to volcanic activity that lasted for about 15 million years. Great fissures opened up in the young Atlantic sea bed (Sea-Floor Spreading). At the same time these fissures were widespread in the area and were forming the Antrim-Derry plateau where the Giant's Causeway is the most distinctive part of the plateau.