

A-Level Geography Resource Package

[Physical >> Hazards >> Tectonics >> Constructive Margins >> Landforms]

Rift Valleys:

“A large, steep-sided valley formed by the downward displacement of a block of Earth's surface between near parallel faults or constructive plate margins.



Fig. 1.1

The figures above and below showcase the famous and aptly named 'Great Rift valley', which dissects Eastern Africa and is a great example of such a landform's occurrence.

Formation:

A rift valley is a lowland region that forms where Earth's tectonic plates move apart, or rift. Rift valleys are found both on land and at the bottom of the ocean, where they are created by the process of seafloor spreading. Rift valleys differ from river valleys and glacial valleys in that they are created by tectonic activity and not the process of erosion, as most of the valleys you've studied before are.

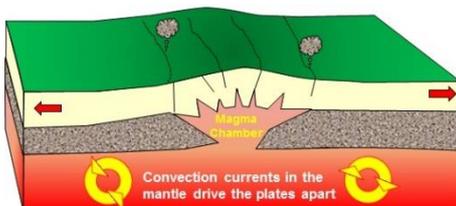


Fig. 2.1

Notes:

In Detail:

The heating and **up-doming** of plates as they shift farther apart leads to cracks and **tensional faults** beginning to form between. As the sides drift apart, the **heavy lithosphere sinks** downwards into the mantle when the cracks become too great, **forming deep and steep valleys** between where they once would have been and their current position. The area between two neighboring rift valleys, an elevated plateau, is known as a **horst**.

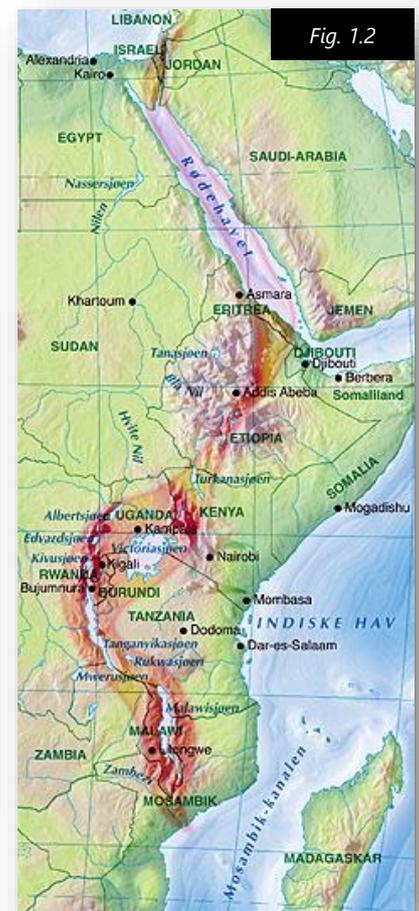


Fig. 1.2

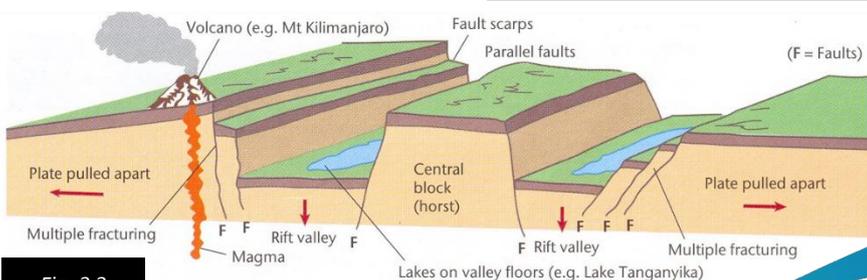


Fig. 2.2



Case Study | Great Rift Valley

The East African Rift System (EARS) is one of the geologic wonders of the world, a place where the earth's tectonic forces are presently trying to create new plates by splitting apart old ones. In simple terms, a rift can be thought of as a fracture in the earth's surface that widens over time, resulting in an elongated, steep-sided valley system (Figure 1.1)

Geologists are still debating exactly how rifting comes about, but the process is so well displayed in East Africa (**Ethiopia-Kenya-Uganda-Tanzania**) that geologists have attached a name to the new plate-to-be; the Nubian Plate makes up most of Africa, while the smaller plate that is pulling away has to the east been named the Somalian Plate. (Figure 1.2)

These two plates are moving away from each other and also away from the Arabian plate to the north. Over 3500 miles in length from top to toe, the great rift valley is so prominent that it can be seen from space and offers significant weight to the plate tectonics theory. However, in the distant future, there are concerns that this fracturing action could result in the splitting of Africa – most of the continent will remain, but the area around Cape Horn, to the east of the Great Rift valley, could be separated and enact 'continental drift' moving towards the Indian subcontinent.



Notes:

Recommended reading & viewing:

<https://geology.com/articles/east-africa-rift.shtml> [more advanced but offers a detailed insight into the geological reasoning behind Rift Valleys.]

<https://www.nationalgeographic.com.au/videos/geologic-journey/african-rift-intro-1296.aspx> [intro to the mini documentary series, linking mankind with the great rift valley geology.]

Mid Oceanic Ridges:

” A long, seismically active **submarine ridge system** situated in the middle of an ocean basin and marking the **upwelling** of buoyant magma associated with sea floor spreading.



Fig. 4.1

In Detail:

The **rising convection currents** in the asthenosphere push up the crust and **cause rifting** or cracking at constructive plate boundaries. This forces up a **central rift**, where new crust is created as the plates diverge **due to rapidly rising and cooling magma**. Over time, and as plates split farther, **seafloor spreading** occurs more and more as a result of the constant development of new material from hardened magma. The low viscosity lava can also create a gently sided shield volcano underwater, known as a **submarine volcano**. These can occasionally grow above sea level to form volcanic islands.



Fig. 4.2

Notes:

We can link this knowledge to the concept of Paleomagnetism as a source of confirmation for plate tectonics theory!

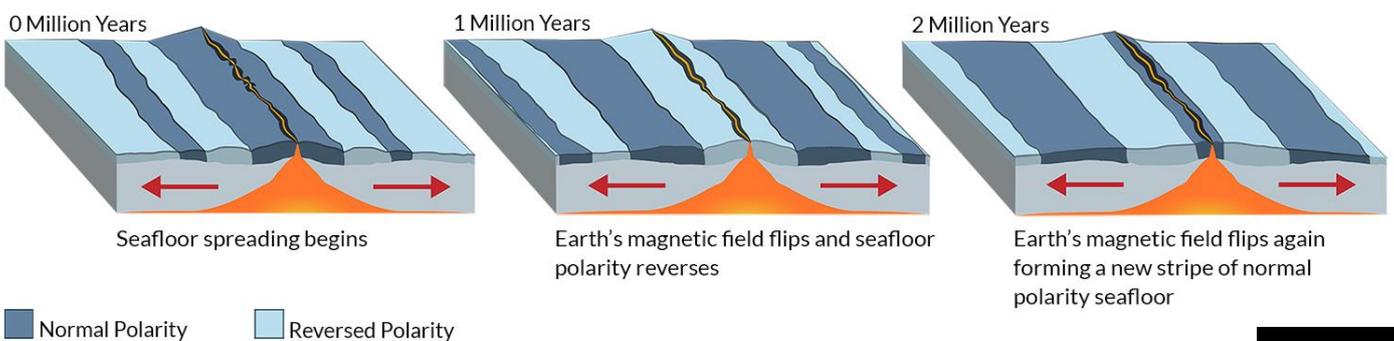


Fig. 4.3



Examination Questions

Sample 1:

With reference to figure 2.2, explain the formation of rift valleys. [4]

Using figure 1.1, outline the appearance of a rift valley [3]

Complete the following sentence [2]

Rising _____ in the asthenosphere cause _____ which in turn leads to the formation of mid oceanic ridges.

Explain how the existence of Mid-Oceanic Ridges helps to prove the theory of plate tectonics [6]
