FAULTING

A fault is a fracture (crack) in the earth's crust along the plane where there has been displacement of the rock relative to the other. Faulting refers to the fracturing of rocks of the earth's crust due to strain and stress that subsequently leads to the dislocation and displacement of rock strata. This is caused by radioactivity and geo-chemical reactions within the mantle which generate great heat that melts mantle rocks creating convective/convectional current, which either diverge to form tensional forces or converge to form Compressional forces. These forces exert pressure on the earth's crust rocks leading to a wide range of land forms in Uganda.

THE INFLUENCE OF FAULTING ON THE DEVELOPMENT OF RELIEF LANDFORMS IN UGANDA

Faulting mainly affected the Western region and to a less extent the Northern region. The process of faulting led to the formation of the following relief landforms.

- ✓ Rift valley
- ✓ Block/ Horst mountains
- ✓ Fault guided valleys
- ✓ Graben hollows
- ✓ Fault scarps and escarpment

RIFT VALLEY

This is an elongated depression or basin bordered by two in-facing fault scarps along more or less parallel fault lines.

FORMATION OF THE RIFT VALLEY

There are two theories that were put forward to explain the origin of the Western rift valley i.e. tensional force and compressional forces theory.

THE TENSIONAL FORCE THEORY

This t
heory was put forward by Gregory. According to this theory, geochemical and radioactive reactions within the interior (mantle) of the earth caused convective currents that diverged leading to the development of tensional forces. These forces pulled the land mass (earth's crust) apart leading to the formation of normal fault lines. This was followed by relative sinking where the central block sunk or subsided faster than the side blocks to form a depression known as the rift valley such as the western arm of the rift valley in Uganda.The steep areas were further modified by denudation forces like weathering, mass wasting, etc to form the present appearance of gentle slopes as seen in figure

Diagrams

COMPRESSIONAL FORCE THEORY

Wayland working in the Albert rift valley noticed that sediments on the rift valley were folded. He put forward the theory of compression. According to this theory, geochemical and radioactive reactions in the core of the earth caused great heat which set off convective currents which converged leading to the development of compressional forces. These forces acted on either sides of the land mass pushing

them towards the centre leading to formation of reversed faults. This was followed by differential uplift where the side blocks were uplifted faster than the central block thrusting or over riding the central block, held down to form a rift valley observed in the western arm of the rift valley in Uganda

The steep scarps were further modified by denudation agents such as weathering and soil erosion leading to more gentle fault scarps (escarpments) that appear as normal faults bordering a rift valley.

BLOCK MOUNTAIN/HORST

A block mountain or horst is an upland (highland or raised land) bordered by fault scarps on one or more sides. The two terms are issued interchangeably. In a strict sense, a horst is an individual fault rock that has been thrust upward and is sharply defined. An example of a block or horst mountain is Mt. Rwenzori (5110m above sea level). Other uplifted hills can be noticed in Bunyabuguru (Rubirizi) and Bunyoro-Toro uplands

The formation of Block Mountain like Mt. Rwenzori is attributed to two processes by way of tensional theory (relatve sinking) and compressional theory (differential uplift). These forces were as a result of faulting due to radioactive and geochemical reactions within the earth's mantle.

COMPRESSIONAL /DIFFERENTIAL UPLIFT THEORY

According to this theory, geochemical and radioactive reactions beneath the earth's crust set off convective currents which resulted into the development of compressional forces. These forces pushed the crustal blocks from opposite directions, resulting into the development of reversed faults and divided the crust into blocks. This was followed by differential rates of uplift of the crustal blocks with the central block rising faster than the side blocks, to form the block mountain such as Margherita peak on mt.Rwenzori raised to about 5111 metres above sea level. It should be noted that the block mountain was later modified by denudation forces such as river erosion, glaciation, weathering and mass wasting to give the present shape.

Diagrams

THEORY OF TENSIONAL/ RELATIVE SINKING

Geochemical and radioactive reactions beneath the earth's crust created convective currents which resulted into the development of tensional forces. These pulled the crustal blocks apart, resulting into the development of normal faults. This was followed by relative sinking with the side blocks sinking/subsiding faster than the central block. It was later modified by denudation forces such as river erosion, glaciation, weathering, mass wasting, etc to give the present shape as seen in figure.

Diagrams

FAULT GUIDED VALLEYS

A fault guided valley is a narrow or wide depression that developed along a single fault. During faulting that resulted from either tensional or compressional forces, the fault zone/rocks along the fault line were crushed /shattered and the weakened rocks were removed by denudational forces which led to the development of the valley along the fault line along which rivers may flow. An example of a fault guided valley is seen in the Aswa valley in Northern Uganda where river Aswa and its tributaries Agago and pager are guided by the fault as seen in figure.

Diagram

FAULT SCARPS/ESCARPMENTS

This is a steep slope along a single fault line formed when one block is thrown down up and the other down thrust

According to the tensional theory, tensional forces led to the development of a normal fault lines. One block of the crust was displaced down wards leaving a steep slope known as fault scarp such as Butiaba (Biso), Kyambura and Kichwamba scarps. It is caused by vertical earth movements along a fault.

Faults can be reflected in the landscape in form of escarpments. There are two escarpments thus fault scarps and escarpment. Fault scarps are seen in an area where faulting is still recent and it can be seen clearly in Biiso near Masindi and Kichwamba fault. Fault escarpment is a modification of a fault scarp by the influence of denudational forces. The soft rocks are eroded away while the resistant rocks are left behind.

Diagram

GRABEN HOLLOW/FAULT BASIN:

This is a narrow trough ordepression found on a rift valley floor.
According to the tensional theory, the crust was subjected to tensional forces which pulled the crust apart to form normal faults.This forced the middle block to sink down to form a rift valley. Secondary faulting and sinking occurred on the floor causing a secondary depression known as the graben like Albert, Edward and George grabens

OR

According to the compressional theory, the crust was subjected to compressional forces which pushed the crust from either side leading to the formation of reverse faults. The side blocks over rode the middle block to create a rift valley. Secondary faulting and sinking on the floor of the rift valley led to the formation of secondary depression known as the graben like the Albert, George and Edward grabens as seen in figure 2:
Diagram
Self evaluation question 2:1

1. Examine the influence of faulting on the development of relief landforms in Uganda.

Approach

- ✓ Define the term faulting
- ✓ Describe the processes that led to the formation of each relef landform due to faulting.

Each landform should be defined, give and account of its formation (processes), give examples and draw diagrams