

Unit One Section 1.1.1

Worksheet One

1.1 Forces Shaping the Earth's Surface

1.1.1 Internal or Tectonic Forces and Resultant Landforms

Internal forces are forces that come from the inside of the earth. These forces form the ups and downs on the earth's crust. These forces include folding, faulting, volcanism and earthquakes.

I. Folding : Folding is the bending of rock layers due to earth movements from one or two sides. Folds are most visible in rocks that contain layering (sedimentary rocks). A monocline is a type of fold in which all rock layers bend in the same direction. If the layers of rock bend upward, it is called anticline. If the layers of rock bend downward, it is called syncline.

Fold Mountains :- Are formed by crust which has been uplifted, and folded by compressional forces. Fold mountains are usually formed from sedimentary rocks and are usually found along the edges of continents. This is because the thickest deposits of sedimentary rock are generally accumulated along the edges of continents.

The following are major Fold Mountains of the world: 1. Andes (South America) 2. Rockies (North America) 3. Alps (Europe) 4. Himalayas (Asia) 5. Atlas (North Africa) 6. Cape Ranges (South Africa) 7. Australian Alps (Australia)

II. Faulting

Movements in the crust of the earth sometimes make cracks. These cracks are called faults. Faults occur due to two basic forces. These are tensional and compressional forces. Tension force causes a normal fault, and compressional force causes a reverse fault. Rift valleys and block/Horst/ mountains are major features formed by faulting.

Rift Valleys :-

A rift valley is formed when the land between two parallel faults sinks down. The largest rift valley in the world is the East African Rift Valley. It extends 7200 km from Syria to Mozambique, passing through the Red Sea; it touches Eritrea, Ethiopia, Kenya, Tanzania, Democratic Republic of Congo (DRC), Rwanda and Burundi. It covers 5600 km in Africa.

The Ethiopian Rift Valley is part of the East African Rift Valley. It extends from northeast to south west. Features found in the Rift Valley include active volcanoes, lakes, hot springs and fumaroles.

Block (Horst) Mountains.

Block Mountains are formed by the uplift of land between two parallel faults. These mountains are found closer to fold mountains in many parts of the world.

III. Volcanism

Volcanism is the process by which molten rock (magma) is forced out to the surface of the earth. The high temperature inside the earth changes rocks into molten magma. The magma that reaches the surface is called lava. The lava may come out on the surface through a single hole called a vent or several cracks called fissures. When a hole is formed at the top of the cone of a volcano it is called crater. If the hole or crater is very wide, it is known as caldera. A lake formed in a caldera is known as Crater Lake. Mount Zequala is a very good example of cone-shaped volcanic mountain with a crater lake. Volcanic activities may result in two different types of landforms. These are:

A. Extrusive landforms: form on the surface of the earth. They include volcano, crater, caldera and lava.

B. Intrusive landforms: result from solidified magma before reaching the surface of the earth. When magma collects in the crust, it forms batholiths, laccoliths, dykes and sills.

- **Batholith:** is a very large mass of magma which accumulates in the crust.

- **Laccolith:** is a mushroom shaped body of intrusive igneous rock smaller than a batholith.
- **Dyke:** is formed when magma solidifies in a vertical or near-vertical crack.
- **Sill:** is a near horizontal intrusion of igneous rock between two rock layers.

Types of volcanoes

Volcanoes have three types. These are:

- Active volcanoes:-** these types of volcanoes have a recent history of eruptions; they are likely to erupt again. Example: Erta'li, Fentale Dubbi and Damailai.
- Dormant volcanoes:-** they have not erupted for a very long time, but they may erupt at a future time. Example: Tatali, and Dabbahu
- Extinct volcanoes:-** they are dead volcanoes that are not expected to erupt in the future. Example: Mt Ras Dejen, Mt Batu, Mt Zuquala etc

Effects of volcanism on human life

Volcanic eruption has both negative and positive impacts on human life. Let us look at these impacts as follows:

i. Advantages of volcanic eruption

Volcanic eruption has the following advantages. It:

- Provides hot water for bathing
- Helps to generate geothermal energy
- Provides fertile soils that is good for farming
- Creates dramatic scenery that can attract tourists
- Forms hard and expensive minerals used as jewelry "Provides hard rocks for building, etc.

ii. Disadvantages of volcanic eruption

Volcanoes emit hot, dangerous gases, ash, lava, and rock that are powerfully destructive. Volcanic eruptions can result in additional threats to health, such as floods, mudslides, power outages, drinking water contamination and wildfires. It also results in infectious disease, respiratory illness, burns, injuries from falls, and vehicle accidents related to the slippery, hazy conditions caused by ash.

IV. Earthquake

Earthquakes are sudden movements in the earth's crust. They are caused by internal movements deep down inside the earth. Earthquakes are frequently associated with faults. They take place along fault lines where the earth's crust is weak. When an earthquake occurs, vibrations from the centre spread out in the form of waves in all

directions. The point at which an earthquake originates is called the focus. The point on the earth's surface immediately above the focus is called the epicenter. The intensity of an earthquake is measured by an instrument called a seismometer, and it is recorded on a seismograph. The scale which gives the magnitude is called the Richter scale. It ranges from 0 to 9. The records that range to 5 indicate minor or light; if it is 5 to 7 moderate to strong. If the range is 7 to 8, it is an indication of major earthquake and if it ranges above 8 or more, it is considered as a great one. The Ring of Fire, also referred to as the Circum-Pacific Belt, is a path along the Pacific Ocean characterized by active volcanoes and frequent earthquakes. The majority of Earth's volcanoes (75%) and earthquakes (90%) take place along the Ring of Fire.

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1. What does it mean by internal force?

- a) Forces that come from the atmosphere
- b) Forces caused by weather and erosion
- c) Forces that originate inside the Earth and shape its surface
- d) Forces caused by human activities

2. Which of the following is an example of an internal force?

- a) Flooding
- b) Volcanic eruption
- c) Deforestation
- d) Wind erosion

3. What is an anticline?

- a) A downward fold in rock layers
- b) A type of fault
- c) An upward arching fold in rock layers
- d) A volcanic crater

4. How does a syncline differ from an anticline?

- a) Syncline is an upward fold; anticline is a downward fold
- b) Syncline is a horizontal fold; anticline is circular
- c) Syncline is a downward fold; anticline is an upward fold
- d) Syncline is made by erosion only

5. In a landscape shaped by folding, where are older rocks usually found in an anticline?

- a) In the center of the fold
- b) On the outer edges
- c) In the lowest part
- d) At the surface only

Faulting & Landforms

6. What are the major features formed by faulting?

- a) Caves and stalactites
- b) Rift valleys and block mountains

- c) Volcanoes and craters
- d) Hills and sand dunes

7. What is a rift valley?

- a) A valley formed by river erosion
- b) A deep crack in the Earth caused by glacial movement
- c) A valley formed when land between two faults drops down
- d) A fold in rock layers

 **Volcano Types & Differences**

8. Which of the following is NOT a type of volcano?

- a) Shield volcano
- b) Composite volcano
- c) Cinder cone volcano
- d) Rift volcano

9. What type of volcano has gentle slopes and is built by lava flows?

- a) Composite volcano
- b) Cinder cone volcano
- c) Shield volcano
- d) Dome volcano

10. What characterizes a composite volcano?

- a) Made of only ash
- b) Formed from both lava and ash layers
- c) Only found underwater
- d) Has a flat top

11. How is a cinder cone volcano different from a shield volcano?

- a) It erupts with water
- b) It is made mainly of ash and cinders, not lava flows
- c) It has no crater
- d) It is much larger

 **Magma vs Lava**

12. What is the main difference between magma and lava?

- a) Magma is solid, lava is gas
- b) Magma is found inside Earth, lava is found on the surface
- c) Magma is colder than lava
- d) Lava forms only in oceans

 **Earthquake Impacts**

13. Which of the following is a possible impact of an earthquake on human life?

- a) Stronger buildings
- b) Creation of farmland
- c) Collapse of infrastructure
- d) Increase in rainfall

14. What happens during a strong earthquake?

- a) Rainfall increases
- b) Energy is released underground, causing ground shaking

- c) Volcanoes stop erupting
- d) New mountains are always formed

15. Which of these is NOT a direct impact of earthquakes?

- a) Tsunamis
- b) Floods caused by river damming
- c) Melting glaciers
- d) Loss of homes and lives