

# Endogenetic Movements

---

## Exercise

**Q. 1 A. Tick in front of the correct option**

**A. On which of the following are slow movements in the earth's interior**

- A. dependent?**
- B. Landforms**
- C. Velocity**
- D. Direction**

**Answer :** Slow movements in the earth's interior is dependent on **velocity**.

**Explanation –** Massive energy waves flowing through the mantle cause movements in it. The velocity in which they move affect the earth's interior.

**Q. 1 B. Tick in front of the correct option**

**When waves divert from each other, what do they create**

- A. Compression**
- B. Tension**
- C. Mountain**

**Answer :** When waves divert from each other, they create **tension**.

**Explanation –** When the energy waves within the earth's mantle move away from each other, they create tension on the layers of rock surrounding the waves leading to fractures in the earth's crust.

**Q. 1 C. Tick in front of the correct option**

**For the formation of a rift valley, which of the following processes should occur in the earth's crust?**

- A. Compression**
- B. Tension**
- C. Weathering**

**Answer :** For the formation of rift valleys, **tension** should occur in the earth's crust.

**Explanation** - When the energy waves within the earth's mantle move away from each other, they create tension on the layers of rock surrounding the waves leading to fractures in the earth's crust. Sometimes, two fractures can occur parallel to each other and the crust between these fractures subside forming the rift valley.

**Q. 1 D. Tick in front of the correct option**

**Which of these is a fold mountain?**

- A. The Satpudas**
- B. The Himalayas**
- C. The Western Ghats**

**Answer :** The Himalayas is a type of fold mountain.

**Explanation** – The Himalayas were formed around 40 to 50 million years ago when the Indo-Australian plate collided with the Eurasian plate. This caused compression in the Tethys sea which raised the ocean floor and folds were formed in the soft rocks to create the mountains.

**Q. 1 E. Tick in front of the correct option**

**The formation of extensive plateaus is a result of which type of movements?**

- A. Mountain-building**
- B. Continent-building**
- C. Horizontal**

**Answer :** The formation of extensive plateaus is a result of **continent-building** movements.

**Explanation** – Continent – building movements or epeirogenic movements occur when slow movements at the earth's center move towards the surface. This causes upliftment in earth's crust forming extensive plateaus.

**Q. 2 A. Give geographical reasons.**

**Buildings collapsed at the foothills of the Himalayas because of an earthquake. Before collapsing they were moving forward and backward.**

**Answer :** An earthquake occurs when the tension in the normal movements within the earth's crust increases leading to formation of massive waves creating trembling on the earth's surface. Initially when the energy is emitted from the earth's surface, it comes out in the form of primary seismic waves that cause the particles it passes through to move to and fro. This causes forward and backward movements or swaying in the earth's surface. This would cause the swaying in any structure present in the area

where such a phenomenon occurs. The collapse would be triggered by the secondary seismic waves which causes the crust to move up and down. Thus, the forward and backward movement caused by the primary waves would be observed first.

**Q. 2 B. Give geographical reasons.**

**There is a difference in the formation of the Meghalaya Plateau and the Deccan Plateau.**

**Answer :** The Meghalaya plateau is a type of block mountain. It was formed when horizontal movements of the waves within the earth's crust moved away from each other creating tension on the surface finally creating faults. When the surface between two parallel faults rises up, it forms block mountains. It is characterized by a flat top and steep sides as seen in the Meghalaya Plateau.

The Deccan plateau is a by-product of a volcanic eruption. During the eruption in a fissure type volcano, the magma comes out not from one single vent but from several fissures. This magma cools down and forms a gently rolling plateau as seen in the Deccan plateau.

**Q. 2 C. Give geographical reasons.**

**Most of the volcanoes are found on the plate boundaries.**

**Answer :** Along plate boundaries, either plates sink below another plate (subduction), heating and creating magma, or plates pull apart, allowing magma to rise to the surface. In both these conditions, when the magma reaches the surface it creates volcanoes. Thus, most of the volcanoes are found on the plate boundaries. More than 400 volcanoes—about 80 percent of all active volcanoes above sea level—are along subduction zones in the Pacific Ocean. The volcanoes around the Pacific Ocean form a belt called the Ring of Fire.

**Q. 2 D. Give geographical reasons.**

**The Barren Island is becoming conical in shape.**

**Answer :** The Barren Island is home to India's only volcanic mountain, the Barren Mountain which had been dormant for a long time. It was a central type or conical volcano where the magma had been ejected through a single central vent. It has started showing activity since February 2017, and mainly dust, smoke and mud is coming out of the vent along with some lava. This has made it more conical in shape.

**Q. 2 E. Give geographical reasons.**

**Volcanic eruptions can cause earthquakes.**

**Answer :** Volcanic eruptions occur when either plates sink below another plate (subduction), heating and creating magma, or plates pull apart, allowing magma to rise to the surface. In both these conditions, when the magma reaches the surface it creates volcanoes. Thus, most of the volcanoes are found on the plate boundaries. An earthquake occurs when the tension in the normal movements within the earth's crust increases leading to formation of massive waves creating trembling on the earth's surface. Thus, volcanic eruptions can cause earthquakes because of the massive amount of energy that is released during an eruption.

**Q. 3 A. Identify and name the internal movement.**

**Tsunamis are generated in coastal areas.**

**Answer :** Sudden internal movements within the earth's crust below the ocean floor that lead to earthquakes and volcanic eruptions can cause tsunamis.

**Explanation –** A tsunami is a seismic sea wave which is caused by the displacement of a large volume of water, generally in an ocean or a large lake. This displacement can occur because of earthquakes or volcanic eruptions under the ocean floor both of which are categorized as sudden earth movements.

**Q. 3 B. Identify and name the internal movement.**

**The Himalayas are an example of fold mountains.**

**Answer :** Compression that lead to folding of the softer rocks formed the Himalayas.

**Explanation -** The Himalayas were formed around 40 to 50 million years ago when the Indo-Australian plate collided with the Eurasian plate. This caused compression in the Tethys sea which raised the ocean floor and folds were formed in the soft rocks to create the mountains.

**Q. 3 C. Identify and name the internal movement.**

**Molten magma is thrown out of the earth's mantle.**

**Answer :** Volcanic eruptions cause molten magma to be thrown out of the earth's crust.

**Explanation -** Volcanic eruptions occur when either plates sink below another plate (subduction), heating and creating magma, or plates pull apart, allowing magma to rise to the surface. In both these conditions, the magma reaches the surface or is thrown out to the surface through vents and fissures.

**Q. 3 D. Identify and name the internal movement.**

**Rift valley is formed because of faulting.**

**Answer :** Tension within the earth's crust which leads to faulting creates rift valleys.

**Explanation -** When the energy waves within the earth's mantle move away from each other, they create tension on the layers of rock surrounding the waves leading to fractures in the earth's crust. Sometimes, two fractures can occur parallel to each other and the crust between these fractures subside forming the rift valley.

**Q. 4. Arrange the following statements in chronological order in which an earthquake occurs.**

- A. The earth's surface vibrates**
- B. The plates suddenly move.**
- C. Due to the movements in the mantle, compression goes on increasing.**
- D. Along the weak points (fault lines) rocks break apart.**
- E. Stored energy is released in the form of seismic waves.**

**Answer :** The following sequence gives the chronological order when an earthquake occurs –

- B. The plates suddenly move.**
- E. Stored energy is released in the form of seismic waves.**
- C. Due to the movements in the mantle, compression goes on increasing.**
- A. The earth's surface vibrates**
- D. Along the weak points (fault lines) rocks break apart.**

**Explanation –** The given sequence describes how an earthquake occurs. An earthquake occurs when the tension in the normal movements within the earth's crust increases leading to formation of massive waves creating trembling on the earth's surface. The tension is a direct result from the movements of plates putting statement B in the first position. The effect of this sudden plate movement results in the release of energy which makes statement E come in the second position. All these movements (tension and energy release) are occurring in the earth's mantle. Statement C which describes the same along with the effect it has on the compression comes in the third spot. Increasing compression will create trembling on the earth's surface making statement A come in at the fourth spot. This vibration is the earthquake and not only will it cause faults to appear on the crust but the crust can also break apart at these fault lines. This makes statement D come in the fifth position. Thus, the correct sequence is B, E, C, A, D.

**Q. 5 A. Distinguish between -**

**Block Mountain and Fold Mountain**

**Answer :**

<b>Block Mountain</b>	<b>Fold Mountain</b>
Block mountains are formed due to faulting which is caused when the horizontal movements within the earth's crust move away from each other.	Fold mountains are formed due to folding which occurs when the horizontal movements within the earth's crust move towards each other.
Tension within the earth's crust causes block mountain formation.	Compression within the earth's crust causes fold mountain formation.
Block mountains are characterized by steep slopes and flat tops.	Fold mountains are characterized by large scale complex folds that have greater height but are comparatively narrow in width.

<p>Black Forest mountains in Europe and The Meghalaya Plateau of India are examples of block mountains.</p>	<p>The Himalayas, the Aravalis, the Rockies, the Andes, the Alps are the major fold mountains of the world.</p>
---	---

**Q. 5 B. Distinguish between -  
Primary and Secondary Seismic Waves**  
**Answer :**

<b>Primary Seismic Waves</b>	<b>Secondary Seismic Waves</b>
The waves that reach the earth's surface first once energy is emitted from the earth's surface are called primary seismic waves.	The waves that reach the earth's surface after the primary waves once energy is emitted from the earth's surface are called secondary seismic waves.
These waves can travel through all the three mediums of liquid, solid and gaseous states.	These waves can travel through only solid state medium and get absorbed in any liquid state mediums.

They have high velocity and move in a radial direction from the focus of the earthquake.	They have lower velocity than Primary waves and scatter in all directions from the earthquake focus point.
These waves are often called forward-backward waves as particles through which these waves pass tend to move to and fro in the direction of the waves.	These waves cause the particles it passes through to move up and down.
Initial waves are felt but are not damaging to a great extent.	These waves are more damaging causing the maximum destruction during an earthquake.

**Q. 5 C. Distinguish between -**

**Earthquakes and volcanoes**

**Answer :**



<b>Earthquakes</b>	<b>Volcanoes</b>
<p>An earthquake occurs when the tension in the normal movements within the earth's crust increases leading to formation of massive waves creating trembling on the earth's surface.</p>	<p>Volcanoes are mountains that result from volcanic eruptions. Volcanic eruptions occur when either plates sink below another plate (subduction), heating and creating magma, or plates pull apart, allowing magma to rise to the surface. In both these conditions, the magma reaches the surface or is thrown out to the surface through vents and fissures.</p>
<p>Earthquakes are difficult to predict because of the random pattern in their occurrence.</p>	<p>Volcanoes are easier to predict as their formation is preceded by eruptions of varying rates.</p>
<p>Earthquakes originate from deep within the earth's mantle.</p>	<p>Volcanoes are surface features.</p>

Earthquakes only lead to destruction.	Volcanoes may cause formation of new crust as magma ejected from a volcano cools down to form new surfaces.
Earthquakes typically will not directly produce significant debris, but debris will result from the disturbances caused by the earthquake.	Volcanoes can produce significant debris through ashfalls, mudslides etc.

**Q. 6 A. Answer in brief**

**Give reasons why an earthquake occurs.**

**Answer :** An earthquake occurs when the tension in the normal movements within the earth's crust increases leading to formation of massive waves creating trembling on the earth's surface.

- Movements below the earth's surface creates tension which keeps on accumulating.
- High energy is released at the place where the tension mounts up creating the center of the earthquake or the focus.
- Seismic waves scatter in all directions from the focus.
- Underground rocks can break along the fault lines created by movements of such waves which is expressed by an earthquake on the surface.

Plate boundaries are active areas of earthquakes as the plates are in constant motion.

**Q. 6 B. Answer in brief**

**Which type of movements have led to the formation of the major fold mountains in the world?**

**Answer :** Fold mountains are formed due to folding which occurs when the horizontal movements within the earth's crust move towards each other.

- The release of energy from within the earth's crust causes movements in the earth's mantle.
- Velocity and direction define the result of these movements on the earth's surface.
- When the movements are slow and horizontal in nature they can lead to formation of mountains and other landforms.
- Slow horizontal movements that move towards each other create compression in the earth's crust.
- This causes the rock layers to fold over each other and rise in height.
- With constant high pressure large scale complex folds are formed, uplifting the earth's surface and forming fold mountains.

The Himalayas, the Aravalis, the Rockies, the Andes, the Alps are the major fold mountains of the world.

#### **Q. 6 C. Answer in brief**

##### **How is the magnitude of the earthquake related to the collapse of houses?**

**Answer :** An earthquake occurs when the tension in the normal movements within the earth's crust increases leading to formation of massive waves creating trembling on the earth's surface. Movements below the earth's surface creates tension which keeps on accumulating. High energy is released at the place where the tension mounts up creating the center of the earthquake or the focus. The point on the Earth's surface directly above the focus is called the *epicenter* of the earthquake. The severity of an earthquake can be expressed in terms of both intensity and magnitude. Intensity is based on the observed effects of ground shaking on people, buildings, and natural features. Magnitude is related to the amount of seismic energy released at the hypocenter of the earthquake. The magnitude of an earthquake is thus represented by a single, instrumentally determined value. This value for the magnitude of an earthquake is measured with the help of seismographs which give the value according to the Richter Scale.

Earthquakes with magnitude of about 2.0 or less are usually called microearthquakes; they are not commonly felt by people and are generally recorded only on local seismographs. Events with magnitudes of about 4.5 or greater--there are several thousand such shocks annually--are strong enough to be recorded by sensitive seismographs all over the world. Great earthquakes, such as the 1964 Good Friday earthquake in Alaska, have magnitudes of 8.0 or higher. On the average, one earthquake of such size occurs somewhere in the world each year. Although the Richter Scale has no upper limit, the largest known shocks have had magnitudes in the 8.8 to 8.9 range.

Thus, higher the Richter scale reading on a seismograph, the earthquake has more magnitude making it more devastating. Earthquakes with low magnitude would not cause houses to collapse. But those of high magnitude can cause houses to collapse.

#### **Q. 6 D. Answer in brief**

#### **What are the effects of earthquakes on the earth's surface and human life?**

**Answer :** An earthquake occurs when the tension in the normal movements within the earth's crust increases leading to formation of massive waves creating trembling on the earth's surface. Earthquakes are naturally devastating in nature and have both primary and secondary effects. The primary effects are mostly observed on the earth's surface, while secondary effects are observed on human life.

#### **Primary effects –**

- The passage of seismic waves through the ground, causes it to shake which can be gentle or extremely violent depending on the magnitude of the earthquake. This leads to rupturing on the surface and/ or creation of faults further weakening the ground stability.
- Landslides are caused by earthquakes both by direct rupture and by sustained shaking of unstable slopes. They can easily destroy buildings in their path, or block roads and railroad lines, or take hilltop homes with them as they tumble.
- Earthquakes can cause tsunamis or seismic sea waves which is caused by the displacement of a large volume of water, generally in an ocean or a large lake because of ground shaking and displacement.
- In a similar fashion, earthquakes can also change the existing groundwater level in an area in which it occurs.
- In mountain areas, earthquakes can also cause the accumulated snow on mountain tops to dislodge through the shaking and create an avalanche.

#### **Secondary effects –**

- Earthquakes can cause devastating fires which in turn affect human life and property.
- Human life and property are also lost and damaged due to building collapse in the event of an earthquake.
- Since earthquakes tend to damage the earth's surface, transportation routes like roads and railways are also severely affected and often destroyed during earthquakes of higher magnitudes.

- The same reason applies for communication systems.

#### **Q. 6 E. Answer in brief**

**Explain the types of seismic waves.**

**Answer :** During an earthquake, accumulated tension is released in massive waves to cause the trembling at the surface of the earth. These waves are called seismic waves and are of three types –

#### **1) Primary Seismic Waves or P waves -**

- The waves that reach the earth's surface first once energy is emitted from the earth's surface are called primary seismic waves.
- These waves can travel through all the three mediums of liquid, solid and gaseous states.
- They have high velocity and move in a radial direction from the focus of the earthquake.
- These waves are often called forward-backward waves as particles through which these waves pass tend to move to and fro in the direction of the waves.
- Initial waves are felt but are not damaging to a great extent.

#### **2) Secondary Seismic Waves or S waves -**

- The waves that reach the earth's surface after the primary waves once energy is emitted from the earth's surface are called secondary seismic waves.
- These waves can travel through only solid state medium and get absorbed in any liquid state mediums.
- They have lower velocity than Primary waves and scatter in all directions from the earthquake focus point.
- These waves cause the particles it passes through to move up and down.
- These waves are more damaging causing the maximum destruction during an earthquake.

#### **3) Surface Seismic Waves or L waves –**

- These waves are generated after the main P and S waves reach the epicenter.

- They travel in the direction of the circumference of the earth along the crust.
- They are highly destructive.

#### **Q. 6 F. Answer in brief**

**Explain the types of volcanoes on the basis of periodicity of eruption with examples.**

**Answer :** Volcanoes are mountains that result from volcanic eruptions. Volcanic eruptions occur when either plates sink below another plate (subduction), heating and creating magma, or plates pull apart, allowing magma to rise to the surface. In both these conditions, the magma reaches the surface or is thrown out to the surface through vents and fissures. Periodicity refers to the period between which eruptions occur from a particular volcano. On the basis of periodicity, volcanoes are of three types –

#### **1) Active Volcanoes -**

- A volcano that is erupting or shows signs of future eruptions like emission of gas, muds, etc. is called active.
- Any signs of unrest including unusual earthquake activity or significant new gas emissions makes a volcano active by nature.
- Most volcanoes are situated on the Pacific Ring of Fire are considered active. Mt Fujiyama in Japan, Mt. Stromboli in Mediterranean Sea are also considered as active volcanoes.

#### **2) Dormant Volcanoes –**

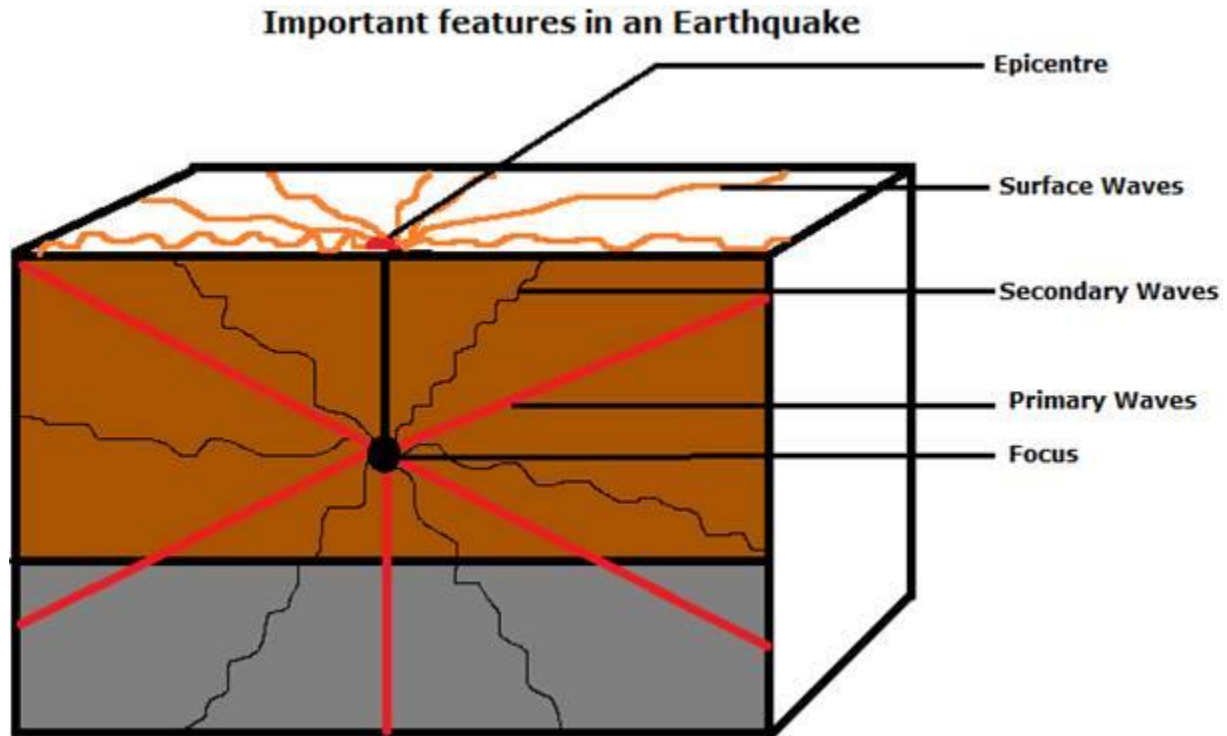
- Dormant volcanoes are those that have not erupted for thousands of years, but are likely to erupt again in the future.
- Mt. Vesuvius in Italy, Mt. Katmai in Alaska, and Barren Island, India are considered to be examples of dormant volcanoes.

#### **3) Extinct Volcanoes –**

- Any volcano that shows no magma supply and has not erupted in recorded history is considered as an extinct volcano.
- Mt. Kilimanjaro in Tanzania is an extinct volcano.

**Q. 7. Show the epicentre, focus and the primary, secondary and surface waves of an earthquake with the help of a neat labelled diagram.**

Answer :



Q. 8. Show the following on a given outline map of the world.

A. Mt. Kilimanjaro

B. Mid-Atlantic Earthquake zone

C. Mt. Fuji

D. Krakatoa

E. Mt. Vesuvius

Answer :



### Description:

- **Mt Kilimanjaro** - Mt. Kilimanjaro in Tanzania on the African continent is an extinct volcano. Any volcano that shows no magma supply and has not erupted in recorded history is considered as an extinct volcano.
- **Mid -Atlantic earthquake zone** – The mid-Atlantic earthquake zone refers to the zone surrounding the mid-Atlantic ridge. This ridge lies over active plate boundaries where different plates are known to converge or diverge. Mainly it is a convergent plate boundary and the shifting of plates often causes under water earthquakes in this region.
- **Mt Fuji** – Mt Fujiyama in Japan is an active volcano. A volcano that is erupting or shows signs of future eruptions like emission of gas, muds, etc. is called active.
- **Krakatoa** – This is a volcanic island in Indonesia. It is famous because of a cataclysmic eruption in 1883. According to the official records of the Dutch East Indies colony, 165 villages and towns were destroyed near Krakatoa, and 132 were seriously damaged. At least 36,417 people died, and many more thousands were injured, mostly from the tsunamis that followed the explosion. The eruption destroyed two-thirds of the island of Krakatoa.
- **Mt Vesuvius** - Mt. Vesuvius in Italy is a dormant volcano. Dormant volcanoes are those that have not erupted for thousands of years, but are likely to erupt again in the future.