

Chapter 10 Section 3

Plate Tectonics

Plate Movements

- According to the theory of **plate tectonics**, Earth's crust and part of the upper mantle are broken into sections.
- These sections called **plates**, move on a plasticlike layer of the mantle.

Composition of Earth's Plates

- Plates are made of the crust and a part of the upper mantle.
- These two parts combined are the **lithosphere**.
- The plasticlike layer below the lithosphere is called the **asthenosphere**.
- The rigid plates of the lithosphere float and move around on the asthenosphere.

Plate Boundaries

- When plates move, they can interact in several ways.
- They can **move toward each other and converge, or collide**.
- They can **pull apart or slide alongside one another**. When the plates interact, the result of their movement is seen at the plate boundaries.
- Movement along any plate boundary means that changes must happen at other boundaries.

THREE WAYS PLATES MOVE

1. Plates Moving Apart

- The boundary between two plates that are moving apart is called a **divergent boundary**. Example-North American Plate moving away from the Eurasian and the African Plates.
- This divergent boundary is called the Mid-Atlantic Ridge.

2. Plates Moving Together

- As new crust is added in one place, it disappears below the surface at another.
- The disappearance of crust can occur when seafloor cools, becomes denser and sinks.
- This occurs where two plates move together at **convergent boundaries**.
- When an oceanic plate converges with a less dense continental plate, the denser oceanic plate sinks under the continental plate.
- The area where an oceanic plate **subducts**, or goes down, into the mantle is called a **subduction zone**.
- Some volcanoes form above subduction zones.
- High temperatures cause rock to melt around the subducting slab as it goes under the other plate.
- This newly formed magma is forced upward along these plate boundaries, forming volcanoes.

Where Plates Collide

- A subduction zone also can form where two oceanic plates converge.
- Usually, no subduction occurs when two continental plates collide.
- Because both of these plates are less dense than the material in the asthenosphere the two plates collide and crumple up, forming mountain ranges.
- Earthquakes are common at these convergent boundaries.

3. Plates Slide Past Each Other

- Transform boundaries** occur where two plates slide past one another.
- They move in opposite directions or in the same direction at different rates.
- When one plate slips past another suddenly, earthquakes occur.
- The San Andreas Fault is part of transform plate boundary. It has been the site of many earthquakes.

Causes of Plate Tectonics—Convection Inside Earth

- The cycles of heating, rising, cooling, and sinking is called **convection current**.
- A version of this same process, occurring on the mantle, is thought to be the force behind plate tectonics.

Moving Mantle Material

- Convection currents in the mantle are the driving force of plate tectonics.

Features Caused by Plate Tectonics

- As plates move, they interact.
- The interaction of plates produces forces that **build mountains, create ocean basins, and cause volcanoes**.
- When rocks in Earth's crust break and move, energy is released in the form of **seismic waves**.
- Humans feel this release as earthquakes.

Normal Faults and Rift Valleys

- When rocks break and move along surfaces, a **fault** forms.
- Faults interrupt rock layers by moving them out of place. Entire mountain ranges can form in the process called **fault-block mountains**.
- Rift valleys and mid-ocean ridges can form where Earth's crust separates.
Example- the middle of mid-ocean ridges

Mountains

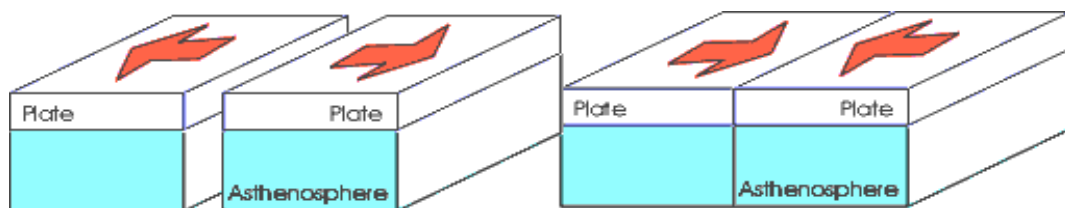
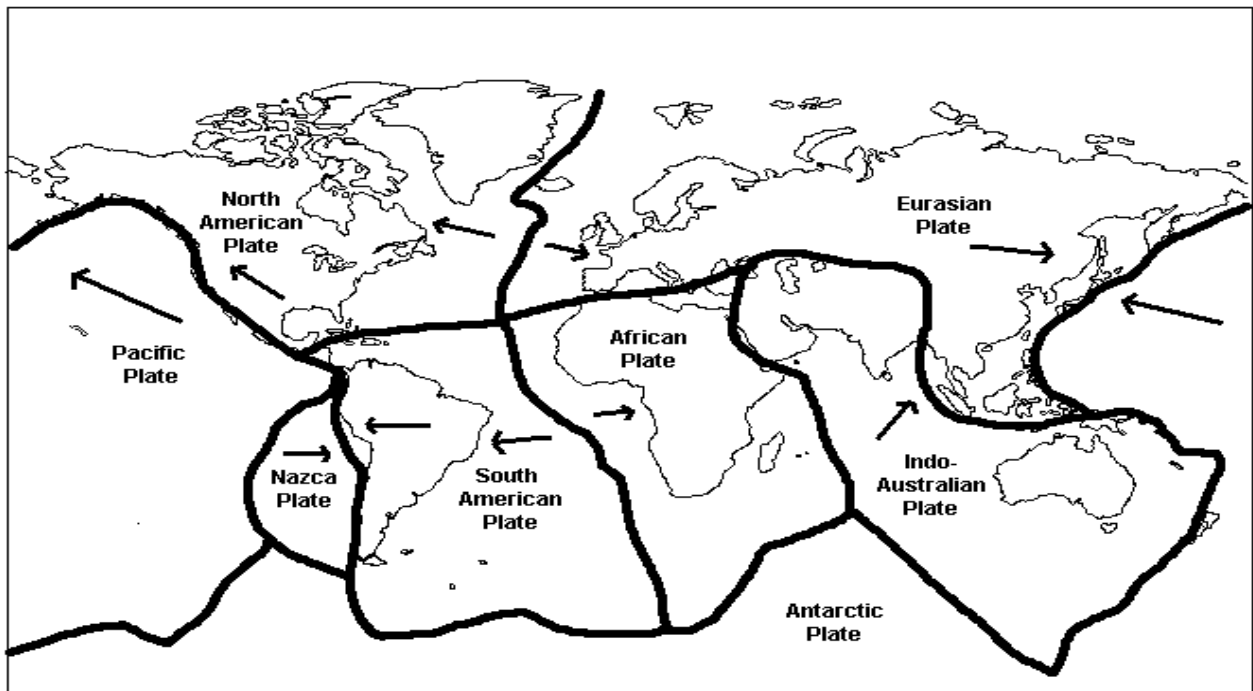
- As continental plates collide, the forces that are generated cause massive folding and faulting of rock layers into mountain ranges such as the Himalaya.

Strike-Slip Faults

- In a **strike-slip fault**, rocks on opposite sides of the fault move in opposite directions, or in the same direction at different rates.
- When plates move suddenly, vibrations are generated inside Earth that are felt as earthquakes.

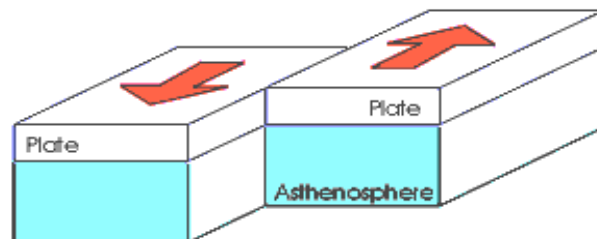
Testing for Plate Tectonics

1. Magnetic characteristics of rocks on the seafloor
2. Study volcanoes and earthquakes
3. Lasers and a satellite-scientists can measure exact movements of Earth's plates as little as 1 cm per year and as much as 12 cm per year.



Divergent

Convergent



Transform