Plate Boundaries (3.53)

- According to the Plate tectonic theory, one or more catagories of boundaries may exist at the edges of each tectonic plate.
 - 1) Divergent Boundary (Ridge)
 - 2) Convergent Boundary (Trench)
 - 3) Transform Boundary

Reference:

Tarbuck and Lutgens pages 526-536, 24-27 CD 72, 74-75, 840-864

Plate Boundaries

Divergent Boundary

- Plates move apart, resulting in upwelling of molten material from the mantle to create new ocean floor.
- Features on the ocean floor called Ridges, show this form of plate movement.



Ocean – Ocean Convergent Boundary

- Compressional forces cause plates to move together, causing one slab of lithosphere to be consumed into the mantle initiating volcanic activity which creates volcanoes to form on the ocean floor.
- Features called ocean trenches are formed at these boundaries. Lithosphere is destroyed as one oceanic slab descends beneath another.
- Fluid, basaltic magmas feed the volcanic islands and form shield volcanoes.
- Example include the Japan island arc and the Japan trench.



Ocean - Ocean Convergence

Ocean – Continent Convergent Boundary

- Compressional forces cause an ocean plate and a continent plate to move together, causing the more dense ocean plate to sink into the asthenosphere. This region where the ocean plate sinks is called a subduction zone.
- Deep ocean trenches form adjacent to the zone of subduction. These trenches can range up to thousands of kilometers long and 8 – 10 km deep. Lithosphere is destroyed as one oceanic slab descends beneath another.
- At depths of about 100 km the oceanic plate and parts of the mantle partially melt producing viscous magmas. This molten rock rises slowly where it cools and solidifies at depths producing plutons. However, some magma may reach the surface and erupt through composite volcanoes as violent volcanic eruptions.

Ocean – Continent Convergent Boundary

If the subduction occurs beneath continental crust, a continental volcanic arc is produced (such as the Cascades of the western U.S.,or the Andes mountains of the South America).



Ocean - Continent Convergence

Continent – Continent Convergent Boundary

- Compressional forces cause two continental plates to move together. Because of the low density of continental crust neither plate will subduct and the two plates ram into one another forming mountains.
- > Such a collision occurred when India collided with Asia forming the Himalayas. During these collisions the continental crust is buckled and fractured pushing rock up to very high elevations.



Plate Boundaries

Transform Boundary

- Where lithospheric plates slide past one another in a horizontal manner, a transform fault is created. Earthquakes along such transform faults are shallow focus earthquakes. Lithosphere is not created or destroyed at these boundaries.
- One of the largest such transform boundaries occurs along the boundary of the North American and Pacific plates and is known as the San Andreas Fault. Here the transform fault cuts through continental lithosphere. Fault
- Most transform faults occur where oceanic ridges are offset on the sea floor.





Sample Problem

Using a labelled diagram, briefly describe what happens at a mid-ocean ridge.



Answer:

Tensional forces cause the plates to move apart resulting in upwelling of molten material from the mantle to create new ocean floor.