

Review for the Plate Tectonics and Structure of the Earth Test!

Don't forget to review:

- The left-hand side of your notes
- Your homework, labs and any quizzes for this unit
- The key concepts, key vocabulary, section headers, illustrations and review questions from the book

To succeed with this test, you should be able to:

- * Describe Earth's interior structure and composition.
- * List the evidence that was used to support the continental drift hypothesis.
- * Describe the theory of plate tectonics.
- * Explain the differences between the continental drift hypothesis and the theory of plate tectonics.
- * List and describe the evidence used to support the plate tectonics theory.
- * Explain the difference between divergent, convergent, and transform plate boundaries, and how these are related to the creation of igneous and metamorphic rocks in the rock cycle!
- * Describe the models that have been proposed to explain the driving mechanism for plate motion.

Here is a summary of what we covered in this unit. You need to know the details also!

- The four major zones of Earth's interior are the 1) crust (the very thin outer layer), 2) mantle (a rocky layer located below the crust), 3) outer core (liquid iron and nickel), and 4) inner core (a solid iron sphere).
- The continental crust is mostly made of felsic granite-like rocks, while the oceanic crust is of mafic basalt-like composition. The core is composed mainly of iron and nickel.
- The crust and uppermost mantle form the lithosphere. Beneath the lithosphere lies a soft, relatively weak layer of the mantle known as the asthenosphere.
- In the early 1900s **Alfred Wegener** set forth his **continental drift hypothesis**. One of its major ideas was that a supercontinent called **Pangaea** began breaking apart into smaller continents about 200 million years ago. The smaller continental fragments then "drifted" to their present positions. To support the claim that the now-separate continents were once joined, Wegener and others used the **fit of South America and Africa**, **distribution of ancient climates**, **fossil evidence**, and **rock structures**.
- One of the main objections to the continental drift hypothesis was its inability to provide an acceptable mechanism for the movement of continents – he couldn't explain *why it happened*.
- The theory of **plate tectonics**, holds that Earth's rigid outer shell, called the **lithosphere**, consists of several large and some smaller **rigid** pieces called **plates** that are in motion relative to each other. Most of Earth's **seismic activity (earthquakes)**, **volcanism**, and **mountain building** occur along the margins of these plates.
- A major difference between plate tectonics and continental drift is that large plates contain **both** continental and ocean crust and the entire plate moves. In continental drift, Wegener proposed that the sturdier continents "drifted" by breaking through the oceanic crust, much like ice breakers cut through ice.
- **Divergent plate boundaries** occur where plates move apart, resulting in upwelling of material from the mantle to create new seafloor. Divergent boundaries are associated with seafloor spreading, which occurs at rates of 2 to 15 centimeters per year. New divergent boundaries may form within a continent (for example, the East African Rift Valleys) where they may fragment a landmass and develop a new ocean basin.

- **Convergent plate boundaries** occur where plates move together, resulting in the subduction of oceanic lithosphere into the mantle along a deep oceanic **trench**.
- Convergence between an oceanic and continental block results in **subduction** of the oceanic slab and the formation of a **continental volcanic arc** such as the **Cascades** of northwestern United States and the Andes of South America.
- Oceanic-oceanic convergence results in an arc-shaped chain of volcanic islands called a **volcanic island arc**.
- When two plates carrying continental crust converge, both plates are too *buoyant* to be subducted. The result is a "**collision**" resulting in the formation of a mountain belt such as the Himalayas.
- **Transform fault boundaries** occur where plates grind past each other without the production or destruction of lithosphere. Most transform faults join two segments of a mid-oceanic ridge. The San Andreas fault, in California, cuts through continental crust.
- The theory of plate tectonics is supported by 1) **paleomagnetism**, the direction and intensity of Earth's magnetism in the geologic past; 2) the global distribution of **earthquakes** and their close association with plate boundaries; 3) the ages of **sediments** from the floors of the deep-ocean basins; and 4) the existence of island groups that formed over **hot spots** and provide a frame of reference for tracing the direction of plate motion.
- One explanation for subduction is slab-pull. **Slab-pull** occurs where cold, dense oceanic lithosphere is subducted and pulls the trailing lithosphere along.