Chapter 7 Notes

Section 1

Objectives

- **Identify** the layers of the Earth by their chemical composition.
- **Identify** the layers of the Earth by their physical properties.
- **Describe** a tectonic plate.
- **Explain** how scientists know about the structure of Earth's interior.

The Composition of the Earth

- The Earth is divided into _____ layers—the crust, the mantle, and the core—based on the
- _____ that make up each layer.
- **The Crust** is the _____ layer of the Earth. The crust is _____ to _____ km thick, and is the _____ layer of the Earth.
- There are _____ types of crust—_____ and _____. Oceanic crust is _____ and denser than continental crust.
- **The Mantle** is the layer of the Earth _____ the crust and the core. The mantle is _____ _____ than the crust and contains most of the Earth's _____.
- The crust is too thick to _____ through, so scientists must draw conclusions about the _____ and other properties of the mantle from observations made on the Earth's surface.
- **The Core** is the central part of the Earth that lies _____ the mantle. The core makes up about _____ of Earth's mass.
- Scientists think that the Earth's core is made mostly of _____ and contains smaller amounts of nickel but almost no _____, silicon, aluminum, or magnesium.

The Physical Structure of the Earth

- The Earth is divided into five _____ layers:
  - The **lithosphere**
  - The **asthenosphere**
  - The **mesosphere**
  - The **outer core**
  - The **inner core**
- Each layer has its own set of physical _____.
- The _____, _____ layer of the Earth is called the **lithosphere.**
- The lithosphere is made of _____ parts—the crust and the rigid upper part of the mantle.

- The lithosphere is divided into pieces that are called _____ _____.
- The **asthenosphere** is a _____ layer of the mantle on which the tectonic plates _____.
- The asthenosphere is made of _____ rock that _____ very slowly.
- The **mesosphere** is the _____, lower part of the mantle between the asthenosphere and the outer core.
- The prefix *meso-* means "_____."
- The Earth's core is divided into _____ parts.
- The *outer core* is the _____ layer of the Earth's core that lies beneath the mantle.
- The *inner core* is the _____, _____ center of our planet that extends from
- the bottom of the outer core to the center of the Earth, about _____ km beneath the surface.

Tectonic Plates

- Pieces of the lithosphere that move around on _____ of the asthenosphere are called **tectonic plates.**
- Tectonic plates consist of the _____ and the _____, outermost part of the _____.
- **A Giant Jigsaw Puzzle** Each tectonic plate fits together with the tectonic plates that _____ it.
- The lithosphere is like a jigsaw puzzle. The tectonic plates are like the pieces of the puzzle.
- Tectonic plates "_____" on the asthenosphere. The plates cover the surface of the asthenosphere, and they _____ one another and _____ around.
- The lithosphere _____ the asthenosphere. Thick tectonic plates, such as those made of _____ crust, displace more asthenosphere than do thin plates, such as those made of _____ lithosphere.

Mapping the Earth's Interior

- Scientists have learned much about the deepest parts of the planet by measuring the _____ of the _____ waves that travel through the Earth's interior during _____.
- By using _____, scientists have learned that the Earth is made of different layers.

Section 2

Objectives

- **Describe** Wegener's hypothesis of continental drift.
- **Explain** how sea-floor spreading provides a way for continents to move.

- **Describe** how new oceanic lithosphere forms at mid-ocean ridges.
- **Explain** how magnetic reversals provide evidence for sea-floor spreading.

Wegener's Continental Drift Hypothesis

- **Continental drift** is the hypothesis that states that continents once formed a single _____, broke up, and _____ to their present locations.
- Scientist _____ _____ developed the hypothesis in the early 1900s.

The Breakup of Pangaea

- Wegener theorized that all of the present continents were once _____ in a single, huge continent he called *Pangaea*.
- *Pangaea* is Greek for "_____."
- Pangaea existed about _____ million years ago.

Sea-Floor Spreading

- _____ to support the continental drift hypothesis comes from sea-floor spreading.
- **Sea-floor spreading** is the process by which new oceanic _____ forms as magma rises toward the surface and solidifies.
- **Mid-Ocean Ridges and Sea-Floor Spreading** Mid-ocean ridges are underwater _____ chains that run through Earth's ocean basins.
- These mid-ocean ridges are the places where sea-floor spreading takes place.
- **Evidence for Sea-Floor Spreading: Magnetic Reversals** Some of the most important evidence of sea-floor spreading comes from magnetic reversals _____ in the ocean floor.
- Throughout Earth's history, the north and south _____ _____ have changed places many times.
- **Magnetic Reversals and Sea-Floor Spreading** Molten rock at the mid-ocean ridge contains tiny grains of magnetic _____ that act like _____.
- These minerals _____ with the magnetic field of the Earth. When the molten rock cools, the record of these tiny compasses remains in the rock.
- When the Earth's magnetic field reverses, the magnetic mineral grains align in the _____ direction. The new rock records the direction of the Earth's magnetic field.
- As the sea floor spreads away from a mid-ocean ridge, it carries with it a _____ of these magnetic reversals.

Section 3

Objectives

- **Describe** the three types of tectonic plate boundaries.
- **Describe** the three forces thought to move tectonic plates.
- **Explain** how scientists measure the rate at which tectonic plates move.

Tectonic Plate Boundaries

- **Plate tectonics** is the theory that explains how large pieces of the Earth's outermost layer, called *tectonic plates*, _____ and _____.
- A _____ is a place where tectonic plates touch. All tectonic plates share boundaries with other tectonic plates.
- The type of boundary depends on how the tectonic plates _____ relative to one another. There are three types of tectonic plate boundaries:
    - _____ **Boundaries**
    - **Divergent Boundaries**
    - **Transform Boundaries**
- When two tectonic plates _____, the boundary between them is a **convergent boundary**.
- What happens at convergent boundaries depends on the kind of _____ at the _____ _____ of each tectonic plate.
- When two tectonic plates _____, the boundary between them is called a **divergent boundary**.
- New sea floor forms at _____ boundaries.
- When two tectonic plates _____ _____ each other horizontally, the boundary between is called a **transform boundary**.
- The San Andreas Fault in California is an example of a transform boundary.

Possible Causes of Tectonic Plate Motion

- Tectonic plate movement occurs because of changes in the _____ within the asthenosphere.

Tracking Tectonic Plate Motion

- Tectonic plate movements are so _____ and gradual that you can't see or _____ them. The movement is measured in _____ per year.
- Scientists use a system of _____ called the *global positioning system* (GPS) to measure the _____ of tectonic plate movement.

Section 4

Objectives

- **Describe** two types of stress that deform rocks.
- **Describe** three major types of folds.
- **Explain** the differences between the three major types of faults.

- **Identify** the most common types of mountains.
- **Explain** the difference between uplift and subsidence.

Deformation

- Whether a material bends or breaks depends on the how much _____ is applied to the material.
- *Stress* is the amount of _____ per unit area on a given material.
- Different things happen to rock when different types of stress are applied.
- The process by which the shape of a rock changes because of stress is called _____.
- Rock layers _____ when stress is placed on them.
- When enough stress is placed on rocks, they can reach their _____ limit and _____.
- The type of stress that occurs when an object is _____, such as when two tectonic plates collide, is called **compression.**
- When compression occurs at a convergent boundary, large _____ _____ can form.
- **Tension** is stress that occurs when forces act to _____ an object.
- Tension occurs at _____ plate boundaries, such as mid-ocean ridges, when two tectonic plates pull away from each other.

Folding

- The _____ of rock layers because of stress in the Earth's crust is called **folding.**
- **Types of Folds** Depending on how rock layers deform, different types of folds are made.
- The major types of folds are anticlines, synclines, and _____.
- *Anticlines* are upward-arching folds.
- *Synclines* are downward, _____ folds.
- In a *monocline,* rock layers are folded so that both ends of the fold are _____.

Faulting

- Some rock layers break when stress is applied. The surface along which rocks break and slide past each other is called a **fault.**
- The blocks of crust on each side of the fault are called _____ _____.
- When a fault is not vertical, its two sides are either a hanging wall or a footwall.
- The type of fault depends on how the hanging wall and footwall _____ in relationship to each other.
- When a *normal fault* moves, it causes the hanging wall to move _____ relative to the footwall.
- When a *reverse fault* moves, it causes the hanging wall to move _____ relative to the footwall.

- A third major type of fault is a *strike-slip fault*. These faults form when _____ forces cause rock to break and move horizontally.

Plate Tectonics and Mountain Building

- When tectonic plates collide, land features that start as folds and faults can eventually become large mountain ranges.
- When tectonic plates undergo _____ or _____, they can form mountains in several ways.
- **Folded Mountains** form when rock layers are _____ together and pushed upward.
- **Fault-Block Mountains** form when large blocks of the Earth's crust _____ _____ relative to other blocks.
- **Volcanic Mountains** form when _____ rises to the Earth's surface and erupts.

Uplift and Subsidence

- _____ movements in the crust are divided into two types—uplift and subsidence.
- **Uplift** is the rising of regions of the Earth's crust to higher elevations.
- **Subsidence** is the _____ of regions of the Earth's crust to lower elevations.
- **Uplifting of Depressed Rocks** Uplift can occur when large areas of land rise without _____.
- One way areas rise without deforming is process known as _____. When the crust rebounds, it slowly springs back to its previous _____.
- **Subsidence of Cooler Rocks** Rocks that are hot take up more space than cooler rocks.
- The lithosphere is relatively _____ at mid-ocean ridges, but _____ as it moves farther from the ridge.
- As it cools, the oceanic lithosphere takes up less volume and the ocean floor _____.
- **Tectonic Letdown** Subsidence can also occur when the lithosphere becomes _____ in rift zones.
- A *rift zone* is a set of deep _____ that forms between two tectonic plates that are pulling away from each other.
- As tectonic plates pull apart, stress between the plates causes a series of _____ to form along the rift zone.