Chapter 8 Notes

Section 1

Objectives

- **Explain** where earthquakes take place.
- **Explain** what causes earthquakes.
- **Identify** three different types of faults that occur at plate boundaries.
- **Describe** how energy from earthquakes travels through the Earth.

What Are Earthquakes?

- **Earthquakes:** A violent _____ of the earth caused by the movement of rocks at a _____.
- **Seismology:** the study of earthquakes.
- **Seismologists:** the scientists who study earthquakes.

Where Do Earthquakes Occur?

- Most earthquakes take place near the edges of _____ _____.
- Tectonic plates move in different directions and at different speeds.
- A **fault** is a break in the Earth's _____ along which blocks of the crust slide relative to one another.
- Earthquakes occur along _____ because of this sliding.

What Causes Earthquakes?

- As tectonic plates move, _____ increases along faults near the plates' edges. In response to this stress, rock in the plates _____.
- **Deformation** is the change in the _____ of rock in response to the stress of bending, tilting, and breaking of the Earth's crust.
- Rock deforms in two ways.
    - Plastic
        - Deforms like modeling _____
        - No earthquakes
    - _____
        - Deforms like a _____ _____
        - Stretches till it breaks (elastic limit)
        - Earthquakes
- **Elastic rebound** is the sudden return of elastically deformed rock to its _____ shape. Elastic rebound occurs when more stress is applied to rock than the rock can withstand.
- During elastic rebound, _____ is released. Some of this energy travels as _____ _____, which cause an earthquake.

Faults at Tectonic Plate Boundaries

- A specific type of plate motion takes place at different tectonic plate _____.
- Each type of motion creates a particular kind of _____ that can produce earthquakes.
- **Transform motion** occurs where two plates slip past each other, creating _____ faults. Blocks of crust slide horizontally past each other.
- **Convergent motion** occurs where two plates push _____, creating _____ faults. Blocks of crust that are pushed together slide along reverse faults.
- **Divergent motion** occurs where two plates pull _____ from each other, creating _____ faults. Blocks of crust that are pulled away from each other slide along normal faults.
- **Earthquake Zones –** Places along tectonic plate boundaries where a _____ number of faults are located.
- Most _____ occur along earthquake zones.
- Not all faults are located at tectonic plate boundaries. Sometimes, earthquakes happen along faults in the _____ of tectonic plates.

How Do Earthquake Waves Travel?

- Waves of _____ that travel through the Earth away from an earthquake are called **seismic waves.**
- 2 Types:
  - **Surface waves** - Seismic waves that travel along the Earth's surface.
  - **Body Waves** – Seismic waves that travel through the earth's _____.
- Seismic waves that travel through Earth's interior are called body waves. There are two types of body waves: ____ waves and ____ waves.
- **P waves** (_____ waves, pressure waves)
  - Move rock in a back-and-forth direction
  - _____ seismic waves
- **S waves** (secondary waves)
  - Move rock in a side-to-side direction
  - Stretch the rock sideways
  - _____seismic waves
- Surface waves differ from body waves in several ways:
  - Move rock in the upper few km only.
  - Up and down motion (like water waves)
  - Travel more _____
  - More _____

Section 2

Objectives

- **Explain** how earthquakes are detected.
- **Describe** how to locate an earthquake's epicenter.
- **Explain** how the strength of an earthquake is measured.
- **Explain** how the intensity of an earthquake is measured..

Locating Earthquakes

- Scientists use _____ to study earthquakes.
- A **seismograph** is an instrument that records _____ in the ground and determines the _____ and _____ of an earthquake.
- When earthquake waves reach a seismograph, it creates a **seismogram**, a tracing of the earthquake's motion.
- **Determining Time and Location of Earthquakes** Seismograms are used to find an earthquake's _____.
- An **epicenter** is the point on the Earth's surface directly _____ an earthquake's starting point.
- A **focus** is the point _____ the Earth where an earthquake begins.
- An earthquake's epicenter is on the Earth's surface directly above the earthquake's focus.
- **The S-P Time Method** is perhaps the simplest method by which seismologists find an earthquake's epicenter.

Measuring Earthquake Strength and Intensity

- **The Richter Magnitude Scale** Throughout much of the 20th century, seismologists used a scale created by Charles Richter to measure the _____ of earthquakes.
- **Earthquake Ground Motion** A measure of the _____ of an earthquake is called _____. The Richter scale measures the ground motion from an earthquake and adjusts for distance to find its strength.
- **Modified Mercalli Intensity Scale** A measure of the degree to which an earthquake is felt by people and the damage it caused is called _____.
- Currently, seismologists use the Modified Mercalli Intensity Scale to measure earthquake intensity. This is a numerical scale that uses _____ numerals from I to XII to describe earthquake intensity levels.
- In the Modified Mercalli Intensity Scale, an intensity of I describes an earthquake that is not felt by most people. An intensity level of XII indicates total damage of an area.
- Because the effects of an earthquake vary based on location, any earthquake will have more than one intensity value. Intensity values usually are higher near the epicenter.

Section 3

Objectives

- **Explain** how earthquake-hazard level is determined.
- **Compare** methods of earthquake forecasting.
- **Describe** five ways to safeguard buildings against earthquakes.
- **Outline** earthquake safety procedures.

Earthquake Hazard

- Earthquake hazard is a measurement of how _____- an area is to have damaging earthquakes in the future.
- An area's earthquake-hazard level is determined by past and present _____ activity.
- The greater the seismic activity, the _____ the earthquake-hazard level.

Earthquake Forecasting

- Forecasting _____ and _____ earthquakes will occur and their strength is difficult.
- By studying areas of seismic activity, seismologists have discovered some _____ in earthquakes that allow them to make some general _____.
- **Strength and Frequency** Earthquakes vary in _____. The strength of earthquakes is related to how often they occur.
- Another method of forecasting an earthquake's strength, location, and frequency is the _____ hypothesis.
- **The gap hypothesis** is based on the idea that a major earthquake is more likely to occur along the part of an active fault where _____ have occurred for a certain period of time.
- An area along a fault where relatively few earth-quakes have occurred recently but where strong earthquakes have occurred in the _____ is called a **seismic gap**.
- **Using the Gap Hypothesis** Not all seismologists believe the gap hypothesis is an _____ method of forecasting earthquakes.
- But some seismologists think the gap hypothesis helped _____ the approximate location and strength of the 1989 Loma Prieta earthquake in California.

Earthquakes and Buildings

- Earthquakes can easily _____ buildings and destroy homes. Today, older structures in seismically active places, such as California, are being made more earthquake resistant.
- **Retrofitting** is the name given to the process of making _____ structures more earthquake resistant.
- A common way of retrofitting an older home is to securely _____ it to its foundation.
- _____ is often used to strengthen buildings and homes made of brick.

- **Earthquake-Resistant Buildings** A lot has been learned from building _____ during earthquakes.

- With this knowledge, architects and _____ use new technology to design and construct buildings and bridges to better withstand earthquakes.

Are You Prepared for an Earthquake?

- **Before the Shaking Starts**

- Place _____ objects on lower shelves so they do not fall during an earthquake.

- Find safe places within each room of your home and outside of your home.

- Make a _____ with others to meet in a safe place after the earthquake is over.

- **When the Shaking Starts** If you are indoors, crouch or lie face down under a table or desk.

- If you are outside, cover your _____ with your hands and lie face down away from _____, power lines, or trees.

- If you are in a car on an open road, you should stop the car and remain _____.

- **After the Shaking Stops**

- Remove yourself from immediate _____, such as downed power lines, broken glass, and fire hazards.

- Do not enter any damaged buildings unless you are told it is _____ by someone in authority.

- Beware that _____ may cause more damage.