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.