GLY1000 Exam 2 Terms/Notes/Concepts

Earthquakes: CH 10

Stress: force applied to rocks. Rocks release stress through motion if possible. If friction prevents this motion, deformation occurs. Pressure is a form of stress. There is tensional, compressional, shear stresses, depending on direction. Strain is a change in size, shape or volume of a material.

Elastic: strain is reversible. measure of an objects ability to change shape when a force is applied to it, and return to its original shape when the force on it is released.

Elastic limit is determined by:

- Temperature higher- becomes plastic
- Pressure: greater confining (pressure from all directions)- becomes plastic
- Time: slower stress is applied, becomes plastic

Plastic: plastic means that the shape of an object can be changed an additional amount beyond its elastic limit before it breaks; other times if the substance is brittle, it breaks at its elastic limit before any plastic deformation occurs. There is also elastic rebound, in which objects return to their original shape After they have been broken apart. During an earthquake, seismic waves are generated as a result of this type of rebound.

Deformation: process where rocks are folded, faulted, sheared or compressed by Earth stresses.

Temperature/pressure/time: leads to rock deformation. See above.

S-wave: (shear, secondary) These are body waves. As an s-wave propagates, it shears the the rock sideways at right angles to the direction of travel. S-waves will not travel through liquid. Much slower than P waves.

P-wave: (primary, pressure) these are body waves. Their motion is the same as that of a sound wave in that as it spreads out, it alternately pushes (compresses) and pulls the rock. These p waves are able to travel through both solid rock, such as granite, and liquid or flowing material such as volcanic magma.

**the distance between the p-wave and the s-wave on a seismograph determines how close to the epicenter the reading took place. (this was a clicker question). the shorter the distance, the closer to the epicenter the reading took place.

Body wave: a wave that travels beneath the surface of the earth.

Surface wave: a wave that travels through the surface of the earth.
Shear: shearing is something that happens when two plates from transform boundaries slide past each other.

Focus (or hypocenter): the place within the Earth where rock ruptures and slips causing earthquake waves. This occurs underground.

Epicenter: the point on the surface of the earth directly above the focus/hypocenter. geologists represent epicenters as dots on maps. dot size indicate magnitude of the earthquake.

Seismograph: A seismograph, or seismometer, is an instrument used to detect and record earthquakes.

Richter- American seismologist who developed a method for defining and measuring earthquake magnitude which came to be known as the Richter Scale. On the Richter Scale, magnitude is expressed in whole numbers and decimal fractions. For example, a magnitude 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3.

- Richter magnitudes are based on the maximum wave amplitude.
- Each step in the Richter scale is 10X the previous step.
- The amount of energy released increases approx. 30X for each step.

Amplitude: the size of the wiggles on an earthquake recording. more precisely, it is the size of a wave from crest to trough.

Magnitude: a number that indicates the side if an earthquake at a specified distance from the epicenter, determined by measuring the maximum amplitude of ground motion recorded by a seismograph. Use of a magnitude scale allows seismologists to define the size of an earthquake in a uniform way.

Energy: seismologists can calculates the energy release of an earthquake from equations that relate magnitude to energy. According to some researchers, a magnitude 6 earthquake releases about as much energy as the atomic bomb.

Lag time: aforementioned gap between p-wave and s-wave

Mercalli: system to define intensity of an earthquake by systematically assessing the damage that occurred. The modified Mercali Scale uses roman numerals from I (extremely low) to XII (extremely high). Whereas Richter scale is based on mathematics, the Mercalli Scale is a subjective assessment of perception and damage, not on a direct measurement with an instrument.

Intensity: refers to the effect or consequence of an earthquake's ground shaking at a locality on the Earth's surface.

Building failure: Most buildings are designed to support their own weight (vertical loads). Some attention is paid to lateral loads like the wind, but building design typically focuses on vertical loading. Depending on the direction of the slip during an earthquake, a building can experience too much lateral or vertical stress, resulting in structural damage or, at its worst, failure. However, it is usually too much lateral load that causes the most damage.

Masonry: consists of un-reinforced brick, or cement, and mortar. An earthquake will Push and Pull on the bricks and so it causes the bricks to crack.

Steel frame: more flexible and less easy to break, however if under enough pressure, steel reinforcement can warp, or even worse, melt with a hot enough temperature.

Wood: more flexible than concrete, however it can snap if under enough pressure and can catch fire much more easily than steel.

Substrate: Housing in very populated areas can be hard to find, so builders begin to build on compacted trash/landfill material. However, this material is not very reliable as a foundation and can break down when hit or shaken by a seismic wave. As a result, housing fails and often slides off the foundation, sometimes into water.

Resonance: happens when each new earthquake wave arrives at just the right time to add more energy to an earthquake system.

Fires: the shaking during an earthquake can make lamps, stoves, or candles with open flames tip over, and it may break wires or topple power lines, generating sparks. As a consequence, areas may be consumed by fire. This is especially dangerous to buildings with wooden structures.

Disease: earthquakes cut water and sewer lines, destroying clean water supplies and exposing the public to bacteria. They also damage routes and modes of transportation, preventing food and medical supplies from reaching the area. Cholera is a risk.

Exposure: when homes are destroyed, those who lived in them are forced to live elsewhere, often victim to exposure to the elements and disease.

Liquefaction: A process by which water-saturated sediment temporarily loses strength and acts as a fluid, like when you wiggle your toes in the wet sand near the water at the beach. This effect can be caused by earthquake shaking. ground shaking causes the sediment grains to try and settle together. however, because the spaces (pores) between grains are filled with water, water pressure in the pores increases and pushes the grains apart, and the sediment becomes fluid-like, sort of resembling quicksand. Buildings whose foundation lie in liquified material may sink or even tip over.

Landslides: the shaking of an earthquake can cause ground on steep slopes or ground underlain by weak sediment to give way. This movement results in a landslide, the tumbling and flow of soil and rock downslope.

Mudflow: When unstable soil experiences shaking, it can flow downhill. This often happens on unsecured soil located on slopes, earthquakes can shake the soil and cause it to loosen and rapidly move down the slope.

Tsunami: A tsunami is a sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, major submarine slides, or exploding volcanic island. They cause devastating damage to costal communities.

Seismic gap: A seismic gap is a section of a fault that has produced earthquakes in the past but is now quiet. For some seismic gaps, no earthquakes have been observed historically, but it is believed that the fault segment is capable of producing earthquakes on some other basis, such as plate-motion information or strain measurements.

- If earth movements that ultimately lead to earthquakes are steady and constant, then:-Active regions that have been seismically quiet or inactive for some time are probably building up excessive elastic strain. This could mean that these regions are potential locations for future earthquakes. The longer the time interval without seismic activity, the more elastic strain is being built up and therefore the larger the subsequent earthquake.