GLY1000
Test 2 Study Guide
Rheology/Deformation, Earthquakes, Interior of the Earth/Gravity and Magnetism, Tectonics

Some things to keep in mind:

- **Mafic**→ LOW in silica, HIGHER temperature, LESS viscous
- **Felsic**→ HIGH in silica, LOWER temperature, MORE viscous
- Water makes melting of rock easier

Rheology and Deformation:

-Stress: A force that produces deformation to a body. (dynes/sq. centimeter)

-Formula→ $\frac{Force}{Area}$

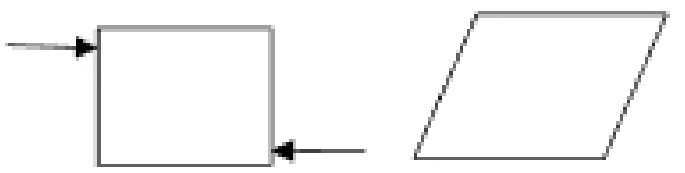
-**Tensional stress** involves forces pulling outwards ←○→

-**Compressional stress** involves forces pushing inwards (think: *compressing*) →○←

-Strain: The deformation that results from stress.

-Formula→ $\frac{\Delta L}{Lo}$ or $\frac{change \in length}{original\ length}$

-Shear Modulus μ: (also known as *Rigidity Modulus*) is derived from the equation $\frac{Stress}{Strain}$ or $\frac{F/A}{tan\theta}$



-Bulk Modulus β: measures incompressibility, derived from the equation $\frac{P_H}{\Delta V/V_o}$ or

$$\frac{hydrostatic\ pressure}{\frac{change \in volume}{original\ volume}}$$

Remember: the **HIGHER** the incompressibility, the **HIGHER** the Bulk Modulus

-Think of bulky items being harder to compress

- **Factors effecting the type of strain**:
  -whether solids are brittle or ductile depends on their temperature and strain rate
  -**brittle** at low temps and ***ductile*** at high temps

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-**brittle** under high strain rates and ***ductile*** under low strain rates

-**Types of Faults**:

-**Reverse (or thrust) Fault**→ the crust is under primary compressible stress with the following fault lines: ↘↖

-**Normal Fault**→the crust is under primary tensional stress with the following fault lines:↖↘

-**Strike Slip Fault**→ the crust is under primary shear stress. Fault lines on surface ↑↓

Earthquakes

-*To simplify what causes earthquakes*:

-Think of Earth's crust as a giant jig-saw puzzle, and the pieces of the puzzle representing tectonic plates. The edges of these "puzzle pieces" represent plate boundaries. These boundaries slowly move around and bump into each other. When a boundary with a fault gets stuck against another boundary, one keeps moving. When the two slip as a result of built up elastic strain energy, an earthquake forms.

-*Major hazards of earthquakes*:

*Insufficient city design of buildings and structures (ground shaking can cause these to crumble)

*Tsunamis=big threats, precautions could include concrete tsunami walls and alert systems

-*Why some great faults generate earthquakes along some segments of their lengths but not along others (San Andreas) +what can account for them:*

*Some sections that produce large-scale earthquakes remain somewhat dormant over hundreds of years until a great amount of elastic strain builds up while others produce more frequent, less intense earthquakes.

-*Distribution and depth*:

**Most earthquakes occur in*: linear belts and arcs

**How deep the foci are*: shallow (up to 70 km below surface), intermediate (70-300 km), or deep (300 km<)

-*Why they originate in lithosphere, but not in the asthenosphere:*

*Lithosphere= only moving, brittle layer of Earth. Asthenosphere is too hot, therefore more mafic (less rigid).

-*How earthquake depths associate with types of plate boundaries:*

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*Earthquakes vary based on what type of boundary they're formed. (convergent boundaries: subduction and collision)

-Collision: shallow, broad seismic activity

-Subduction: more complex, deeper

-*Factors that affect the level of damage caused by an earthquake:*

*Location, magnitude, depth, distance from the epicenter, geological conditions, construction

-*Liquefication of sediments during earthquakes:*

*Liquefication: process of loose soil acting like a liquid during an earthquake.

*Landslides can occur, more damage to buildings on unconsolidated sediments

-*Signs of impending earthquakes:*

-decrease of crustal seismic velocities

-swelling in local volume of crustal rocks (produces bulging/doming)

-ground-tilting

-increased emission of radon from the crust

-changes in the water level in wells

-changes in the activity of geysers

-Magnitude: amount of energy released. (on a numerical scale of 2-10. Difference in whole #= 30x)

-Magnitude can be determined w/ a seismometer by measuring P and S waves

-P-Wave: Compressional shock wave that vibrates in the same direction it travels. Travels faster than S-Wave. Velocity depends on elastic moduli and density of transmitting medium.

-S-Wave: Transverse wave/shear wave that vibrates perpendicular to direction it travels. Velocity depends of shear modulus and density of transmitting medium.

The Earth's Interior

Composition/Physical Characteristic of Layers of Earth: (in order from surface to core)