

GLY 1000 Exam 1 Study Guide

Chapter 1

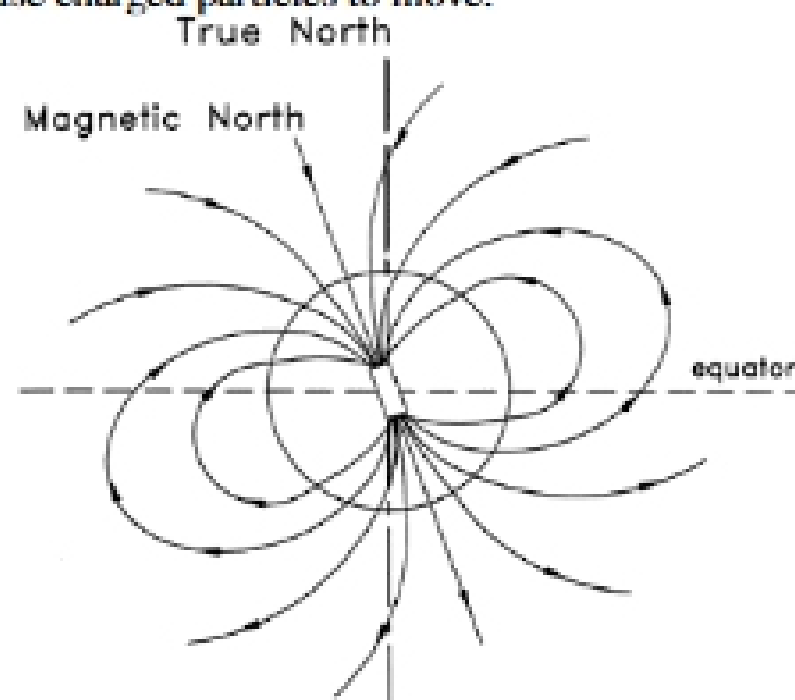
- Geocentric VS heliocentric Universe concepts
 - Geocentric
 - Ancient Greek idea
 - The sat motionless in the center of the universe while stars and other planets and the sun orbited around it.
 - Heliocentric
 - Proposed by a Greek philosopher around 250 BCE
 - All heavenly objects including the earth orbited the sun.
- Foucault's pendulum
 - Proves that earth spins on its axis
 - He set a heavy pendulum, attached to a long string, in motion. As the pendulum continued to swing, the plane in which it oscillated appeared to rotate around a vertical axis.
 - This is due to Newton's first law of motion
- The circumference of the earth
 - Calculated by Greek astronomer Eratosthenes
 - The sun's rays at noon are exactly perpendicular to the earth's surface at Syene, and since the earth is spherical, then the sun's rays could not simultaneously be perpendicular to the earth's surface at Alexandria.
 - Eratosthenes measured the shadow cast by a tower in Alexandria at noon.
 - $\frac{360}{x} = \frac{7.2}{5000 \text{ stradia}}$ so $x = 24421 \text{ miles}$, this is within 2% of today's accepted value of 24865 miles.
- Light years
 - The distance that light travels in one earth year
 - A light year is about 6 trillion miles.
- Doppler effect
 - The phenomenon in which the frequency of wave energy appears to change when a moving source of wave energy passes an observer.
- Red shift
 - The light of distant galaxies displayed red shifts relative to the light of nearby stars.
 - Red shifts must be a consequence of the Doppler effect- and thus that the distant galaxies are moving away from earth at an immense velocity.
 - But Hubble realized that the light from all distant galaxies exhibits a red shift, because they are all moving rapidly away from us.
- Forming the planets and the earth-moon system, page 26
 1. Nebular hypothesis
 - A nebula forms from hydrogen and helium left over from the big bang
 2. Gravity pulls gas and dust inward to form an accretionary disk, and then the proto-sun.
 3. "Dust" concentrates in the inner rings, while "ice" concentrates in the outer rings, then it become hot enough for a fusion reaction.
 4. Form planetesimal by colliding dust and ice.
 5. Planets form from planetesimals.
 6. Gravity reshapes the proto-earth into a sphere.
 7. After the earth forms a small planet collides with it, blasting debris that forms a ring around the earth.
 8. The moon forms from the debris.
 9. Atmosphere develops volcanic gases.
- Supernova VS normal star
 - Supernova
 - Short lived, very bright object in space that results from the cataclysmic explosion marking the death of a very large star; the explosion ejects large quantities of matter into space to form new nebulae.
 - Normal star

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- Inner VS outer planets
 - Inner planets
 - Terrestrial planets, earth-like
 - Mercury, Venus, earth, and mars
 - Consist of a shell of rock surrounding a core of iron alloys
 - Outer planets
 - Jovian planets, Jupiter-like
 - Gas-giant planets
 - Jupiter and Saturn have an elemental composition similar to the sun
 - Uranus and Neptune appear to consist predominantly of ice

Chapter 2

- Magnetic field is a region affected by the force emanating from a magnet, it grows progressively stronger as you approach the magnet and can cause charged particles to move.



- The solar wind interacts with the earth's magnetic field, distorting it into a huge teardrop pointing away from the sun.
- The magnetic field acts like a shield against the solar wind; the region inside the magnetic shield is called the magnetosphere.
- The Van Allen radiation belts, 10500 to 300 km from earth, consists of solar wind particles and cosmic rays that move fast enough that can penetrate the weaker outer part of the magnetic field and were then trapped by the stronger magnetic field closer to earth.
- Some charged particles interact with gas atoms in the upper atmosphere causing the gases to glow, this is the aurorae.
- Atmosphere
 - Earth
 - Nitrogen: 78%
 - Oxygen: 21%
 - Other: 1%, consisting of argon, carbon dioxide, neon, methane, ozone, carbon monoxide, and sulfur dioxide
 - Venus
 - Consist almost entirely of carbon dioxide
 - Mercury
 - Only a small trace of atmosphere, because of the planet's high temperatures the atmosphere escaped into space.
 - Mars
 - Thin atmosphere
 - Primarily carbon dioxide
 - Humans cannot live for long at elevations greater than about 4.5-5.5 km, they would die of suffocation.
- Land and oceans

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- Land: 30%
- Surface water: 70%
- The hypsometric curve plots the surface elevation with the percentage of the earth's surface. About 5% of earth's surface lies above 2km.
 - Most land lies less than 1km above sea level, but the tallest mountain reaches 8.85km.
 - Most sea floor lies 4 to 5km below sea level, the deepest point reaches 11km.
- Earth's composition
 - Iron: 35%
 - Oxygen: 30%
 - Silicon: 15%
 - Magnesium: 10%
 - The remaining 10% is the other 88 naturally occurring elements.
 - Categories of earth materials
 - Organic chemicals: carbon-containing compounds
 - Minerals: a solid substance in which atoms are arranged in an orderly pattern
 - Glasses: a solid in which atoms are not arranged in an orderly pattern
 - Rocks: aggregates of mineral crystals and grains and masses of natural glass
 - Igneous: hot molten rock cools and freezes
 - Sedimentary: grains from preexisting rocks become cemented together
 - Metamorphic: undergo changes in response to heat and pressure
 - Metals: solids composed of metal atoms
 - Alloy is a mixture containing more than one type of metal atom
 - Melts: solid materials become hot and transform into liquid
 - Volatiles: materials that are easily transformed into gas
- Earth's layers
 - Crust
 - Oceanic crust
 - Continental crust
 - Moho: crust mantle boundary, discovery based on that the velocity of earthquake waves suddenly increased at a depth of about 50km, this increase is caused by an abrupt change in the property of rock.
 - Approximately 0.1 to 1.0% of the earth's radius is the crust.
 - Mantle
 - Upper mantle
 - Transition zone
 - Lower mantle
 - Core
 - Liquid outer core
 - Solid inner core
- Earthquakes
 - Ground shaking due to the sudden breaking of rocks in the earth.
 - Earthquake waves are vibrations, they are seismic waves, and they travel at different velocities through different materials.
- Pressure and temperature inside the earth
 - Pressure and temperature increase with depth in the earth.
 - Geothermal gradient is the rate of change in temperature with depth.
- Lithosphere VS asthenosphere
 - Lithosphere
 - Consist of crust and the uppermost part of the mantle