Physic CP Semester 2 Study Sheet - End of Course Final

(Exam that covers Chapters 13-30)

Behavior of Waves

Waves transfer energy not matter

- Know the difference between compressional and transverse waves
- Mechanical waves need matter and can be compressional or transverse
- Transverse waves have a crest, trough, and wavelength is crest to crest or trough to trough
- Compressional wave has rarefactions and compressions, wavelength is measured between like parts
- Know the terms wavelength, frequency, period, amplitude, resonance, positive and negative interference
- Waves velocity = frequency time x wavelength size
- Angle of incidence = angle of reflection

Sound Waves

- Sound is a compressional wave
- Sound travels fastest through solids, slower through gas
- Know the terms Intensity (energy), pitch (higher=faster frequency), Doppler effect (train passing)
- Sonar is sound waves, reflected
- Ultrasound is used for nonintrusive body imaging (seeing a baby)

Electromagnetic Waves

- Know the Difference between AM and FM frequencies
- Know the different wavelengths in order of size : Radio, infrared, visible, UV X-Rays and Gamma rays

<u>Light</u>

- Light is absorbed, transmitted or reflected by matter.
- Reflected (reversed) light waves obey the Law of Reflection (angle of incidence = angle of reflection)
- Refracted (bent) light waves are passing through different materials
- Know the difference between incandescent (old-fashioned), fluorescent, neon and laser lights.

Mirrors and Lens

- Concave mirrors magnify objects, Convex mirror reduce the image.
- Convex lenses form real and virtual images
- Concave lenses form virtual upright images
- Refracting Telescopes use convex lenses to see in the distance, reflecting telescopes use concave lenses and mirrors
- Microscopes use convex lenses to magnify
- Cameras use lenses that invert and reduce size

Physical and Chemical Properties

- Know the terms: Elements, Compounds, heterogeneous, homogeneous, solution and mixture and an example of each.
- Identify the Physical Characteristics of material (and that they don't change the identity as they change) Ex: color, state, densities, boiling/melting points
- Identify Chemical Properties of materials and that chemical changes form new substances. Ex: rust, burning, forming a new substance
- The Law of Conservation of Mass states, matter is never created or destroyed, it just changes.

States of Matter and Gas Laws

- Know the 4 states of matter: Solid, liquid, gas and plasma
- Remember Kinetic Energy is movement, and all atomic particles are moving, transferring energy through collisions, heat (expanding) and cool (contracts)
- Know how to apply Archimedes' Principle: Every molecule has a buoyant force equal to the weight displaced when dropped in water.
- Know how to use Pascal's Principle: Pressure on a fluid is evenly disbursed
- Know Bernoulli's Principle: Pressure on a fluid decreases as velocity increases
- Remember that Gas pressure is colliding atoms in a container
- Know Charles' Law: Volume of a gas increases as temperature increases
- Know Boyle's Law: Volume of a gas decreases as pressure increases

Atomic Structure

- Understand the structure of an atom, including it parts: protons, neutrons, electrons
- There are 6 quarks: up, down, charmed, strange, bottom and top
- Protons are made of 2 up, 1 down quarks, neutrons from 2 down, 1 up quarks
- A Proton has 1 amu mass, a neutron has 1 amu mass. Know how to calculate the approximate mass of an atom, adding up protons and neutrons.
- Learn to read the Periodic Table with an introductory understanding of rows (across) and columns (up/down) and metals, metalloids, and nonmetals.

Radioactivity and Nuclear Physics

- How does the ratio of protons to neutrons determine an atom's stability?
- Who discovered Radioactivity? When? How?
- How is radioactivity detected? (What does a Geiger counter detect?)

- Unstable nuclei emit 3 types of decaying particles: Alpha (α), beta (β) and Gamma (γ) particles
- What are the properties of the types of decaying particles?
- What is the difference between nuclear fusion and fisson? Which is on the Sun?

Elements

- Properties of metals: malleable, ductile, hard, shiny. How does that affect a metal's conductivity?
- Properties of nonmetals: brittle, dull and poor conductors of electricity.
- Know the properties and crystalline forms of carbon: graphite, diamond and Buckminster-fullerene

Particle Physics

- What are Protons made of? Neutrons? 6 types of Quarks?
- What are the new particles? What are the Anti-particles?

String Theory

- Know Newton's Laws of Motion.
- Explain the Theories of Special and General Relativity.
- What is Quantum Physics and String Theory?