

Final Review Sheet

Here are some things you'll want to be able to do or understand for the final exam.

Electricity and Magnetism

Electrostatics

- What is the electromagnetic force? What objects are affected by it? What variables affect its strength? What direction does it act? Be able to use "Colomb's Law".
- What causes electric fields? What happens to objects in electric fields? Be able to distinguish between "source" and "test" charges and apply appropriate formulae.

Electrodynamics

- What is the difference between current, voltage, and power?
- What are the components of a circuit, and what is the function of each? What is the difference between series and parallel circuits
- Be able to calculate V, I, R, and P for series and parallel circuits.

Magnetism

- What is the relationship between magnetism and electricity? How do you make a permanent magnet? How do you make an electromagnet?
- Be able to calculate the magnetic force of a moving charged object or a current-carrying wire in an external magnetic field.
- Use the right hand rule to find the direction of a magnetic field around a current-carrying wire, and to find the direction of force on a charged object or wire in an external magnetic field.

Waves and Optics

Wave Properties

- What is the difference between wavelength, frequency, period, velocity, and amplitude?
- Be able to explain and apply the wave equation.
- Apply the superposition principle and explain how it is used to create resonance.
- Be able to classify waves as mechanical, transverse, and longitudinal, and explain the differences between these types.

Sound and Light

- What are the similarities / differences between sound and light?
- How do the wave properties above apply to sound and light?
- Roughly, how fast do these waves move, and how do they get through space?
- How do humans sense these waves?
- What are the Doppler effect and polarization?

Optics

- What happens to a light wave when it enters a new medium?
- Be able to calculate relevant variables and draw accurate ray diagrams.

Thermodynamics

- What is the difference between thermal energy, heat, work, and temperature? What is a system?

- Be able to use the first law of thermodynamics and understand the sign conventions for all variables.
- Be able to solve specific heat problems.
- What happens to the atoms of an object as it is heated or cooled?
- How does a heat engine work? What determines the efficiency of an engine?
- How does conservation of energy apply in thermodynamics?
- What is entropy? What are some examples of systems that are increasing or “decreasing” in entropy.