

Get ready for the final exam

Re-doing the homeworks is a great way to study for the final exam. When you do so, put the text and all the resources (other than a cheat sheet) away and work through the problems “from scratch”: read the problems, visualize, think of the concepts involved; set the problem (what is given and what you need to find) and then use the appropriate equations. **Important:** Write the equations in symbolic form, do not start with calculations and numbers right away!

If you are not able to solve the problems without help from resources (except the provided formula sheets), this means you are not ready for the exam. Important: Do not memorize the problems. You need to recognize the concepts involved in each problem. Focus on understanding the concepts—this will allow you to solve 100 other similar problems.

- Re-do exams 1, 2 and 3, as well as the practice problems we did in preparation for the exams.
- Re-do recitation problems.
- Make sure you go over all quizzes and are able to answer correctly each question! Same for the mastering physics homeworks.

No cheat-sheet

You should print the formula sheets that are posted on the website.

Content covered

Waves and Optics

- Types of waves.
- Properties of waves (superposition, propagation, wavelength, frequency, wave number, angular frequency, phase, wave speed, wave speed in different media, period, ...)
Source properties vs medium properties;
Sinusoidal waves (equation).
- Interference.
- Diffraction.
- Reflection and refraction (Snell’s Law, Law of Reflection, Total Internal Reflection, Critical angle).

Electricity

- Properties of electric charges.
- Properties of conductors and insulators.
- Sources of electric field (electric potential).
- Electric field lines, electric field vectors, equipotential lines, and their relation.

- How do charges move in electric field (+ and - charges)?
- Electric field of point charges.
- Electric field of continuous charge distributions (rod, infinite line, ring, plane, cylinder).
- Electric Forces.
- Polarization Force.
- Coulomb's Law.
- Conservation of charge.
- Conservation of energy.
- Electric Flux.
- Gauss's Law!
- Know how to derive \vec{E} of a point charge, line charge, and uniformly charged plane using Gauss's Law!
- Current and current density.
- Conductivity and resistivity.
- Ohm's Law.
- Kirchhoff's Laws.
- Circuits (R-circuits, C-circuits, and RC-circuits).

Magnetism

- Sources for magnetic field.
- Properties of magnets.
- Magnetic field lines.
- Magnetic Flux.
- Ampere's Law!
- Magnetic Forces.
- Electromagnetic Induction
Lenz's Law;
Faraday's Law;
RHR for current;
Cross product.