

General Study Tips

1. Start by looking at your first five exams, and seeing what you got wrong and why. Think how you could have solved the problems correctly. Were you missing a basic concept, or not understanding some definition, or lost in algebra? Did you write down the formulas being applied, **before** doing calculations and inserting numbers? Did you forget to make some important conversion of units in the middle of the calculation? Did you get an answer with the correct units? Did you round off to the correct number of significant figures?
2. You might look up some old tests online and see if you can solve them. It may even be useful to read some of the problems quickly, and just imagine how you would try to answer them, without going through all the details. If you are pretty sure you know how to do one, then go on to another one until you find the ones that give you a greater challenge.
3. Review the extra credit iclicker questions we did in class, posted at www.phys.ksu.edu/personal/wysin/gpll/Term_Summary.html. Especially see if you can now work out the ones you missed.
4. Check out the list of Concepts to Review and Equation Highlights on the following page. For each concept listed, check your memory, do you have a good idea what it means? If so, then go on to another one until you find the ones that you don't know, then research those in the appropriate chapters of the textbook. Do the same for the listed equations, if you can't remember the situations in which you would apply them.
5. Check your old homework solutions, especially the ones on the Self-Study Review Assignment. Also make sure you now know how to do any other examples that gave you difficulty during the semester. Try to do the new suggested problems that are marked there in **bold**. Ask your friends or tutor for help if you still can't figure them out, but don't do this until you try to find the answers on your own. You want to develop the confidence that you can figure things out for yourself on the exam.

Doing the Final Exam

For full credit, remember to show the formulas you use, a diagram if it is appropriate, the essential calculation steps, and then finally, put in numbers with correct units, and give answers with correct units. If you are stuck, at least try to write down one idea or concept that is relevant. Or write a formula that is relevant. Make your work organized. Don't write a lot of stuff unrelated to the problem. You are trying to show the graders that you know what you are doing.

| Ch. | Concepts to Review | Eqn. Highlights |
|-----|---|---|
| 16 | Electrostatics: electric field and lines, charge, force, vector addition | $E = \frac{kQ}{r^2}$ $\vec{F} = q\vec{E}$ |
| 17 | Electric potential: voltage, work, energy, eV, capacitance | $W = q\Delta V$ $Q = CV$ |
| 18 | Electric current: resistance, resistivity, power, AC rms averages, Ohm's Law | $V = IR$ $P = IV$ |
| 19 | DC circuits: parallel, series, equivalent R or C, Kirchoff's rules | $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$ $\sum_{loop} \Delta V = 0$ |
| 20 | Magnetic field: lines, forces, B due to long wires, right hand rule | $\vec{F} = q\vec{v} \times \vec{B}$ $B = \mu_0 I / 2\pi r$ |
| 21 | EM induction: emf, magnetic flux, Lenz' Law, reactance, impedance, RLC circuit, resonance | $\mathcal{E} = -N \frac{\Delta\Phi_B}{\Delta t}$ $\omega_0 = 2\pi f_0 = \frac{1}{\sqrt{LC}}$ $X_L = \omega L, X_C = 1/\omega C$ |
| 22 | EM waves: speed of light c , wavelength, frequency, intensity, EM spectrum | $\frac{E}{B} = c = f\lambda$ $I = \frac{P}{A} = \frac{1}{2}\epsilon_0 E_0^2 c$ |
| 23 | Ray optics: reflection, refraction, Snell's Law, focus, ray diagrams, image formation, position, orientation, real/virtual, magnification, diopters | $n_1 \sin \theta_1 = n_2 \sin \theta_2$ $\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$ $m = \frac{-d_i}{d_o} = \frac{h_i}{h_o}$ |
| 24 | Wave optics: interference, diffraction, single & double slits, maxima, minima, diffraction grating, spectral orders, thin film interference, polarization | $d \sin \theta = m\lambda$ $D \sin \theta = m\lambda$ $I = I_0 \cos^2 \theta$ |
| 25 | Optical: f-stop, near- & far-sighted, near pt., far pt., angular magnification | $M = \frac{\theta'}{\theta} = \frac{NP}{d_o}$ |
| 27 | Quanta: photons, photoelectrons, work function, energy levels, spectral lines, bohr model, emission, absorption, ionization | $E = hf = \frac{hc}{\lambda}$ $E = -13.6 \text{ eV} \frac{Z^2}{n^2}$ $hf = W_0 + KE_{max}$ |
| 28 | Quantum Mechanics: uncertainty principle, probability, matter waves, quantum numbers, electron configuration, periodic table | $\Delta x \Delta p \geq \hbar$ $\Delta E \Delta t \geq \hbar$ (n, l, m_l, m_s) |
| 30 | Nuclear Physics: nucleons, binding energy, mass number A , atomic number Z , isotope, radioactive decays ($\alpha\beta\gamma$), activity, half-life, radio dating | $N = N_0 e^{-\lambda t}$ $\lambda = \ln(2)/T_{1/2}$ $\frac{\Delta N}{\Delta t} = -N\lambda$ |
| 31 | Nuclear Energy: transmutation, reaction energy Q , fission, fusion, neutrons, uranium enrichment, nuclear power plant | $Q = \Delta M c^2$ $A = Z + N$ |

Self-study Review Assignment (not to be handed in or graded)
 New questions/problems are in **bold** with answers in brackets.

| Ch. | Figures | Questions | Problems |
|-----|--------------|---------------|--|
| 16 | 16-31 | Q6, 17 | P16, 28, 67, 32 [0.265 nC] |
| 17 | 17-1 | Q4, 7 | P8, 21, 76, 64 [94 nC], 72 [1.55 J] |
| 18 | 18-22 | Q5, 12 | P11, 39 [7500 W], 46, 58 |
| 19 | 19-12 | Q4, 15 | P17, 27, 84, 26 [$V_{ab} = 0$ V] P85 [7.6 Ω , 0.33 A, 0.33 A, 0.95 W] |
| 20 | 20-11, 20-19 | Q9, 10 | P11, 41, 72 [4.1 cm], 78 [$\frac{2\mu_0 I_0}{\pi l}$] |
| 21 | 21-2, 21-32 | Q3, 4 | P4, 15, 65, 70 P80 [46 mA, L to R thru R] |
| 22 | 22-8 | Q1, 7 | P30, 34, 48 |
| 23 | 23-13 | Q5, 13 | P21, 50, 83 [106.4 mm, 2.7 m] |
| 24 | 24-26 | Q6, 18 | P18, 30, 57 P66 [(21.5°, 47.2°); (10.6°, 33.4°, 66.6°)] |
| 25 | 25-10 | Q1, 6 | P7, 12, 19, 20 [FP=1.00 m, NP=16.7 cm] |
| 27 | 27-27 | Q15, 18 | P20, 56 [yes, 1 \rightarrow 3], 76, 80 |
| 28 | 28-10 | Q2, 16 | P10, 18, 42, 8 [1.3×10^{-54} kg] |
| 30 | 30-10, 30-11 | Q11, 14 | P18, 37, 68 [4.6×10^{15} /s, 12400/s] |
| 31 | 31-2, 31-11 | Q4, 22 | P20, 31, 34 [1.12 GJ] |