

Contemporary Physics I – Midterm Prep Sheet

Midterm Prep Sheet

General Guidelines

Your midterm exam will be held on Oct. 30, 2006 in class. I will hand out the exam at precisely noon, so if you are late, you will have less time to work.

The exam will be closed book. However, you will be given a fresh copy of the accompanying equation sheet.

You are required to bring a calculator.

I shouldn't have to say this, but you may not use cell phones or any other transmitting/receiving device during the exam.

The exam will consist of 2 or 3 long-ish problems generally similar in style to those on your homeworks. Obviously, you should be able to do calculations. Be aware, however, that we may also ask questions which require a descriptive sentence or two.

The material on the exam will include that discussed in class up to (and including) Monday, Oct. 23. This will include material in your textbook from Chapters 1-4.4 (inclusive).

Note, also, that I spent considerable time on certain topics in class which are glossed over in your textbook. If I talked about it at length and gave you a homework problem or recitation assignment which discusses it, I clearly think it's important and you should know it.

As a reminder, we have discussed the following topics in great depth:

1. Fundamental Composition of Matter – Leptons, Baryons, quarks, mediator particles. Fundamental properties, composition, charge, and scales.
2. The Concept of Conservation Laws, why they're important, and which one's we've seen so far.
3. Newton's Laws of Motion – including the definition of momentum in relativistic form.
4. The 4 Fundamental Forces. Know them in ranked order, and be able to qualitatively describe which particles/scales they act on. You should also know Gravity and E&M in a little more detail.

Quick question: The neutrino is the signature particle of what force?

5. Gravity – Including the superposition principle, gravity near the surface of the earth, and the solution of a body in a circular orbit. You should definitely be able to solve for projectile motion.
6. Net forces – In simple systems, you should be able to vectorially add forces and compute the net forces (and accelerations) of particles.
7. Springs – Conceptually you should understand their relation to molecules and solids, but you should also know Hooke's law, and understand the oscillating properties of springs (and oscillations of pendulums, for that matter). You should also understand the relation between potential and kinetic energy in springs.

8. Young's Modulus & Pressure – You should understand the relation between the spring model of solids and compression in macroscopic solids. You should also understand the concept of pressure and be able to use it to relate force and surface area.
9. Work – What happens when you push a particle over some distance? How much work will you do? What work does the particle do on you? What happens if the force and displacement don't line up with one another?
10. Kinetic, Potential, and Relativistic Energy – Know what forms energy can take. Understand how energy can be converted from one form to another. What is the potential energy of different systems? What are the relativistic limits of a fast moving particle?

Not all of these topics will be asked (of course), but if you understand them all well you should do well on the exam.

Note: if your favorite topic doesn't show up on the midterm, remember, there's always the final!