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NOTES TO THE STUDENT

ABOUT THE TEXT:

1.) In its original form, the Honors Physics course used Volume I of Physics With Calculus (i.e., the Calculus driven, C-level AP physics text the AP physics class used to use) for the first semester. The non-Calculus text used for the second semester was written specifically for the course and was titled simply Honors Physics.

The book for the new Honors course, cleverly and redundantly titled Honors Physics, is relatively Calculus free. That is to say, there are places in which Calculus is used, but you won't be required to analyze situations on tests in which Calculus is required.

The first semester's chapters cover a bit of Cosmology, standard Classical Mechanics, Wave Mechanics and Relativity. This is a lot of material, but as long as you don't get wimpy on me and start demanding sleep during the week, we should be able to engulf it all.

The second semester will cover electricity, magnetism, electronics, and some robotics.

2.) This text is designed to be a *reference source*. It is very much like an expanded set of class notes. That is, there is little within the text that will not be discussed in class, and there is little that will be discussed in class that is not covered by the text. Put another way, if you are an *ear-learner* and absorb material by listening to lectures, you may successfully complete this class without ever opening the book (though I wouldn't suggest trying it). If you are an *eye-learner* and learn through reading, this book will do it all for you. In either case, the text was written specifically for your use and convenience.

3.) On the assumption that complex ideas are more easily absorbed when presented in chunks, this text has been written in an *outline format*.

4.) There are anywhere from fifteen to twenty-five *conceptual questions* and ten to fifteen hard core *problems* at the end of each chapter. These are all designed to make you *think about the ideas being presented*. You will not, in general, turn any of them in for a grade. In fact, full blown solutions to all of the questions and problems are found at the end of the text (or, possibly, in a separate manual if the text is deemed too big for one hardbound cover).

Nevertheless, your goal is to understand the material so completely that you can answer the questions and take apart the problems *on your own*, which is to say, *without the use of your book, your friends, or the chapter-end solutions*. If you can do this, you will be succeeding toward the goal of this class.

Warning: I reiterate. I WOULD STRONGLY SUGGEST THAT YOU **DO NOT** LOOK AT A GIVEN PROBLEM, THINK ABOUT IT FOR FIFTEEN SECONDS, THEN GIVE UP AND LOOK AT MY SOLUTION AT THE BACK OF THE BOOK (or in the separate manual). You only have a few problems with which to play. Treat those problems like test problems. When you are ready, try to do them under test conditions. That is, see how far you can get cold without looking back in the *chapter* for help (you can't use your book on tests--if the problems are supposed to be like test problems, treat them so). If you are absolutely clueless about a particular problem, talk to me or a friend about it. You should use the end-of-text solutions *only* as a LAST RESORT.

ABOUT THE CLASS:

1.) Grades:

a.) You may expect from 4 to 6 tests per quarter (a test every one-to-two weeks). Tests will make up approximately 75% of your grade.

b.) Labs will make up approximately 25% of your grade. Labs will be held on one of two days during the week. More will be said about them later.

c.) Homework assignments will occasionally be given. That does not mean you have nothing to do on nights when homework is not formally assigned. You are big people now. A year from now you will be roaming the college of your choice completely footloose and fancy-free. It is time for you to begin to develop study habits that will allow you to take responsibility for your education, not to mention dealing with all of that freedom, without going glug-glug in the process.

For those of you who feel naked without some kind of assignment guidance for those off nights, I will put together a calendar of sorts from which you can plan. The very loose calendar will be found on the class's Web site.

Minor note: Do a little every night. Cramming will take you nowhere except down. Tests are cumulative.

d.) You will, in all probability, have a multiple choice, thirty second quiz at the beginning of each class. The material on each quiz will come either from the previous night's homework or from the material that was covered on the previous day. These quizzes are not designed to be stressful, but they will have a small bearing on your grade.

e.) You will have occasional speed tests during the year. These are, hard as this is going to be to believe, very fun. More about that later.

f.) There will be extra credit possibilities sprinkled throughout the year.

2.) Assignment deadlines:

a.) Deadline extensions will be generally frowned upon unless unusual, extenuating circumstances dictate leniency in the policy.

b.) Having made the above statement, let me add a human touch to the pronouncement. I realize you will have a lot of things to do over the course of the year--much more than you probably realize considering the added burden of college applications, etc. I have been dealing with seniors for over twenty-eight years and know there will be times when things get tight.

Requiring you to get things in on time is not my way of making your life miserable. I am trying to get you to think more about the way you study. You will know *exactly* when each lab is due (we will decide on a fixed day--it will be approximately one week after the completion of a given lab) and tests will be announced with at least *one weekend* between the test and the announcement (usually about a week in advance). If you are being conscientious, you should be able to adjust your study schedule to accommodate those deadlines.

I want all of my students to take their tests on the same day during the same period, but IF YOU HAVE AN UNFORESEEN PROBLEM, DON'T BE BASHFUL ABOUT COMING TO TALK TO ME. Although I won't make a habit of it, I am not averse to giving a deserving student a break if there is a good reason to do so.

c.) *Legitimate* absence (i.e. for sickness) is automatically grounds for an extension, but God help you if I find your "sickness" was intimately related to your need to write a paper for another class.

3.) Cheating: The following will be discussed during our first few class periods:

- a.) Cheating on labs;
- b.) Cheating on tests;
- c.) Cheating on homework;
- d.) Cheating on make-up tests.

4.) Final exam: There will be a final exam at the end of the first semester AND at the end of the second semester (just before you leave for senior projects). Both will be cumulative.

5.) Dropping the class: You may drop the class *without* teacher approval within the first three weeks of the first quarter. You may drop the class *with* teacher approval up until the end of the first quarter (in rare cases, people have dropped all the way up to Christmas, but the administration does not like to grant such drops unless absolutely necessary).

Parting Shot:

Physics is not for the intellectually timid. Why? Because it is not a *memory driven* endeavor, it is a *thinking* endeavor.

To get a feel for what this means, consider the following example.

According to Newton's First Law, (in an inertial frame of reference) an object in motion will stay in motion in a straight line with a constant velocity unless impinged upon by a force.

So you're walking down the street with a constant velocity. You hold a ball next to your body as you go. You release the ball and it falls. When the ball hits the ground, does it hit *behind you*, *next to you*, or *ahead of you*?

The temptation is to jump at the problem and conclude that the ball will land *behind you*. After all, if you throw a piece of wadded up paper out a moving car window, the wad lands behind the car.

If you so think, it is probably that what you've done in your analysis is to attempt to parallel the problem with something familiar in life. It's a kind of pattern recognition process that is linked to memory.

The difficulty here is that that conclusion is wrong!

Think about it from the perspective of Newton's First Law.

1.) Before the ball drops, you and the ball are one. Consequence? When you let the ball go, its initial velocity will be *your* velocity. It will be moving in the horizontal with that velocity. It will not be moving in the vertical.

2.) As the ball drops, there will be no appreciable forces acting on it *in the direction you are walking* (i.e., in the horizontal direction). Indeed, air friction will act, but its effect will be so small you won't notice it. Gravity will act, but its effect will only be in the vertical (i.e., gravity is what makes the ball pick up speed falling *down*). Consequence: As there appear to be no horizontal forces acting, the ball's horizontal velocity *should not change*. That's what Newton's First Law says; no force in a particular direction means no change in velocity in that direction.

3.) If *your* velocity magnitude *in the horizontal* doesn't change (i.e., you just keep walking), and if the ball's velocity magnitude *in the horizontal* doesn't change (i.e., it doesn't slow down or speed up in the horizontal because there is no force to make it do either of those things), you and the ball should still be side by side when the ball strikes the ground.

Written out, the thinking that drew us to the right conclusion seems cumbersome. But if you had done it in your head, it would have taken only seconds.

The point is that what often makes physics classes hard is not the math, it is the *thinking on your feet* you have to do to get to the math.

Bottom line:

Physics can be a bit of a challenge, but it can also be a lot of fun if you get the knack of it. My job is to make it enjoyable while teaching you the fundamentals of the subject. If I do my job well and you are at all open-minded, the two of us should be able to make the class palatable, enlightening, maybe even a bit amusing while delving into the rigor of it all. This book is the first step. Use it well.

