PH201 Reading Week1

Book Introduction

Familiarize yourself with our textbook. I will post chapter reading guides to prepare you for class. We will not have time to discuss every detail of the course content in class. We will focus on the most important issues, and the issues that have been proven to be most difficult for physics students. Students who use the book regularly, who stay on top of reading, who answer the reading questions, who answer all or most of the conceptual questions at the end of each chapter, and obviously who do the homework and actively participate in class are successful in this class.

Start with reading the "Preface to the Student". It is important to understand that every learning process is based on your practice, your commitment to struggle, your willingness to learn from your mistakes. Physics is not any different than learning baseball, tennis or the violin. Nobody is born knowing how to do it … some people start earlier, some later, and some never do)-: Science is one of the pillars of modern society, and so every citizen who will need to make informed decisions about their lives will need to understand the basic principles of nature that we will discuss in this class. I hope you will enjoy the path!

What are the roots of the principles discussed in your physics class? Who invented them?

Physics is focused more on discovering _____ that exist between facts and _____ that exist in nature than on learning facts for their own sake (we will need a few facts though).

How often does Randy Knight recommend reading the textbook passages for a chapter we discuss? What do you focus on during each reading?

When should you use the workbook that accompanies the book?

Where do you find the answers to the conceptual questions in the book?

When do you answer the "Stop to think" questions? Where do you find the answers?

What is the difference between Problems and General Problems given at the end of each chapter? When should you do more exercises, when should you do more problems than the ones your instructor has assigned? Why does the instructor assign just the bare minimum of exercises and problems?

Where do you find the answers to the Problems at the end of each chapter?

Chapter 1 and Chapter 3.1 – 3.3

For the week in class you need to read chapter 1 "Representing Motion", and chapter 3.1-3.3 (vector review).

We will start right away with one of the most important concepts we will use in this course: You will learn that solving a physics problem often is made possible or made much easier by choosing suitable **representations** of the problem. In chapters 1 - 3 you will learn about 3 key representations:

1) A picture (yes, scientists draw lots of pictures to visualize and communicate problems),
2) A motion diagram

Using representations is an art that needs to be learned through practice. You will see lots of senior scientists working with many representations while trying to grasp and understand a real world problem. Students often misunderstand physics as plugging some number into an equation. This is far from the reality. Actually the most important part of solving a problem is often the assessment of the problem, formulating the problem in your own words, making valid assumptions and approximations, deriving a precise description of the problem (using a mathematical language), then plugging in the numbers given to the problem, and finally evaluating if the solution is reasonable. Remember in the real world you will need to solve problems where the solutions are not listed in the back of any book – so you need to somehow convince yourself and others that your solution is correct.

You will review or learn international units, prefixes and review significant figures.

Student Learning Objectives

In covering the material of this chapter, students will learn to

- Understand and use the basic ideas of the particle model.
- Analyze the motion of an object by using motion diagrams as a tool.
- Describe motion using the concepts of position, velocity, and acceleration.
- Be able to express quantities with the correct units and significant figures, as well as the ability to use scientific notation.
- Gain initial experience with displacement and velocity vectors and feel comfortable with the graphical addition of vectors.
- Begin learning to analyze problem statements and to translate the information into other representations.

Some questions that successful students can answer after reading the text

1. What does the distance of two neighboring dots in a motion diagram represent?
2. How can you "see" when velocity is changing in a motion diagram?
3. What is a coordinate system?
4. What is the difference between velocity and speed? Are they different?
5. What is the equation that describes the location of an object moving at a constant speed?
6. How is this equation related to the x,t plot?
7. What is uniform motion?
8. What is the SI unit for length and mass?
9. How tall are you in SI units with a) one significant figure L =
   b) three significant figures L =
10. What is your mass in SI units with a) one significant figure M =
    b) three significant figures M =
11. Can you calculate the components of a vector? What do you need to know before you do so?
12. How are a vector's components related to its magnitude?
13. How do you graphically add two vectors?