PH201 Reading Week 3

Chapter 3: Vectors and motions in 2D

Right in the first week in class, I asked you to start reading chapter 3. One of the reasons being that the first three sections have some great vector analysis review, and you will discover (and are hopefully already discovering) how important vectors are in understanding physics the further we get into the course. This chapter also takes what you learn in chapter 2 and extends it to two dimensions. Here is where you will learn about projectile motion, and you will get to experience this in the lab as well. Don't forget to use the intuition that you developed in the previous weeks.

Student Learning Objectives

- To be able to work with vectors, coordinate systems and components of vectors.
- To be able to analyze a motion diagram in two dimensions and to compute the direction of acceleration.
- To use vectors to understand, solve and analyze concepts and problems involving motion on a ramp.
- To use vectors to illustrate and solve relative motion problems.
- To solve projectile motion problems, utilizing your ability to break down motion vectors into perpendicular components.
- Understand why there is acceleration with circular motion, and to solve uniform circular motion kinematic problems.

Some questions that successful students can answer after reading the text

When writing, how do you distinguish between the representation for a vector and the magnitude of a vector?

What is the 'negative' of a vector (i.e. -1*(vector))? How do you draw this? What does this mean iin the component form of the vector?

How do you subtract two vectors?

How do you multiply a vector (say 4*(1m,2m,-3m)) by a scalar? Can you show this by drawing? By calculation?

Does multiplying a vector by a scalar change the direction of the vector?

Does a body accelerate when it is moving in uniform circular motion? If yes, what is the direction of acceleration?

What is the difference between component vectors and components?

When you add, subtract and/or use scalar multiplication, what do you do to the components of the vectors?

What would be a useful situation to use tilted axes? Does using or not using tilted axes make a difference to your final solution?

How is the acceleration on a ramp related to free-fall acceleration g?

What does one mean when you speak of relative velocity?

What is the general rule relating horizontal and vertical components of a projectiles motion?

What variable links the horizontal and vertical motion of a projectile's motion?

What does "range" mean when we refer to projectile motion?

What is centripetal acceleration? What is the equation that describes centripetal acceleration?