PH201 Reading Week 2

Chapter 2: Motion in One Dimension

Now that you have learned how to represent motion and the meanings of displacement and velocity, it is time to dig in and explore what velocity really means, and how we describe changing velocity (acceleration). You will use graphs to relate displacement, velocity and acceleration, as well as learn how to interpret graphs. Motion diagrams help you visualize motions, and graphs are also important tools used to describing motion. We will particularly learn about the following diagrams a) position-time diagram, b) velocity-time diagram, and c) acceleration-time diagram.

Student Learning Objectives

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

- Describe problems in different representations including graphical, pictorial and mathematical descriptions.
- Develop your understanding of the variables position, velocity, and acceleration, and their relationship to each other.
- Use position, velocity, and acceleration to describe 1D (e.g. horizontal or vertical or on a slope) motion.
- Develop basic problem solving skills with regards to motion, and problem-solving in general.
- Solve constant acceleration problems where there is more than one object moving, or there is more than one stage to the motion.

Some questions that successful students can answer after reading the text

1. What is the relationship between the slope of the x-t plot and the velocity?
2. What does the position vs time graph for uniform motion look like? What about the *v* vs *t* graph? The *a* vs *t* graph?
3. How can you go from a position vs time graph to a velocity vs time graph? What about the reverse? What is the equation that links the two?
4. Can you derive the uniform motion equation (eq. 2.4) from a velocity vs time graph of uniform motion?
5. How can you go from a position vs time graph to a velocity vs time graph? What about the reverse? What is the equation that links the two?
6. How can you go from a velocity vs time graph to an acceleration vs time graph? What about the reverse? What is the equation that links the two?
7. What are the SI units for acceleration?
8. Can one have a nonzero acceleration and zero velocity? Describe such a situation.
9. What happen to the speed of an object if its acceleration has an opposite sign to its velocity?
10. Of what importance are signs (+ and -) when discussing 1D motion?
11. What elements should be in a pictorial representation for a problem?
12. What does the term “free-fall” mean? What important value is associated with free-fall? What symbol is used for that?