Reading Guide

for the Newton's First and Second Laws unit

Physics Chapter 1: Motion

This chapter focuses on how we describe motion. It also introduces a little physics, giving examples of the relationship between force and motion. That relationship will be made quantitative in the next chapter.

pp. 3–6. This section explains the concepts of **speed** and **velocity**. Key points are:

- What is the difference between *average* speed and *instantaneous* speed?

- What is the relationship between *speed* and *velocity*? (You could draw this as a Venn diagram.)

pp. 7–8. This section explains the concept of **acceleration**. To see if you grasp the point of this section, complete the following analogy:

- *Velocity* is to *distance* as *acceleration* is to _____.

pp. 9–10. More on acceleration, and also about how forces apply.

- How can your acceleration be negative (backward) when your velocity is positive (forward)?

pp. 11–12. This section describes several scenarios of motion in which velocity and acceleration are in different directions. It is good stuff to know, especially the part about the direction of acceleration when Ringo drives in a circle.

- How can you be accelerating if your speed does not change?

p. 13. Derives a formula for determining the distance traveled during constant acceleration. The important idea for our class is not the formula itself, but the concept the book uses to derive it. Note the graph in the left-hand column of velocity and time. From the graph it is easy to see the average velocity, which can be used to find the distance from the definition of velocity.

pp. 14–15. Describes the motion of objects in free-fall.

- In the absence of air resistance, what physical quantity is constant as an object falls?

- What physical quantity is the same for all falling objects on earth (again, in the absence of air resistance)?

pp. 16–17. Applies the formula derived earlier to describe a falling object's position at different times.

- Can an object be accelerating if its speed is zero?

Wrap-Up

It might be a good idea to draw a concept map incorporating the ideas of Position, time, velocity, speed, acceleration, and force. Could you work in the concepts of change, positive, negative, and direction as well? (All of these concepts are important to understanding this material.)