Reading Assignment: pp1-18
EOC (End of Chapter) Problems: 4, 7, 11, 20, 21, 35, 41

There is separate test on this chapter. It will be covered with Chapter 2 test. Those objectives are attached.

Chapter 1 Objectives

Upon completion of this chapter you should be able to:

1. Express length, mass, and time in the appropriate SI units.
2. Use dimensional analysis to solve problems.
3. Apply the rules for significant figure calculations.
4. Convert units.
5. Use estimation to check a detailed calculation and perform order-of-magnitude calculations.
6. Use Cartesian coordinate systems and polar coordinate systems.
7. Use sin, cos, and tan functions, as well as the Pythagorean Theorem.

Bonus Problems Complete these for bonus points on test.

*Indicates intermediate level problems.

1. Show that the equation $v^2 = v_0^2 + 2ax$ is dimensionally correct, where $v$ and $v_0$ represent velocities, $a$ is acceleration and $x$ is a distance.

2. Which of the equations below are dimensionally correct? (a) $v = v_0 + ax$
   (b) $y = (2 \text{ m}) \cos (kx)$, where $k = 2 \text{ m}^{-1}$.

3. Carry out the following arithmetic operations: (a) 756 minus 37.2, (b) 3.2 divided by 1.4577.

4. How many meters are there in the hundred-yard dash?

*5. Assume an oil slick consists of a single layer of molecules and that each molecule occupies a cube 1.0 mm on a side. Determine the area of an oil slick formed by 1.0 m$^3$ of oil.

*6. Estimate the number of Ping-Pong balls that would fit (without being crushed) into a room 4 m long, 4 m wide, and 3 m high. Assume that the diameter of a Ping-Pong ball is 3.8 cm.

7. Two points in a rectangular coordinate system have coordinates (2.0, –4.0) and (–3.0, 3.0), where the units are in meters. Determine the distance between these points.


Physics
Chapter 2 Objectives
Reading Assignment: 23-46
CQ (Conceptual Questions): 3, 7, 8, 10, 13, 14, 17, 18
EOC: 1, 5, 7, 11, 15, 17, 19, 29, 43, 45, 47, 53

2 MOTION IN ONE DIMENSION

BONUS PROBLEMS

Show work for these and hand in on test day. These problems will be worth bonus points on your test.

*Indicates intermediate level problems.

1. A football player makes a touchdown run of 100 yards in a time of 15.0 seconds. What was his average velocity in m/s during his run?

2. The position-time graph for a bug crawling along the x axis is shown in Figure 2.1. Determine whether the velocity is positive, negative, or zero for the times (a) $t_1$, (b) $t_2$, (c) $t_3$, (d) $t_4$.

3. A jogger runs eastward in a straight line with an average speed of 2.0 m/s for 5.0 min and then continues with the average speed of 1.5 m/s for 2.0 min. (a) What is her total displacement? (b) What is her average velocity during this time?

4. It is found that the position of a model airplane as a function of time is given for a portion of time by $x = 2t^2$. Plot a graph of this equation between $t = 0$ and $t = 3.0$ s. From your graph find (a) the average velocity during this 3.0 s interval and (b) the instantaneous velocity at 2.0 s.

5. A shopper in a supermarket is in a great hurry. Plot a position-time graph for him as he moves along an aisle in a straight-line path. Use the following data and assume the origin of coordinates is at the initial position of the shopper. He moves from position 0 to –3.0 m at constant velocity in 1.0 s. He then moves from this position to +3.0 m at a constant velocity in 2.0 s. Finally, he pauses to catch his breath for 1.0 s. Use the graph you have plotted to find the average velocity during the total time interval, and the instantaneous velocity at 0.50 s, 2.0 s, and 3.5 s.

6. A car traveling in a straight-line path has a velocity of +10.0 m/s at some instant. After 3.00 s, its speed is +6.00 m/s. What is the average acceleration in this time interval?

7. A car starts from rest and accelerates at 0.300 m/s$^2$. What is the speed of the car after it has traveled 25.0 m?

*8. A car, initially traveling at 20.0 m/s, accelerates at a uniform rate of 4.00 m/s$^2$ for a distance of 50.0 m. How much time is required to cover this distance?

9. A bicyclist starts down a hill with an initial speed of 2.0 m/s. She moves down the hill with a constant acceleration, arriving at the bottom with a speed of 8.0 m/s. If the hill is 12 m long, what is the acceleration of the bicyclist on the hill?

10. The tallest volcano in the Solar System is the 24.0-km-tall Martian volcano, Olympus Mons. Assume an astronaut drops a ball off the rim of the crater and that the free-fall acceleration remains constant throughout the ball's 24.0-km fall at a value of 3.70 m/s$^2$. (We assume the crater is as deep as the
volcano is tall, which is not the case in nature.) Find (a) the time for the ball to reach the crater floor and (b) the velocity with which it hits. (In light of your answer for the velocity, does it seem reasonable that air resistance, even in Mars' thin atmosphere, can really be neglected in this problem?)

11. A ball is thrown downward from the top of a tall cliff with an initial speed of 10.0 m/s. Determine the velocity and acceleration of the ball at $t = 2.00$ s.

12. When a nurse squeezes a syringe, the liquid squirts 3.43 cm into the air. With what speed does the liquid emerge from the syringe?

13. A foul ball is hit into the stands at a baseball game. The ball rises to a height of 40 m and is caught by a fan at a height of 30 m as it drops back toward the field. What is its velocity in the vertical direction just before it is caught?

14. The velocity of an object is shown as a function of time if Figure 2.2. Find the average acceleration of the object in the intervals (a) 0 to 1 s, (b) 1 s to 3 s, and (c) 3 s to 4 s. (d) Find the instantaneous acceleration at 5.0 s, 2 s, and 3.5 s.

Figure 2.2