Physics I (PHYS 200): PS 3

Fall 2013 v1.0

Reading:

HRW Chapter 6 for new material in the next week's classes
HRW Chapters 3, 4, 5 (now including the vector bits) for this past week's material.

Problems:

Due in class Friday, September 20.

(1) Vector $\vec{v}_1$ is 6.6 units long and points in the direction $-\hat{i}$. Vector $\vec{v}_2$ is 8.5 units long and points at 45^o to the positive x-axis.
   (a) What are the x and y components of each vector?
   (b) Determine the sum $\vec{v}_1 + \vec{v}_2$ (magnitude and direction).

(2) For the vectors in HRW Chapter 3 Problem 38 find
   (a) $\vec{A} \cdot \vec{B}$
   (b) $\vec{A} \times \vec{B}$
   (c) $\vec{C} \cdot (\vec{A} \times \vec{B})$

(3) A tug boat, which has a speed in still water of 1.70 m/s must cross a 260 m wide river and arrive at a point 110 m upstream from where it starts. To do so, the pilot must head the boat at a 45^o upstream angle. What is the speed of the rivers current?

(4) HRW Chapter 3 Problem 16

(5) HRW Chapter 4 Problem 74

(6) Romeo is chucking pebbles gently up to Juliet's window, and he wants the pebbles to hit the window with only a horizontal component of velocity. He is standing at the edge of a rose garden 4.5 m below her window and 5.0 m from the base of the wall. How fast are the pebbles going when they hit her window?

(7) A rescue plane wants to drop supplies to isolated mountain climbers on a rocky ridge 235 m below. If the plane is traveling horizontally with a speed of 69.4 m/s.
   (a) How far in advance of the recipients (horizontal distance) must the goods be dropped?
   (b) Suppose, instead, that the plane releases the supplies a horizontal distance of 425 m in advance of the mountain climbers. What vertical velocity (up or down) should the supplies be given so that they arrive precisely at the climbers position?
   (c) With what speed do the supplies land in the latter case?

(8) HRW Chapter 5 Problem 34

(9) HRW Chapter 5 Problem 42

(10) HRW Chapter 5 Problem 71