Kinematics Homework Problems #5

p. 43 #1, 5, 8, 12, 13, 17

Problems taken from the school's old textbook:
Giancoli, D. (1980). *Physics*, 2nd Ed. Englewood Cliffs, NJ: Prentice Hall.

Answers are provided at the bottom of the page.

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1. A car is driven 30 km west and then 80 km southwest (in a direction 45° from due west and due south). What is the displacement of the car from the point of origin (magnitude and direction)?

5. Figure 2-18 shows two vectors, **A** and **B** whose magnitudes are *A* = 6.3 units and *B* = 3.5 units. Determine **C** (both the magnitude and direction) if
   a) **C** = **A** + **B**
   b) **C** = **A** – **B**
   c) **C** = **B** - **A**

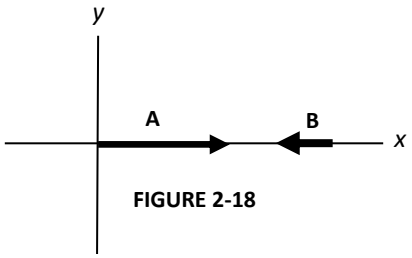

FIGURE 2-18

8. Three vectors are shown in Figure 2-19; their magnitudes are given in arbitrary units. Determine the sum of the three vectors. Give the resultant in terms of
   a) components.
   b) magnitude and angle with the x-axis.

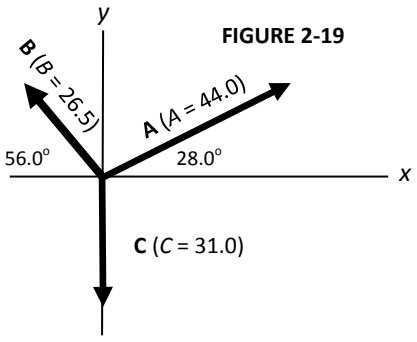

FIGURE 2-19

12. A skier is accelerating down a 30.0° hill at 3.60 m/s^2.
   a) What is the vertical component of her acceleration?
   b) How long will it take her to reach the bottom of the hill, assuming she starts from rest and accelerates uniformly, if the elevation change (elevation is a measure of the vertical direction) is 150 m?

13. The components of a vector **V** are often written ($\mathbf{V_x}$, $\mathbf{V_y}$, $\mathbf{V_z}$). What are the components and length of a vector which is the sum of the two vectors $\mathbf{V_1}$ and $\mathbf{V_2}$ whose components are (6, 0, 2) and (1, 4, 3)?

17. The summit of a mountain, 2150 m above a camp, is measured on a map to be 4750 m horizontally from the camp in a direction 28.2^o west of due north. What are the components of the displacement vector from camp to summit? What is its length? Choose the x-axis east, y-axis north, and z-axis up.

Answers:

1. 103.4 km, 56.8^o west of due south
5a. 2.8 units
5b. 9.8 units
5c. -9.8 units
8a. (24.03, 11.7) units
8b. 26.7 units at 26^o above the + x-axis
12a. 1.8 m/s^2
12b. 12.9 s
13. (7, 4, 5); 9.49 units
17. components (-2244.6, 4186.2, 2150) m (here -2244.6 is negative because it is to the west, the negative direction) length = 5213.9 m