# Unit 2 Vector Problems

**Directions:** On a separate sheet of paper start each problem with a vector diagram and then show all work.

1. A seal swims toward an inlet with a speed of 5.0 m/s as a current of 1.0 m/s flows in the opposite direction. What is the seals speed and how long will it take the seal to swim 100 m?

2. Esther dives off of a high dive with a velocity of 8.0 m/s at an angle of 80° above the horizontal. What are the horizontal and vertical components of her velocity?

3. Dwight pulls his sister in her wagon with a force of 65 N at an angle of 50° to the vertical. What are the horizontal and vertical components of the force exerted by Dwight?

4. A rollercoaster travels 135 ft at an angle of 40° above the horizontal. How far does it move horizontally and vertically?

5. A submarine dives at an angle of 30° with the horizontal and follows a straight line path for a total distance of 50 m. How far is the submarine below the surface of the water?

6. Ivan pulls a sled loaded with logs to his cabin in the woods. If Ivan pulls with a force of 800 N in of direction of 20° above the horizontal, what are the horizontal and vertical components for the force exerted by Ivan?

7. If Boston Red Sox baseball legend, Carl Yaztremski, hit a baseball due west with a speed of 50m/s, and the ball encountered a wind that blew it north at 5 m/s, what was the resultant velocity of the baseball?

8. Arny flies due east from San Francisco to Washington D. C. which has a displacement of 5600 km. He then flies from Washington to Boston, a displacement of 900 km at an angle of 55° east of north. What is Arny's total displacement?

9. A shopper pushing a cart through a store moves a distance of 40 m down one aisle then makes a 90° turn and moves 15 m. He then makes another 90° turn and moves 20 m. Find the 2 possible <u>magnitudes</u> of her displacement.

10. A dog searching for a bone walks 3.5 m south, then 8.2 m at 30° north of east. Find the dog's resultant (displacement).

11. An airplane flies from city A to city B in a direction due east for 800 miles. In the next part of the trip the airplane flies 600 miles from city B to city C in a direction of 40° north of east. What is the displacement of the airplane from city A to city C?