Vectors
Homework Worksheet

I. Adding Perpendicular Vectors

1. You walk 30 m south and 30 m east. Draw and add vectors for these two displacements. Compute the resultant.
2. A ship leaves its home port expecting to travel to a port 500 km due south. Before it can move, a severe storm comes up and blows the ship 100 km due east. How far is the ship from its destination? In what direction must the ship travel to reach its destination?
3. A hiker leaves camp and, using a compass, walks 4 km E, 6 km S, 3 km E, 5 km N, 10 km W, 8 km N, and 3 km S. At the end of three days, the hiker is lost. Draw a diagram and compute how far the hiker is from camp and what direction should be taken to get back to camp.
4. Diane rows a boat at 8.0 m/s directly across a river that flows at 6.0 m/s.
   a. What is the resultant speed of the boat?
   b. If the stream is 240 m wide, how long will it take Diane to row across?
   c. How far downstream will Diane be?
5. Dave rows a boat across a river at 4.0 m/s. The river flows at 6.0 m/s and is 360 m across.
   a. In what direction, relative to the shore, does Dave's boat go?
   b. How long does it take Dave to cross the river?
   c. How far downstream is Dave's landing point?
   d. How long would it take Dave to cross the river if there were no current?
6. Kyle is flying a plane due north at 225 km/h as a wind carries it due east at 55 km/h. Find the magnitude and direction of the plane's resultant velocity.
7. Sue and Jenny kick a soccer ball at exactly the same time. Sue's foot exerts a force of 66 N north. Jenny's foot exerts a force of 88 m east. What is the magnitude and direction of the resultant force on the ball?
8. Kym is in a boat traveling 3.8 m/s straight across a river 240 m wide. The river is flowing at 1.6 m/s.
   a. What is Kym's resultant velocity/
9. A weather station releases a weather balloon. The balloon's buoyancy accelerates it straight up at 15 m/s^2. At the same time, a wind accelerates it horizontally at 6.5 m/s^2. What is the magnitude and direction (with reference to the horizontal) of the resultant acceleration?
10. A descent vehicle landing on the moon has a vertical velocity toward the surface of the moon of 35 m/s. At the same time, it has a horizontal velocity of 55 m/s.
    a. At what speed does the vehicle move along its descent path?
    b. At what angle with the vertical is this path?