Name:

Physics 11
M. Lam

Vectors

Block:

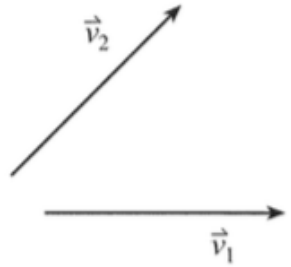
1. Draw the following vectors. Show necessary angles.
   a) 10 m north
   b) 15 m/s^2 west
   c) 5.3 m 20° west of south
   d) 24 m/s 20° east of south
   e) 11 m 40° south of west
   f) 150 m/s 10° north of east

2. Determine the horizontal and vertical components of the following vectors.
   a) 14 N 45° north of east
   b) 1.6 m/s^2 33° west of north
   c) 55 m 15° west of south
   d) 910 m/s 5.0° south of east
   e) 15 m 25° east of south
   f) 25 m/s 22° north of west

3. Add the following displacement vectors. Be sure to determine both the magnitude and direction of the resultant vector.
   a) 1.0 m north; 0.5 m south
   b) 12 m east; 25 m west
   c) 150 km north; 240 km west
   d) 8.0 m west; 10.0 m south
   e) 9.0 m south; 6.0 m 30.0° north of west
   f) 182 km east; 40.0 km 20.0° south of east
   g) 3.5 m 40.0° east of north; 4.3 m 35° north of west
   h) 1.5 km 20.0° south of east; 2.5 km 30.0° north of east

4. A Physics 11 student rides up an escalator that is angled 25° above the horizontal. While he moves 2.8 m in the horizontal direction, how far does he move in the vertical direction?

5. Two velocity vectors, v_1 and v_2, are shown. Draw the resultant of the addition of the two velocity vectors.



6. Justin skis down a 40.0° slope (measured above the horizontal). If the distance he skis along the slope is 360 m, how far does he move in the…
   a) horizontal direction?
   b) vertical direction?

7. Determine the displacement between the initial position, x_i, and the final position, x_f.
   a) x_i, = 3.0 m west; x_f. = 10.0 m west
   b) x_i, = 320 km east; x_f. = 110 km north
   c) x_i, = 11 m 32° south of east; x_f. = 10.0 m south
   d) x_i, = 550 km 15° west of north; x_f. = 620 km 40.0° north of west

8. A car travelling south at 15 m/s is later travelling west at 25 m/s. What is the change in velocity?

9. An airplane heads due north with an airspeed of 75 m/s. The wind is blowing due west at 18 m/s. What is the airplane's speed relative to the ground?

10. A girl can swim at 6.2 km/h. She decides to swim across a river heading straight across (east). If the current is 3.0 km/h south…
    a) what is her velocity relative to someone sitting on the shore?
    b) what is her speed relative to a bird sitting on a free-flowing log next to her?

11. A plane is heading directly south towards a runway at a speed of 210 km/h. Suddenly, the plane experiences a gust of wind 75 km/h due west. What direction should the pilot aim the plane in order to continue to head directly to the runway?

12. An aircraft heads due south with a speed relative to the air of 56 m/s. Its resultant speed over the ground is 62 m/s. The wind blows from the east.
    a) What is the speed of the wind?
    b) What is the direction of the aircraft's path over the ground?

