

1. Is a speed of 7 m/sec is a vector or a scalar quantity? Why?
2. Is a velocity of 6 m/sec at  $20^\circ$  from the horizontal is vector or a scalar quantity? Why?
3. Sketch the following vectors. Find the x and y components of the following vectors:
  - (a)  $\vec{\delta x} = 27$  cm at  $30^\circ$
  - (b)  $\vec{v} = 93$  m/sec at  $80^\circ$
  - (c)  $\vec{A} = 15$  m at  $110^\circ$
  - (d)  $\vec{B} = 9.8$  m/sec<sup>2</sup> at  $270^\circ$
4. Sketch the following vectors. Find the magnitude and direction of the following vectors:
  - (a)  $v_x = 5$   $v_y = 7$
  - (b)  $v_x = -3$   $v_y = 5$
  - (c)  $v_x = -4$   $v_y = -5$
  - (d)  $v_x = 6$   $v_y = 7$
5. A person walks 100 m to east and then turns left and walks an additional 200 m north. What is his displacement? If he wanted to go the shortest distance, what direction should he have walked in?
6. A person runs 90 feet east, then 90 feet north. What is his displacement? What direction of he went in a straight line?
7. A boat launches perpendicular to a river with a speed of 30 m/sec. If the rivers current is 10 m/sec downstream, then what is the boats resultant velocity? What direction does it go in?
8. A arrow moves with a velocity of 30 m/sec at 30 degrees. What are the x,y components of the velocity?
9. A bullet is fired from a mountain moves 350 m at an angle of 25 degrees. What are the x,y components of the bullets displacement?
10. A jogger runs at the rate of 4 m/sec in the direction of  $60^\circ$  north of east. How fast is she running due east and how fast due north?
11. A car travels 100 km on a highway in a straight line at  $30^\circ$  south of west. How far west of the starting point is the car at the end of trip? How far south?
12. An airplane travels at the rate of 180 km/hr at  $40^\circ$  north of west. What is his velocity due north? What is his velocity due west?
13. A rocket lifts off its launching pad with a vertical velocity of 20 m/sec and a horizontal velocity of 60 m/sec. What are the magnitude and direction of its resultant velocity?
14. A proton experiences a force of  $3.2 \times 10^{-16}$  N in one direction and a magnetic force of  $1.9 \times 10^{-16}$  in a direction at a right angle to the electric force. What are the magnitude and direction of the resultant force?
- Honors only 15. A boat crosses a river 120 m wide. If the current is 10m/sec downstream (east) and the boat has a launch velocity of 30 m/sec north, then how long does it take to cross the river? How far downstream does the boat move from its original starting spot?
- Honors only 16. A pilot wants to fly due north, but the wind is pushing the plane due east at the rate of 40 m/sec. In what direction should he aim the plane of its engine speed is 80 m/sec? What will the plane's resultant speed be due north under these conditions?