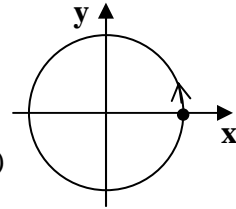
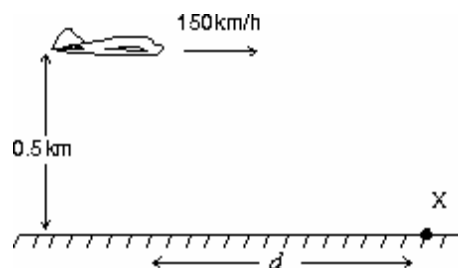


## Chapter 4 (Motion in two and three dimension)

- 1- A particle moves with a constant speed along the circumference of a circle of radius 5 m. It completes one revolution every 20 s. What is the magnitude of its average velocity during the first 5 s? Assume that at  $t = 0$ , the particle is on +x-axis see figure. (A:  $\sqrt{2}$  m/s)



- 2- Car A is moving with a speed of 30 km/h along the positive x-axis and car B is moving with a speed of 40 km/h along the positive y-axis. What is the velocity of car B with respect to car A? (A:  $-30\mathbf{i} + 40\mathbf{j}$  km/h)
- 3- A ball leaves the ground with a speed of 50 m/s at an angle of 60 degrees with the horizontal. Find its speed at its highest point. (A: 25 m/s)
- 4- A stone is thrown from the ground into the air with an initial velocity  $\mathbf{V} = (5.0\mathbf{i} + 9.0\mathbf{j})$  m/s. To what maximum height will the stone rise? (A: 4.1 m)
- 5- A particle starts from the origin at  $t = 0$  with a velocity of  $8.0\mathbf{j}$  m/s and moves in the XY plane with a constant acceleration of  $(4.0\mathbf{i} + 2.0\mathbf{j})$  m/s<sup>2</sup>. At the instant the X coordinate of the particle is 32 m, find its y coordinate. (A: 48 m)
- 6- A stone is thrown horizontally from the top of a 40m high hill. It strikes the ground at an angle of 30 degrees. With what speed was it thrown? (A: 49 m/s)
- 7- A river has a steady flow of 0.30 m/s. A student swims downstream a distance of 1.2 km and returns to the starting point. If the student can swim at a constant speed of  $v$  in still water and the downstream portion of the swim takes him 20 minutes, the time required for the entire swim is: (A: 70 minutes)
- 8- Find the magnitude of the centripetal acceleration of a particle on the tip of a fan blade, 0.150 m in radius, rotating at 1200 revolutions every minute. (A: 2370 m/s<sup>2</sup>)
- 9- A boat can travel with a velocity of 1.70 m/s in still water (that is  $V_{bw} = 1.70$  m/s). The boat heads (points) across a river where the current is 0.75 m/s (that is  $V_{wg} = 0.75$  m/s). What is the speed of the boat relative to the ground? (A: 1.86 m/s)
- 10- The airplane shown is in level flight at an altitude of 0.50 km and a speed of 150 km/h. At what distance  $d$  should it release a heavy bomb to hit the target X? Take  $g = 10$  m/s<sup>2</sup>. (A: 417 m)



- 11- An object is moving on a circular path of radius  $\pi$  meters at a constant speed of 4.0 m/s. The time required for one revolution is: (A:  $\pi^2/2$  s)