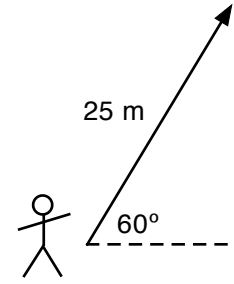


Vector Word Problems 1

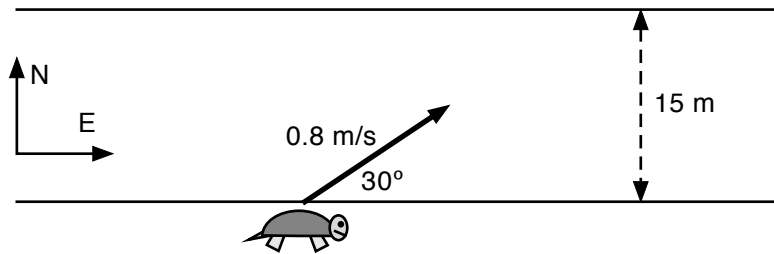
1. You are looking for something you dropped in an empty parking lot. You finally find what you are looking for 25 meters away from you at an angle of 60° N of E. You walk over in 20 seconds.



- a. What are the components of your displacement? (Worded another way: How far East and how far North did you move?)
 - b. What was your velocity (as a magnitude and direction.)
 - c. What are the horizontal and vertical components of your velocity? (Notice that you can answer this question two different ways, but you should get the same answers.)
2. A dog is sitting next to its owner in a field when it notices a squirrel at the base of a tree. The tree is located 50 meters to the West and 75 North of the dog's original position. The dog takes off after the squirrel, reaching the tree in only 12 seconds.
- a. How far away is the tree from the dog's original position?
 - b. How fast was the dog running?
 - c. What were the components of the dog's velocity?
3. A plane has a velocity with the components 75 m/s West and 50 m/s North.
- a. After 20 minutes, what are the components of the displacement? (Worded another way: how far West and North did the plane travel?)
 - b. How fast is the plane traveling?
 - c. How far away from its starting point is the plane?
4. A cruise ship is travels with a constant velocity of 25 km/h at an angle of 35° N of E for 8 hours.
- a. What was its displacement in that time? (i.e. how far did it travel?)
 - b. What were the components of its velocity?

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- c. What were the components of its displacement?
5. A plane is flying with a constant velocity of 300 km/h at 70° N of E. How far North does it travel in 1.5 hours?
6. A car has a velocity of 22 m/s W and 17 m/s S. After 3 minutes, how far has it traveled?
7. A bird flew 3500 meters exactly NE in 5 minutes. What was the eastern component of its velocity?



8. A turtle is trying to cross a road that is 15 meters wide (shown above.) Being a turtle however, it does not go straight across. Instead, the turtle moves with a velocity of 0.8 m/s at an angle of 30° N of E.
- What are the horizontal and vertical components of the velocity of the turtle?
 - How long does it take the turtle to cross the road? (*Be careful!*)
 - How far sideways (East) does the turtle move in this time?

Answers: 1. a) $x=12.5\text{ m}$ & $y=21.7\text{ m}$ b) 1.25 m/s @ 60° N of E c) $v_x=0.63\text{ m/s}$ & $v_y=1.08\text{ m/s}$
 2. a) 90.1 m b) 7.51 m/s c) 4.17 m/s W & 6.25 m/s N 3. a) $x=-90,000\text{ m}$ & $y=60,000\text{ m}$
 b) 90.1 m/s c) $108,000\text{ m}$ 4. a) 200 km b) 20.5 km/h E & 14.3 km/h N c) 164 km E & 115 km N
 5) 408 km 6) 5005 m 7) 8.25 m/s 8. a) $v_x=0.69\text{ m/s}$ & $v_y=0.4\text{ m/s}$ b) 37.5 s c) $x=26\text{ m}$