

Module 3

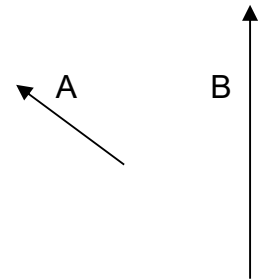
Physics

Write the answers on your own paper, not on this sheet.

Read Module 3.

1. When measuring the angle of a vector, what direction is considered zero degrees:
right \rightarrow , up \uparrow , left \leftarrow , or down \downarrow ?
2. Convert these vectors to x and y components:
 - a. 57 miles at 61°
 - b. 240 meters at 110°
3. Convert these x and y components to a length and direction:
 - a. $X = 34$ meters, $Y = 59$ meters
 - b. $X = 67$ feet, $Y = -26$ feet

Draw a picture for Problems 4 & 5. Use Vectors A & B shown here:



4. Add the vectors graphically. $A + B$
5. Subtract the vectors graphically: $A - B$
6. Multiply: $4A$
7. Add the vectors mathematically: $A = 3.2 \hat{i} + 9.7 \hat{j}$ and $B = 8.1 \hat{i} - 5.4 \hat{j}$. Convert your answer to length and direction.
8. Honors: Add the vectors mathematically.
 $A = 72$ meters at 130° , $B = 41$ meters at 250° .

9. Superman flies upward 185 meters at an angle of 115° to get to the top of a building. Find the x and y components of Superman's flight.



10. A turtle crawls 4 meters east and then 8 meters north.
How far away is the turtle from where he started?
11. An airplane flies 280.0 km due west of Ashton to Bloomburg. Then it flies 310 km at 125° to go from Bloomburg to Carville. What is the straight-line distance from Ashton to Carville?

12. Mario drives $30 \hat{i} + 12 \hat{j}$ miles and then $40 \hat{i} - 25 \hat{j}$ miles. What is the distance he drives? What is his displacement?

13. Force A equals 126 pounds at 10° and Force B equals 90 pounds at 35° . If both forces are applied to a box, what is the magnitude and direction of the resulting force? (Add the vectors, then find the length and angle.)



14. A shark swims at a velocity of 4 meters per second due east for 10 seconds, then turns to chase a fish and swims at a velocity of 10 meters per second due north for 3 seconds.
- Find the total distance the shark swims?
 - Find the displacement of the shark from where it started (length & direction).
15. Honors – A boat goes 350 km at a direction of 42° and drops off supplies on a small island. Then it turns and goes 185 km at 214° to drop supplies on a larger island. What is the boat's straight-line distance from where it started (its displacement)?
16. Honors – A dog searching for a bone walks 3.5 meters south, then 5.8 meters at 35° , and finally 15 meters due west. What is the distance and angle of the dog from where he started?
17. Honors – At time = 0, a particle moving with constant acceleration has a velocity of $\mathbf{v_i} = 17.2 \hat{i} - 4.6 \hat{j}$ meters per second. At time = 3 seconds, the particle's velocity is $\mathbf{v_f} = 26.5 \hat{i} + 8.7 \hat{j}$ meters per second. Find the particle's acceleration.