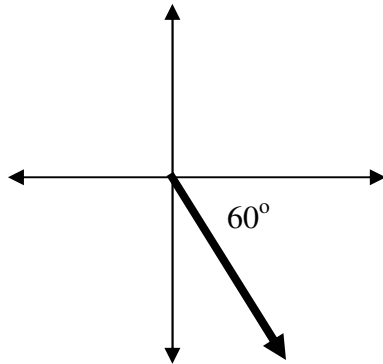


# Vectors

## Review Sheet

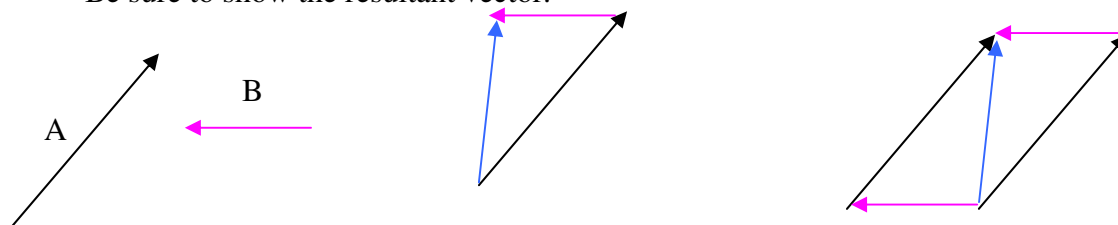
1. Define the following terms:
  - a. Vector a quantity that needs magnitude and direction. Examples: Velocity, Acceleration, displacement and Force
  - b. Scalar a quantity that needs magnitude only. Examples: Speed, distance, time, mass,
  - c. Component the legs of the right triangle
  - d. Magnitude amount
  - e. Direction north, south, east, west, up, down, left, right, positive, negative
2. Describe the direction of the following vector in at least 4 possible ways. -60°, 300°, 60° South of East, 30° East of South



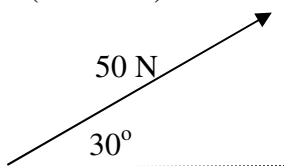
3. What two things do all vectors need? Magnitude and direction
4. When vectors are acting in the same direction you add their magnitude and when they are acting in opposite directions you subtract their magnitudes.
  - a. What is the maximum value a 5 N vector and an 8 N vector can have? 13 N
  - b. What is the minimum value a 5 N vector and an 8 N vector can have? 3 N

5. A bird is flying at 7 m/s to the south when it encounters a 2 m/s gust of wind from the north. What is the bird's resultant velocity? 9 m/s to the south
  
6. An ant crawls 5 cm to the north, then 5 cm to the east, then 5 cm to the south, then 5 cm to the west. Where has the ant ended up? Back at its starting point, its displacement is zero meters.
  
7. Classify each of the following as either a vector or a scalar quantity:
  - a. Distance scalar
  - b. Displacement vector
  - c. Velocity vector
  - d. Speed scalar
  - e. Acceleration vector
  - f. Force scalar

8. Sketch the vectors A and B being added by the parallelogram method and the head to tail method. Be sure to show the resultant vector.



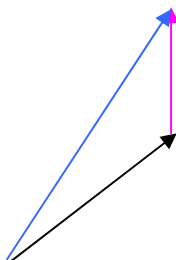
9. Find the magnitude of the horizontal and vertical components of a 50 N vector acting at 30 degrees. (Pre – AP)



Horizontal component  $50 \cos 30 = 43.3 \text{ Newtons}$

Vertical Component  $50 \sin 30 = 25 \text{ Newtons}$

10. Graphically show the resultant velocity of a bird flying at 25 m/s at an angle of 60° North of East against a 5 m/s wind from the south.



11. A hiker walks 12 km north and then walks 15 km west of his campsite. If the hiker walks back to the starting point in a straight line, how many kilometers will the hiker need to go?

$$\underline{12^2 + 15^2 = 19.2km}$$

12. A motorboat is attempting to cross a 500 m river. The motorboat heads due west at 8 m/s. The river has a current of 6 m/s due south. What is the magnitude of the resultant velocity of the boat relative to the bank? How long does it take to cross the river? How far downstream does the motorboat reach the other bank?

$$\underline{\sqrt{8^2 + 6^2} = 10m/s}$$

$$\underline{\theta = \tan^{-1}\left(\frac{8}{6}\right) = 53.1^\circ \text{ (Pre-AP)}}$$

$$\underline{\frac{500}{8} = 62.5 \text{ sec}}$$

$$\underline{(6)(62.5) = 375m}$$