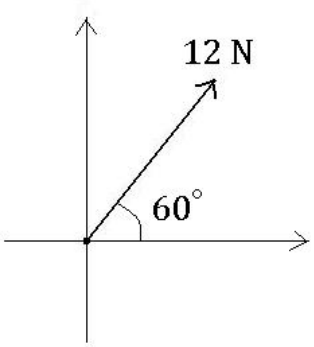
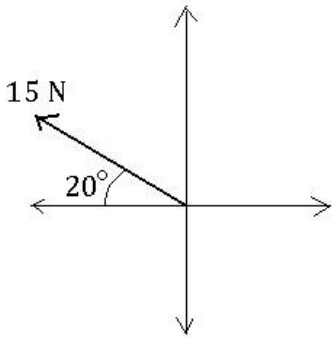
Now that you have the idea, here are some practice problems to cement the concepts in your mind.

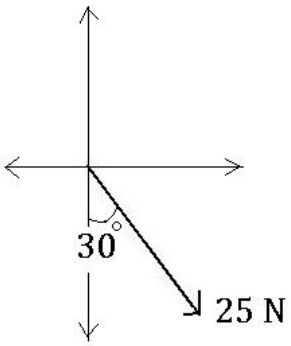
Practice Problems



(a)



(b)



(c)

1. Determine the x and y components of each of the force vectors above.

2. Are the following quantities vectors or scalars? Explain.

   (a) The cost of a theater ticket.

   (b) The current in a river.

   (c) The initial flight path from Houston to Dallas.

   (d) The population of the world.

3. Of the following quantities, which are vectors? If it is, explain why. If it isn't, explain why.

   (a) The speed of a car.

   (b) The velocity of a car.

   (c) How long it takes to do a physics assignment.

   (d) The magnitude of the force required to push a pumpkin off an abandoned overpass.

   (e) The acceleration of said pumpkin.

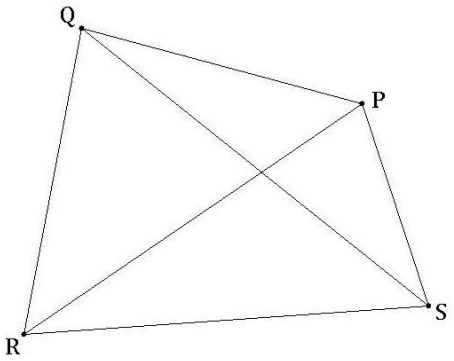
4. Write each combination of vectors as a single vector. See figure below.

(a) $\overrightarrow{PQ} + \overrightarrow{QR}$

(b) $\overrightarrow{RP} + \overrightarrow{PS}$

(c) $\overrightarrow{QS} - \overrightarrow{PS}$

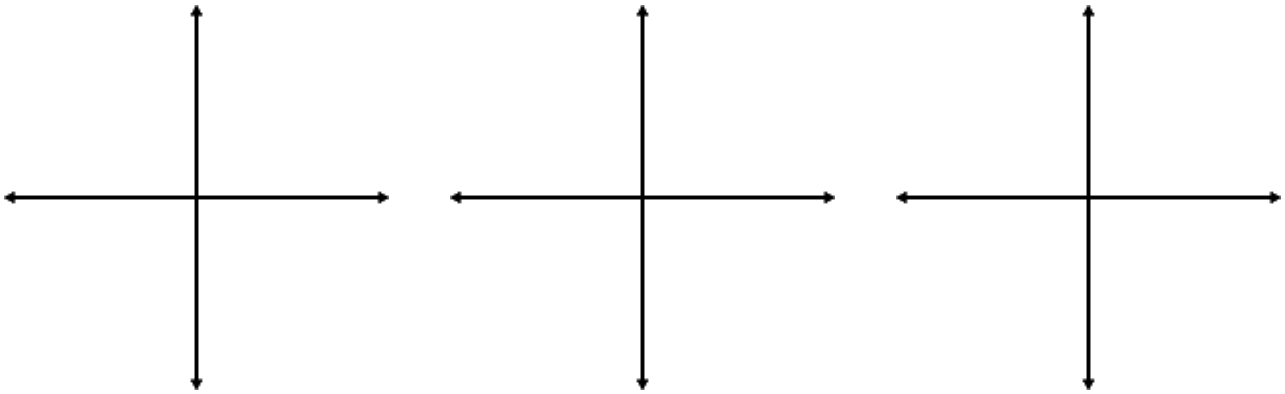
(d) $\overrightarrow{RS} + \overrightarrow{SP} + \overrightarrow{PQ}$



5. If a child pulls a sled through the snow with a force of 50 N exerted at an angle of 38° above the horizontal, find the horizontal and vertical components of the force.

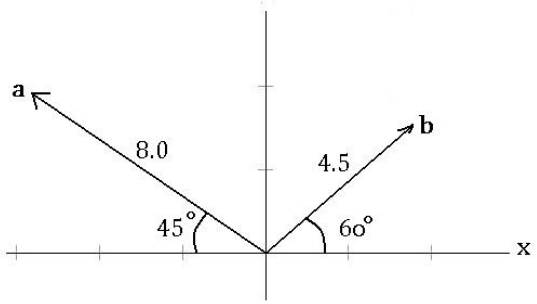
6. A plane flies with a velocity of 52 m/s east through a 12 m/s cross wind blowing the plane south. Find the magnitude and direction (relative to due north) of the resultant velocity at which it travels.

7. Draw the vector $\vec{v}$ and find the magnitude and direction, counter clockwise from the $+x$-axis.

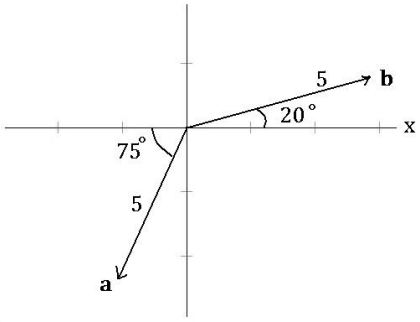


(a) v_x=2.5, v_y=1 (b) v_x=-0.5, v_y=1 (c) v_x=-1.5, v_y=-1

8. Construct **c**=**a**+**b** by drawing and calculating the direction and magnitude of **c**. The direction should be measured from the $+x$-axis.

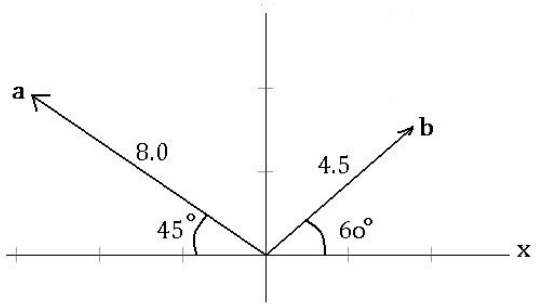


(a)

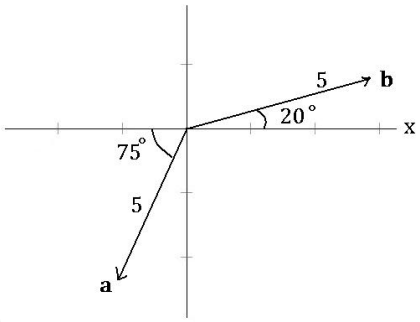


(b)

9. Construct **c**=**a**-**b** by drawing and calculating the direction and magnitude of **c**. The direction should be measured from the $+x$-axis.



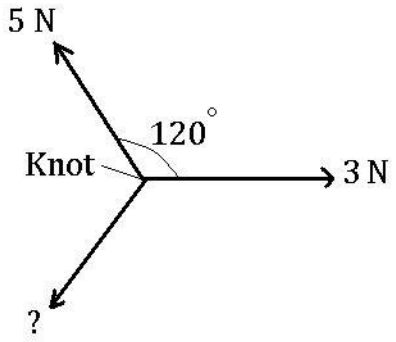
(a)



(b)

10. A racing car is accelerating at 20 m/s^2 70° N of W. Find the acceleration of the car in the north direction and in the west direction.

11. Your uncle Mike's boat can travel 4.0 m/s in still water. One sunny afternoon, you and Unk Mike decide to go fishing. While waiting for a bite, you begin thinking, "If this river is flowing at 5.5 m/s southward, and we are heading eastward, directly across the river, what are the direction and magnitude of our total velocity?" Answer your own question.



12. The figure above shows three ropes tied together in a knot. One of your friends pulls on a rope with a force of 3 Newtons and another pulls on a second rope with a force of 5 Newtons. How hard and in what direction must you pull on the third rope to keep the knot from moving? (*Hint:* If you don't want the knot to move, the net force must be zero.)