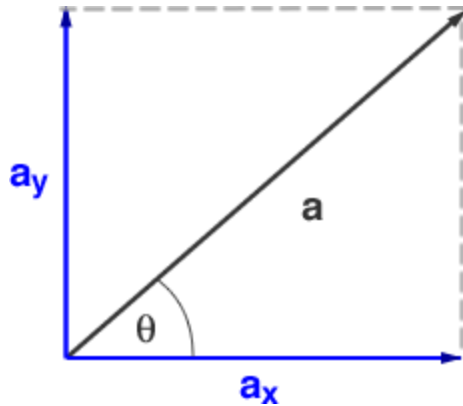
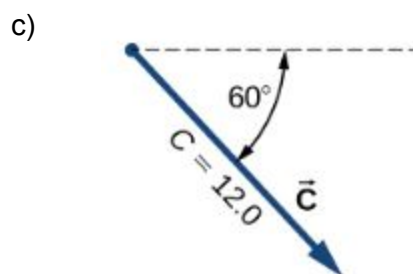
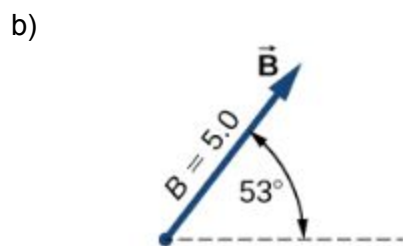
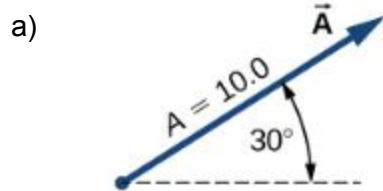


3.4 Components of a Vector & Unit Vectors

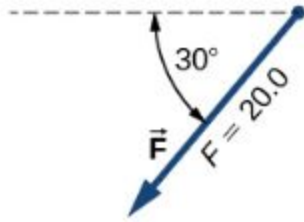
- 1.) In the diagram below, identify the trigonometric value of the component vectors of the resultant.



- 2.) Find the component vectors A_x and A_y .



d)



3.) What are unit vectors?

4.) Write out the unit vectors of A.

5.) Find the sum of A and B in unit vectors.

6.) Find the sum of two vectors A and B lying in the xy plane and given by:

$$A = (2.0i + 2.0j) \text{ m and } B = (2.0i + 4.0j) \text{ m}$$

7.) A particle undergoes three consecutive displacements:

$$d_1 = (15i + 30j + 12k) \text{ cm}, d_2 = (23i + 14j + 5.0k) \text{ cm and } d_3 = (13i + 15j) \text{ cm}.$$

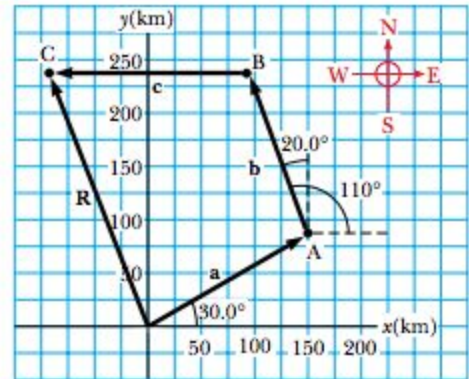
Find the components of the resultant displacement and its magnitude.

8.) A hiker begins a trip by first walking 25.0 km southeast from her car. She stops and sets up her tent for the night. On the second day, she walks 40.0 km in a direction 60.0° north of east, at which point she discovers a forest ranger's tower.

a) Determine the components of the hiker's displacement for each day.

b) Determine the components of the hiker's resultant displacement R for the trip. Find an expression for R in terms of unit vectors.

- 9.) A commuter airplane takes the route shown in the illustration. First, it flies from the origin of the coordinate system shown to city A, located 175 km in a direction 30.0° north of east. Next, it flies 153 km 20.0° west of north to city B. Finally, it flies 195 km due west to city C. Find the location of city C relative to the origin.



- 10.) While exploring a cave, a spelunker starts at the entrance and moves the following distances. She goes 75.0 m north, 250 m east, 125 m at an angle 30.0° north of east, and 150 m south. Find the resultant displacement from the cave entrance.

11.) A map suggests that Atlanta is 730 miles in a direction of 5.00° north of east from Dallas. The same map shows that Chicago is 560 miles in a direction of 21.0° west of north from Atlanta. Modeling the Earth as flat, use this information to find the displacement from Dallas to Chicago.

12.) Given the vectors $A = 2.00i + 6.00j$ and $B = 3.00i + 2.00j$,

a) draw the vector sum $C = A + B$ and the vector difference $D = A - B$.

b) Calculate C and D , first in terms of unit vectors and then in terms of polar coordinates, with angles measured with respect to the $+x$ axis.

13.) Find the magnitude and direction of the resultant of three displacements having rectangular components (3.00, 2.00) m, (-5.00, 3.00) m, and (6.00, 1.00) m.

14.) A man pushing a mop across a floor causes it to undergo two displacements. The first has a magnitude of 150 cm and makes an angle of 120° with the positive x axis. The resultant displacement has a magnitude of 140 cm and is directed at an angle of 35.0° to the positive x axis. Find the magnitude and direction of the second displacement.