

Mekelle University
College of natural and computational science
Department of Physics (Course: General Physics)

Worksheet one

1. If vector **B** is added to vector **A**, under what condition does the resultant vector $\mathbf{A} + \mathbf{B}$ have magnitude $A + B$? Under what conditions is the resultant vector equal to zero?
2. Two vectors have magnitudes 5 and 3 units but unknown directions, the angle between these two vectors is θ in degree such that resultant vector makes maximum angle with vector of 5 unit. Find the value of $10 \sin \theta$.
3. If one of the rectangular components of a vector is not zero, can its magnitude be zero? Explain.
4. An experimenter performs a simple experiment to find the average acceleration of a falling object. He drops a baseball from a building and uses a string and meter stick to measure the height the ball was dropped, and he uses a stopwatch to find an average time of fall for three trials from the same height and reports the following data: $h = 5.25 \pm 0.15$ m, $t = 1.14 \pm 0.06$ s. Use the equation $a = 2h/t^2$ to determine the average acceleration and its uncertainty.
5. A dog searching for a bone walks 3.50m south, and then runs 8.20 m at an angle 30.0° north of east, and finally walks 15.0 m west. Find the dog's resultant displacement vector using graphical techniques.
6. 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.
7. The rectangle showed in Figure 1 has sides parallel to the x and y axes. The position vectors of two corners are $\mathbf{A} = 10.0$ m at 50.0° and $\mathbf{B} = 12.0$ m at 30.0° . (a) Find the perimeter of the rectangle. (b) Find the magnitude and direction of the vector from the origin to the upper right corner of the rectangle.

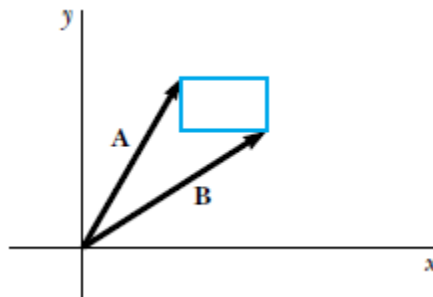


Figure 1

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8. Three concurrent forces acting on a bracket (Figure 2). Find the magnitude and angle of the resultant force.

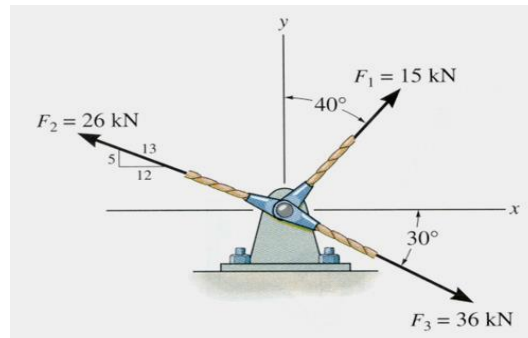


Figure 2

9. A commuter airplane takes the route shown in Figure 3. 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.

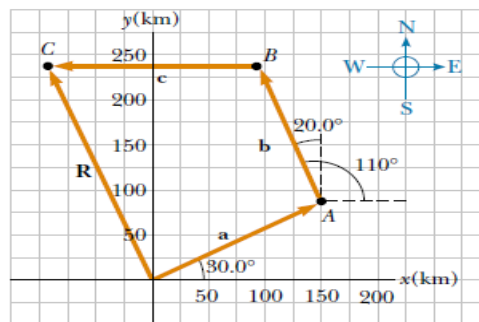


Figure 3

10. Each of the displacement vectors **A** and **B** shown in Figure 4 has a magnitude of 3.00 m.
(a) find the x and y components of the vectors **A** and **B**, (b) find graphically $\mathbf{A} + \mathbf{B}$, and $\mathbf{A} - 2\mathbf{B}$ and express in unit-vector notation.

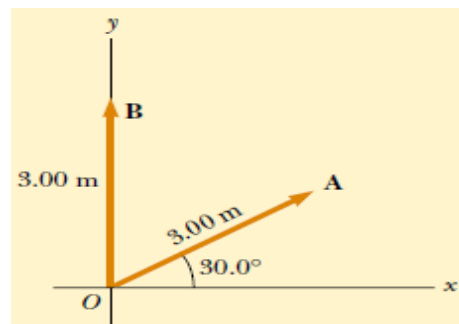


Figure 4