## Vector Addition Example 2

Given: Two or more **vectors** to be added together to find the **Resultant** vector **R**.

Example: Vector $\vec{A}$ = **5.0 m** is 50° North of (from) East. Vector $\vec{B}$ = **8.0 m** is 75° West of (from) North

1) Draw Rough **Graphical** Sketch

+y = North

Draw Vectors
Tip-to-Tail

75°

50°

B

R

A

-x = West

+x = East
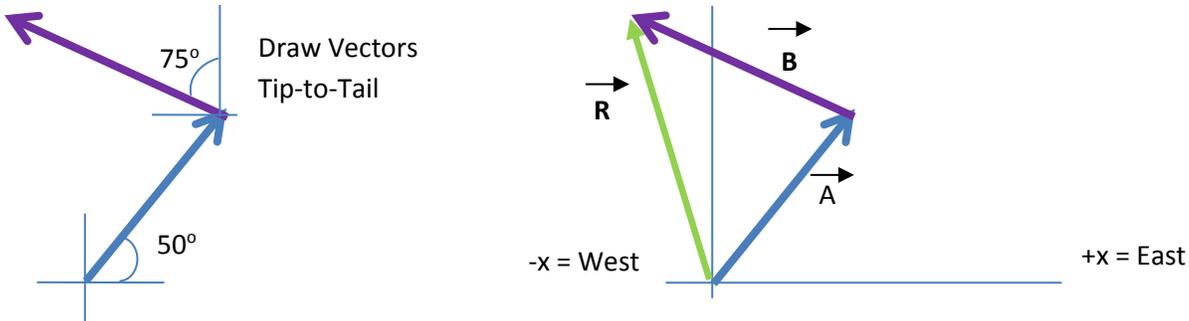
Need to find vector components for $\vec{A}$ and $\vec{B}$ and add them to get resultant components for $\vec{R}$.

2) Draw a x-y coordinate system

3) Draw first vector starting from the origin and find components Ax and Ay. (Remember SOH CAH TOA)

$Sin50° = \dfrac{Ay}{\vec{A}}$

$Cos50° = \dfrac{Ax}{\vec{A}}$

y

A

Ay

50°

Ax

x

Answer: Below

$\vec{R}$ = 7.4m

y = North

Ry =5.9m

53°

-x = West

Rx = -4.5m

x = East
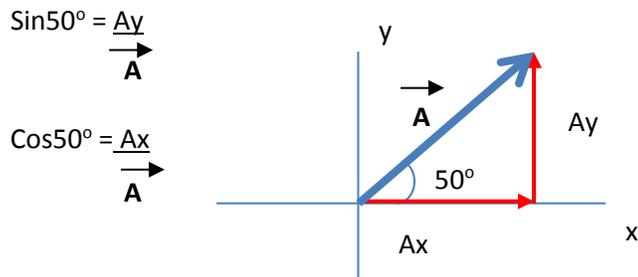
Ax = (Cos50°)($\vec{A}$)   Ax = (.643)(5m)   Ax = 3.2m

Ay = (Sin50°)($\vec{A}$)   Ay = (.766)(5m)   Ay = 3.8m
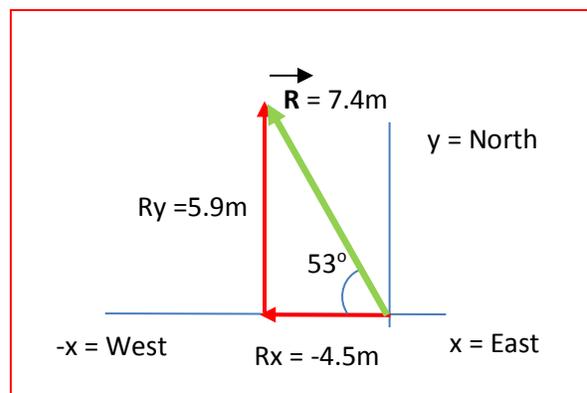
4) Draw "another" x-y coordinate system.

5) Draw second vector starting from the origin and find components.   6) Draw table and **ADD** components.

$Cos75° = \dfrac{By}{\vec{B}}$

$Sin75° = \dfrac{Bx}{\vec{B}}$

Bx

y

75°

By

B

x

Note: Bx is negative points towards west (-x)
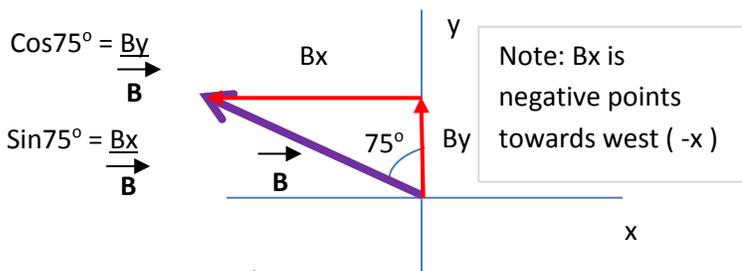
Vector	x component	y component
$\vec{A}$	Ax = 3.2m	Ay = 3.8m
$\vec{B}$	Bx = -7.7m	By = 2.1m
$\vec{R}$	Rx =-4.5m	Ry = 5.9m

Bx = (Sin75°)($\vec{B}$)   Bx = (.966)(8m)   Bx = -7.7m

By = (Cos75°)($\vec{B}$)   By = (.259)(8m)   By = 2.1m

$\vec{R}^2$ = Rx² + Ry²

$\vec{R} = \sqrt{(-4.5 * -4.5) + (5.9 * 5.9)} = 7.4m$

Angle = Tan⁻¹(|Ry|/|Rx|) = 53° North of West