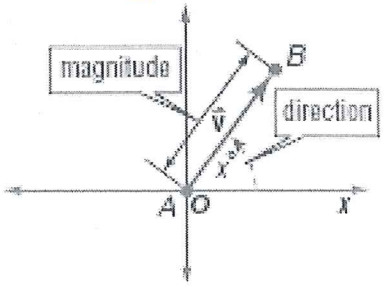
Key

9.6 Vectors



What is a Vector?

measurement that includes magnitude and direction.

- Force, acceleration, velocity

1). Magnitude

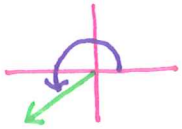
length of the vector

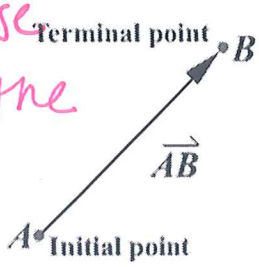
→ length = distance ←

2). Direction

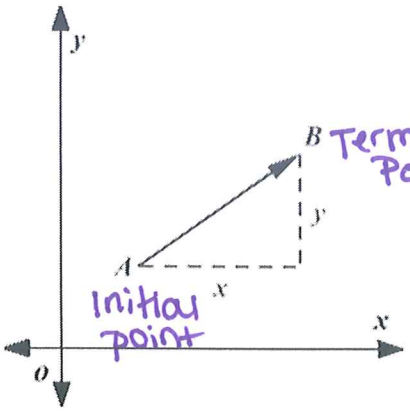
The amount of rotation counterclockwise Starting from the positive x-axis to the Vector.

Ex.)





Component Form:



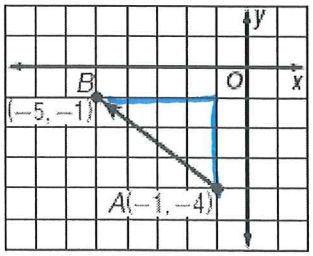
$\langle \Delta x, \Delta y \rangle$

Terminal - initial ← always in this order

$\langle x_2 - x_1 , y_2 - y_1 \rangle$

Ex1:

Write the component form of $\overrightarrow{AB}$.



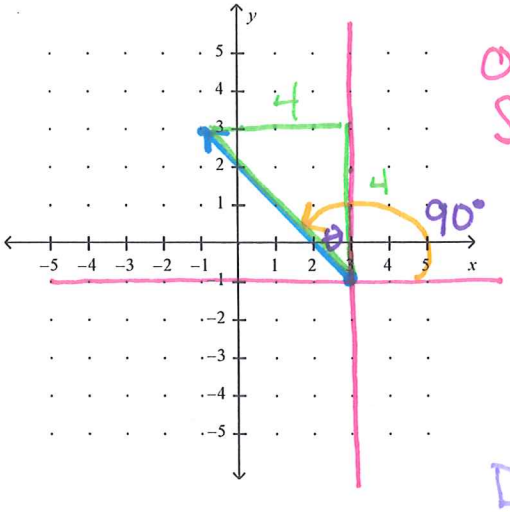
A(−1, −4) B(−5, −1)

$\langle -5-(-1), -1-(-4) \rangle$

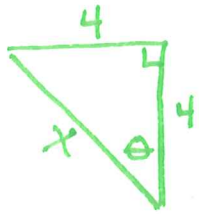
$\boxed{\langle -4, 3 \rangle}$ component Form

(3,-1)
initial oops! Terminal

Ex1 Find the magnitude and direction of $\overrightarrow{RT}$ where R(3,1) and T(-1,3).



* Because it didn't start at the origin, you need to draw a new set of axis *



magnitude is distance

$|\overrightarrow{RT}| = \sqrt{4^2+4^2}$

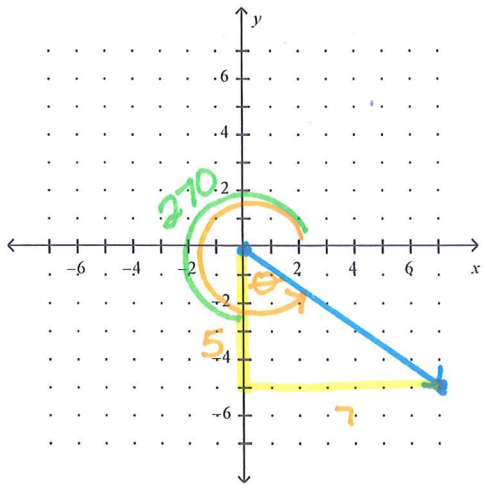
$\boxed{|\overrightarrow{RT}| = 4\sqrt{2}}$

Direction $90+\theta$, $\theta = 45°$ b/c it is a special RT Δ

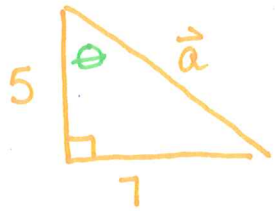
$\boxed{\therefore \text{ direction } 135°}$

Ex2 Find the magnitude and direction of the $\vec{a} = \langle 7, -5 \rangle$.

Points at this point (7,-5) and starts @ origin



magnitude



$|\vec{a}| = 5^2+7^2$

$\boxed{|\vec{a}| = \sqrt{74}}$

Direction: $270+\theta$

$\theta = \tan^{-1}\left(\frac{7}{5}\right)$

$\theta \approx 54.5°$

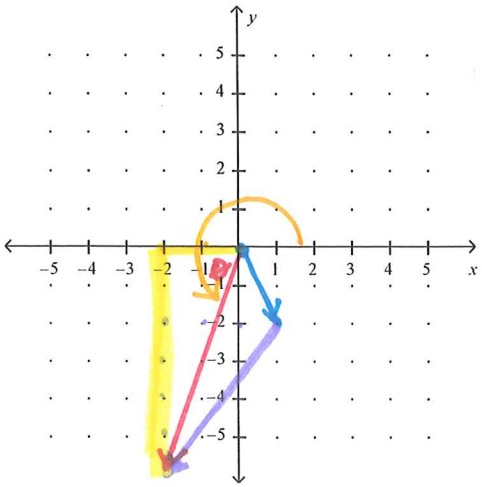
direction: 324.5°

Resultant:

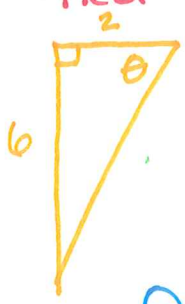
Tail to Head Method:

1) **Put one vector's tail on the head of the other vector.**
2) **Draw a vector from tail to head (the resultant)**

Ex 3: Find the magnitude and direction of the resultant vector given $\boxed{\vec{m} = \langle 1, -2 \rangle}$ and $\boxed{\vec{n} = \langle -3, -4 \rangle}$.



Red is the New vector we use :)



$|\vec{r}| = \sqrt{2^2+6^2}$

$|\vec{r}| = \sqrt{40}$

magnitude

$\boxed{|\vec{r}| = 2\sqrt{10}}$

$\theta = \tan^{-1}\left(\frac{6}{2}\right)$

$\theta \approx 71.6°$

Direction: $180+\theta$

$\boxed{\text{Direction: } 251.6°}$