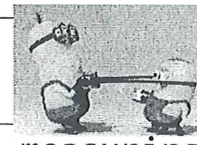
VECTORS Notes 9-6 Name: ____________

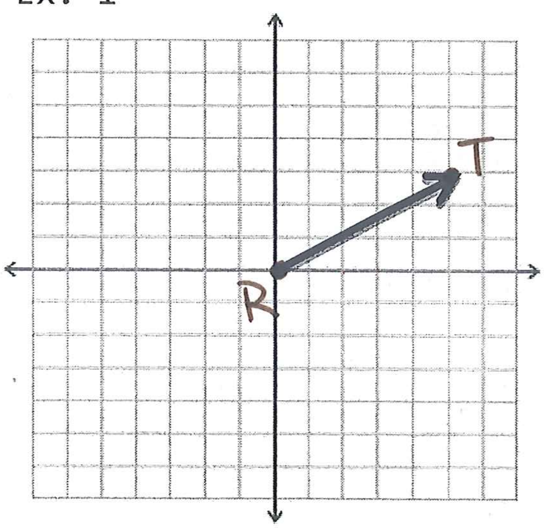
*A directed segment representing a quantity that has both magnitude and directions is called a vector

*__Magnitude__ is another term for: length



*The direction of a vector is found by measuring the angle that the vector forms with the positive x-axis or any other horizontal line.

Ex. 1



There are two ways to write a Vector. *Label points R and T.*

$\overrightarrow{RT}$ Where **R** is the Intial point

And **T** is the terminal point.

We could also use $\vec{v}$.

The vector above is in standard position because its initial point is at the origin.

We can also use component form **to describe our vector.**

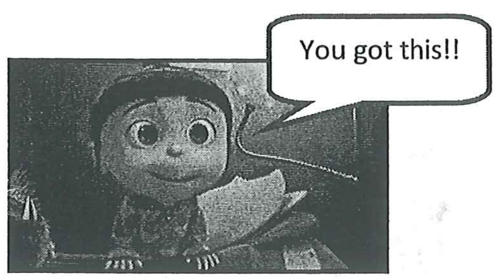
$\overrightarrow{RT} = < x_2 - x_1, y_2 - y_1 >$

What is the Component form of the vector?

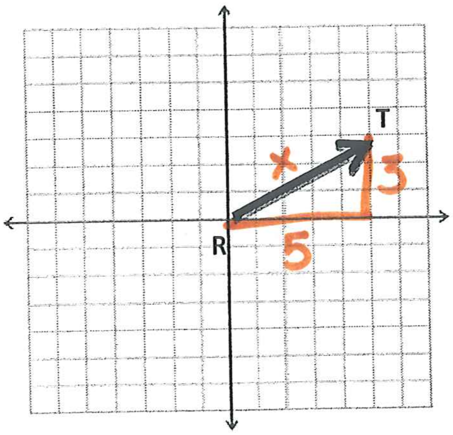
R(0 , 0 **) and T(** 5 , 3 **)**

$\overrightarrow{RT} = < 5-0 , 3-0 >$

$\overrightarrow{RT} = < 5 , 3 >$



Ex. 1 continued



To find the magnitude of a vector, use the distance formula or the Pythagorean Thm.

Find the MAGNITUDE:

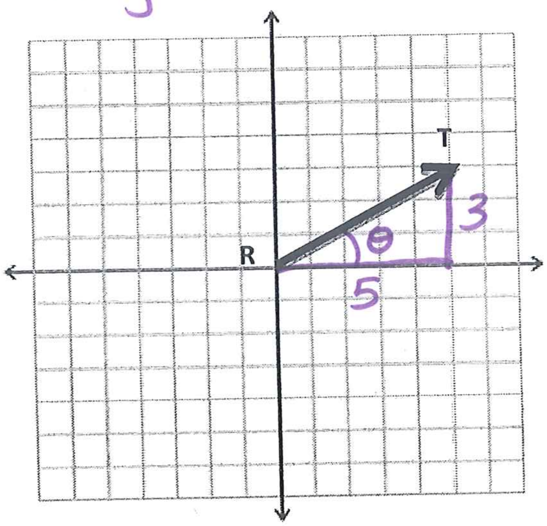
$5^2 + 3^2 = x^2$

$25 + 9 = x^2$

$\sqrt{34} = \sqrt{x^2}$

$x = \sqrt{34}$

The direction of a vector is found by measuring the angle that the vector forms with any positive x axis or any horizontal line



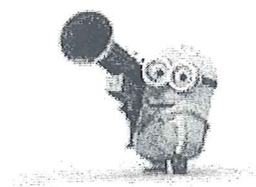
Find the DIRECTION:

$\tan\theta = \frac{3}{5}$

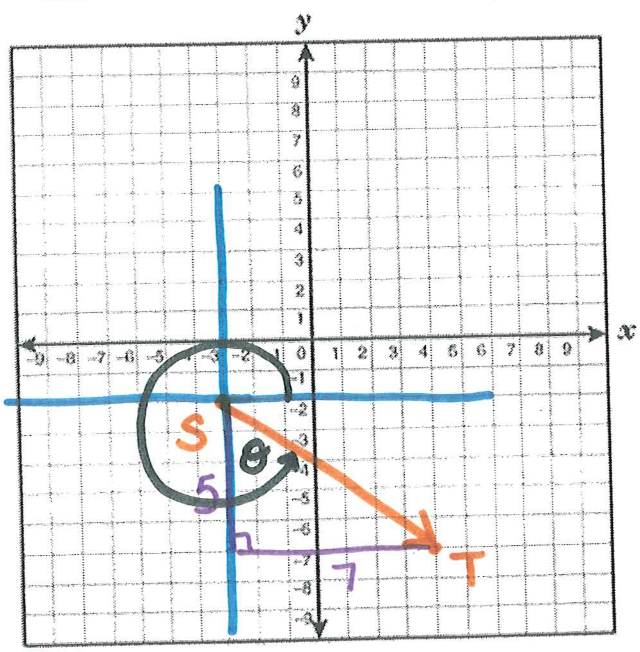
$\theta = \tan^{-1}\left(\frac{3}{5}\right)$

$\theta = 30.96^\circ$ round to nearest tenth

$\boxed{\theta = 31^\circ}$



Example 2. Find the component form, the magnitude and the direction of $\overrightarrow{ST}$ for S(-3,-2) and T(4,-7).



Component Form:

$\langle 4-(-3), -7-(-2) \rangle = \langle 7, -5 \rangle$

Magnitude:

$x^2 = 5^2 + 7^2$

$x^2 = 25 + 49$

$\sqrt{x^2} = \sqrt{74}$

$x = \sqrt{74}$

Direction:

$90 + 90 + 90 + \theta$

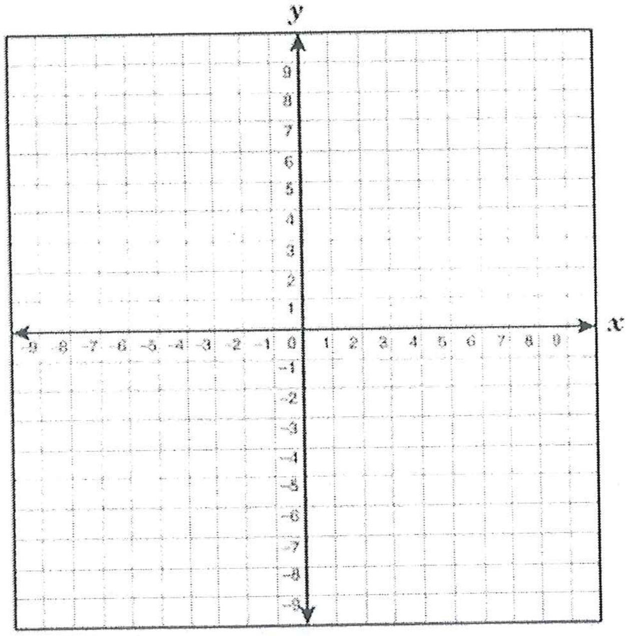
$\tan\theta = \frac{7}{5}$

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

$\theta = 54.5^\circ$

direction $= 90+90+90+54.5 = 324.5^\circ$

Example 3. Find the component form, the magnitude and the direction of $\overrightarrow{AB}$ for A(1,-3) and B(3,3).

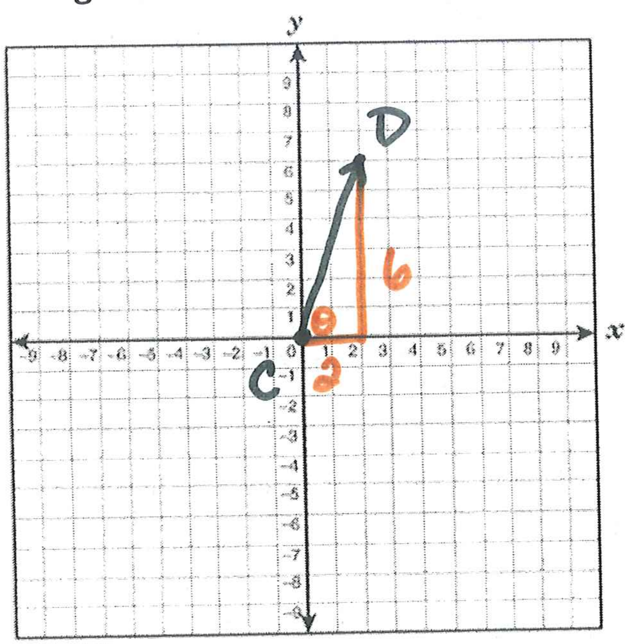


Component Form:

Magnitude:

Direction:

Example 4. Graph the standard position then find the magnitude and the direction of $\overrightarrow{CD} = \langle 2,6 \rangle$



Magnitude:

$x^2 = 2^2 + 6^2$

$x^2 = 4 + 36$ $\quad x = 2\sqrt{10}$

$x^2 = 40$

Direction:

$\tan\theta = \frac{6}{2}$

$\theta = 71.6°$

With your neighbor, what are the similarities and differences between Example 3 and 4? ____________________

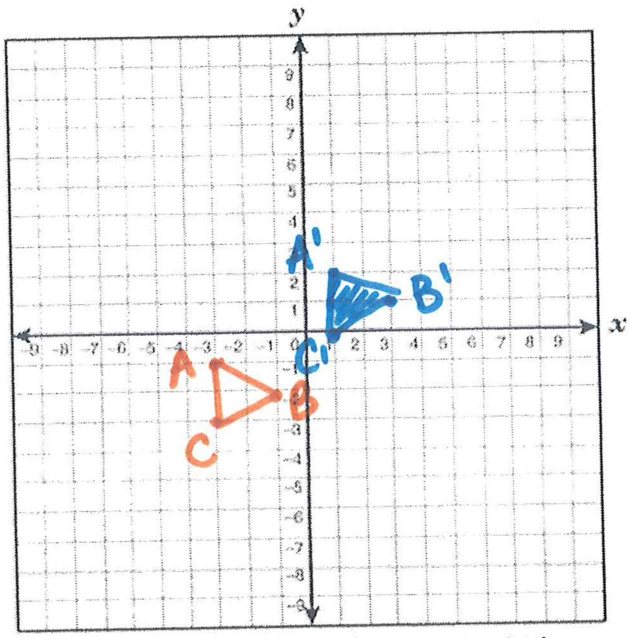
Using vectors to describe translations

Translation $(x, y) \rightarrow (x + 3, y - 4)$

Can be written in vector form as:

$\vec{v} = < 3, -4 >$

Example 1. Graph ΔABC with vertices A(-3,-1), B(-1,-2) and C(-3,-3) under the translation $\vec{v} = < 4,3 >$. ***This means:***



$(x,y) \rightarrow (x+4, y+3)$

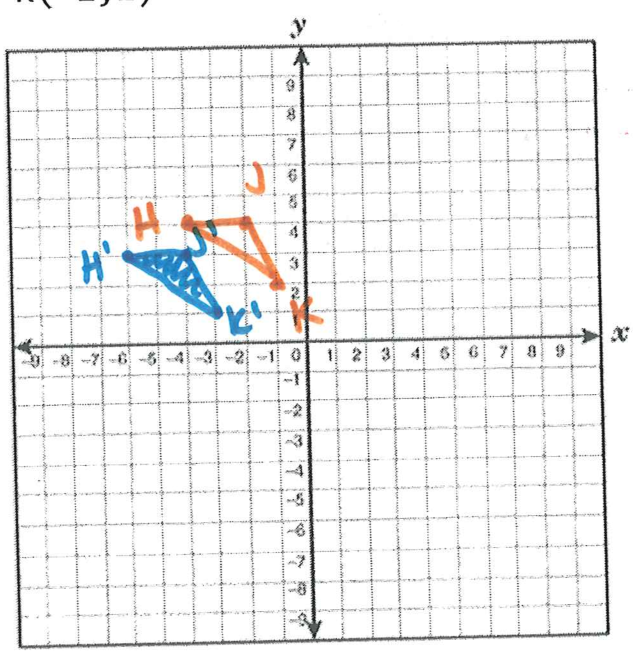
right 4, up 3

$A(-3,-1) \rightarrow A'(1,2)$

$B(-1,-2) \rightarrow B'(3,1)$

$C(-3,-3) \rightarrow C'(1,0)$

Example 2. Graph ΔHJK with vertices H(-4,4), J(-2,4) and K(-1,2) under the translation $\vec{v} = < -2,-1 >$. ***This means:***



Left 2, down 1

$H(-4,4) \rightarrow H'(-6,3)$

$J(-2,4) \rightarrow J'(-4,3)$

$K(-1,2) \rightarrow K'(-3,1)$