

Vector:

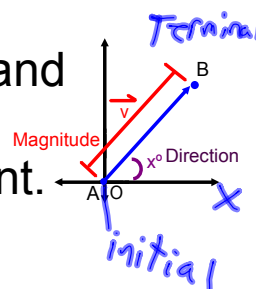
9-6 Vectors

- * A quantity that has both **magnitude** (length) and **direction**.

- * Shown by a directed segment.

- * Symbol: \vec{v} or \overrightarrow{AB}

- * Has an initial (beginning) point and a terminal (end) point.
 - A is the initial point
 - B is the terminal point

Standard Position:

- ___ * When the initial point is at the origin.

- * Ordered pair indicates the endpoint.

Vectors do not need to start at the origin, they can start anywhere. you will need to find the change in the x- and y- values, then write it as an ordered pair.

Component Form:

___ * The ordered pair representation of a vector.

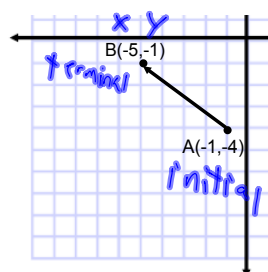
* Written like: $\langle x, y \rangle$
(change in x, change in y)

Ex 1) Write the component form of \vec{AB}

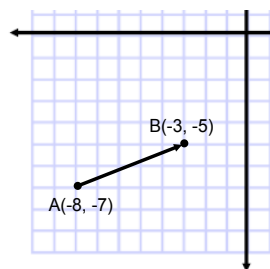
Terminal - initial

$$\vec{AB} = \langle -5 - (-1), -1 - (-4) \rangle$$

$$\vec{AB} = \langle -4, 3 \rangle$$



Ex 2) Write the component form of \vec{AB}



*The distance formula will help us find the magnitude (length) of the vector.

*Symbol for the magnitude of \vec{AB} is $\|\vec{AB}\|$

*Direction of a vector is the measure of the angle the vector forms with the positive x-axis or any other horizontal line.

*Direction will be found by using \tan^{-1} .

*Form a right triangle and the vector is the hypotenuse.

Ex 3) Find the magnitude and direction of \vec{ST} for $S(-3,-2)$ and $T(4,-7)$.

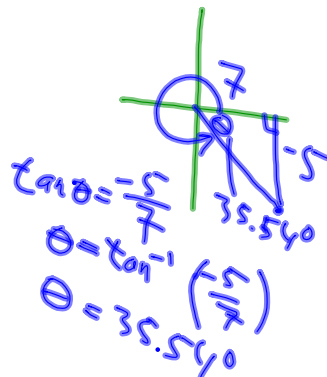
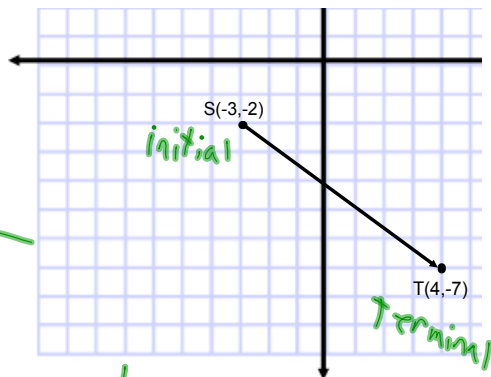
$$\vec{ST} = \langle 4 - (-3), -7 - (-2) \rangle$$

$$\vec{ST} = \langle 7, -5 \rangle$$

$$\|\vec{ST}\| = \sqrt{(7)^2 + (-5)^2}$$

$$\|\vec{ST}\| = \sqrt{49 + 25}$$

$$\|\vec{ST}\| = \sqrt{74}$$



$$360 - 35.54 = 324.50$$

Ex 4) Find the magnitude and direction of \vec{ST} for $S(3,8)$ and $T(-4,2)$.

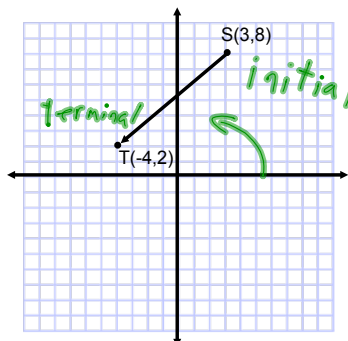
$$\vec{ST} = \langle -4-3, 2-8 \rangle$$

$$\vec{ST} = \langle -7, -6 \rangle$$

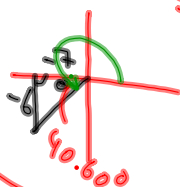
$$|\vec{ST}| = \sqrt{(-7)^2 + (-6)^2}$$

$$|\vec{ST}| = \sqrt{49 + 36}$$

$$|\vec{ST}| = \sqrt{85}$$



direction



$$\tan \theta = \frac{-6}{-7}$$

$$\theta = \tan^{-1} \frac{6}{7}$$

$$\theta \approx 40.60^\circ$$

$$180 + 40.60 = 220.60^\circ$$