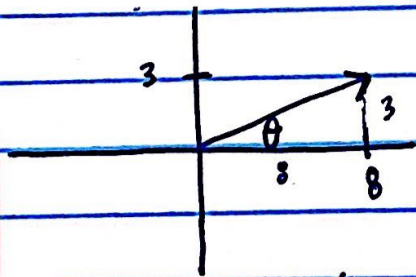


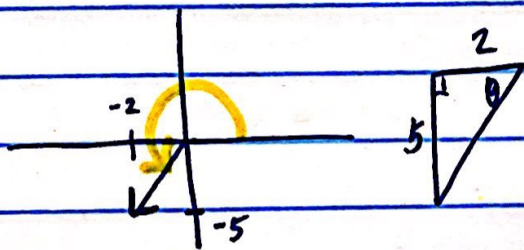
# Direction of Vectors

ex:  $\vec{v} = \langle 8, 3 \rangle$



$$\tan \theta = \frac{3}{8}$$
$$\theta = \tan^{-1}\left(\frac{3}{8}\right)$$
$$\theta \approx 20.6^\circ$$

ex:  $\vec{v} = \langle -2, -5 \rangle$

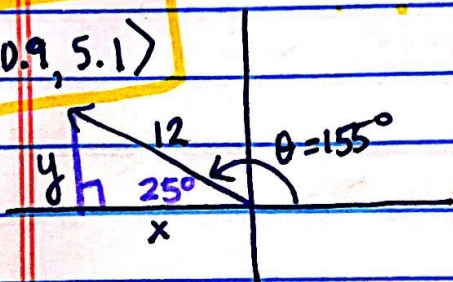


$$\tan \theta = \frac{5}{2}$$
$$\theta \approx 68.2^\circ + 180^\circ = 248.2^\circ$$

If  $\langle x, y \rangle$  then  $\theta = \tan^{-1}\left(\frac{y}{x}\right)$

ex:  $\|\vec{v}\| = 12$ ,  $\theta = 155^\circ$ , find the vector components

$\langle -10.9, 5.1 \rangle$



$$\cos 25^\circ = \frac{x}{12}$$

$$x = 12 \cdot \cos 25^\circ \approx 10.9$$

$$\sin 25^\circ = \frac{y}{12}$$

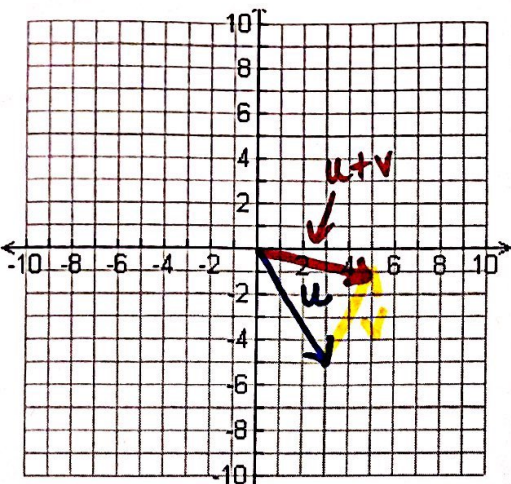
$$y = 12 \sin 25^\circ \approx 5.1$$

$\vec{v}$  = vector components  $\langle \|\vec{v}\| \cos \theta, \|\vec{v}\| \sin \theta \rangle$

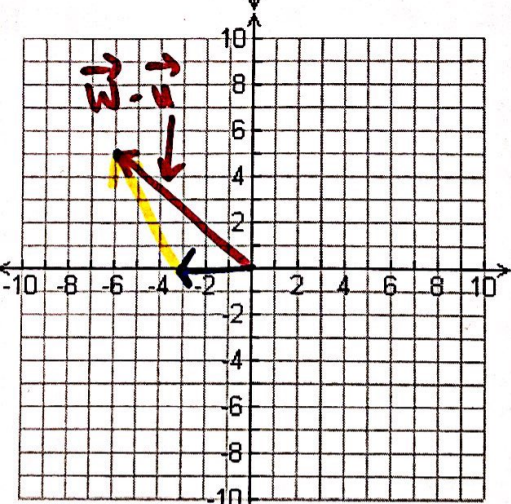


Vector +, -, scalar x

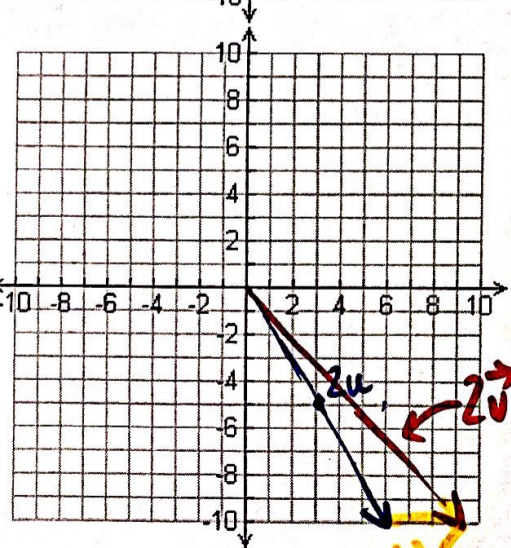
$$\text{Let } \vec{u} = \langle 3, -5 \rangle \quad \vec{v} = \langle 2, 4 \rangle \quad \vec{w} = \langle -3, 0 \rangle$$



$$\text{ex: } \vec{u} + \vec{v} = \langle 3, -5 \rangle + \langle 2, 4 \rangle \\ = \langle 5, -1 \rangle$$



$$\text{ex: } \vec{w} - \vec{u} = \langle -3, 0 \rangle - \langle 3, -5 \rangle \\ = \langle -6, 5 \rangle$$



$$\text{ex: } 2\vec{u} - \vec{w} = 2\langle 3, -5 \rangle - \langle -3, 0 \rangle \\ = \langle 6, -10 \rangle - \langle -3, 0 \rangle \\ = \langle 9, -10 \rangle$$

