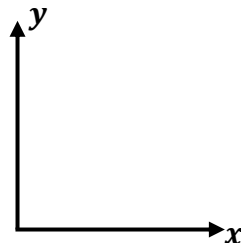
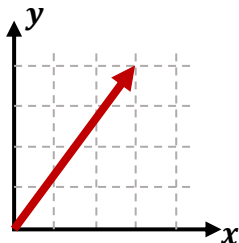


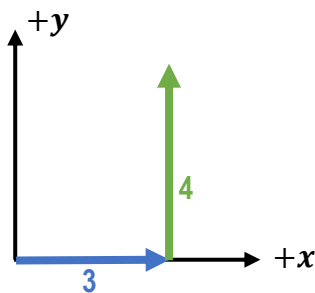
CONCEPT: VECTOR COMPOSITION AND DECOMPOSITION

- You'll need to do vector math **without** using grids/ squares.
 - Vectors have **magnitude** (length), **direction** (angle θ_x), and **components** (legs).



VECTOR COMPOSITION

1D Components $\rightarrow$ 2D Vector (Magnitude & Direction)



- Components A_x & A_y combine $\rightarrow$ magnitude $\vec{A}$
 - Points in direction θ_x

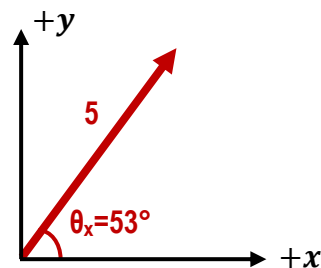
VECTOR COMPOSITION

$$A = \sqrt{A_x^2 + A_y^2}$$

$$\theta_x = \underline{\hspace{2cm}}$$

VECTOR DECOMPOSITION

2D Vector (Magnitude & Direction) $\rightarrow$ 1D Components



- Use **SOH-CAH-TOA** to decompose $\vec{A} \rightarrow$ components A_x & A_y .
 - Angle θ_x must be drawn to nearest $\underline{\hspace{2cm}}$

VECTOR DECOMPOSITION

$$A_x = \underline{\hspace{2cm}}$$

$$A_y = \underline{\hspace{2cm}}$$

EXAMPLE: For each of the following, draw the vector and solve for the missing variable(s).

a) $A_x = 8\text{m}$, $A_y = 6\text{m}$, $A = ?$ $\theta_x = ?$

b) $B = 13\text{m}$, $\theta_x = 67.4^\circ$, $B_x = ?$ $B_y = ?$

EXAMPLE: A vector **A** has y-component of 12 m makes an angle of 67.4° with the positive x-axis. **(a)** Find the magnitude of **A**. **(b)** Find the x-component of the vector.

Vector Composition (Components→Vector)	Vector Decomposition (Vector→Components)
$A = \sqrt{A_x^2 + A_y^2}$ $\theta_x = \tan^{-1} \left(\frac{A_y}{A_x} \right)$	$A_x = A \cos(\theta_x)$ $A_y = A \sin(\theta_x)$