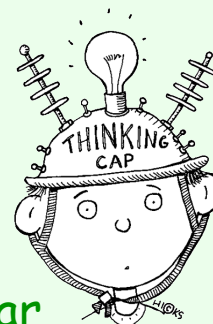## 4.1 | Vector Components

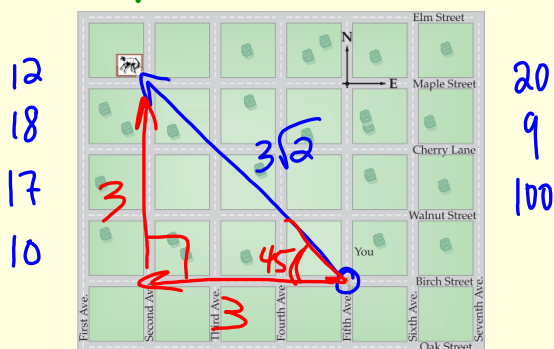**STANDARDS**

4.1 | **I can define a vector and represent vectors in multiple forms.**
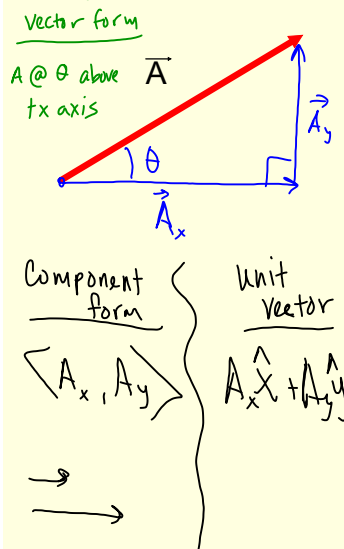
What is the difference between a scalar and a vector?

THINKING CAP

Components of a Vector

12
18
17
10

3

$3\sqrt{2}$

45

20
9
100

3

Dist = 6 blks (20)

Components of a Vector

Vector form

A @ θ above $\overrightarrow{A}$
$+x$ axis

$\overrightarrow{A_y}$

θ

$\overrightarrow{A_x}$

Component form | Unit Vector

$\langle A_x, A_y \rangle$ | $A_x \hat{x} + A_y \hat{y}$

DON'T FORGET
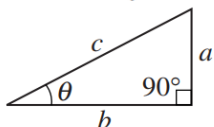
Right triangle
$$c^2 = a^2 + b^2$$
$$\sin\theta = \frac{a}{c}$$
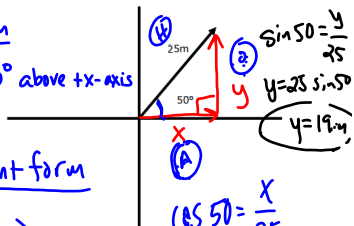$$\cos\theta = \frac{b}{c}$$
$$\tan\theta = \frac{a}{b}$$

c a
θ $90°$
b

Signs of Component Vectors

y

$(-,+)$	$(+,+)$
$(-,-)$	$(+,-)$

x

$\langle -5, 3 \rangle$
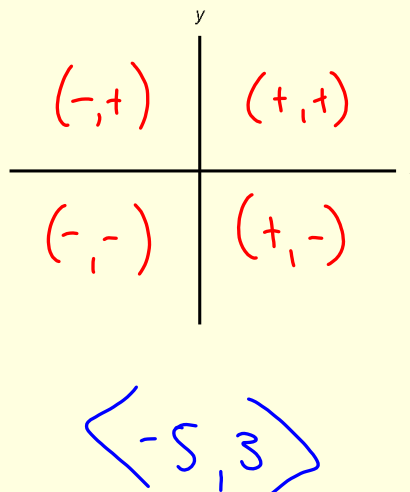
Vector Components

Find the x and y components of the following vector.

Vector form

25 m @ 50° above +x-axis

component form

⟨16m, 19m⟩

Unit vector

$16m \hat{x} + 19m \hat{y}$
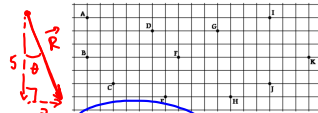
25m

$\sin 50 = \dfrac{y}{25}$

$y = 25 \sin 50$

y = 19m

50°

$\cos 50 = \dfrac{x}{25}$

$x = 25 \cos 50$

$x = 16m$

Vector Components

Consider the grid below with several marked locations.

$\vec{R}$

5, θ, 7, 2

Determine the resultant displacement for a person who walks from location...

A to C: ⟨2, -5⟩   J to K to F: _____

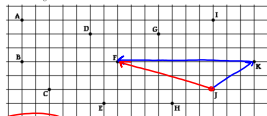Write the answers in vector notation and in component notation.

$R = \sqrt{2^2 + 5^2} = \sqrt{29} = 5.4\, u$

$\tan \theta = \dfrac{2}{5}$

$\theta = \tan^{-1}\left(\dfrac{2}{5}\right) = \begin{vmatrix} 22° \\ right\ of \\ -y\ axis \end{vmatrix}$

Vector Components

Consider the grid below with several marked locations.

⟨-7, 2⟩

$\vec{R}$

2, θ, 7

$R = \sqrt{2^2 + 7^2} = \sqrt{53} = 7.3\, u$

$\theta = \tan^{-1}\left(\dfrac{2}{7}\right) = \begin{matrix} @ \\ 16° \\ above \\ -x\ axis \end{matrix}$
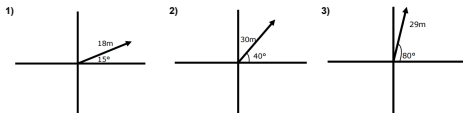
7

74-θ, 2, 74° left +y axis
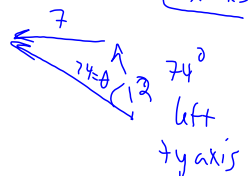
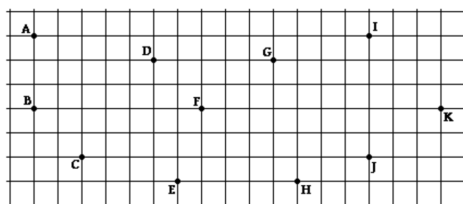## HOMEWORK
Worksheet

Name _____   Date _____

Finding the Components of a Vector – Independent Practice Worksheet

Find the x and y components of each of the following vectors.

1)

18m
15°

2)

30m
40°

3)

29m
80°

4) Consider the grid below with several marked locations.

Determine the direction of the resultant displacement for a person who walks from location ...
a. A to C: _____   b. D to B: _____   c. G to D: _____

d. F to A: _____   e. F to E: _____   f. C to H: _____

g. E to K: _____   h. J to K to F: _____   i. I to K to B: _____

AP PHYSICS