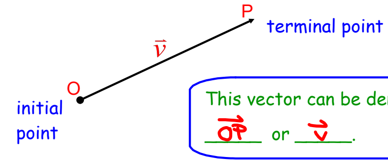
Geometric Vectors p. 69

Vector - a quantity or directed distance, that has magnitude & amplitude (direction)



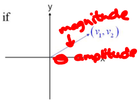
This vector can be denoted as $\overrightarrow{OP}$ or $\vec{v}$.

The length of a vector is called the magnitude.

- measure in centimeters
- it is represented as $|v|$

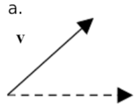
The amplitude of the vector is the directed angle between the horizontal line (positive x-axis) & the vector (object)

A vector is in standard position if the initial point is at the origin.



Find the magnitude and direction of the following vectors.

a.



b.

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Adding & Subtracting Vectors

When two vectors are added or subtracted to produce a third vector this vector is called the **resultant**. The resultant vector is marked with a double arrowhead.

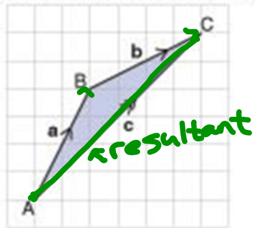
Triangle law

To add two vectors means apply the first vector then apply the second vector.

$\overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AC}$

or $\mathbf{a} + \mathbf{b} = \mathbf{c}$

This is known as the **triangle law**.



Parallelogram law

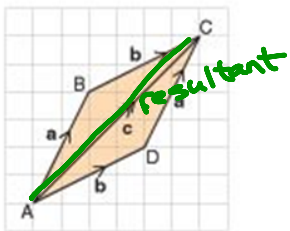
The **parallelogram law** shows that going from A to C via B is the same as going from A to C via D.

In other words:

$\overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AC}$ is the same as

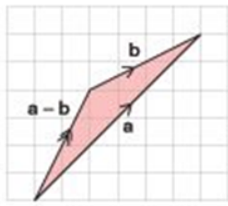
$\overrightarrow{AD} + \overrightarrow{DC} = \overrightarrow{AC}$

or $\mathbf{a} + \mathbf{b} = \mathbf{b} + \mathbf{a} = \mathbf{c}$



Subtracting a vector is the same as adding its inverse:

$\mathbf{a} - \mathbf{b}$ is the same as $\mathbf{a} + (-\mathbf{b})$.



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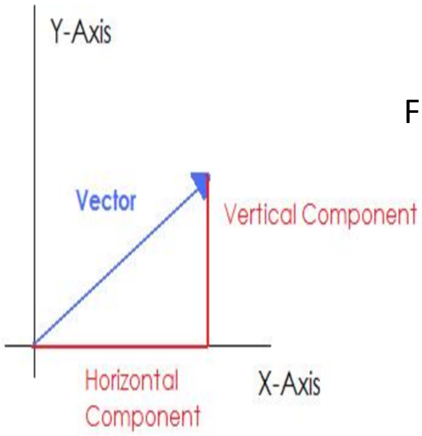
Horizontal & Vertical Components:



$$\langle \textit{horizontal}, \textit{vertical} \rangle$$

Find the component form of vector u, v, & w above.

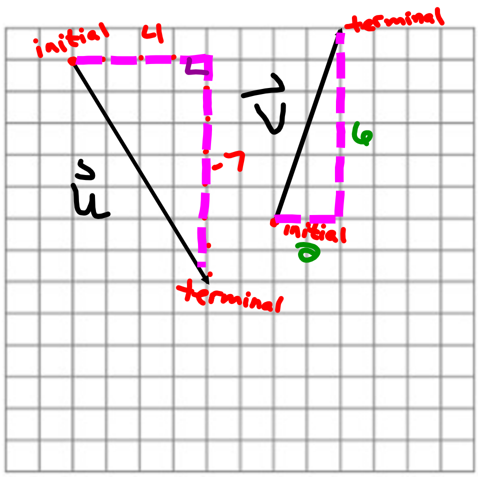
1. $\vec{u}$

2. $\vec{v}$

3.

Nov 2-9:44 AM

Given vectors $\vec{u}$ and $\vec{v}$. Find their component form and magnitude:



1. $\vec{u}$ $\langle 4,-7\rangle$

$a^2+b^2=c^2$

$(4)^2+(-7)^2=c^2$

$16+49=c^2$

$c=\sqrt{65}$

$|u|=\sqrt{65}$

2. $\vec{v}$ $\langle 2,6\rangle$

$(2)^2+(6)^2=c^2$

$\sqrt{40}=c$

$\sqrt{4\cdot 10}$

$|v|=2\sqrt{10}$

1. $\vec{u}$ $\langle 4,-7\rangle$, $\sqrt{65}$

2. $\vec{v}$ $\langle 2,6\rangle$, $2\sqrt{10}$

Nov 4-8:55 PM

$\vec{u} = \langle 4, -7 \rangle$ $\vec{v} = \langle 2, 6 \rangle$

horiz. vert.

p.69b

Sketch the following:

3. $\overrightarrow{2u}$ or $\vec{u} + \vec{u}$

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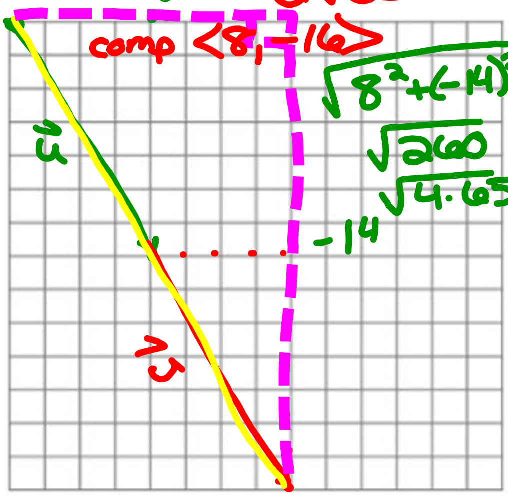
magnitude of resultant $2\sqrt{65}$



comp $\langle 8, -16 \rangle$

$\sqrt{8^2 + (-14)^2}$

$\sqrt{260}$

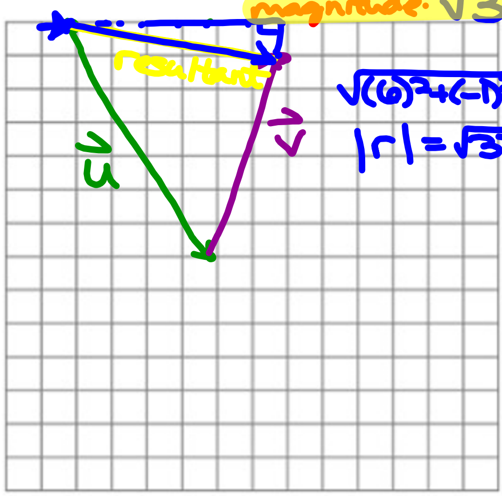
$\sqrt{4 \cdot 65}$

-14

4. $\vec{u} + \vec{v}$

resultant components: $\langle 6, -1 \rangle$

magnitude: $\sqrt{37}$



$\sqrt{(6)^2 + (-1)^2}$

$|r| = \sqrt{37}$

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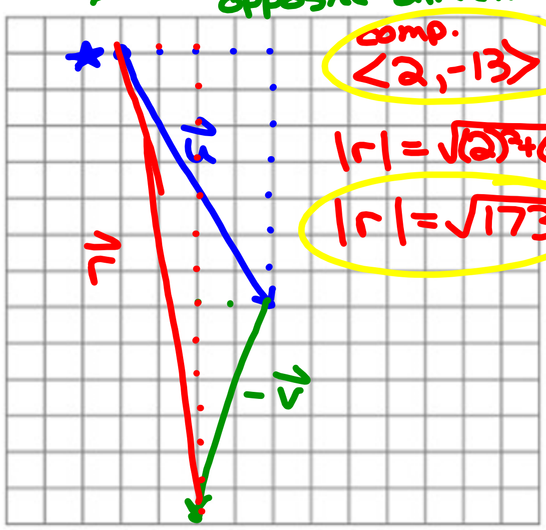
5. $\vec{u} - \vec{v}$ $\langle 4, -7 \rangle - \langle 2, 6 \rangle$

$+ \langle -2, -6 \rangle$

* subtraction goes the opposite direction



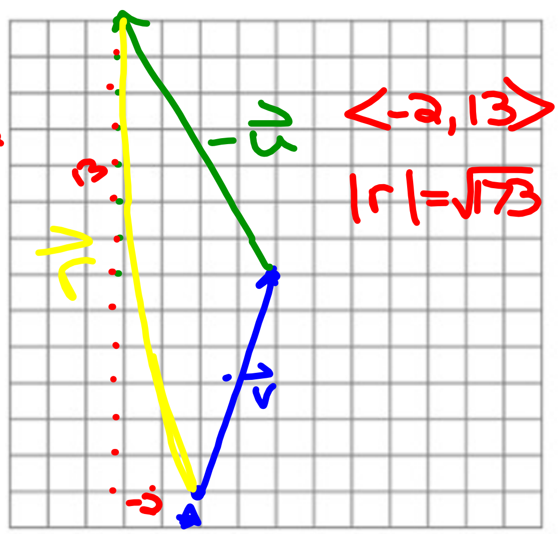
comp. $\langle 2, -13 \rangle$

$|r| = \sqrt{(2)^2 + (-13)^2}$

$|r| = \sqrt{173}$

6. $\vec{v} - \vec{u}$ $\langle 2, 6 \rangle - \langle 4, -7 \rangle$

$+ \langle -4, 7 \rangle$



$\langle -2, 13 \rangle$

$|r| = \sqrt{173}$

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