Warm up

1. Find the component form of the vector $\overrightarrow{PQ}$ where P (2, 8) and Q (-3, 2).

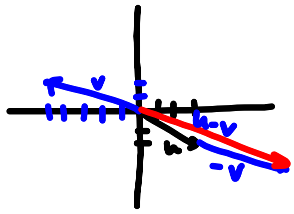
$\langle -5, -6 \rangle$ $\langle -3-2 \; , \; 2-8 \rangle$

2. Find the unit vector for $\overrightarrow{PQ}$ in problem #1.

$\left\langle -\frac{5}{\sqrt{61}}, -\frac{6}{\sqrt{61}} \right\rangle$ $\|\overrightarrow{PQ}\| = \sqrt{(-5)^2 + (-6)^2} = \sqrt{61}$

3. For the vectors $u = \langle 3, -2 \rangle$ and $v = \langle -5, 2 \rangle$:

   a. Sketch $u - v$



   b. Find $3v - 2u$ $= \langle -21, 10 \rangle$

Apr 7-3:19 PM

GO COUGARS!

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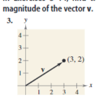
In Exercises 3–14, find the component form and the magnitude of the vector **v**.

3.



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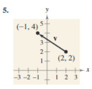

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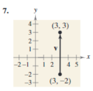
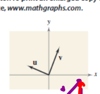
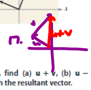


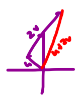
	Initial Point	*Terminal Point*
9.	$(-1, 5)$	$(15, 12)$
11.	$(-3, -5)$	$(5, 1)$
13.	$(1, 3)$	$(-8, -9)$

In Exercises 15–20, use the figure to sketch a graph of the specified vector. To print an enlarged copy of the graph, go to the website, *www.mathgraphs.com*.



17.





15. $-\mathbf{v}$
17. $\mathbf{u} + \mathbf{v}$
19. $\mathbf{u} + 2\mathbf{v}$

In Exercises 21–28, find (a) $\mathbf{u} + \mathbf{v}$, (b) $\mathbf{u} - \mathbf{v}$, and (c) $2\mathbf{u} - 3\mathbf{v}$. Then sketch the resultant vector.

21. $\mathbf{u} = \langle 2, 1 \rangle$, $\mathbf{v} = \langle 1, 3 \rangle$
23. $\mathbf{u} = \langle -5, 3 \rangle$, $\mathbf{v} = \langle 0, 0 \rangle$ a) $\langle -5, 3 \rangle$ b) $\langle -5, 3 \rangle$

In Exercises 29–38, find a unit vector in the direction of the given vector.

29. $\mathbf{u} = \langle 3, 0 \rangle$
31. $\mathbf{v} = \langle -2, 2 \rangle$

In Exercises 39–42, find the vector **v** with the given magnitude and the same direction as **u**.

	Magnitude	*Direction*
39.	$\|\mathbf{v}\| = 5$	$\mathbf{u} = \langle 3, 3 \rangle$
41.	$\|\mathbf{v}\| = 9$	$\mathbf{u} = \langle 2, 5 \rangle$

$\sqrt{9+9} = \sqrt{18} = 3\sqrt{2}$

$\left\langle \frac{\cancel{3}\,1}{\cancel{3}\sqrt{2}}, \frac{\cancel{3}\,1}{\cancel{3}\sqrt{2}} \right\rangle$ unit vector

$5\left\langle \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right\rangle$

$\left\langle \frac{5}{\sqrt{2}}, \frac{5}{\sqrt{2}} \right\rangle$

Feb 2-9:51 PM

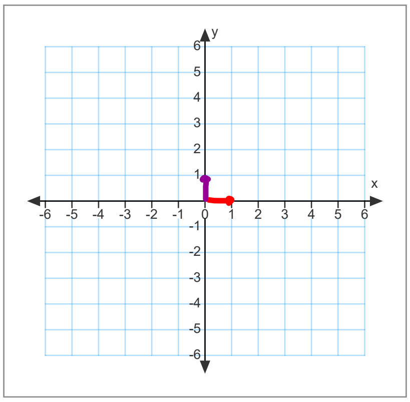
6.3 Day 2 Vectors in a Plane

Standard Unit Vectors

Trig Component Form

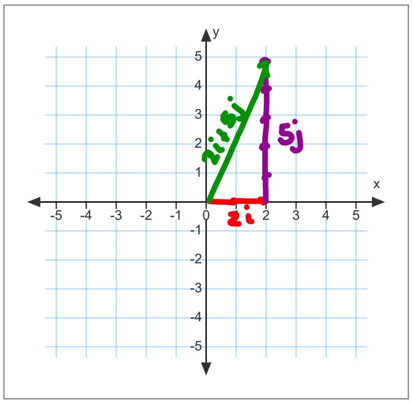
Apr 9-6:07 AM

Standard Unit Vectors



$$i = \langle 1,0 \rangle$$

$$j = \langle 0,1 \rangle$$



$$v = \langle 2,5 \rangle = 2i + 5j$$

Mar 22-12:15 PM

Example 1

If $u = 3i + 4j$, $v = -2i + 3j$ find u+v

$3i - 2i + 4j + 3j$

$i + 7j$

Example 2

Now find 2u-4v $= 14i - 4j$

Mar 22-12:19 PM

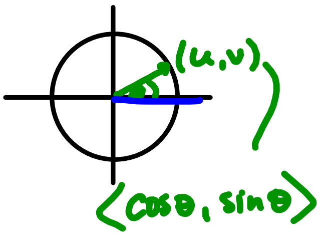
If U is a unit vector on a unit circle, then

$u = \langle u, v \rangle$ component form

$= \langle cos\theta, sin\theta \rangle$ trig form

$= icos\theta + jsin\theta$ unit vector trig form

θ is the direction angle



For any vector with direction angle θ

not just on unit circle

$$V = \|v\| \langle cos\theta, sin\theta \rangle$$
$$= \langle \|v\| cos\theta, \|v\| sin\theta \rangle$$

What if you know the components but not the angle??

Remember that $\tan\theta = \frac{\sin\theta}{\cos\theta} \rightarrow \tan\theta = \frac{y}{x}$

Apr 9-6:11 AM

Example 3 Find the trig component form of the vector.

$v = \langle -1, 1 \rangle$ 1. Find $\| v \|$ $= \sqrt{(-1)^2 + 1^2} = \sqrt{2}$

Q2

2. Find θ $\tan\theta = \frac{1}{-1}$

$\tan\theta = -1$ $\theta = 135$ or $\frac{3\pi}{4}$

$\langle \sqrt{2}\cos 135, \sqrt{2}\sin 135 \rangle$

Example 4 Find the trig unit vector form of the vector.

$v = 3i - 2j$

$\langle 3, -2 \rangle$ $\|v\| = \sqrt{9+4} = \sqrt{13}$ $\tan\theta = \frac{-2}{3}$

Q4

$\theta = 33.69$

$\sqrt{13}\cos 326.31 i + \sqrt{13}\sin 326.31 j$ $\theta = 326.31$

Example 5 Find component form if $\| v \| = 5, \quad \theta = 45^\circ$

$\langle \quad \rangle$

$\langle 5\cos 45, 5\sin 45 \rangle$

$\langle 5(\frac{1}{\sqrt{2}}), 5(\frac{1}{\sqrt{3}}) \rangle$

$\langle \frac{5}{\sqrt{2}}, \frac{5}{\sqrt{2}} \rangle$

Mar 22-12:29 PM

Find the component form of the sum of u and v with the given direction angles.

$\|u\| = 4 \quad \theta_u = 60^\circ$ $\langle 4\cos 60, 4\sin 60 \rangle$

$\|v\| = 4 \quad \theta_v = 90^\circ$ $+ \langle 4\cos 90, 4\sin 90 \rangle$

$\langle 2, 2\sqrt{3} \rangle$

$\langle 0, 4 \rangle$

$\langle 2, 4 + 2\sqrt{3} \rangle$

Mar 28-8:32 AM