GO COUGARS!

Homework Questions

In Exercises 45–50, find the vector v with the given magnitude and the same direction as u.

	Magnitude	*Direction*
45.	$\|\mathbf{v}\| = 8$	$\mathbf{u} = \langle 5, 6\rangle$

	Magnitude	*Direction*
47.	$\|\mathbf{v}\| = 7$	$\mathbf{u} = 3\mathbf{i} + 4\mathbf{j}$
48.	$\|\mathbf{v}\| = 10$	$\mathbf{u} = 2\mathbf{i} - 3\mathbf{j}$
49.	$\|\mathbf{v}\| = 8$	$\mathbf{u} = -2\mathbf{i}$
50.	$\|\mathbf{v}\| = 4$	$\mathbf{u} = 5\mathbf{j}$

In Exercises 51–54, the initial and terminal points of a vector are given. Write the vector as a linear combination of the standard unit vectors i and j.

	Initial Point	*Terminal Point*
51.	$(-3, 1)$	$(4, 5)$
52.	$(0, -2)$	$(3, 6)$
53.	$(-1, -5)$	$(2, 3)$

In Exercises 55–60, find the component form of v and sketch the specified vector operations geometrically, where $\mathbf{u} = 2\mathbf{i} - \mathbf{j}$ and $\mathbf{w} = \mathbf{i} + 2\mathbf{j}$.

55. $\mathbf{v} = \frac{3}{2}\mathbf{u}$ **56.** $\mathbf{v} = \frac{2}{3}\mathbf{w}$

57. $\mathbf{v} = \mathbf{u} + 2\mathbf{w}$ **58.** $\mathbf{v} = -\mathbf{u} + \mathbf{w}$

59. $\mathbf{v} = \frac{1}{2}(3\mathbf{u} + \mathbf{w})$ **60.** $\mathbf{v} = 2\mathbf{u} - 2\mathbf{w}$

In Exercises 61–66, find the magnitude and direction angle of the vector v.

61. $\mathbf{v} = 5(\cos 30°\mathbf{i} + \sin 30°\mathbf{j})$

62. $\mathbf{v} = 8(\cos 135°\mathbf{i} + \sin 135°\mathbf{j})$

63. $\mathbf{v} = 6\mathbf{i} - 6\mathbf{j}$ **64.** $\mathbf{v} = -4\mathbf{i} - 7\mathbf{j}$

65. $\mathbf{v} = -2\mathbf{i} + 5\mathbf{j}$ **66.** $\mathbf{v} = 12\mathbf{i} + 15\mathbf{j}$

In Exercises 67–72, find the component form of v given its magnitude and the angle it makes with the positive x-axis. Sketch v.

	Magnitude	*Angle*
67.	$\|\mathbf{v}\| = 3$	$\theta = 0°$
68.	$\|\mathbf{v}\| = 1$	$\theta = 45°$
69.	$\|\mathbf{v}\| = 3\sqrt{2}$	$\theta = 150°$
70.	$\|\mathbf{v}\| = 4\sqrt{3}$	$\theta = 90°$
71.	$\|\mathbf{v}\| = 2$	$\mathbf{v}$ in the direction $\mathbf{i} + 3\mathbf{j}$
72.	$\|\mathbf{v}\| = 3$	$\mathbf{v}$ in the direction $3\mathbf{i} + 4\mathbf{j}$

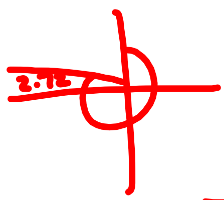
In Exercises 73–76, find the component form of the sum of u and v with direction angles $\theta_{\mathbf{u}}$ and $\theta_{\mathbf{v}}$.

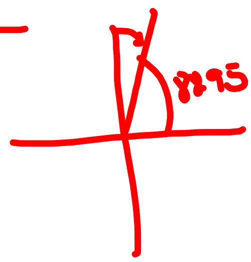
	Magnitude	*Angle*
73.	$\|\mathbf{u}\| = 5$	$\theta_{\mathbf{u}} = 60°$
	$\|\mathbf{v}\| = 5$	$\theta_{\mathbf{v}} = 90°$
75.	$\|\mathbf{u}\| = 20$	$\theta_{\mathbf{u}} = 45°$
	$\|\mathbf{v}\| = 50$	$\theta_{\mathbf{v}} = 150°$

Feb 2-9:51 PM

Vector Application Worksheet Answers

1. $\langle -223.99, 480.34\rangle$
2. $\langle 250, -433.01\rangle$
3. speed = 362.85 mph, bearing = 337.84
4. speed = 530.79, bearing = 174.32
5. speed = 18.91 mph, bearing = 251.63
6. speed = 433.48, bearing = 272.72
7. speed = 758.91, bearing = 1.05





Apr 17-3:25 PM

6.4 Vectors and Dot Products

find dot products
find the angle between two vectors
orthogonal vectors

Apr 10-1:46 PM

Dot product of a vector: $u \bullet v = u_1v_1 + u_2v_2$

The dot product is a constant or scalar

Ex1 If $u = \langle 3,-1 \rangle$ $v = \langle -2,-1 \rangle$ find the dot product

$u \cdot v = (3)(-2) + (-1)(-1)$
$= -6 + 1$
$= -5$

Ex2a If $u = \langle -5,2 \rangle$ $v = \langle 2,5 \rangle$ find the dot product

$u \cdot v = (-5)(2) + (2.5)$
$= 0$

Ex2b If $u = \langle 0,2 \rangle$ $v = \langle 5,0 \rangle$ find the dot product

$u \cdot v = 0$

EX3 Let $u = \langle 1,-2 \rangle$ and $v = \langle 0,6 \rangle$ and $w = \langle 3,-4 \rangle$

Find $(u \bullet v)w$

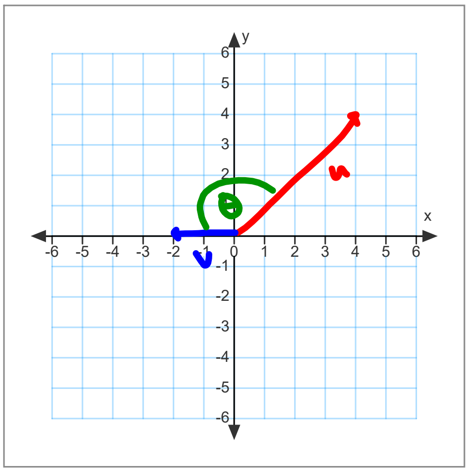
$u \cdot v = 0 - 12$
$= -12$
$-12\langle 3, -4 \rangle$
$\langle -36, 48 \rangle$

Mar 22-11:50 AM

Finding the angle between 2 vectors

$$Cos\theta = \frac{u \bullet v}{\|u\|\|v\|}$$

Let $u = \langle 4,4 \rangle$ and $v = \langle -2,0 \rangle$, find the angle between the vectors.



$u \cdot v = 4 \cdot -2 + 4 \cdot 0$
$= -8$

$\|u\| = \sqrt{4^2+4^2} = \sqrt{32} = 4\sqrt{2}$

$\|v\| = \sqrt{2^2+0} = 2$

$\cos\theta = \dfrac{-8}{(4\sqrt{2})(2)}$

$\cos\theta = \dfrac{-\cancel{8}}{\cancel{8}\sqrt{2}} = \dfrac{-1}{\sqrt{2}}$

RA 45

$\theta = 135°$ or $\frac{3\pi}{4}$

Mar 22-12:03 PM

Let's revisit the zero dot products and find the angle in between

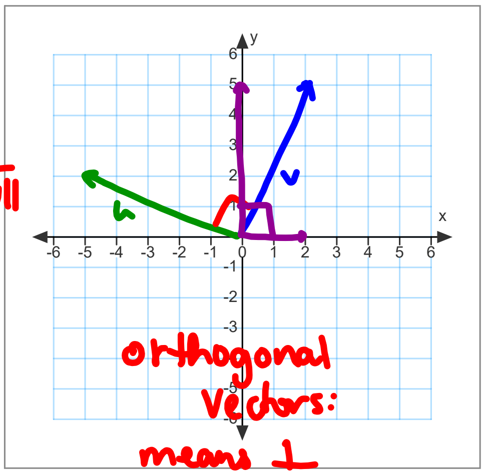
$u = \langle -5,2 \rangle \quad v = \langle 2,5 \rangle$ $\qquad\qquad$ $u = \langle 0,2 \rangle \quad v = \langle 5,0 \rangle$

$u \cdot v = 0$

$\theta = 90$

$\cos\theta = \dfrac{0}{\|u\| \|v\|}$

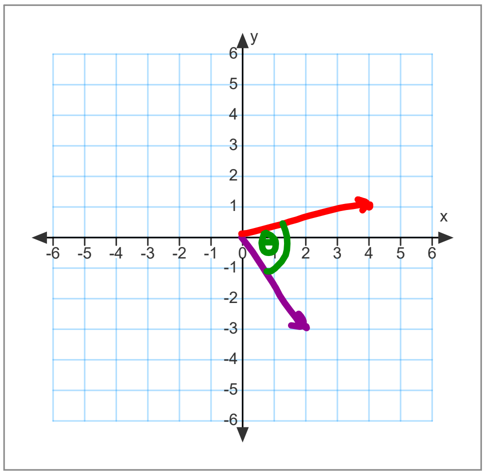
$\theta = 90$



orthogonal vectors: means ⊥

Apr 11-1:41 PM

Let u= 2i-3j and v= 4i +j, find the angle between the vectors. $Cos\theta = \dfrac{u \bullet v}{\|u\|\|v\|}$



$u \cdot v = 2(4) + -3(1)$
$= 5$

$\|u\| = \sqrt{4+9} = \sqrt{13}$

$\|v\| = \sqrt{16+1} = \sqrt{17}$

$\cos\theta = \dfrac{5}{\sqrt{13 \cdot 17}}$

$\theta = 70.35^\circ$

Apr 10-1:56 PM

HOMEWORK

p 445 1-9 odd, 17-31 odd, omit #23

Feb 2-9:51 PM