

Let $\mathbf{u} = \langle -1, 3 \rangle$, $\mathbf{v} = \langle 4, 7 \rangle$ and $\mathbf{w} = \langle -2, 5 \rangle$. Find the component form of the vector.

A) $\mathbf{u} + \mathbf{v}$

$$\langle -1, 3 \rangle + \langle 4, 7 \rangle$$

$$\langle -1 + 4, 3 + 7 \rangle$$

$$\langle 3, 10 \rangle$$

$$\text{mag} = \sqrt{109}$$

B) $\mathbf{u} - \mathbf{w}$

$$\langle -1, 3 \rangle - \langle -2, 5 \rangle$$

$$\langle -1 - (-2), 3 - 5 \rangle$$

$$\langle 1, -2 \rangle$$

$$\text{mag} = \sqrt{5}$$

$$2\langle -1, 3 \rangle + 3\langle -2, 5 \rangle$$

C) $2\mathbf{u} + 3\mathbf{w}$

$$\langle -2, 6 \rangle + \langle -6, 15 \rangle$$

$$\langle -8, 21 \rangle$$

$$\sqrt{485}$$

$$-2\langle -1, 3 \rangle - 3\langle 4, 7 \rangle$$

D) $-2\mathbf{u} - 3\mathbf{v}$

$$\langle 2, -6 \rangle + \langle -12, -21 \rangle$$

$$\langle -10, -27 \rangle$$

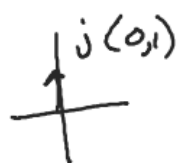
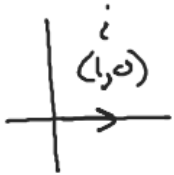
$$\sqrt{829}$$

Unit Vector

• Original Vector

Divide by magnitude

$$|\vec{u}| = \text{magnitude}$$



Find a unit vector in the direction of the given vector. Write your answer in component form and as a linear combination of the standard unit vectors i and j

A) $u = \langle -1, 3 \rangle$

$$|u| = \sqrt{(-1)^2 + (3)^2} \\ = \sqrt{10}$$

Unit Vector

$$\left\langle \frac{-1}{\sqrt{10}}, \frac{3}{\sqrt{10}} \right\rangle$$

$$-\frac{1}{\sqrt{10}}i + \frac{3}{\sqrt{10}}j$$

B) $v = \langle 4, 7 \rangle$

$$|v| = \sqrt{4^2 + 7^2} \\ = \sqrt{65}$$

Unit Vector

$$\left\langle \frac{4}{\sqrt{65}}, \frac{7}{\sqrt{65}} \right\rangle$$

$$\frac{4}{\sqrt{65}}i + \frac{7}{\sqrt{65}}j$$

$w = \langle -2, 5 \rangle$

$$|w| = \sqrt{29}$$

$$\left\langle \frac{-2}{\sqrt{29}}, \frac{5}{\sqrt{29}} \right\rangle$$

$$-\frac{2}{\sqrt{29}}i + \frac{5}{\sqrt{29}}j$$

$$\sqrt{\left(\frac{-2}{\sqrt{29}}\right)^2 + \left(\frac{5}{\sqrt{29}}\right)^2}$$

$$\sqrt{\frac{4}{29} + \frac{25}{29}}$$

$$\sqrt{\frac{29}{29}} = \sqrt{1} = 1$$

Find the component form of the vector v with the given magnitude and angle.

A) $v = |10| \theta = 35^\circ$

$$\langle x, y \rangle$$

$$\langle 10 \cos 35^\circ, 10 \sin 35^\circ \rangle$$

B) $v = |20| \theta = 135^\circ$

$$\langle 20 \cos 135^\circ, 20 \sin 135^\circ \rangle$$

$$\langle 20 \left(-\frac{\sqrt{2}}{2}\right), 20 \left(\frac{\sqrt{2}}{2}\right) \rangle$$

$$\langle -10\sqrt{2}, 10\sqrt{2} \rangle$$

Find the magnitude and direction angle of the vector.

A) $\langle 6, 8 \rangle$

$$\text{mag} = \sqrt{6^2 + 8^2}$$

$$= 10$$

$$\theta = \tan^{-1} \left(\frac{y}{x} \right)$$

$$\theta = \tan^{-1} \left(\frac{8}{6} \right)$$

$$\theta = 53^\circ$$

B) $6i - 8j$

$$\langle 6, -8 \rangle$$

$$\text{mag} = \sqrt{6^2 + (-8)^2}$$

$$= 10$$

$$\theta = \tan^{-1} \left(\frac{-8}{6} \right) = -53^\circ$$

$$307^\circ$$



C) $10(\cos 235^\circ i + \sin 235^\circ j)$

$$\text{mag} = 10$$

$$\theta = 235^\circ$$

