

KEY

PreCalculus: Vector Basics Review

Whenever possible, find exact answers. If you must approximate, round to the nearest hundredth.

A vector v has initial point $R(-9, 2)$ and terminal point $S(-4, 6)$.

1. Write the vector using the following notations:

\vec{v} a) Using its name ("v")

\vec{RS} b) Using its points

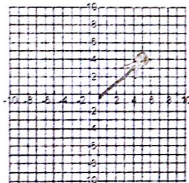
$\langle 5, 4 \rangle$ c) In component form

$5i + 4j$ d) As a linear combination of i and j .

2. Find $\|v\|$

$$\sqrt{5^2 + 4^2} = \sqrt{41}$$

3. Sketch v in standard position.



4. Find the Direction Angle of v .

$$\cos^{-1}\left(\frac{5}{\sqrt{41}}\right) = 38.660^\circ$$

5. Verify whether vectors r and s are equal. If not, explain why not.

\vec{ST} (with $S(11, -29)$ and $T(2, -23)$) and $r = \langle -9, 6 \rangle$

$$s = \langle -9, 6 \rangle \quad r = \langle -9, 6 \rangle$$

yes
same mag
same direction

6. Find a unit vector in the direction of u if $u = -6i + 11j$

$$\|u\| = \sqrt{157} \quad \frac{\langle -6, 11 \rangle}{\sqrt{157}} = \left\langle \frac{-6}{\sqrt{157}}, \frac{11}{\sqrt{157}} \right\rangle$$

Given vectors $u = \langle -5, 2 \rangle$ and $v = \langle -6, 12 \rangle$, find the following.

7. $2v + 4u$

8. $5v$

9. $5(u - v)$

$$\langle -12, 24 \rangle + \langle -20, 8 \rangle = \langle -30, 60 \rangle \quad 5 \cdot \langle 1, -10 \rangle = \langle 5, -50 \rangle$$

$$\langle -32, 32 \rangle$$

10. Find the component form of the vector w with $\|w\| = 15$ in the same direction as $u = \langle 4, 3 \rangle$.

$$\frac{\langle 4, 3 \rangle}{\sqrt{25}} = \left\langle \frac{4}{5}, \frac{3}{5} \right\rangle \cdot 15 = \langle 12, 9 \rangle$$

Find the direction angle of the vector.

Q III 11. $v = \langle -8, -4 \rangle$ $\sqrt{80}$ Q IV 12. $w = 12i - 10j$ $\langle 12, -10 \rangle$

$$\cos^{-1}\left(\frac{-8}{\sqrt{80}}\right) \quad \cos^{-1}\left(\frac{12}{\sqrt{244}}\right) = 39.806^\circ$$

$$180 - 153.435 = 26.565 \quad 360 - 39.806 = 320.194^\circ$$

$$180 + 26.565 = 206.565^\circ$$



13. A vector has magnitude 8 and direction angle 136° . Write the vector in component form.

$$\langle 8 \cos 136, 8 \sin 136 \rangle = \langle -5.755, 5.557 \rangle$$