

Math Virtual Learning

Precalculus with Trigonometry

Students will calculate the magnitude and direction angle of a vector.

May 12th, 2020



Precalculus with Trigonometry

Lesson: May 12th, 2020

Objective/Learning Target:

Students will calculate the magnitude and direction angle of a vector

Let's Get Started!

Watch Video: [Finding Magnitude and Direction angle](#)

Example of Finding Magnitude and Direction Angle

- Find the magnitude and direction angle for

$$\mathbf{u} = \langle 3, -2 \rangle.$$

- Magnitude:

$$|\mathbf{u}| = \sqrt{3^2 + (-2)^2} = \sqrt{13}$$

- Direction Angle:

$$\tan \theta = \frac{b}{a} = \frac{-2}{3}$$

- Vector \mathbf{u} has a positive horizontal component.
- Vector \mathbf{u} has a negative vertical component, placing the vector in quadrant IV.

$$\tan^{-1}\left(\frac{-2}{3}\right) \approx -33.7^\circ$$

$$-33.7^\circ + 360^\circ = 326.3^\circ$$

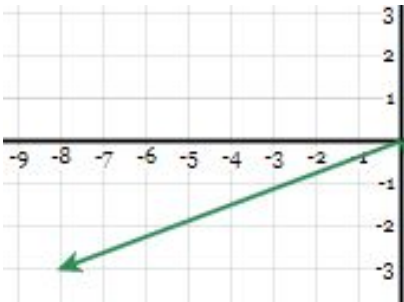
Example: How to represent a vector

Vectors can be expressed in multiple formats. In yesterday's lesson you learned how to represent vectors graphically and in their component form. You can also represent vectors with their magnitude and direction angle. All of the examples below represent the same vector.

Component Form:

$$\mathbf{v} = \langle -8, -3 \rangle$$

Graph:



Unit Vector Form: (video linked)

$$-8\mathbf{i} - 3\mathbf{j}$$

Magnitude and Direction:

$$\|\mathbf{v}\| = \sqrt{(-8)^2 + (-3)^2} = \sqrt{73} \approx 8.5$$

$$\theta = \tan^{-1}\left(\frac{-8}{-3}\right) = 69.4^\circ + 180 = 249.4^\circ$$

$$\sqrt{73}(\cos 249.4^\circ, \sin 249.4^\circ)$$

Practice

Find the magnitude and direction angle of the following vectors.

1 $\vec{r} = \langle -8, -41 \rangle$

2 $8\vec{i} + 15\vec{j}$

3 $5\vec{i} - 12\vec{j}$

4 $\langle 12, -6 \rangle$

Practice - **ANSWERS**

1. $\sqrt{1745} \approx 41.773$
 258.96°

2. 17
 61.93°

3. 13
 292.62°

4. $6\sqrt{5} \approx 13.416$
 333.43°

Additional Practice and Resources:

Additional Resource Videos:

[Finding magnitude and direction angle](#)

[Finding magnitude and direction with unit vectors](#)

Additional Practice:

[Vector Operation and Magnitude Practice with answers](#)

[Vector practice](#) [Answers](#)

Do problems #33-36. You can also try others for a review of yesterday's assignment as well as working ahead for tomorrow's assignment