

6.1 Vectors in the Plane (continued)

Target 8A: Perform vector operations: scalar multiple and sums and represent them graphically
Target 8B: Perform vector operations: magnitude, direction angle, and unit vector

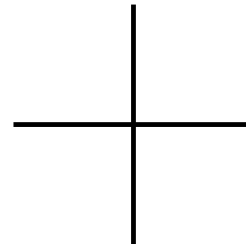
Unit Vector

Unit Vector – A vector, \mathbf{u} , with a length of _____.

$$|\mathbf{u}| = \underline{\hspace{2cm}}$$

If \mathbf{v} is not the zero vector, then the unit vector in the direction of \mathbf{v} is:

$$\mathbf{u} = \frac{\mathbf{v}}{|\mathbf{v}|} =$$



The **Standard Unit Vectors** are $\mathbf{i} = \langle 1, 0 \rangle$ and $\mathbf{j} = \langle 0, 1 \rangle$.

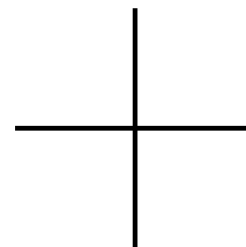
So, any vector $\mathbf{v} = \langle a, b \rangle$ can be expressed as

the linear combination of _____,

where the scalar a is the _____ component

and b is the _____ component

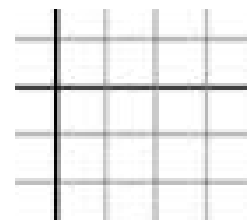
of vector \mathbf{v} .



Example

Find a unit vector in the direction of $\mathbf{v} = \langle 3, -2 \rangle$. Write the unit vector as a linear combination of the standard unit vector.

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A vector's **Direction Angle** is the angle θ that \mathbf{v} makes with the positive x -axis.

$$\sin \theta =$$

$$\cos \theta =$$

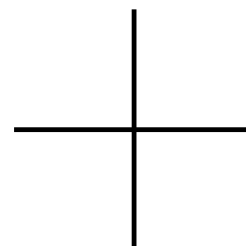
$$\text{So, } b =$$

$$\text{So, } a =$$

The horizontal component is _____.

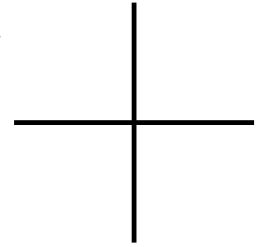
The vertical component is _____.

$$\mathbf{v} = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$



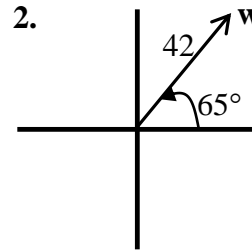
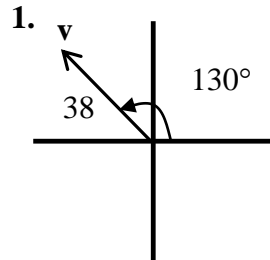
Example

Find the components of vector \mathbf{v} with direction angle of 125° and magnitude of 8.



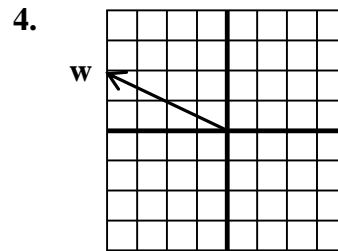
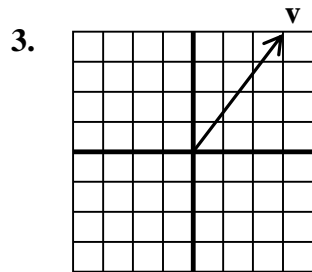
Practice

For #1 & 2, find the component form of the vector.



For #3-6, find:

- a) the unit vector in the direction of the given vector,
- b) the direction angle of the vector,
- c) and the component form of the vector.



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

6. $\mathbf{w} = 5\mathbf{i} + 2\mathbf{j}$

More Practice**Unit Vectors**

<https://www.khanacademy.org/math/precalculus/vectors-prec calc#unit-vectors>

<https://www.mathsisfun.com/algebra/vector-unit.html>

http://www.algebralab.org/lessons/lesson.aspx?file=Trigonometry_TrigVectorUnits.xml

http://www.softschools.com/formulas/physics/unit_vector_formula/83/

https://youtu.be/6o_S7u7Ddx4

<https://youtu.be/iAeKI5h2SJM>

Magnitude and Direction Angle of Vectors

<https://braingenie.ck12.org/skills/108146>

<https://www.khanacademy.org/math/precalculus/vectors-prec calc#magnitude-direction>

https://www.varsitytutors.com/hotmath/hotmath_help/topics/magnitude-and-direction-of-vectors

http://www.softschools.com/math/pre_calculus/direction_angles_of_vectors/

<https://youtu.be/WxWJorOVIj8>

<https://youtu.be/8Eur16foTMw>

https://youtu.be/82nu_sAPmmo

Component Form of Vectors

<https://www.khanacademy.org/math/precalculus/vectors-prec calc#component-form-of-vectors>

<https://www.math10.com/en/geometry/vectors-operations/vectors-operations.html>

<https://www.varsitytutors.com/precalculus-help/express-a-vector-in-component-form>

<https://youtu.be/GxBUbiNL1eE>

<https://youtu.be/WZ3xzVHT0mc>

Homework Assignment

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