Vectors

Definitions

1. Vector: ____

2. Vector Notation: ______________________________________

3. Magnitude of a Vector: _________________________________

4. Direction Angles: ______________________________________

5. Standard Position of a Vector: ____________________________

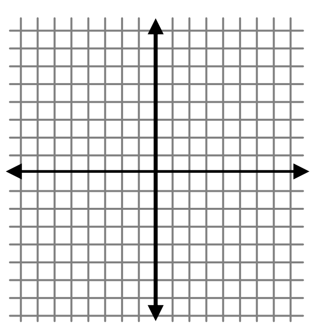
Component Form of a Vector

Consider a vector with initial point P(p_1, p_2) and terminal point Q(q_1, q_2):

Component Form:

Magnitude:

Example 1: Find the component form and magnitude of the vector v that has initial point (4, -7) and terminal point (-1, 5). Sketch the vector.



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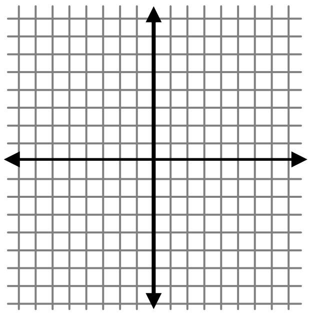
Practice Problem 1: Find the component form and magnitude of the vector v that has initial point (-2, 3) and terminal point (-7, 9). Sketch the vector.



Vector Operations: Scalar Multiplication and Vector Addition

Consider $u = \langle u_1, u_2 \rangle$ and $v = \langle v_1, v_2 \rangle$

u + v =

If k is a real number

ku =

Example 2: Let $v = \langle -2, 5 \rangle$ and $w = \langle 3, 4 \rangle$, find each of the following vectors:

a) 2v **b) w – v** **c) v + 2w**

Practice Problem 2: Let $u = \langle 1, 2 \rangle$ and $v = \langle 3, 1 \rangle$, find each of the following vectors:

a) u + v **b) u – v** **c) 2u – 3v**

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Unit Vectors

Unit Vector =

Example 3: Find a unit vector in the direction of $v = \langle -2,5 \rangle$.

Practice Problem 3: Find a unit vector in the direction of $v = \langle 7,-3 \rangle$.

Linear Combination Form of Vectors

$v = \langle v_1, v_2 \rangle$ = ______________________________

v_1 = ______________________________________

v_2 = ______________________________________

Example 4: Let u be the vector with initial point (2, -5) and terminal point (-1, 3). Write u in linear combination form.

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Practice Problem 4: Let u be the vector with initial point (-2, 6) and terminal point (-8, 3). Write u in linear combination form**.**

Example 5: Let $u = -3i + 8j$ and $v = 2i - j$. Find $2u - 3v$.

Practice Problem 5: Let $u = i + j$ and $v = 5i - 3j$. Find $2u - 3v$.

Direction Angles

If u is a unit vector in standard position as shown below

Then $u = \langle x, y \rangle =$

$\tan\theta =$

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Example 6: Find the direction angle of each vector:

a) $u = 3i + 3j$ b) $v = 3i - 4j$

Practice Problem 6: Find the direction angle of each vector:

a) $v = -6i + 6j$ b) $v = -7i - 4j$