

**Objective:****Vocabulary**

1. Scalar quantities:

2. Vector quantities:

3. Vector

4. Magnitude:

Notations:

5. Direction:

Notation:

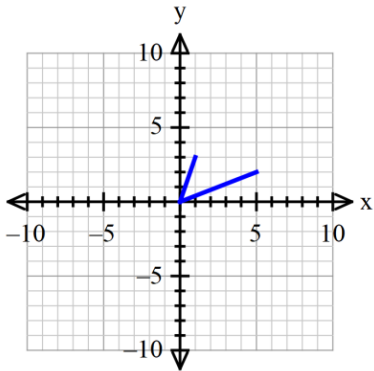
6. Equal Vectors

7. Zero Vector:

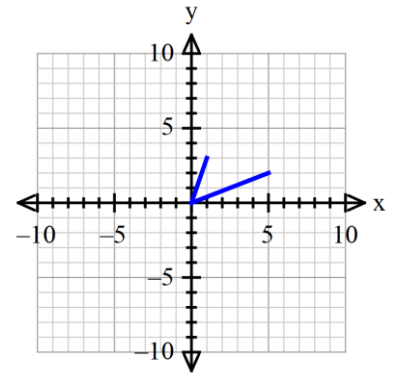
8. Scalar Multiplication:

**Vector Addition:**

Resultant vector:



**Steps for addition and subtraction (A + B or A - B)**



**A + B =**

**A - B =**

**Steps for scalar multiplication (kA)**

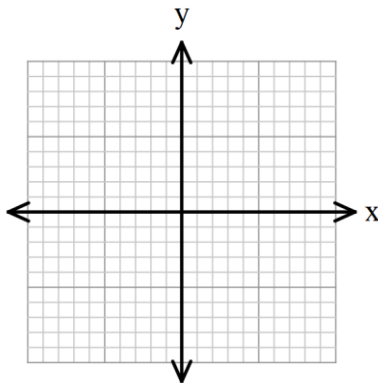
**2A =**

**3B =**

**VECTORS** have 2 parts

**Horizontal component:**

**Vertical component:**



**Position Vector:**

**Direction Angle:**

$$\cos \theta = \text{——} = \text{——}$$

$$\sin \theta = \text{——} = \text{——}$$

r:

OR

$$|A_x| =$$

$$|A_y| =$$

Example: Find the magnitude of  $V_x$  and  $V_y$  if  $r = |V| = 5.6$  and  $\theta = 22^\circ$

Example: Write the above vector in component form.

**To find magnitude:**

**To find direction angle:**

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Example: Find the magnitude and direction of the vector  $w = \langle 2, -6 \rangle$ .

Example: Find the following operations with the vectors  $w = \langle -1, -3 \rangle$  and  $v = \langle 3, -4 \rangle$ .

1.  $w + v$

2.  $w - v$

3.  $-8v$

4.  $3w + 4v$

**Dot Product:**

5.  $w \cdot v$

**To find the angle between vectors:**

Example: Find the smallest angle between the vectors  $\mathbf{w} = \langle 1, 3 \rangle$  and  $\mathbf{v} = \langle 5, 2 \rangle$ .

**Vocabulary:**

Parallel:

Perpendicular or orthogonal:

**To find parallel vectors:**

**To find orthogonal vectors:**

Examples: Are the following vectors parallel or orthogonal or neither?

1.  $\mathbf{w} = \langle -2, 3 \rangle$  and  $\mathbf{v} = \langle 6, 4 \rangle$

2.  $\mathbf{w} = \langle 2, -5 \rangle$  and  $\mathbf{v} = \langle -4, 10 \rangle$

**To find unit vectors in linear combination:**

The unit vectors are \_\_\_\_\_ and \_\_\_\_\_

Example: Write the following vector in linear combination.

$\mathbf{w} = \langle -6, 10 \rangle$