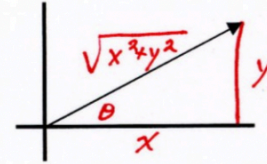# BC Topic 11 - Vector Definitions
due Tuesday, January 16

Vectors (definitions):

Vector- $directed\ line\ segment$

Magnitude- $\|v\| = \sqrt{x^2+y^2}$
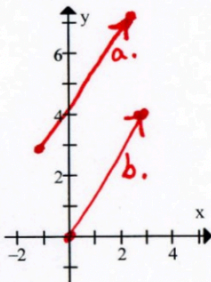

Direction- $\theta = \arctan \frac{y}{x}$

Equivalent Vectors- $Same\ magnitude\ and\ same\ direction$ $(not\ same\ starting\ /$ $ending\ points)$

Component form- $\langle x,y \rangle$

Example 2. The initial point of a vector is $(-1,3)$ and its terminal point is $(2,7)$

a. Graph the vector.

b. Graph the vector in standard position on the same axes.

c. Give the component form of the vector.

$\langle 3, 4 \rangle$

d. Find the magnitude of the vector.

$\sqrt{3^2+4^2} = 5$

e. Find the direction of the vector.

$\theta = \tan^{-1}\frac{4}{3}$

$= .927$

Example 3. Find the direction of a vector given by $\langle -3, 5 \rangle$.

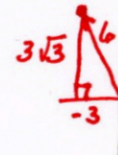$\tan^{-1}\left(-\frac{5}{3}\right) = -1.030$

$\theta = -1.030 + \pi = 2.111$

Example 4. If the magnitude of a vector v is $\|v\| = 6$ and its direction is $\theta = \frac{2\pi}{3}$, write the v in component form.

$x = 6\cos\frac{2\pi}{3}$ $y = 6\sin\frac{2\pi}{3}$ $3\sqrt{3}$
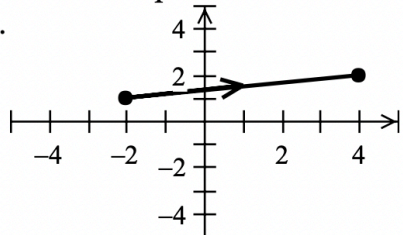
$= -3$ $= 3\sqrt{3}$

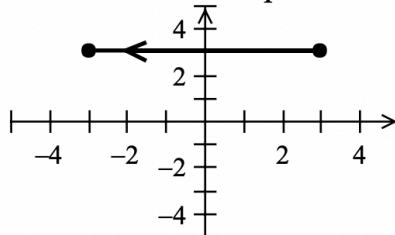

$v = \langle -3, 3\sqrt{3} \rangle$

Assignment

Find the component form of the vector and sketch it with the initial point at the origin.

5.

6.

7. Find the component form of the u and v vectors whose initial and terminal points are given. Show that u and v are equivalent. u: $(3,-2)$, $(5,2)$ v: $(-1,-4)$, $(1,0)$

8. The initial and terminal points of a vector are $(-1,3)$ and $(3,6)$.

    a. Sketch the vector.
    b. Write the component form.
    c. Sketch the vector with the initial point at the origin.

9. If the initial point of vector v is $(5,-2)$ and $v=\langle -2,4\rangle$, find the terminal point.

10. Find the magnitude of the vector $v=\langle -4,3\rangle$.

Find the component form of each vector given the magnitude and the direction without using a calculator.

11. $\|v\|=5, \theta=0$.   12. $\|v\|=6, \theta=\dfrac{4\pi}{3}$.   13. $\|v\|=4, \theta=\dfrac{7\pi}{4}$.

14. Use a calculator to find the magnitude and the direction of the vector $v=\langle -8,-13\rangle$.

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5. $\langle 6,1\rangle$

6. $\langle -6,0\rangle$

7. $u=\langle 2,4\rangle=v$ 8b. $\langle 4,3\rangle$ 9. $(3,2)$ 10. $\|v\|=5$ 11. $v=\langle 5,0\rangle$

12. $v=\langle -3,-3\sqrt{3}\rangle$ 13. $v=\langle 2\sqrt{2},-2\sqrt{2}\rangle$ 14. $\|v\|=15.264$, $\theta=4.160$ or 4.161