Polar Coordinates
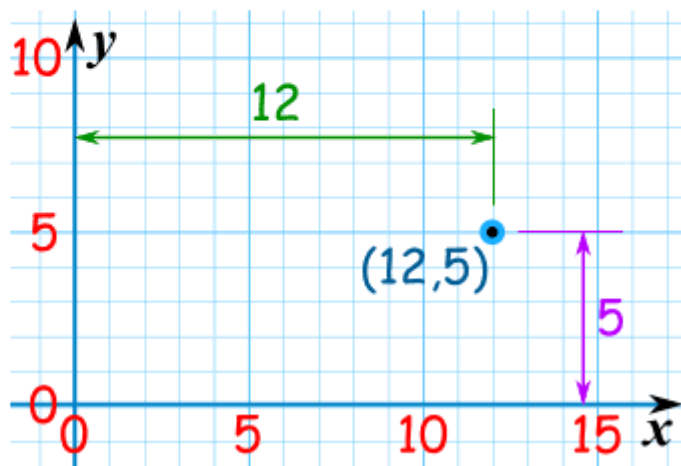
To pinpoint where you are on a map or graph there are two main systems:

Cartesian Coordinates

Using Cartesian Coordinates you mark a point by **how far along** and **how far up** it is:
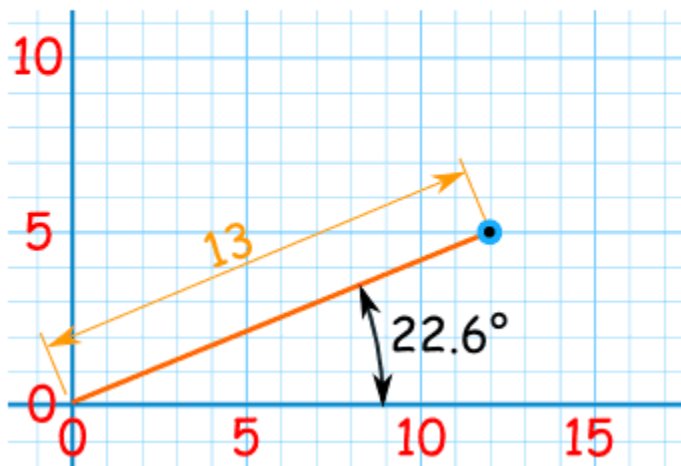
(x , y)

10 y

12

5

(12,5)

5

0

0   5   10   15 x

Polar Coordinates

Using Polar Coordinates you mark a point by **how far away**, and **what angle** it is:

(r , θ)

10

5

13

22.6°

0

0   5   10   15

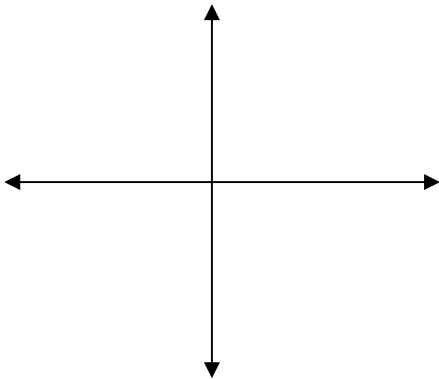|	IF		THEN
	$r > 0$		
	$r < 0$		
	$\theta > 0$		
	$\theta < 0$		

Example 1) Plot each of the following

a) $\left(3, \dfrac{3\pi}{4}\right)$ b) $\left(3, -\dfrac{3\pi}{4}\right)$ c) $\left(-3, \dfrac{3\pi}{4}\right)$ d) $\left(-3, -\dfrac{3\pi}{4}\right)$
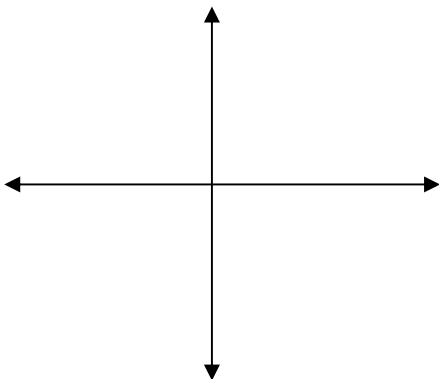
Example 2) Name 3 other pairs of polar coordinates for $\left(5, \dfrac{\pi}{4}\right)$

Every point has more than 1 name!!
By changing the direction of
rotation or the number of rotations

Example 3) Name 3 other pairs of polar coordinates for $\left(-2, \dfrac{7\pi}{5}\right)$

To convert from rectangular $\longrightarrow$ *polar*

$(x , y) \longrightarrow (r , \theta)$

__GRAPH FIRST__

$x^2 + y^2 = r^2$

$\tan \theta = \dfrac{y}{x}$

Example 4) Convert each rectangular coordinate to polar coordinates.

a) $(5,2)$

b) $(10,-10)$

c) $(-3,-8)$

To convert from polar ⟶ rectangular

$(r, \theta) \longrightarrow (x, y)$

GRAPH FIRST

$x = r\cos\theta$

$y = r\sin\theta$

Example 5) Convert each polar coordinate to rectangular coordinates.

a) $\left(4, \dfrac{3\pi}{4}\right)$

b) $(-1, 2.03)$

c) $\left(-2, -\dfrac{5\pi}{6}\right)$