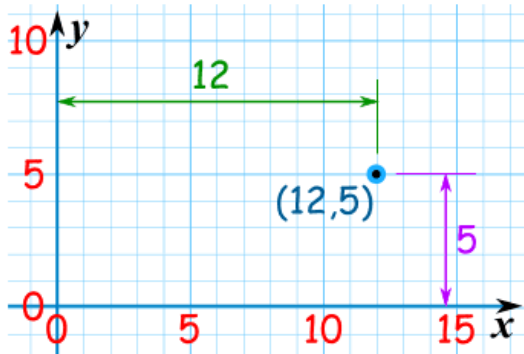


Rectangular and Polar Coordinate Conversions

Phil Sherrod – W4PHS

Rectangular Coordinates (also called Cartesian Coordinates)

The coordinates of a point are specified as a pair of X and Y values (x,y):

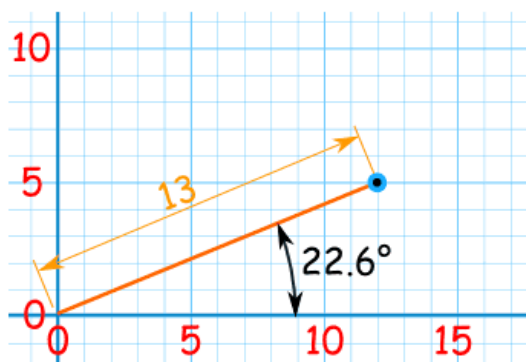


The rectangular coordinate of the point is (12,5).

Using the 'j' (imaginary) axis notation, the coordinate would be $12+j5$
12 is the distance on the horizontal axis, 5 is the distance on the vertical (j) axis.

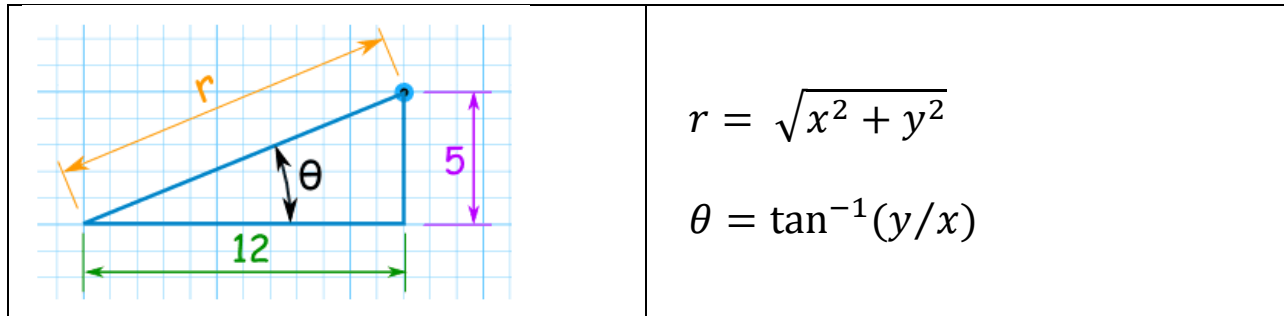
Polar coordinates

The coordinates of a point are specified by an angle and distance from the origin:



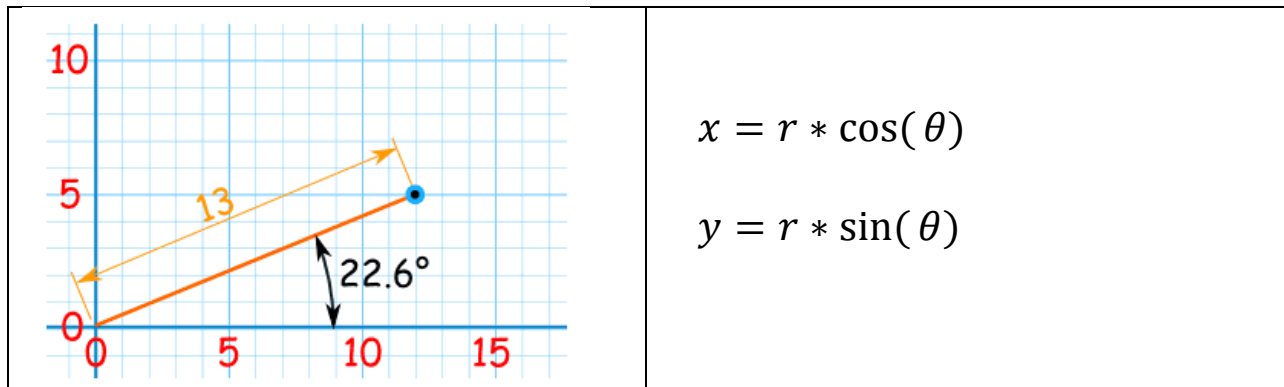
The polar coordinates of the point are $13 \angle 22.6^\circ$.

Converting Rectangular to Polar coordinates



$$(12,5) \xrightarrow{\text{yields}} \begin{cases} r = \sqrt{12^2 + 5^2} = \sqrt{169} = 13 \\ \theta = \tan^{-1}(5/12) = 22.6^\circ \end{cases}$$

Converting Polar to Rectangular coordinates



$$13 \angle 22.6^\circ \xrightarrow{\text{yields}} \begin{cases} x = 13 * \cos(22.6^\circ) = 12 \\ y = 13 * \sin(22.6^\circ) = 5 \end{cases}$$