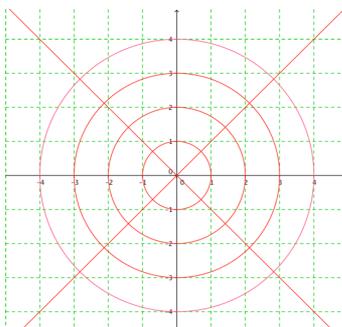# 3.6 ~ Introduction to polar coordinates

In this lesson you will:

- Learn what polar coordinates are.

- Convert between polar coordinates and rectangular coordinates.

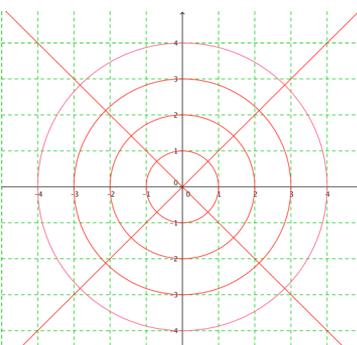- Convert between polar and rectangular equations.
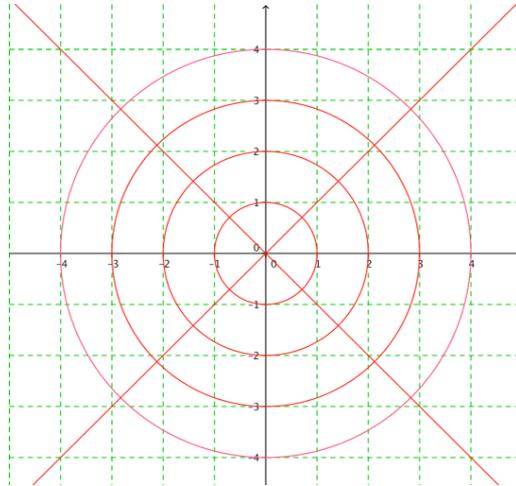
Rectangular Coordinates
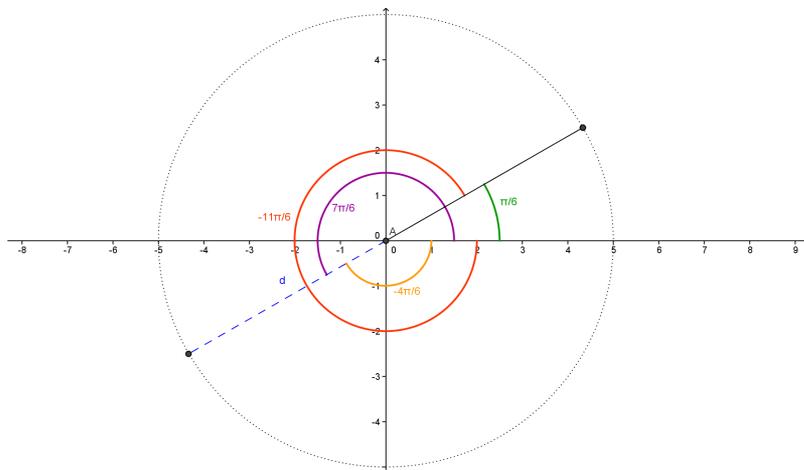
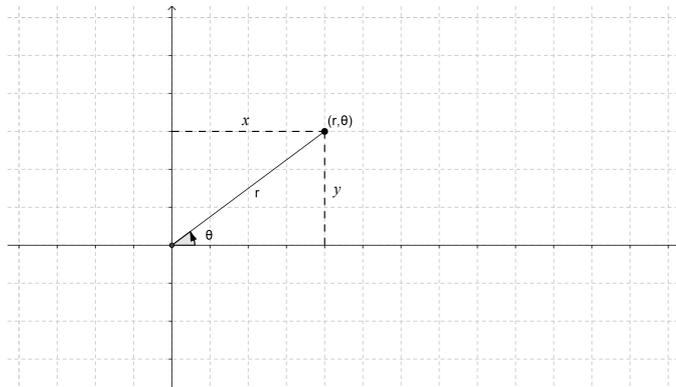*(x,y)*

Polar Coordinates

(r;θ)

In fact:

(r, θ) has infinitely many representations:

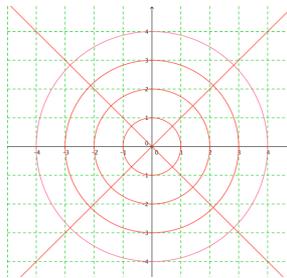$(r, \theta + 2n\pi)$ and $(- r, \theta + (2n+1)\pi)$, where n is any integer

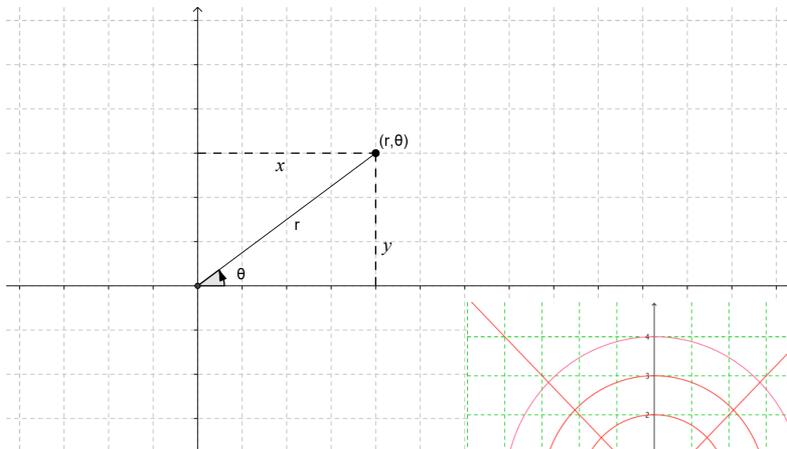How do we translate between Cartesian and polar coordinates?

Polar to Cartesian

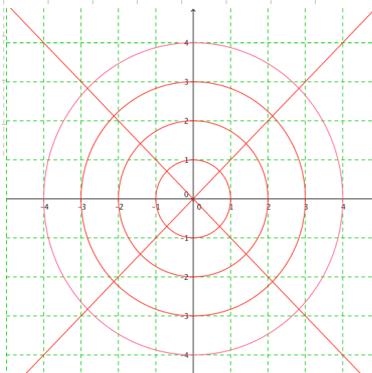Example 1: Convert *(-4, 2π/3)* to Cartesian coordinates

How do we translate between Cartesian and polar coordinates?

Cartesian to polar

Example 2: Convert *(-2, 2)* to polar coordinates

We can convert equations, too!

Example 3:

(a) Convert $x^2-3x=1+xy$ into polar coordinates.

(b) Convert $r=-2\cos\theta$ into Cartesian coordinates.