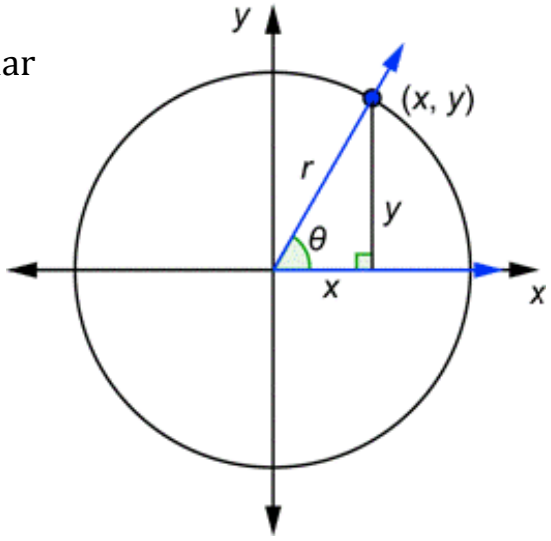
Unit #4: Parametric and Polar Equations
Topic: Polar Coordinate Conversions
Objective: SWBAT work in both directions to convert between rectangular and polar coordinates.

The right triangle given below can be used to explain the correspondence between the Cartesian (Rectangular) Coordinates (x, y) and the Polar Coordinates (r, θ) where the Pole of the Polar Coordinates is the Origin of the Cartesian Coordinates and the Polar Axis is the positive x-axis.

The polar coordinates (r, θ) are related to the rectangular coordinates (x, y) as follows:



$x =$	$y =$
$tan\theta =$	$r^2 =$

Example#1: Convert each point to rectangular coordinates.

a) $(2, \pi)$

b) $\left(\sqrt{3}, \frac{\pi}{6}\right)$

Example#2: Find two sets of polar coordinates for the point for $0 \leq \theta < 2\pi$.

a) $(0, 2)$

b) $(-1, 1)$

Problem Set #3:

Set 1: Convert each point to rectangular coordinates.	
1) $\left(2, \frac{7\pi}{6}\right)$	2) $\left(-3, -\frac{2\pi}{3}\right)$
3) $\left(18, -\frac{3\pi}{2}\right)$	4) $\left(1, \frac{7\pi}{4}\right)$
5) $\left(-7, \frac{4\pi}{3}\right)$	6) $\left(-6, \frac{\pi}{3}\right)$
7) $\left(\sqrt{5}, -\frac{11\pi}{6}\right)$	8) $\left(\frac{1}{2}, \frac{3\pi}{4}\right)$

Set 2: Find two sets of polar coordinates for each point for $-2\pi < \theta < 2\pi$.	
9) $(0, -5)$	10) $\left(3, -\sqrt{3}\right)$
11) $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$	12) $(-8, 0)$
13) $(e,\ e)$	14) $\left(-5\sqrt{3}, -5\right)$
15) $\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$	16) $\left(-1, \sqrt{3}\right)$