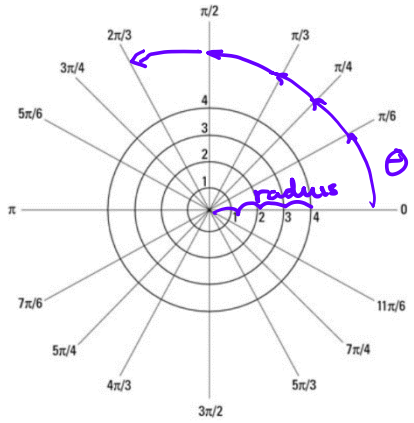
DATE: _____

Polar Coordinates

(r, θ)

radius

(theta) angle



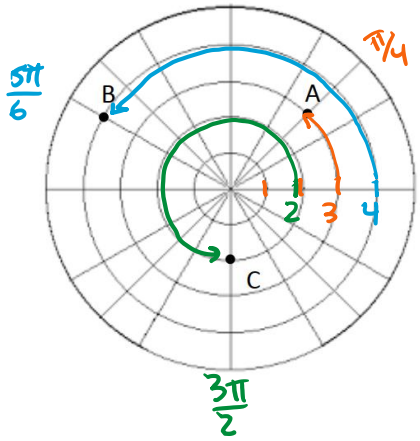
(r, θ)

The polar coordinates of point A is $\left(3, \frac{\pi}{4}\right)$.

Example 1: Identify the coordinates of:

a) point B $\left(4, \frac{5\pi}{6}\right)$

b) point C $\left(2, \frac{3\pi}{2}\right)$

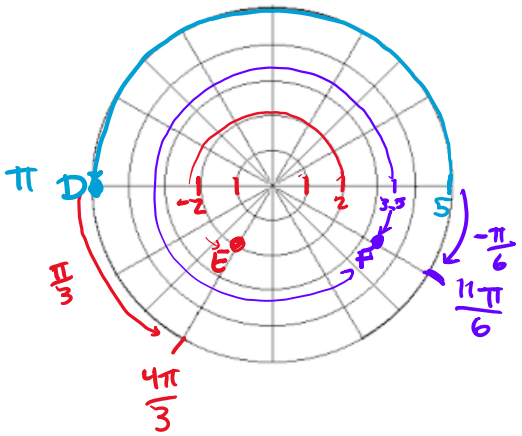


Example 2: Plot each of the given points:

a) D $(5, \pi)$

b) E $\left(-2, \frac{\pi}{3}\right)$ also $\left(2, \frac{4\pi}{3}\right)$

c) F $\left(3.5, -\frac{\pi}{6}\right)$ also $\left(3.5, \frac{11\pi}{6}\right)$



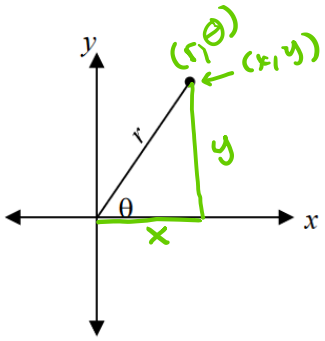
Convert Polar Coordinates to Rectangular Coordinates

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

$\cos\theta = \frac{x}{r}$ $\quad \sin\theta = \frac{y}{r}$

$r\cos\theta = x$ $\quad r\sin\theta = y$

$(x, y) \rightarrow (r\cos\theta, r\sin\theta)$



Example 3:
Determine the rectangular (x, y) coordinates of point A.

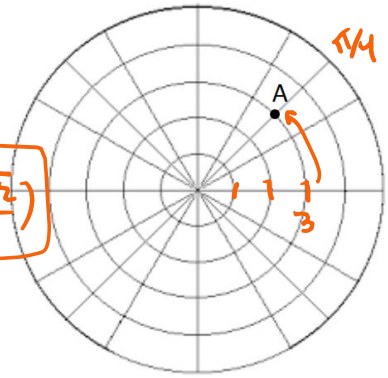
$(3, \frac{\pi}{4}) \rightarrow$ polar

$x = 3\cos\frac{\pi}{4}$ $\quad y = 3\sin\frac{\pi}{4}$

$x = 3(\frac{\sqrt{2}}{2})$ $\quad y = 3(\frac{\sqrt{2}}{2})$

$= \frac{3\sqrt{2}}{2}$ $\quad = \frac{3\sqrt{2}}{2}$

$(\frac{3\sqrt{2}}{2}, \frac{3\sqrt{2}}{2})$



Example 4:
Convert $\left(2, \frac{5\pi}{6}\right)$ to rectangular coordinates.

r $\quad \theta$

$x = 2\cos\frac{5\pi}{6}$ $\quad y = 2\sin\frac{5\pi}{6}$

$= 2(-\frac{\sqrt{3}}{2})$ $\quad = 2(\frac{1}{2})$

$= -\sqrt{3}$ $\quad = 1$

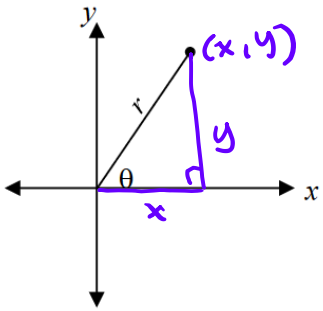
$(-\sqrt{3}, 1)$

Convert Rectangular Coordinates to Polar Coordinates

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

$x^2 + y^2 = r^2$ $\quad \tan\theta = \frac{y}{x}$

* then solve for r $\quad$ * then solve for θ



Example 5:
Convert $(3\sqrt{2}, 3\sqrt{2})$ to polar coordinates.

x $\quad y$

$(3\sqrt{2})^2 + (3\sqrt{2})^2 = r^2$

$18 + 18 = r^2$

$36 = r^2 \rightarrow r = 6$

$\tan\theta = \frac{3\sqrt{2}}{3\sqrt{2}}$

$\tan\theta = 1$

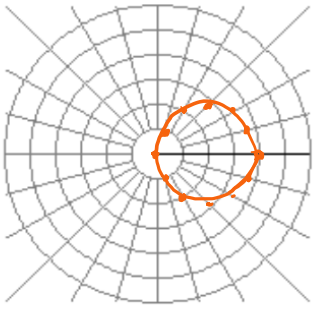
$\theta = \pi/4$

$(6, \frac{\pi}{4})$

Sketching Polar Curves Using TI-Nspire

Use a TI-Nspire to sketch a graph of the polar equations:

1. $r = 4\cos\theta$



2. $r = 3\sin 2\theta$