Today's Plan:

Learning Target (standard): I will describe coordinates in rectangular and polar form.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

p.576 #2-28 even

$22a)\left(4, -\dfrac{5\pi}{4}\right)$

$b)\left(-4, \dfrac{7\pi}{4}\right)$

$c)\left(4, \dfrac{11\pi}{4}\right)$

$24a)\left(3, -\pi\right)$

$b)\left(-3, 0\right)$

$c)\left(3, 3\pi\right)$

$26a)\left(2, -\pi\right)$

$b)\left(-2, 0\right)$

$c)\left(2, 3\pi\right)$

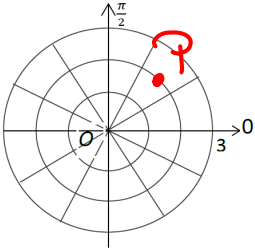$28a)\left(2, -\dfrac{5\pi}{3}\right)$

$b)\left(-2, \dfrac{4\pi}{3}\right)$

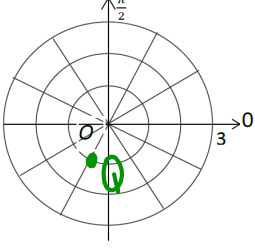$c)\left(2, \dfrac{7\pi}{3}\right)$

Plotting Points in the Polar Coordinate System

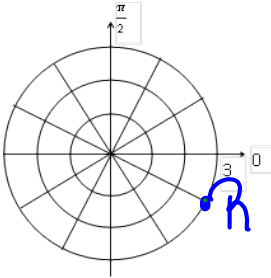**EX #1:** Plot the points with the given polar coordinates.
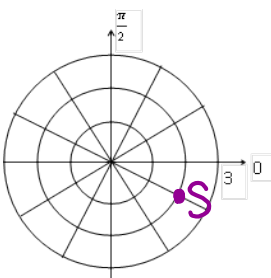
A. $P\left(2,\dfrac{\pi}{4}\right)$ **B.** $Q\left(-1,\dfrac{\pi}{3}\right)$
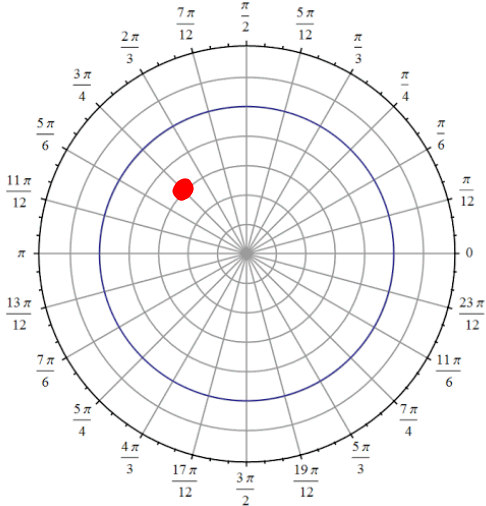
C. $R\,(3,-30°)$ **D.** $S\left(-2,-\dfrac{7\pi}{6}\right)$

Plot the point given in polar coordinates and find the other polar coordinates fitting the requirements.

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

$a)\,r>0,-2\pi\le\theta<0$

$\left(3,\dfrac{-5\pi}{4}\right)$

$b)\,r<0,0\le\theta<2\pi$

$\left(-3,\dfrac{7\pi}{4}\right)$

$c)\,r>0,2\pi\le\theta<4\pi$
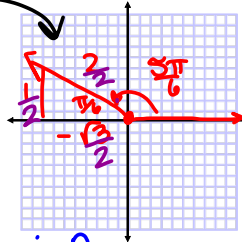
$\left(3,\dfrac{11\pi}{4}\right)$

Coordinate Conversion

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

polar → rectangular

$$x = r \cos \theta \qquad r^2 = x^2 + y^2$$

$$y = r \sin \theta \qquad \tan \theta = \frac{y}{x}$$

} *rectangular to polar*

EX #3: Find the rectangular coordinates of the points with
the given polar coordinates. Use $x = r \cos \theta$
and $y = r \sin \theta$

A. $P\left(3, \dfrac{5\pi}{6}\right)$

$X = r \cos \theta$

$X = 3\left(-\dfrac{\sqrt{3}}{2}\right)$

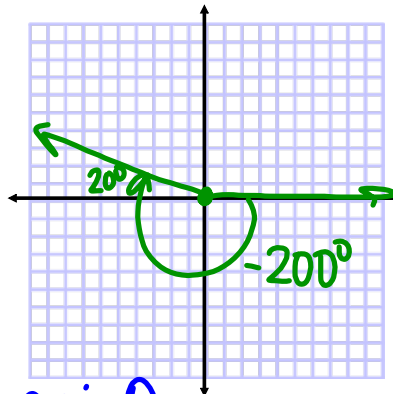$X = -\dfrac{3\sqrt{3}}{2}$

$Y = r \sin \theta$

$Y = 3\left(\dfrac{1}{2}\right)$

$Y = \dfrac{3}{2}$

$\left(-\dfrac{3\sqrt{3}}{2}, \dfrac{3}{2}\right)$

EX #3: Find the rectangular coordinates of the points with
the given polar coordinates. Use $x = r \cos \theta$
and $y = r \sin \theta$

B. $Q\,(2, -200°)$

$X = r \cos \theta$

$X = 2 \cos(-200°)$

$X = -1.879$

$Y = r \sin \theta$

$Y = 2 \sin(-200°)$

$Y = 0.684$

$(-1.879, 0.684)$

Converting Rectangular to Polar Coordinates

EX #4: Find two polar coordinate pairs for the points with given rectangular coordinates.

Use: $r^2 = x^2 + y^2$ and $\tan \theta = \dfrac{y}{x}$

Plot the points on both coordinate grids.

A. $P(1,-1) \rightarrow \left(\sqrt{2}, -\frac{\pi}{4} \right)$

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

$r^2 = (1)^2 + (-1)^2$

$r^2 = 1 + 1$

$r = \sqrt{2}$

$\tan \theta = \frac{-1}{1}$

$\tan^{-1}(-1) = \theta$

$\theta = -\frac{\pi}{4}$

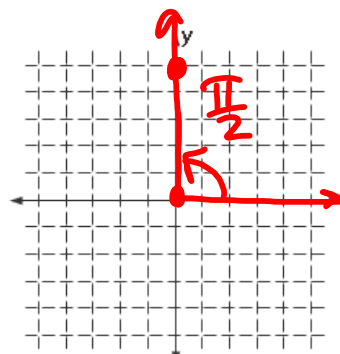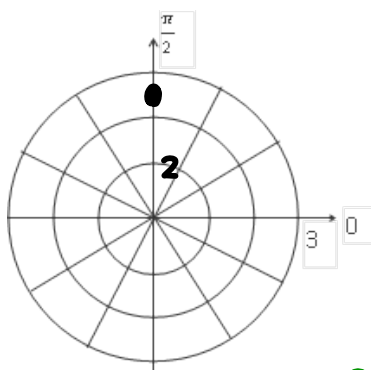Convert the rectangular coordinates to polar coordinates.

B. $Q(2,0)$

$(2,0)$

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

$r^2 = 4 + 0$

$r^2 = 4$

$r = 2$

$0° \text{ or } 0$
$\text{or } 2\pi$

$\tan^{-1}\left(\frac{0}{2} \right) = \theta$

$\theta = 0$

Convert the rectangular coordinates to polar coordinates.

$(0,5)$

$$r^2 = x^2 + y^2$$
$$r^2 = 0 + 25$$
$$r^2 = 25$$
$$r = 5$$

$$\tan^{-1}\left(\tfrac{5}{0}\right) = \theta$$
$$\theta = \frac{\pi}{2}$$

$$\left(5, \frac{\pi}{2}\right)$$

Assignment:

p.576 #30-48 even