Name: _____ **Precalculus Unit 10, Lesson 11**

Aim: How do we convert equations between polar and rectangular form?

I. Do Now:

1. Given the polar coordinates $\left(-3, -\frac{3\pi}{4}\right)$.
   (a) State the coordinates of the given point with $r > 0$.
   (b) Convert the given point to rectangular form.

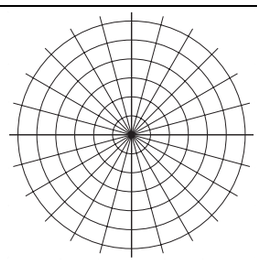
2. Given the rectangular coordinates $\left(3, -4\right)$.
   (a) Convert the given point to polar form. Use a value of θ such that $0 \le \theta < 2\pi$. Round θ to the nearest hundredth.
   (b) State the coordinates of the point in polar form with $r < 0$.

II. Graphs of Simple Polar Equations

3. Consider the polar equation $r = 3$.
   (a) Describe the graph of $r = 3$.

   (b) State its equation in rectangular form.

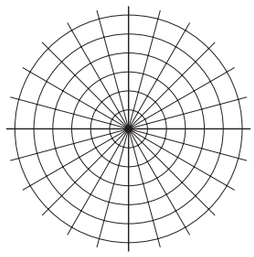
   (c) Sketch the graph of $r = 3$ on the polar plane to the right.



4. Consider the polar equation $\theta = \frac{\pi}{4}$.
   (a) Describe the graph of $\theta = \frac{\pi}{4}$.

   (b) State its equation in rectangular form.

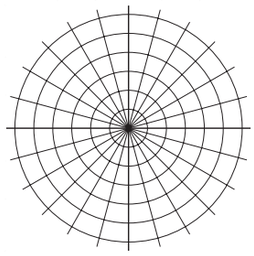
   (c) Sketch the graph of $\theta = \frac{\pi}{4}$ on the polar plane to the right.



5. Consider the polar equation $r = \sec\theta$.
   (a) Describe the graph of $r = \sec\theta$.

   (b) State its equation in rectangular form.

   (c) Sketch the graph of $r = \sec\theta$ on the polar plane to the right.



III. Use the formulas in the box at the right to convert each polar equation to rectangular form.

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

6. $r = 2$

7. $\theta = \frac{\pi}{3}$

8. $r = -\sec\theta$

9. $r = \csc\theta$

10. $r = 2\sec\theta$

Convert each rectangular equation to polar form.

11. $y = 2$

12. $x = 1$

13. $y = 6x + 7$

Convert each polar equation to rectangular form.

14. $r = \dfrac{4}{\cos\theta + 2\sin\theta}$

15. $r = \dfrac{3}{1 - \cos\theta}$

HW36
- Read pages 803 – 804.
- p. 805: 28, 33, 34, 41, 44, 49, 50, 54
- p. 455: 34, 46, 47