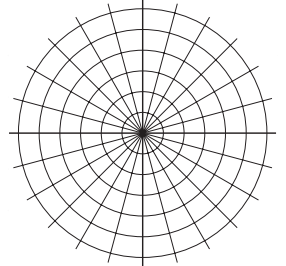
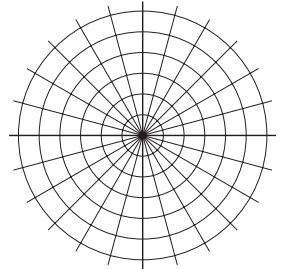
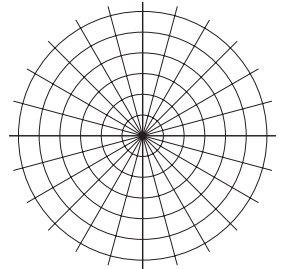


**Aim: How do we convert equations between polar and rectangular form?****I. Do Now:**

- Given the polar coordinates  $(-3, -\frac{3\pi}{4})$ .
  - State the coordinates of the given point with  $r > 0$ .
  - Convert the given point to rectangular form.
- Given the rectangular coordinates  $(3, -4)$ .
  - Convert the given point to polar form. Use a value of  $\theta$  such that  $0 \leq \theta < 2\pi$ . Round  $\theta$  to the nearest hundredth.
  - State the coordinates of the point in polar form with  $r < 0$ .

**II. Graphs of Simple Polar Equations**

- Consider the polar equation  $r = 3$ .
  - Describe the graph of  $r = 3$ .
  - State its equation in rectangular form.
  - Sketch the graph of  $r = 3$  on the polar plane to the right.
- Consider the polar equation  $\theta = \frac{\pi}{4}$ .
  - Describe the graph of  $\theta = \frac{\pi}{4}$ .
  - State its equation in rectangular form.
  - Sketch the graph of  $\theta = \frac{\pi}{4}$  on the polar plane to the right.
- Consider the polar equation  $r = \sec \theta$ .
  - Describe the graph of  $r = \sec \theta$ .
  - State its equation in rectangular form.
  - 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.**

- $r = 2$
- $\theta = \frac{\pi}{3}$
- $r = -\sec \theta$

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

Convert each rectangular equation to polar form.

- $y = 2$
- $x = 1$
- $y = 6x + 7$

Convert each polar equation to rectangular form.

- $r = \frac{4}{\cos \theta + 2 \sin \theta}$
- $r = \frac{3}{1 - \cos \theta}$

**HW34**

- p. 682: 48, 51, 52, 54, 57, 73, 77, 85
- p. 391: 53 (find sine only)
- p. 396: 50