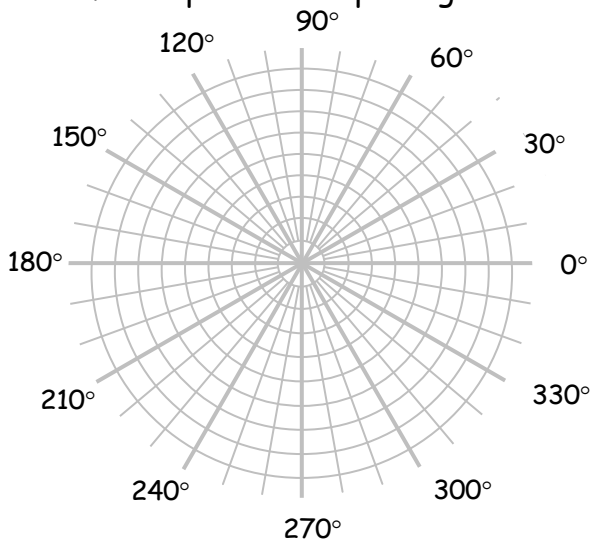
Polar Graphing Notes: Lines and Circles

Ex 1: Graph the polar equation r = 4

A. Find points in a table:

θ	r = 4	(r, θ)
0°		
30°		
60°		
90°		
120°		
150°		
180°		
etc.		

B. Plot points on a polar grid:



C. Algebraically change the polar equation r = 4 into a Cartesian equation.

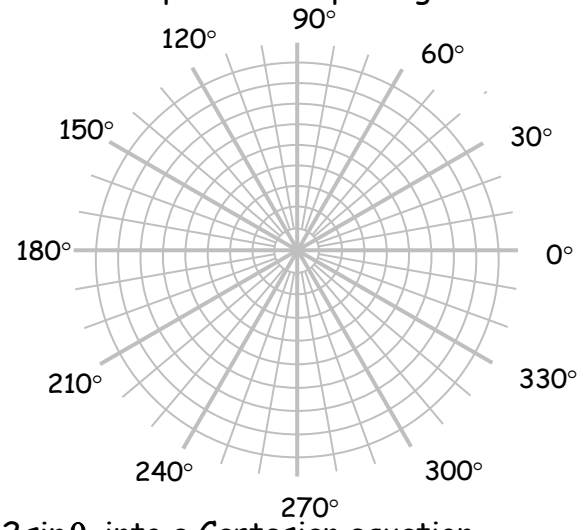
D. What can you guess about the polar equation r = -3 ?

Ex 2: Graph the polar equation $r = -2\sin\theta$

A. Find points in a table:

θ	$r = -2\sin\theta$	(r, θ)
0°		
30°		
60°		
90°		
120°		
150°		
180°		

B. Plot points on a polar grid:



C. Algebraically change the polar equation $r = -2\sin\theta$ into a Cartesian equation

D. What symmetry do you notice in the graph?

Polar Circles Summary: (Fill in the blanks!)

- r = constant
  - circle with center _____
  - radius = #

- $r = a\sin\theta$
  - circle with center _____ the pole
  - radius = $\left|\frac{a}{2}\right|$
  - need to calculate points at 0°, 30°, 60°, 90°, and others are _____
  - symmetric across the y-axis
  - If a > 0 circle is _____ the x-axis
  - If a < 0 circle is _____ the x-axis

- $r = a\cos\theta$
  - circle with center _____ the pole
  - radius = $\left|\frac{a}{2}\right|$
  - need to calculate points at 0°, 30°, 60°, 90°, and others are _____
  - symmetric across the x-axis
  - If a > 0 circle is on _____ of the y-axis
  - If a < 0 circle is on _____ of the y-axis

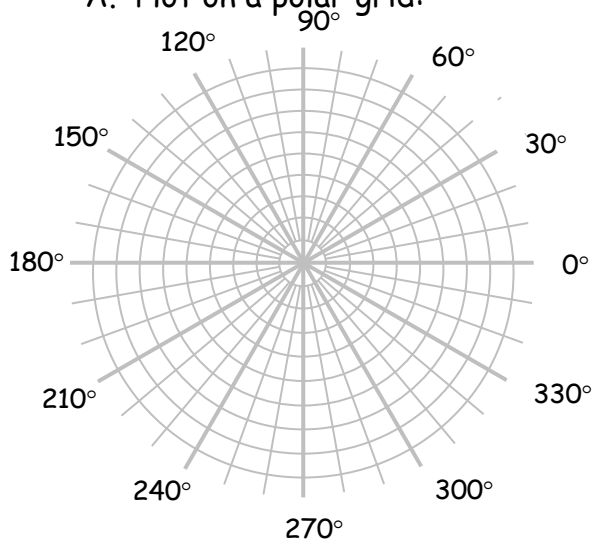
Ex 3: Give identifying features of the polar equation given. Then change the polar equation to Cartesian and verify your answers.

1. $r = 4\cos\theta$

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

Ex 4: Graph the polar equation $\theta = 135°$

A. Plot on a polar grid:



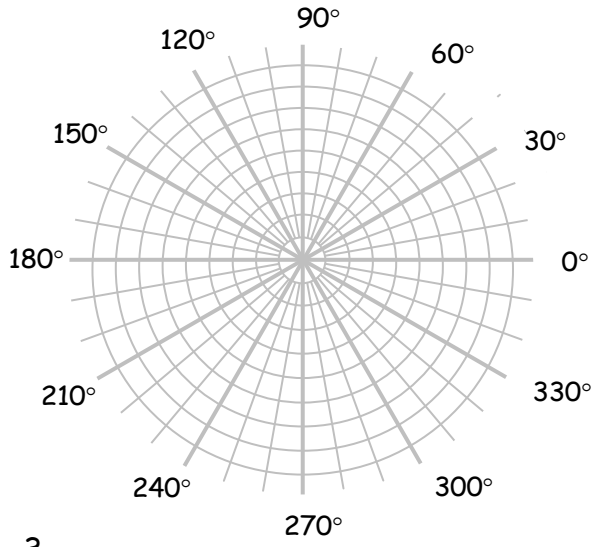
B. Algebraically change the polar equation $\theta = 135°$ into a Cartesian equation.

Ex 5: Graph the polar equation $r = \frac{3}{\sin\theta}$

A. Find points in a table:

θ	$r = \frac{3}{\sin\theta}$	(r, θ)
0°		
30°		
60°		
90°		
120°		
150°		
180°		

B. Plot points on a polar grid:



C. Algebraically change the polar equation $r = \frac{3}{\sin\theta}$ into a Cartesian equation

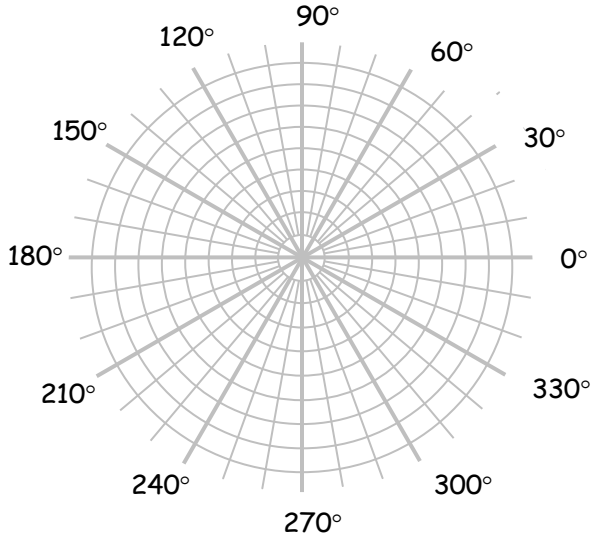
D. What can you guess about the polar equation $r\cos\theta = 6$? Change it to Cartesian to verify your guess.

Ex 6: Graph the polar equation $r = \dfrac{3}{\cos\theta - \sin\theta}$

A. Find points in a table:

θ	$r = \dfrac{3}{\cos\theta - \sin\theta}$	(r, θ)
0°		
30°		
60°		
90°		
120°		
150°		
180°		

B. Plot points on a polar grid:



C. Algebraically change the polar equation $r = \dfrac{3}{\cos\theta - \sin\theta}$ into a Cartesian equation

Polar Lines Summary:

To graph polar lines, you must find and plot at least 2 points!

- $r\sin\theta$ = constant (or)
  - horizontal line at y = #
- $r\cos\theta$ = constant (or)
  - vertical line at x = #
- θ = constant
  - line through _____
- $r = \dfrac{a}{b\cos\theta \pm c\sin\theta}$
  - oblique (_____) line, not through pole

Ex 7: Give identifying features of the polar equation given. Then change the polar equation to Cartesian and verify your answer.

1. $r = \dfrac{3}{2\cos\theta + \sin\theta}$