LESSON MAKER PRO

Polar Plot Paths

Read circles and sketch curves on polar graphs.

HIGH SCHOOL · G.GPE.D.12

G.GPE.D.12 "Graph polar equations by hand and using technology."

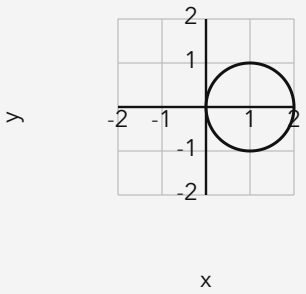
NAME _____ DATE _____

FROM POLAR TO PLANE

To graph a polar equation, choose angles, find each value of r, and plot the points. A negative r places a point in the opposite direction. For a circle, use $x = r\cos\theta$, $y = r\sin\theta$, and $x^2 + y^2 = r^2$ to find its center and radius.

WORKED EXAMPLE

Find a polar equation for the circle shown.



1. The center is (1, 0), and the radius is 1.
2. Write $x^2 + y^2 = 2x$.
3. Substitute to get $r^2 = 2r\cos\theta$.
4. Divide by r. The origin is also on the graph.

Answer: $r = 2\cos\theta$

PRACTICE 4 problems

1 Find the center and radius of $r = 5$.

ANSWER _____

2 Find the center and radius of $r = 6\cos\theta$.

ANSWER _____

3 Find the center and radius of $r = 8\sin\theta$.

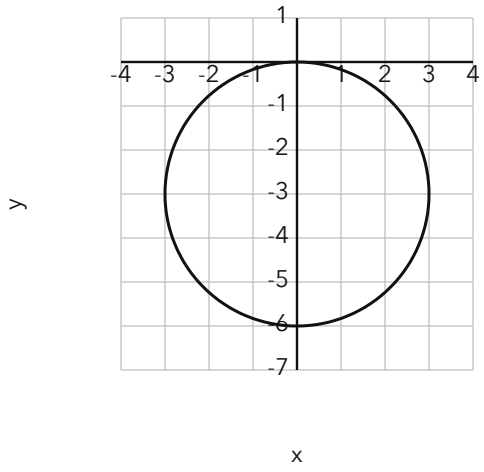
ANSWER _____

4 Find the center and radius of $r = -7\cos\theta$.

ANSWER _____

APPLY IT Show your work

1 A game map shows a circular safe zone. The pole is the origin. Write a polar equation for the edge shown.



ANSWER _____

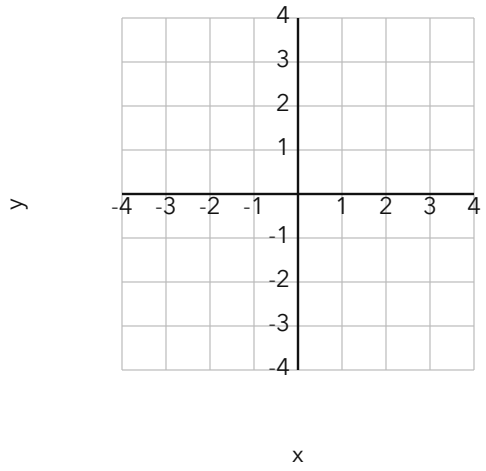
2 A stage spotlight has a circular edge given by $r = -10 \cos \theta$ meters. The pole is the stage center. Find the circle's center and radius for a sketch.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Sketch r = 3 cos(2θ) on the grid. Mark all four petal tips and give their coordinates.



WORK SPACE AND ANSWER

ANSWER KEY

Polar Plot Paths

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the center and radius of $r = 5$.	**Center (0, 0); radius 5.**
2	Find the center and radius of $r = 6 \cos \theta$.	**Center (3, 0); radius 3.**
3	Find the center and radius of $r = 8 \sin \theta$.	**Center (0, 4); radius 4.**
4	Find the center and radius of $r = -7 \cos \theta$.	**Center (-7/2, 0); radius 7/2.**

PART 2 · APPLY IT

1. **$r = -6 \sin \theta$** The circle has center (0, -3) and radius 3, so $x^2 + y^2 = -6y$. Substitute r^2 and $r \sin \theta$, then divide by r.
2. **Center (-5, 0) meters; radius 5 meters.** Multiply by r to get $x^2 + y^2 = -10x$. Completing the square gives $(x + 5)^2 + y^2 = 25$.

CHALLENGE

Four petals, with tips (3, 0), (0, 3), (-3, 0), and (0, -3).

Accept equivalent polar equations for the circles. In the challenge, accept a hand sketch with four petals along the coordinate axes and the correct tips.