Graph And Find Area Of Polar Equations Worksheet

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Part 1: Building a Foundation

What is the formula to convert a point from polar coordinates \((r, \theta)\) to Cartesian coordinates?

Hint: Consider the definitions of x and y in terms of r and theta.

- ◯ A) x = r sin(θ), y = r cos(θ)
- ◯ B) x = r cos(θ), y = r sin(θ)
- ◯ C) x = r tan(θ), y = r cot(θ)
- ◯ D) x = r sec(θ), y = r csc(θ)

Which of the following are true about polar coordinates?

Hint: Think about the definitions and properties of polar coordinates.

- ☐ A) The origin is represented as (0, θ) for any θ.
- ☐ B) The angle θ is measured from the positive x-axis.
- ☐ C) Polar coordinates can only represent points in the first quadrant.
- ☐ D) r can be negative, indicating the point is in the opposite direction of θ.

Explain the relationship between polar and Cartesian coordinates. How do they differ in representing points on a plane?

Hint: Consider how each system defines a point in space.

Part 2: Understanding and Interpretation

Which of the following polar equations represents a circle?

Hint: Consider the standard form of a circle in polar coordinates.

- ◯ A) $r = 2 + 3\cos(\theta)$
- ◯ B) $r = 4$
- ◯ C) $r = 3\sin(2\theta)$
- ◯ D) $r = \theta$

Identify the symmetries present in the polar equation $r = 5\cos(\theta)$.

Hint: Think about how the graph behaves with respect to the axes and origin.

- ☐ A) Symmetry about the polar axis
- ☐ B) Symmetry about the line $\theta = \pi/2$
- ☐ C) Symmetry about the pole
- ☐ D) No symmetry

Describe how you would determine the symmetry of a polar graph. What tests would you perform?

Hint: Consider the properties of polar equations and their graphs.

Part 3: Application and Analysis

If a polar equation is given by $r = 3 + 2\sin(\theta)$, what is the maximum value of r?

Hint: Consider the range of the sine function.

- ◯ A) 2
- ◯ B) 3
- ◯ C) 5

◯ D) 1

Consider the polar equation r = 2sin(θ). Which of the following are true about its graph?

Hint: Think about the shape and properties of the graph.

☐ A) It is a circle.
☐ B) It is symmetric about the line θ = π/2.
☐ C) The maximum radius is 2.
☐ D) It passes through the origin.

Given the polar equation r = 4cos(3θ), determine the number of petals in the graph and explain your reasoning.

Hint: Consider the properties of rose curves.

Which integral would you use to find the area enclosed by one petal of the polar equation r = 3cos(2θ)?

Hint: Think about the formula for area in polar coordinates.

◯ A) 1/2∫ from 0 to π (3cos(2θ))^2 dθ
◯ B) 1/2∫ from 0 to π/2 (3cos(2θ))^2 dθ
◯ C) 1/2∫ from 0 to π/4 (3cos(2θ))^2 dθ
◯ D) 1/2∫ from 0 to π/3 (3cos(2θ))^2 dθ

Part 4: Evaluation and Creation

Evaluate the accuracy of the following statement: "The area enclosed by the polar curve r = 2sin(θ) from θ = 0 to θ = π is π." Is this statement:

Hint: Consider the area calculation for polar curves.

◯ A) True
◯ B) False

◯ C) Uncertain
◯ D) Not applicable

Create a polar equation that represents a rose curve with 6 petals. Which of the following equations would work?

Hint: Consider the relationship between the number of petals and the coefficient in the equation.

☐ A) $r = 4\cos(3\theta)$
☐ B) $r = 2\sin(3\theta)$
☐ C) $r = 5\cos(6\theta)$
☐ D) $r = 3\sin(6\theta)$

Design a real-world scenario where polar coordinates would be more advantageous than Cartesian coordinates. Explain why polar coordinates are preferable in this context.

Hint: Think about situations involving angles and distances.