Graph And Find Area Of Polar Equations Worksheet Questions and Answers PDF

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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)

> The correct formula is x = r cos(θ), y = r sin(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. ✓**

> The true statements are A, B, and D.

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.

Polar coordinates use a radius and angle, while Cartesian coordinates use x and y values.

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 + 3cos(θ)
- ◯ **B) r = 4 ✓**
- ◯ C) r = 3sin(2θ)
- ◯ D) r = θ

The equation r = 4 represents a circle with radius 4.

Identify the symmetries present in the polar equation r = 5cos(θ).

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 θ = π/2
- ☐ **C) Symmetry about the pole ✓**
- ☐ D) No symmetry

The equation has symmetry about the polar axis and the pole.

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.

To determine symmetry, check if the equation remains unchanged under specific transformations.

Part 3: Application and Analysis

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

Hint: Consider the range of the sine function.

- ○ A) 2
- ○ B) 3
- ○ **C) 5 ✓**
- ○ D) 1

The maximum value of r is 5 when sin(θ) is at its maximum.

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.

The graph is a circle, symmetric about the line θ = π/2, with a maximum radius of 2.

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.

The graph has 6 petals because the coefficient of θ is 3, which indicates 2n petals for n being odd.

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

The correct integral is 1/2∫ from 0 to π/2 of (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

The statement is true; the area is indeed π.

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 = 4cos(3θ)
- [ ] B) r = 2sin(3θ)
- [ ] **C) r = 5cos(6θ) ✓**
- [ ] **D) r = 3sin(6θ) ✓**

> The equations r = 5cos(6θ) and r = 3sin(6θ) both represent rose curves with 6 petals.

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.

> **Polar coordinates are preferable in scenarios like navigation or radar, where direction and distance are key.**