

Introduction to Polar Coordinates

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In this worksheet, we will graph some basic functions in polar coordinates and make some conjectures about their shapes.

Before beginning, make sure your calculator is in the correct mode. First make sure the angle is in radian mode. Second, in the mode menu, on the fourth line highlight “POL” and hit enter. This puts your calculator in polar coordinates mode. Notice when you hit “Y=” you will have r ’s instead of y ’s. The X, T, Θ, n button will give you θ ’s.

1 Some Basic Graphs

First we will graph some simple functions.

1. Make a conjecture (guess) about the graph of the function $r = 5$. Graph this function. When you graph the function, make sure you use the Zoom menu and hit 6 for a standard window. This may be a bit distorted, so hit 5 in the Zoom menu for a square window. Sketch the graph. Does the graph agree with your conjecture?
2. Make a conjecture (guess) about the graph of the function $r = \theta$. Graph this function on the calculator and sketch. Does it agree with your conjecture?

2 Roses

Here we will graph functions of the form $r = a \sin(n\theta)$.

1. Graph and sketch the following:

(a) $r = 6 \sin(2\theta)$

(b) $r = 6 \sin(3\theta)$

2. How would you describe the general shape of these graphs?

3. Make a conjecture about the effect of the number n in the form $r = a \sin(n\theta)$. Graph and sketch $r = 6 \sin(4\theta)$ to see if the result agrees with your conjecture.

4. Now graph and sketch the following:

(a) $r = 5 \sin(2\theta)$

(b) $r = 10 \sin(2\theta)$

5. Make a conjecture about the effect of the number a in the form $r = a \sin(n\theta)$. Graph and sketch $r = 2 \sin(2\theta)$ to see if the result agrees with your conjecture.

6. What happens if we use cosine instead of sine? Graph, sketch and compare the following:

(a) $r = 10 \sin(2\theta)$

(b) $r = 10 \cos(2\theta)$