

Polar Coordinates

Exploration Questions

Before you begin, make sure you have paper, pencil and a calculator that can perform basic trig functions available. For our purposes, t is used to represent θ . For each exploration, build a chart like:

t	$r=f(t)$
0	
$\pi/6$	
$\pi/4$	
$\pi/3$	
$\pi/2$	
$2\pi/3$	
$3\pi/4$	
$5\pi/6$	
π	
$7\pi/6$	
$5\pi/4$	
$4\pi/3$	
$3\pi/2$	
$5\pi/3$	
$7\pi/4$	
$11\pi/6$	
2π	

Exploration 1: Using values of theta between 0 and 2π , compute r for the function $r=\sin(3t)$. Looking at the values you computed, do you think you would need all of them to produce the complete graph of the function? If not, what range of theta values are needed to plot the entire graph? Plot this function in the Polar Coordinates activity using this range of theta values.

Exploration 2: For the range of theta values that you decided in Exploration #1 would create a complete graph, compute r for the function $r=\cos(3t)$. Compare these values to the values you calculated above. Can you predict the difference between the two graphs? FOR A HINT: Plot both functions in the Multi-function Data Flyer.

Exploration 3: Using values of theta between 0 and 2π , compute r for the function $r=\sin(2t)$. Do you need all of these points to see the general behavior of the graph? Plot this function in the Polar Coordinates Activity. Compare this graph to the one created with the $r=\sin(3t)$ function in Exploration 1 above. What pattern do you see? If you don't see it yet, try plotting $r=\sin(4t)$ and $r=\sin(5t)$. What do you think $r=\cos(2t)$ would look like?

Exploration 4: You may have noticed that the Polar Coordinates Activity only plots positive values for theta and r. Looking at the tables you created, did you find some negative r values? How would you change the theta and r values to plot the correct point, but make both values positive? After making the changes, plot the points using the data window. Did it work?