


What color is that bear?

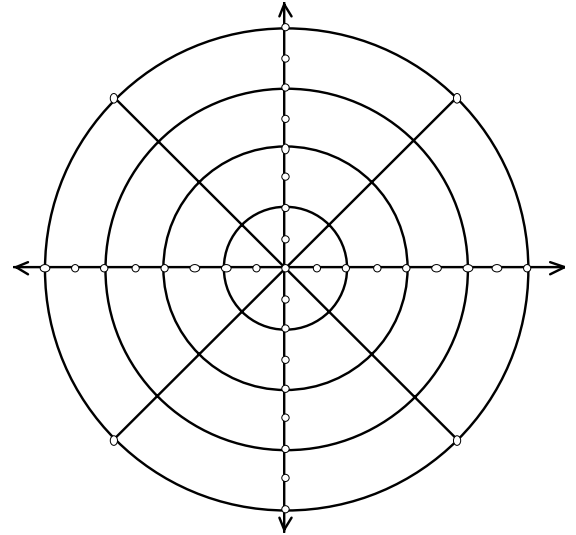
So far we've used polar coordinates as a way of dealing with complex numbers and as a way of graphing things easily. This worksheet asks the question: what kinds of interesting graphs do you get if graphing equations using x and y (rectangular coordinates), you graph equations relating r and θ (polar coordinates)?

On your Nspire, to graph a polar equation, select the graphing line (**f1(x)=**) and choose  to select polar graphing.

Do #s 1 and 2 **WITHOUT** your calculator, so you get a feel for this stuff on your own.

1. Graph the relation $r = \frac{1}{2}\theta$. Sketch the graph on the polar grid at right:

2. On the same grid, sketch $r = -\frac{1}{2}\theta$.

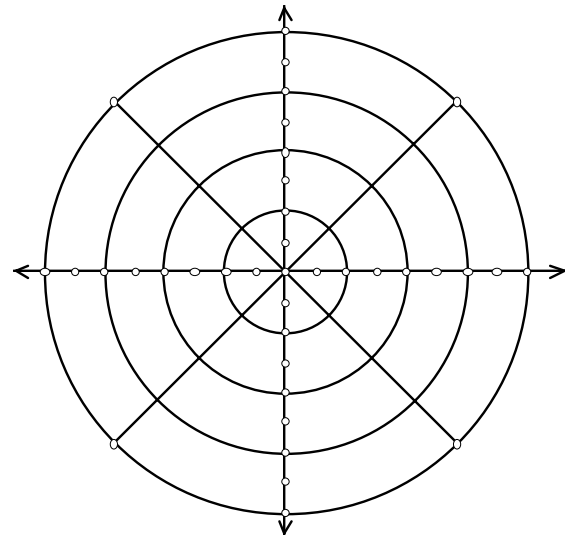


3. Explain why your TI refuses to even try to find intersections of graphs in polar coordinates.

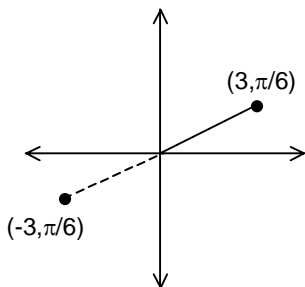
4. Fill in the table below to graph $r = \sin \theta$ by hand (last one, I promise) on the grid at right.

θ	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$	$2\pi/3$	$3\pi/4$	$5\pi/6$	π
r									

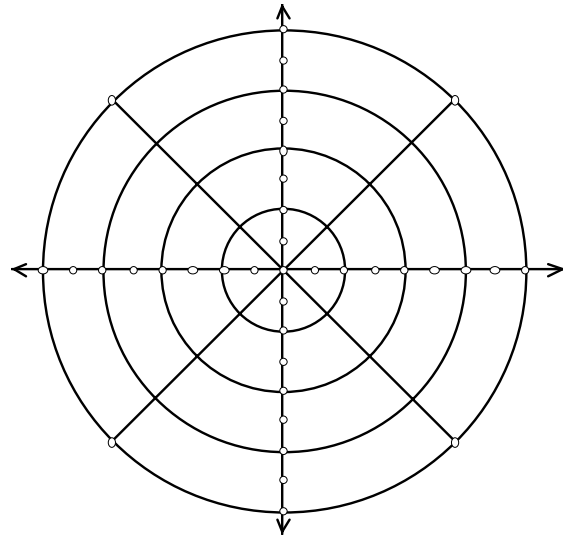
θ	$7\pi/6$	$5\pi/4$	$4\pi/3$	$3\pi/2$	$5\pi/3$	$7\pi/4$	$11\pi/6$	2π
r								



By the way, the convention is that if r is negative, you go *backward* along the ray as in the picture below (which you would probably have decided on your own).



5. To get rid of those pesky negative radii, you might consider just *adding* 1 to each r -value. Graph $r = 1 + \sin \theta$, and sketch it on the grid at right.



6. Okay, so that probably wasn't what you expected (it's called a cardioid, for reasons that should be obvious now that you've seen the graph). Now experiment with equations of the form $r = a \sin n\theta$ until you can describe how the values of a and n affect the graphs. It may help to divide the problem up into different cases (e.g. "For these values of n , ..."). Of course, $a \in \mathbf{R}$ and $n \in \mathbf{Z}^+$. Include thumbnail sketches.

7. How do your answers to 4, 5, and 6 change if you use the cosine instead of the sine? Explain why.