

## Practice Worksheet: Polar Coordinates

1. Find a polar ordered pair  $(r, \theta)$  that's plotted at the same location as the given rectangular ordered pair  $(x, y)$ . Answers should be ordered pairs involving exact values, with  $\theta$  in radians.

a.  $(x, y) = (-4, -4)$

b.  $(x, y) = (6, -6\sqrt{3})$

2. Find a polar ordered pair  $(r, \theta)$  that's plotted at the same location as the given rectangular ordered pair  $(x, y)$ . Answers should be ordered pairs involving approximations of  $\theta$  in radians.

a.  $(x, y) = (10, -2)$

b.  $(x, y) = (-3, 7)$

3. Find a rectangular ordered pair  $(x, y)$  that's plotted at the same location as the given polar ordered pair  $(r, \theta)$ . Answers should be ordered pairs involving exact values.

a.  $(r, \theta) = \left(5, \frac{2\pi}{3}\right)$

b.  $(r, \theta) = (16, 210^\circ)$

4. Find a rectangular ordered pair  $(x, y)$  that's plotted at the same location as the given polar ordered pair  $(r, \theta)$ . Answers should be ordered pairs involving approximate values.

a.  $(r, \theta) = (3, 80^\circ)$

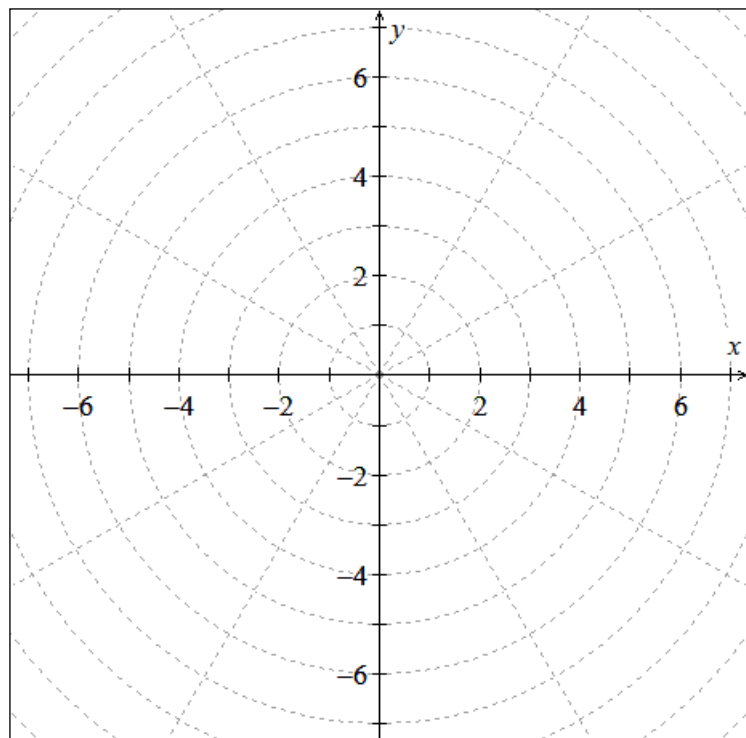
b.  $(r, \theta) = \left(7, -\frac{\pi}{10}\right)$

5. The polar ordered pair  $(5, \frac{\pi}{3})$  can be plotted as a “dot” on the polar coordinate plane. List four other (different) polar ordered pairs that are plotted on the same “dot.” Use “ $r = -5$ ” for at least one of your ordered pairs.

6. Complete the 1<sup>st</sup> column of the table below with appropriate multiples of  $\frac{\pi}{6}$ ,  $\frac{\pi}{4}$ , and  $\frac{\pi}{3}$ ; then determine the corresponding values of  $r$  if  $r = 6 \cos(2\theta)$  in order to complete the 2<sup>nd</sup> column of the table; then plot the points implied by each of the 16 rows of the table on the polar plane below and connect those points in order to draw a graph of  $r = 6 \cos(2\theta)$ .

(HINT: Graph the function in Desmos so that you can predict its shape before you draw it.)

	$\theta$	$r$
	0	
Quad. 1 angles		
	$\frac{\pi}{2}$	
Quad. 2 angles		
	$\pi$	
Quad. 3 angles		
	$\frac{3\pi}{2}$	
Quad. 4 angles		



Draw a graph of  $r = 6 \cos(2\theta)$ .

## Practice Worksheet: Complex Numbers

1. Express the complex number  $z = 10e^{i\frac{11\pi}{6}}$  in the form  $z = a + bi$ .

2. Express the complex number  $z = 8e^{i\frac{2\pi}{3}}$  in the form  $z = a + bi$ .

3. Express the complex number  $z = -7e^{i\frac{5\pi}{4}}$  in the form  $z = a + bi$ .

4. Express the complex number  $z = 20e^{i\pi}$  in the form  $z = a + bi$ .

5. Find a polar form,  $z = re^{i\theta}$ , of the complex number  $z = -3 - 3\sqrt{3}i$ .

6. Find a polar form,  $z = re^{i\theta}$ , of the complex number  $z = 2 - 2i$ .

7. Find a polar form,  $z = re^{i\theta}$ , of the complex number  $z = -4\sqrt{3} + 12i$ .

8. Find a polar form,  $z = re^{i\theta}$ , of the complex number  $z = -100$ .

9. Find three different polar forms,  $z = re^{i\theta}$ , of the complex number  $z = 4i$ . (HINT:  $i = 0 + 4i$  can be associated with the point  $(0, 4)$  so find three different angles that can be used to represent the “direction of this point” and use each angle to create a polar form.)