

For #1-3 use the following polar coordinates

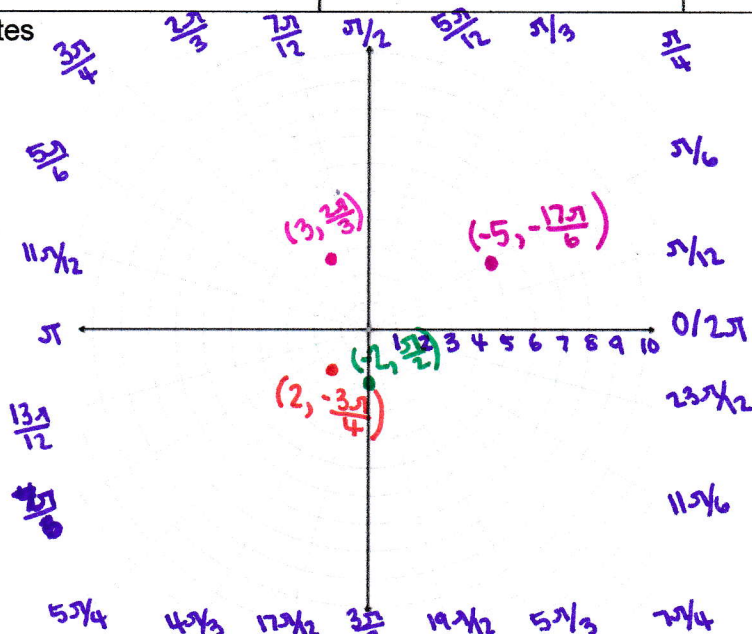
A. $(3, \frac{2\pi}{3})$

B. $(-5, -\frac{17\pi}{6})$

C. $(2, -\frac{3\pi}{4})$

D. $(-2, \frac{\pi}{2})$

1. Plot the polar coordinates



2. For each of the points above, find 2 other coordinates that represent the same point, one with $r > 0$ and the other $r < 0$

A. $(3, \frac{2\pi}{3})$
 $(-3, \frac{5\pi}{3})$

B. $(5, \frac{\pi}{6})$
 $(-5, \frac{7\pi}{6})$

C. $(2, \frac{5\pi}{4})$
 $(-2, \frac{\pi}{4})$

D. $(2, \frac{3\pi}{2})$
 $(-2, -\frac{3\pi}{2})$

3. State the rectangular coordinates.

A. $x = 3 \cos(\frac{2\pi}{3}) = -\frac{3}{2}$
 $y = 3 \sin(\frac{2\pi}{3}) = \frac{3\sqrt{3}}{2}$
 $(-\frac{3}{2}, \frac{3\sqrt{3}}{2})$

B. $x = 5 \cos(-\frac{17\pi}{6}) = \frac{5\sqrt{3}}{2}$
 $y = 5 \sin(-\frac{17\pi}{6}) = \frac{5}{2}$
 $(\frac{5\sqrt{3}}{2}, \frac{5}{2})$

C. $x = 2 \cos(-\frac{3\pi}{4}) = -\sqrt{2}$
 $y = 2 \sin(-\frac{3\pi}{4}) = -\sqrt{2}$
 $(-\sqrt{2}, -\sqrt{2})$

D. $x = -2 \cos(\frac{\pi}{2}) = 0$
 $y = -2 \sin(\frac{\pi}{2}) = -2$
 $(0, -2)$

4. Convert the rectangular coordinates into polar coordinates:

$(3\sqrt{3}, -3) \leftarrow QIV$

$$(3\sqrt{3})^2 + (-3)^2 = r^2$$

$$27 + 9 = r^2$$

$$\sqrt{36} = \sqrt{r^2}$$

$$r = \pm 6$$

$$\tan(\theta) = \frac{-3}{3\sqrt{3}}$$

$$\tan(\theta) = -\frac{1}{\sqrt{3}}$$

$$\theta = \frac{5\pi}{6}, \frac{11\pi}{6}, \dots$$

$(6, \frac{11\pi}{6})$ OR $(-6, \frac{5\pi}{6})$

5. Convert the following equations into their polar form.

a) $x^2 + y^2 = 16$

$$\sqrt{r^2} = \sqrt{16}$$

$$r = \pm 4$$

b) $y^2 = 3x$

$$\frac{r^2 \sin^2(\theta)}{r} = \frac{3r \cos(\theta)}{r}$$

$$\frac{r \sin^2(\theta)}{\sin^2(\theta)} = \frac{3 \cos(\theta)}{\sin^2(\theta)}$$

$$r = \frac{3 \cos(\theta)}{\sin^2(\theta)}$$

c) $y = 3$

$$\frac{r \sin(\theta)}{\sin(\theta)} = \frac{3}{\sin(\theta)}$$

$$r = \frac{3}{\sin(\theta)}$$

$$r = 3 \csc(\theta)$$

d) $x = 7$

$$\frac{r \cos(\theta)}{\cos(\theta)} = \frac{7}{\cos(\theta)}$$

$$r = \frac{7}{\cos(\theta)}$$

$$r = 7 \sec(\theta)$$

6. Convert the following equations from polar form into rectangular form.

$r = 6$

$$r^2 = 36$$

$$x^2 + y^2 = 36$$

$\theta = \frac{3\pi}{4}$

$$\tan(\theta) = \tan\left(\frac{3\pi}{4}\right)$$

$$\frac{y}{x} = -1$$

$$y = -x$$