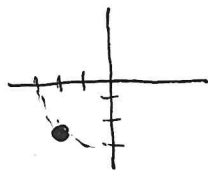


Advanced Studies Precalculus Polar Coordinates Worksheet

Plot each point on a polar coordinate system.

1. $(3, 225^\circ)$



2. $(2, \frac{\pi}{6})$



3. $(-3, \frac{5\pi}{4})$



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



Give two other coordinates that represent the same point as the one given.

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

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

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

6. $(4, \frac{\pi}{2})$

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

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

7. $(6, \frac{4\pi}{3})$

$(6, -\frac{2\pi}{3})$

$(-6, \frac{\pi}{3})$

8. $(-3, -45^\circ)$

$(-3, 315^\circ)$

$(3, 135^\circ)$

Find the rectangular coordinates of the given point.

9. $(5, 180^\circ)$

$x = 5 \cos 180^\circ$

$y = 5 \sin 180^\circ$

$(-5, 0)$

10. $(-3, \frac{\pi}{4})$

$x = -3 \cos \frac{\pi}{4}$

$y = -3 \sin \frac{\pi}{4}$

$(-\frac{3\sqrt{2}}{2}, -\frac{3\sqrt{2}}{2})$

Find the polar coordinates of the given point.

11. $(-2, 2)$

$\tan \theta = \frac{2}{-2} = -1$

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

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

$(2\sqrt{2}, \frac{3\pi}{4})$

12. $(-\sqrt{3}, 1)$

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

$\theta = \frac{5\pi}{6}$

$\sqrt{(-\sqrt{3})^2 + (1)^2} = 2$

$(2, \frac{5\pi}{6})$

13. $(0, -4)$

$\tan \theta = \frac{-4}{0}$

$\theta = -\frac{\pi}{2}$

$r = 4$

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

14. $(4, 5)$

$\tan \theta = \frac{5}{4}$

$\theta = .8961$

$\sqrt{4^2 + 5^2} = \sqrt{41}$

$(\sqrt{41}, .8961)$

Convert each rectangular equation to a polar equation in terms of θ .

15. $3x + y = 7$

$$\begin{aligned} 3(r \cos \theta) + (r \sin \theta) &= 7 \\ r(3 \cos \theta + \sin \theta) &= 7 \\ r &= \frac{7}{3 \cos \theta + \sin \theta} \end{aligned}$$

16. $x = 7$

$$\begin{aligned} r \cos \theta &= 7 \\ r &= \frac{7}{\cos \theta} \\ r &= 7 \sec \theta \end{aligned}$$

17. $x^2 + y^2 = 144$

$$\begin{aligned} r^2 &= 144 \\ |r| &= 12 \\ r &= 12 \end{aligned}$$

18. $(x-2)^2 + y^2 = 4$

$$\begin{aligned} (r \cos \theta - 2)^2 + (r \sin \theta)^2 &= 4 \\ r^2 \cos^2 \theta - 4r \cos \theta + 4 + r^2 \sin^2 \theta &= 4 \\ r^2 \cos^2 \theta + r^2 \sin^2 \theta - 4r \cos \theta &= 0 \\ r^2 (\cos^2 \theta + \sin^2 \theta) - 4r \cos \theta &= 0 \\ r^2 - 4r \cos \theta &= 0 \\ r(r - 4 \cos \theta) &= 0 \\ r = 0 & \text{ * not a graph} \end{aligned}$$

so $r - 4 \cos \theta = 0$
 $r = 4 \cos \theta$

Convert each polar equation to a rectangular equation in terms of x and y .

19. $r = 8$

$$\begin{aligned} r^2 &= 64 \\ x^2 + y^2 &= 64 \end{aligned}$$

20. $r \sin \theta = 3$

$$y = 3$$

21. $r = 12 \cos \theta$

$$\begin{aligned} r^2 &= 12r \cos \theta \\ x^2 + y^2 &= 12x \\ x^2 - 12x + y^2 &= 0 \\ (x-6)^2 + y^2 &= 36 \\ \frac{(x-6)^2}{6^2} + \frac{y^2}{6^2} &= 1 \end{aligned}$$

22. $r = 6 \cos \theta + 4 \sin \theta$

$$\begin{aligned} r^2 &= 6r \cos \theta + 4r \sin \theta \\ x^2 + y^2 &= 6x + 4y \\ x^2 - 6x + 9 + y^2 - 4y + 4 &= 13 \\ (x-3)^2 + (y-2)^2 &= 13 \end{aligned}$$