Polar Coordinate Exercises

Convert each of the following from rectangular coordinates to polar coordinates with the angle in radians. Give exact answers if possible; otherwise, round to the nearest thousandth.

1. $\left(-\sqrt{3},3\right)$ 2. $(-1,-1)$ 3. $\left(\sqrt{3},-1\right)$ 4. $(-2,5)$

Convert each of the following from polar coordinates, which the angle is given in radians, to rectangular coordinates. Give exact answers if possible; otherwise, round to the nearest thousandth.

5. $\left(8,\frac{5\pi}{6}\right)$ 6. $\left(3,\frac{4\pi}{3}\right)$ 7. $\left(5,\frac{3\pi}{2}\right)$ 8. $(2.194,-0.907)$

Graph each of the following:

9. $r = 5$
10. $\theta = \pi / 3$
11. $r = \frac{-4}{\cos\theta}$
12. $r = \frac{3}{\sin\theta}$
13. $r = \frac{12}{-4\cos\theta + 6\sin\theta}$
14. $r = \frac{4}{-3 + 3\sin\theta}$
15. $r = 2\cos\theta$
16. $r = 0.4\theta$
17. $r = 4 - 2\cos\theta$
18. $r = 2 - 4\cos\theta$
19. $r = 3 - 3\cos\theta$
20. $r = 4\sin(2\theta)$
21. $r = 4\sin(3\theta)$
22. $r = 4\sin(4\theta)$
23. $r = 4\sin(5\theta)$
24. $r = -3\sin\theta$

Find rectangular coordinate equations for each of the following:

25. $r = 5$
26. $\theta = \pi / 3$
27. $r = \frac{-4}{\cos\theta}$
28. $r = \frac{3}{\sin\theta}$
29. $r = \frac{12}{-4\cos\theta + 6\sin\theta}$
30. $r = -3\sin\theta$
31. $r = 2\cos\theta$
32. $r = \frac{4}{-3 + 3\sin\theta}$

Answers

1. $\left(2\sqrt{3},\frac{2\pi}{3}\right)$
2. $\left(\sqrt{2},\frac{5\pi}{4}\right)$
3. $\left(2,\frac{11\pi}{6}\right)$
4. $\left(\sqrt{29},1.951\right)$
5. $\left(-4\sqrt{3},4\right)$
6. $\left(-\frac{3}{2},-\frac{3\sqrt{3}}{2}\right)$
7. $(0,-5)$
8. $(1.352,-1.728)$

25. $x^2 + y^2 = 25$
26. $y = \sqrt{3}x$
27. $x = -4$
28. $y = 3$
29. $-4x + 6y = 12$
30. $x^2 + y^2 = -3y$
31. $x^2 + y^2 = 2x$
32. $9x^2 = -24y + 16$