Name_____ Date_____ Period_____

Worksheet 7.1—Polar Coordinates

Show all work on a separate sheet of paper. Calculator permitted, show all set ups.

Multiple Choice

1. If $r \neq 0$, which of the following polar coordinate pairs represents the same point as the point with polar coordinates (r, θ)?

   (A) $(-r, \theta)$ (B) $(-r, \theta + 2\pi)$ (C) $(-r, \theta + 3\pi)$ (D) $(r, \theta + \pi)$ (E) $(r, \theta + 3\pi)$

2. Which of the following are the rectangular coordinates of the point with polar coordinate $\left(-2, -\dfrac{\pi}{3}\right)$?

   (A) $\left(-\sqrt{3}, 1\right)$ (B) $\left(-1, -\sqrt{3}\right)$ (C) $\left(-1, \sqrt{3}\right)$ (D) $\left(1, -\sqrt{3}\right)$ (E) $\left(1, \sqrt{3}\right)$

3. Which of the following polar coordinate pairs represent the same point as the point with polar coordinates $\left(2, 110°\right)$?

   (A) $\left(-2, -70°\right)$ (B) $\left(-2, 110°\right)$ (C) $\left(-2, -250°\right)$ (D) $\left(2, -70°\right)$ (E) $\left(2, 290°\right)$

4. Which of the following polar coordinate pairs does NOT represent the point with rectangular coordinates $(-2, -2)$?

   (A) $\left(2\sqrt{2}, -135°\right)$ (B) $\left(2\sqrt{2}, 225°\right)$ (C) $\left(-2\sqrt{2}, -315°\right)$ (D) $\left(-2\sqrt{2}, 45°\right)$ (E) $\left(-2\sqrt{2}, 135°\right)$

Short Answer

For problems 5-8, plot the point that has the given polar coordinates.

5. $\left(3, \dfrac{3\pi}{4}\right)$ 6. $\left(-4, \dfrac{4\pi}{3}\right)$ 7. $(0, -1)$ 8. $\left(-2, -\dfrac{17\pi}{6}\right)$

For problems 9-12, plot the point that has the given polar coordinates, then give two other polar coordinate representations of the point, one with $r < 0$ and the other with $r > 0$.

9. $\left(3, -\dfrac{\pi}{2}\right)$ 10. $\left(-2, \dfrac{7\pi}{6}\right)$ 11. $\left(-4, -\dfrac{\pi}{3}\right)$ 12. $(1, 1)$

For problems 13-16, find the rectangular coordinates for the point whose polar coordinates are given.

13. $\left(7, \dfrac{\pi}{6}\right)$ 14. $\left(\sqrt{2}, -\dfrac{3\pi}{4}\right)$ 15. $(7, 7\pi)$ 16. $\left(-\sqrt{3}, -\dfrac{5\pi}{3}\right)$

For problems 17-20, convert the rectangular coordinates to polar coordinates with $r > 0$ and $0 \leq \theta < 2\pi$.

17. $(-6, 6)$ 18. $\left(\sqrt{8}, -\sqrt{8}\right)$ 19. $\left(\sqrt{6}, \sqrt{2}\right)$ 20. $\left(-\sqrt{3}, 0\right)$

For problems 21-24, convert the rectangular equation to polar form.

21. $y = x$ 22. $y = 2x^2$ 23. $x = 8$ 24. $x^2 - y^2 = 1$

For problems 25-30, convert the polar equation to rectangular form.

25. $r = 5$ 26. $\theta = \dfrac{5\pi}{6}$ 27. $r = 3\cos\theta$ 28. $r^2 = \sin 2\theta$ 29. $r = \dfrac{4}{1 + 2\sin\theta}$ 30. $\csc\theta = 2$

31. A radar detects two airplanes at the same altitude. Their polar coordinates are $\left(8 \text{ miles}, 110°\right)$ and $\left(5 \text{ miles}, 15°\right)$. How far apart are the airplanes?