SM 3H

2023-2024

9.3 Parametric Equations Day 2

SCORE: /

Name _____ Date _____ Period _____

Write a pair of parametric equations that will produce the indicated graph. (Answers may vary.)

1. The line segment starting at $(2, 3)$ with $t = 0$ and ending at $(5, 9)$ with $t = 2$.

2. The line segment starting at $(3, 4)$ with $t = 0$ and ending at $(6, -3)$ with $t = 1$.

3. That portion of the circle $x^2 + y^2 = 4$ that lies in the third quadrant.

4. That portion of the circle $x^2 + y^2 = 9$ that lies below the x-axis.

5. The circle with center (5, 2) and radius 3 and $0 \leq t < 2\pi$

6. The circle with center (-2, -4) and radius 2 and $0 \leq t < 2\pi$

7. The circle whose polar equation is $r = 2 \sin\theta$.

8. The circle whose polar equation is $r = 2\cos\theta$.

The following problems involve the parametric equations for the path of a projectile.

$x = v_0(\cos\theta)t \quad and \quad y = -16t^2 + v_0(\sin\theta)t + h_{0,}$

Where θ is the angle of inclination of the projectile at the launch, v_0 is the initial velocity of the projectile in feet per second, and h_0 is the initial height of the projectile in feet.

9. An archer shoots an arrow from a height of 5 ft at an angle of inclination of 30 degrees with a velocity of 300 ft/sec. Write the parametric equations for the path of the projectile and sketch the graph of the parametric equations. Round all answers to the nearest tenth.

a) For how many seconds is the arrow in flight?

10. Ms. Peterson hit a baseball with an initial speed of 180 feet per second at an angle of $40°$ to the horizontal. The ball was hit at a height of 3 feet off the ground. Round all answers to the nearest tenth.

a) Find the parametric equations that describe the position of the ball as a function of time.

b) How long is the ball in the air?

c) When is the ball at its maximum height? Determine the maximum height of the ball.

d) Determine the distance the ball traveled.

Review

11. Write a rectangular equation that is equivalent to the polar equation $r = 8\cos\theta$.

Convert the polar coordinates of each point to rectangular coordinates.

12. $\left(\sqrt{3}, \frac{5\pi}{6}\right)$

13. $\left(-4, \frac{\pi}{3}\right)$

Convert the rectangular coordinates of each point to polar coordinates. Use degrees for θ. Round to the nearest tenth if needed.

14. $(4,-4)$

15. $(-5\sqrt{3},-5)$

Factor completely.

16. $x^3 + 8$

17. $27x^3 - 125$