

Precalculus
7.6 Homework

Graph each pair of parametric equations in the rectangular coordinate system. Label or make a table with the exact coordinates of at least 3 points on each graph.

1. $x = 3t - 2$, $y = t + 3$, for $0 \leq t \leq 4$
2. $x = 4 - 3t$, $y = 3 - t$, for $1 \leq t \leq 3$
3. $x = t - 1$, $y = t^2$, for t in $(-\infty, \infty)$
4. $x = t - 3$, $y = 1/t$, for t in $(-\infty, \infty)$
5. $x = t - 2$, $y = \sqrt{t + 2}$, for $-2 \leq t \leq 7$
6. $x = 4 \cos t$, $y = 4 \sin t$

Eliminate the parameter and identify the graph of each pair of parametric equations.

7. $x = 4t - 5$, $y = 3 - 4t$
8. $x = t + 4$, $y = \sqrt{t - 5}$
9. $x = t - 5$, $y = t^2 - 10t + 25$
10. $x = 2 \sin t \cos t$, $y = 3 \sin(2t)$ (Hint: Identities!)
11. $x = 5 \sin t$, $y = 3 \cos t$
12. $x = -4 \sin(3t)$, $y = 4 \cos(3t)$

Write a pair of parametric equations that will produce the indicated graph.

13. The line segment starting at $(2, 3)$ with $t = 0$ and ending at $(5, 9)$ with $t = 2$
14. The line segment starting at $(-3, -3)$ with $t = 2$ and ending at $(5, 1)$ with $t = 6$
15. The line segment starting at $(6, -3)$ with $t = 5$ and ending at $(3, 4)$ with $t = 8$
16. The portion of the circle $x^2 + y^2 = 9$ that lies below the x -axis. (Hint: Convert to polar first.)
17. The circle whose polar equation is $r = 2 \sin \theta$
18. The vertical line that passes through the point $(3, 1)$

The following problem involves the parametric equations for the path of a projectile:

$$x = v_0 (\cos \theta)t \quad \text{and} \quad y = -16t^2 + v_0 (\sin \theta)t + h_0$$

where x is the horizontal distance traveled and y is the height (both in feet) after t seconds, 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.

19. An archer shoots an arrow from a height of 5 feet at an angle of inclination of 30° with an initial velocity of 300 ft/sec.
 - a. Write the parametric equations for the path of the projectile and sketch the graph of the parametric equations.
 - b. How long will the arrow stay in flight before it hits the ground? Solve algebraically.
 - c. What is the maximum height reached by the arrow? Solve algebraically.
 - d. If the arrow strikes a target at a height of 5 feet, then how far is the target from the archer? Solve algebraically.