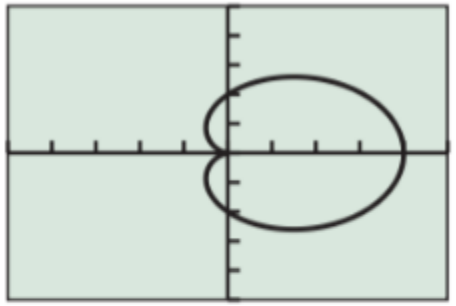
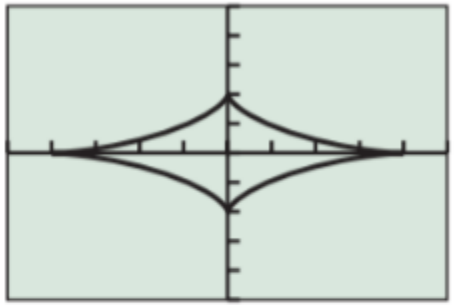
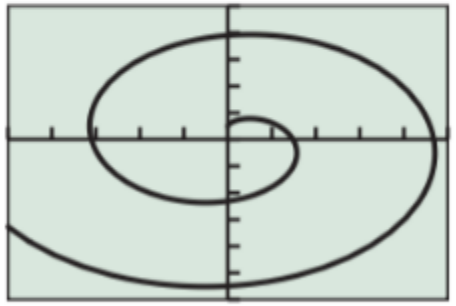
In Exercises 1–4, match the parametric equations with their graph. Identify the viewing window that seems to have been used.



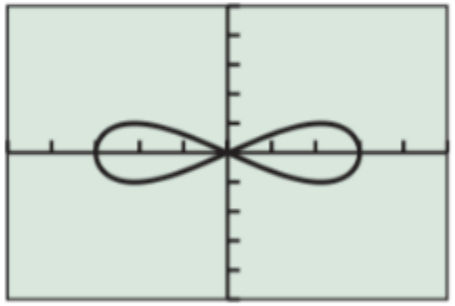
(a)



(b)



(c)



(d)

1. $x = 4\cos^3 t,\ y = 2\sin^3 t$

2. $x = 3\cos t,\ y = \sin 2t$

3. $x = 2\cos t + 2\cos^2 t,\ y = 2\sin t + \sin 2t$

4. $x = \sin t - t\cos t,\ y = \cos t + t\sin t$

In Exercises 5 and 6, **(a)** complete the table for the parametric equations and **(b)** plot the corresponding points.

5. $x = t + 2, y = 1 + 3/t$

t	-2	-1	0	1	2
x					
y					

6. $x = \cos t, y = \sin t$

t	0	$\pi/2$	π	$3\pi/2$	2π
x					
y					

37. Simulating a Foot Race Ben can sprint at the rate of 24 ft/sec. Jerry sprints at 20 ft/sec. Ben gives Jerry a 10-ft head start. The parametric equations can be used to model a race.

$$x_1 = 20t, \qquad y_1 = 3$$

$$x_2 = 24t - 10, \quad y_2 = 5$$

(a) Find a viewing window to simulate a 100-yd dash. Graph simulaneously with t starting at $t = 0$ and Tstep $= 0.05$.

(b) Who is ahead after 3 sec and by how much?

40. Height of a Pop-up A baseball is hit straight up from a height of 5 ft with an initial velocity of 80 ft/sec.

(a) Write an equation that models the height of the ball as a function of time t.

(b) Use parametric mode to simulate the pop-up.

(c) Use parametric mode to graph height against time. [*Hint:* Let $x(t) = t$.]

(d) How high is the ball after 4 sec?

(e) What is the maximum height of the ball? How many seconds does it take to reach its maximum height?

44. Hitting a Baseball Kirby hits a ball when it is 4 ft above the ground with an initial velocity of 120 ft/sec. The ball leaves the bat at a 30° angle with the horizontal and heads toward a 30-ft fence 350 ft from home plate.

(a) Does the ball clear the fence?

(b) If so, by how much does it clear the fence? If not, could the ball be caught?

50. Hitting Golf Balls Nancy hits golf balls off the practice tee with an initial velocity of 180 ft/sec with four different clubs. How far down the fairway does the ball hit the ground if it comes off the club making the specified angle with the horizontal?

(a) 15° **(b)** 20° **(c)** 25° **(d)** 30°

51. Analysis of a Ferris Wheel Ron is on a Ferris wheel of radius 35 ft that turns counterclockwise at the rate of one revolution every 12 sec. The lowest point of the Ferris wheel (6 o'clock) is 15 ft above ground level at the point (0, 15) on a rectangular coordinate system. Find parametric equations for the position of Ron as a function of time t (in seconds) if the Ferris wheel starts ($t = 0$) with Ron at the point (35, 50).