10.7 Plane Curves and Parametric Equations

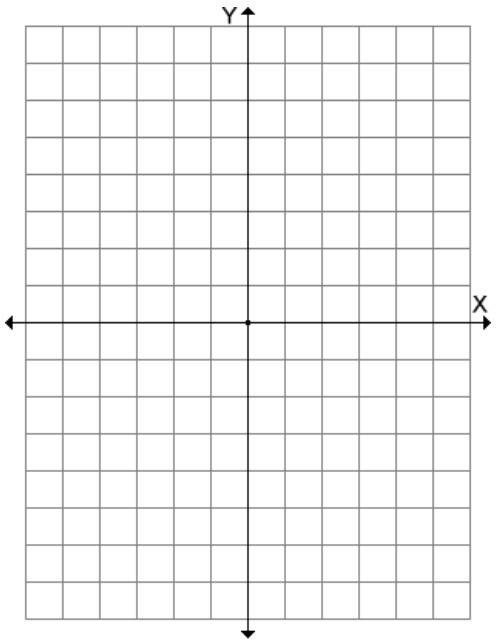
If we take a point (x, y) and move it on the x–y plane after a time t, we have a pair of equations:

$x = f(t)$ and $y = g(t)$

These equations are called **parametric equations** with parameter t.

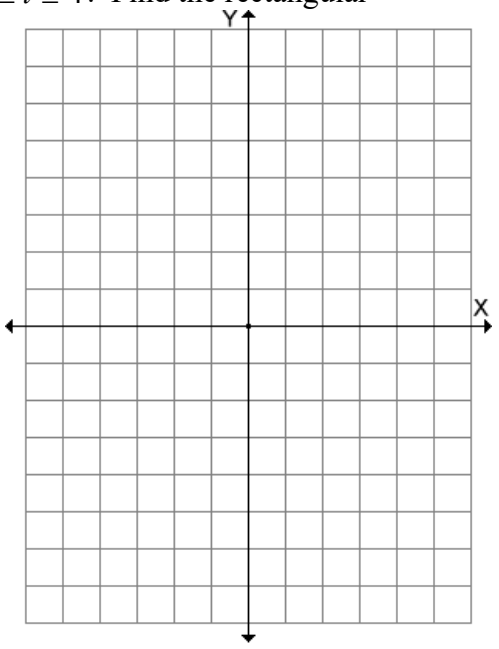
EXAMPLE: Graph the following equations $x = 3t$ and $y = t^2$ where $-2 \le t \le 2$. Find the rectangular equation.

t	$x = 3t$	$y = t^2$	(x, y)
-2			
-1			
0			
1			
2			



Eliminate the parameter:_____

EXAMPLE: Graph the following equations $x = \sqrt{t}$ and $y = \frac{1}{2}t + 1$ where $0 \le t \le 4$. Find the rectangular equation.

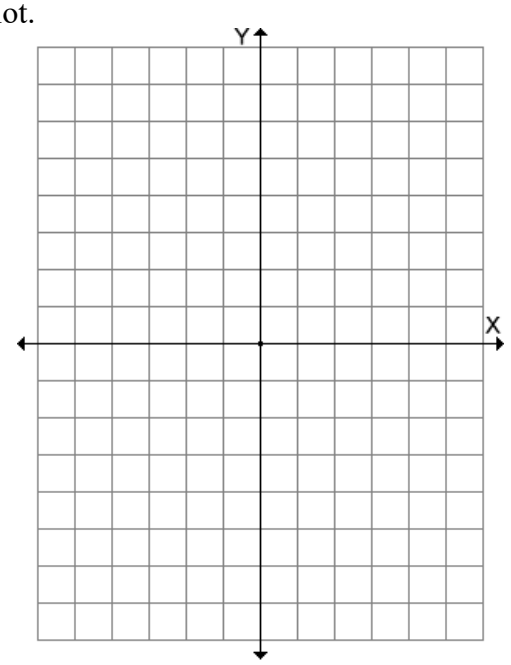


t	$x = \sqrt{t}$	$y = \frac{1}{2}t + 1$	(x, y)
0			
1			
2			
3			
4			

Eliminate the parameter:_____

EXAMPLE: Graph the following equations $x = e^{t}$ and $y = e^{-t}$ where $0 \le t \le 2$. Find the rectangular equation.

First we make our table and plot the points. Since t is between 0 and 2 I wanted to do more than just plot three points. That is why I chose 0.5 and 1.5. I wanted to have enough points to plot.

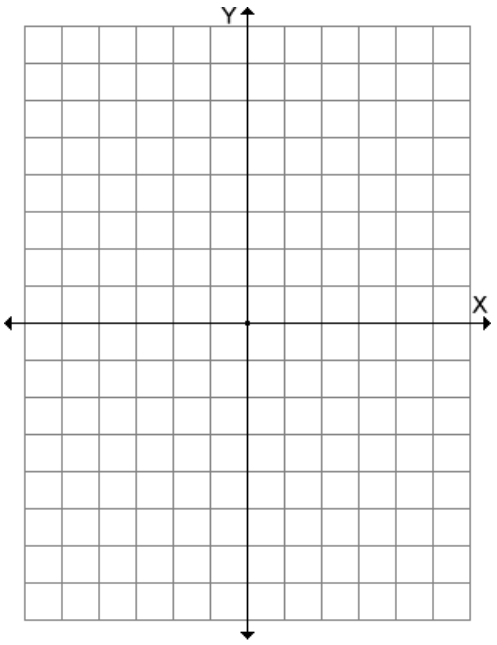


t	$x = e^{t}$	$y = e^{-t}$	(x, y)
0			
.5			
1			
1.5			
2			

Eliminate the parameter:_____

EXAMPLE: Graph the following equations $x = 4\cos t$ and $y = 2\sin t$ where $0 \le t \le 2\pi$. Find the rectangular equation.

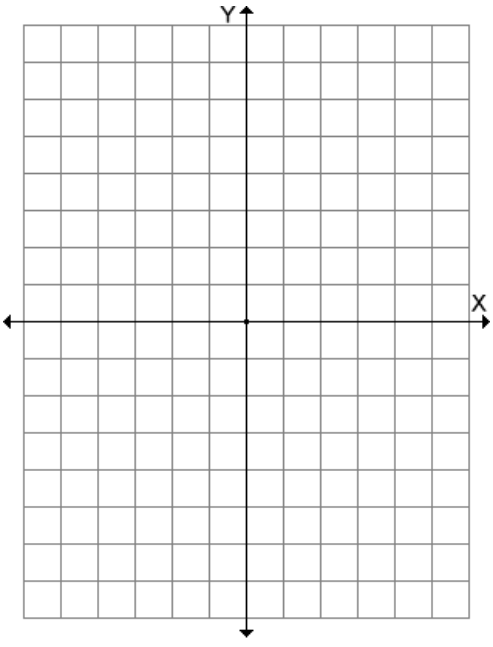
t	$x = 4\cos t$	$y = 2\sin t$	(x, y)
0			
$\frac{\pi}{2}$			
π			
$\frac{3\pi}{2}$			
2π			



Eliminate the parameter:_____

EXAMPLE: Graph the following equations $x = 3\cos t$ and $y = 3\sin t$ where $0 \le t \le 2\pi$. Find the rectangular equation.

t	$x = 3\cos t$	$y = 3\sin t$	(x, y)
0			
$\frac{\pi}{2}$			
π			
$\frac{3\pi}{2}$			
2π			



Eliminate the parameter:_____

EXAMPLE: Write parametric equations for the curve $y = -3x + 2$ with the definition $x = t$.

EXAMPLE: Write parametric equations for the curve $y = 6x - 4$ with the definition $x = \frac{t}{3}$.

EXAMPLE: Write parametric equations for the curve $y = 7 - 2x$ with the definition $x = -5t^2$.