Parametric Equations and Graphs

_____ can be used to describe curves in the xy-plane (called plane curves).

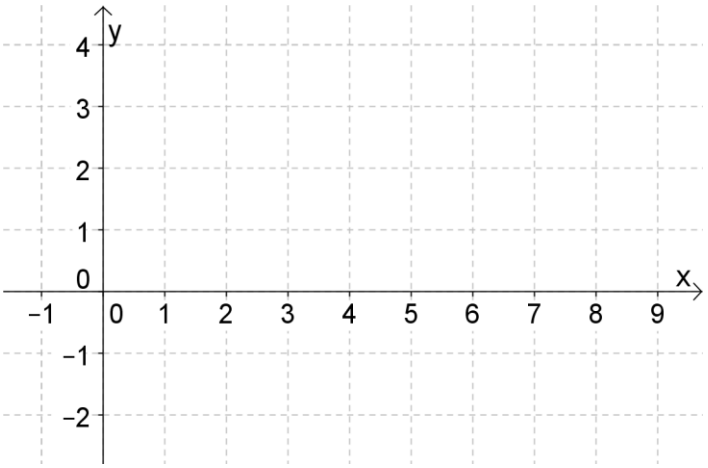
Here is an example of a set of parametric equations:

$x = t^2, \quad y = t + 1$

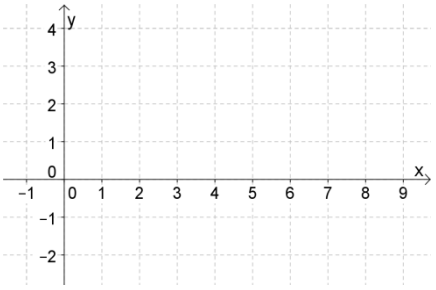
Each value of t gives you a point (x, y).

Let's plot a few points:

t	x	y
-3		
-2		
-1		
0		
1		
2		
3		



What would the graph look like if we restricted the parameter interval to $0 \leq t < 2$?



We could have turned the parametric equations $x = t^2,\ y = t + 1$ into a rectangular equation:

Getting a rectangular equation by eliminating the parameter helps us identify the path of the curve. However, eliminating the parameter is not always possible (ex: $x = t - \ln t\,,\ y = t^2 + \sin t$).

Ex 1.

Find a rectangular equation for the following curve, then graph it.

$x = 5\cos t\,,\ \ y = 5\sin t\,,\ \ \text{for } t \text{ in } [0,2\pi]$

In the previous example, what would happen if we let our parameter interval be $[0,4\pi]$?

_____

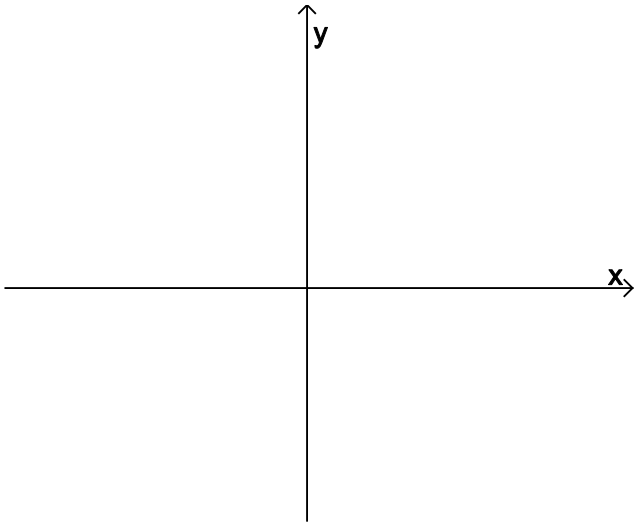
Note: Any function $y = f(x)$ can be parametrized by $x = t,\ y = f(t)$.

For example, the parabola $y = x^2$, can be parametrized by _____.

Practice

1. Find a rectangular equation for the following curve, then graph it.

   $x = 2t - 1,\ y = t^2 + 2,\ \text{for } t \text{ in } [-1, 1]$



Q: What are the next two letters in the following series and why?

W A T N T L I T F S _ _