

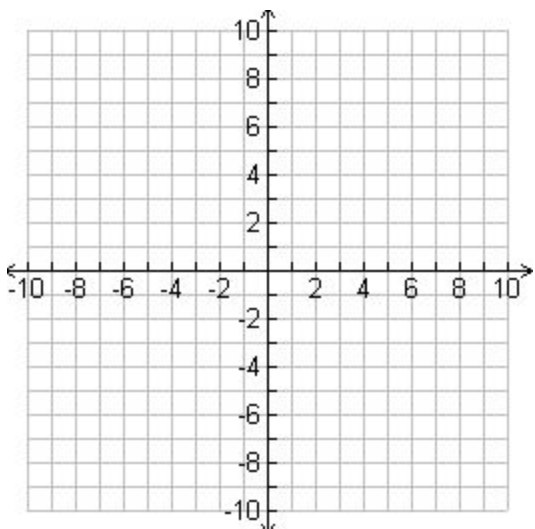
9.5 Parametric Equations

Take Home Notes

A parametric equation is a function with **two separate outputs** and a **hidden variable, t** .

Example 1

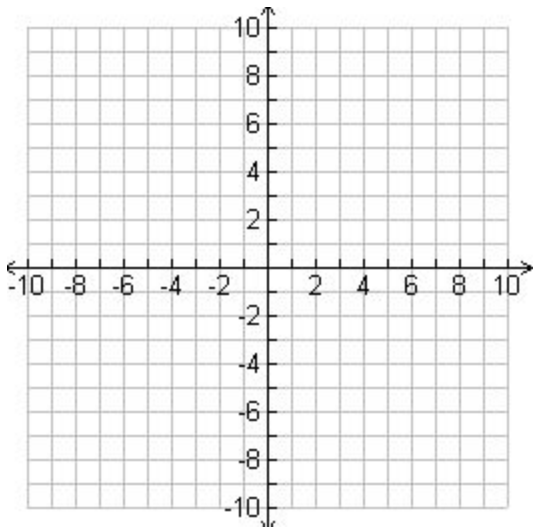
Suppose you start at $(0, 0)$ and walk at a pace of 2 meters east per second and 2 meters north per second.



t	x	y

Example 2

Suppose you start at $(-2, 3)$ and walk south at a pace of 1 meter per second and east at a pace of 3 meters per second.



t	x	y

Things to Notice

Time is not visible!

Rate is in meters/second, but is not “slope” as seen on the graph. (Where is it?)

Plotting points is the easiest way to graph.

Plotting Parametric Functions on Desmos

Because you can plot a point by typing (x,y) , for example $(3,2)$, we plot the equations by doing $(x(t),y(t))$. The variable always has to be t .

Example

Plot the equation parametric function $x(t) = 6 \sin(t)$ and $y(t) = \frac{t^2}{5} + 2$.

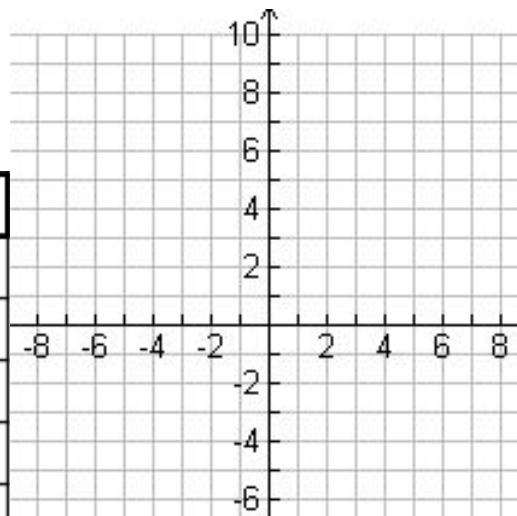
Change the domain to $0 \leq t \leq 2\pi$. Sketch the graph to the right.

Where is the person when $t = 0$?

Where is the person when $t = \frac{\pi}{2}$?

At what time is the person directly above where they started?

t	x	y



More Practice

Plot the equation parametric function $x(t) = 6 \sin(t)$ and $y(t) = 5 \cos(t)$.

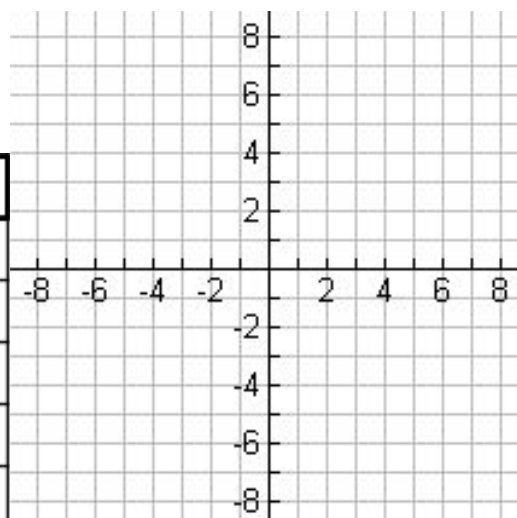
Change the domain to $0 \leq t \leq 5$. Sketch the graph to the right.

Is the person walking clockwise or counterclockwise around $(0,0)$?

Where is the person when $t = 0$?

Where is the person when $t = \frac{\pi}{2}$?

t	x	y



Explore Parametrics

Playing on Desmos, create some other graphs & equations that you would be willing to share with the class. One of the best ways to learn how something works is to toy with it until you get a feel for what will happen!

Write down the two functions below.

Function 1

$x(t) =$

$y(t) =$

Function 2

$x(t) =$

$y(t) =$