



## Parametric Plotting : Part One - The Plotting



The 2D graphs we have examined so far have one thing in common. There is an expression in terms of some variable and this expression has a name.

These expressions all have similar graphing Curve statements. The coordinates for the curve plot are of the form (variable, expression name).

These graphs are all formed by having the variable in the first coordinate take on a lot of values. These values are used to calculate the values of the second coordinate via the expression.


[We can expand on this type of graphing with Parametric Plot.](#)



With parametric plotting we still have a variable that is taking on all values in a certain interval. However, there are now two expressions using this variable. One expression for the first coordinate and one expression for the second coordinate of the Curve statement.



### Example

 In this example our variable is going to be  $t$ .  
We are going to call our first coordinate  $x$  and it will be calculated by the expression:


$$x = \cos(t)$$

Our second coordinate will be called  $y$  and it will be calculated by the expression:

$$y = \sin(t).$$

$x = \cos(t)$

$y = \sin(t)$

 We want to make a 2D graph of the points  $(x, y) = (\cos(t), \sin(t))$ , where  $t$  will take on the values in some interval.

Step 1) Create statement objects defining your two equations.

Step 2) Click on the equal sign in the first equations to highlight it.

Step 3) Hold down the SHIFT key and click on the equal sign of the second equations.

Step 4) Both equations are highlighted now.


Click on the 2D-Parametric Plot button  in the palette.

OR

Highlight both equations and select Parametric from the 2D-Graph SubMenu of the Graph Menu.

Step 5) LiveMath will need some information about which expression to use for the horizontal and vertical axis and what is the variable (also called a parameter). It will bring up a dialog box to ask you these questions.


**Graph Variables**



$x = \cos(t)$

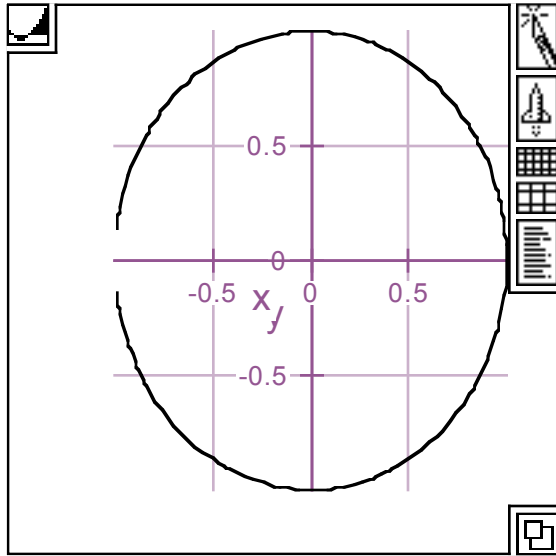
**LiveMath isn't sure of the variables that you want to use for your graph. Please confirm them below and click on OK.**

x axis	y axis	t parameter	
<div style="display: flex; justify-content: space-between;"> <span>arbitrary variable</span> <span>▲</span> </div> <div style="background-color: #ff0000; color: white; text-align: center; padding: 2px;">x</div> <div style="background-color: #ffffff; text-align: center; padding: 2px;">y</div> <div style="display: flex; justify-content: space-between;"> <span>▼</span> <span>☰</span> </div>	<div style="display: flex; justify-content: space-between;"> <span>arbitrary variable</span> <span>▲</span> </div> <div style="text-align: center; padding: 2px;">x</div> <div style="background-color: #ff0000; color: white; text-align: center; padding: 2px;">y</div> <div style="display: flex; justify-content: space-between;"> <span>▼</span> <span>☰</span> </div>	<div style="background-color: #ff0000; color: white; text-align: center; padding: 2px;">t</div> <div style="text-align: center; padding: 2px;">n</div> <div style="text-align: center; padding: 2px;">h</div> <div style="display: flex; justify-content: space-between;"> <span>▼</span> <span>☰</span> </div>	<div style="border: 1px solid gray; padding: 5px; width: 100px; margin-bottom: 5px;">Cancel</div> <div style="border: 1px solid gray; padding: 5px; width: 100px;">OK</div>
<input checked="" type="checkbox"/> Dep	<input checked="" type="checkbox"/> Dep	<input type="checkbox"/> Dep	

 Once you have the proper choices selected, click the OK button and LiveMath will create the graph.

$x = \cos(t)$

$y = \sin(t)$



**Now It's Your Turn...** Follow the directions below to get hands on experience.



Graph a parametric graph using the following two expressions

$$x = \sin(t)$$

$$y = t - 5$$