

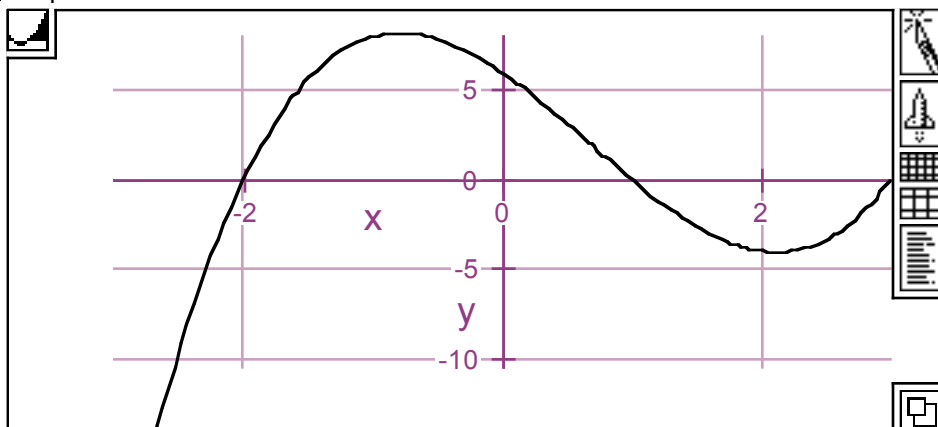
**The Viewing Window : Part 2 - Buttons on the Right**

The viewing window in a graphic object contains more than just the graph of your expression, formula, or function. There are axes, gridlines, and labels.





After creating your graph you may want to change some of its most obvious characteristics. The icons arranged vertically along their right hand side of the viewing window are there for this exact purpose.

$y_1 = (x + 2)(x - 1)(x - 3)$

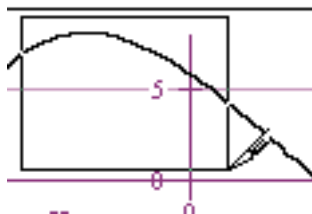
**The Knife for Zooming In**

The knife is used to zoom in. You use the knife to cut out the piece of the graph that you would like expanded to the full window.

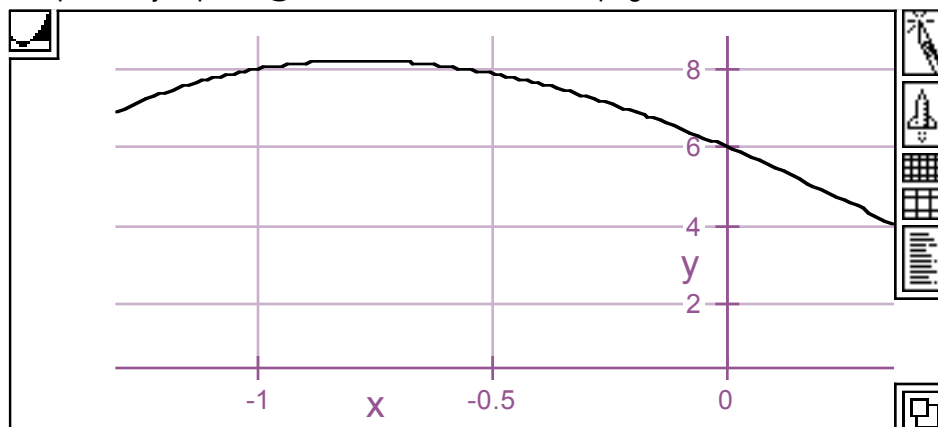


First click on the knife icon to highlight it . When you move your cursor into the viewing window area the cursor will change to a knife . The point of the knife will do the cutting.


Move the point of the knife cursor to one of the corners of the rectangle you would like to cut out and zoom in on. Click the (left) mouse button and hold the mouse button down. Drag the knife cursor to the opposite corner. As you move the cursor a rectangle will form showing which portion of the graph will be cut out.




$y_2 = (x + 2)(x - 1)(x - 3)$



 This is the result of the indicated cut on the previous graph.


 When you release the mouse button LiveMath will zoom in on the area you have cut out.

### **The Rocket for Zooming Out**

 The rocket icon is for zooming out. That is it will increase the dimensions of the viewing window. One click will double the values of the left, right, bottom, and top sides. LiveMath will automatically redraw.


### **More Points**

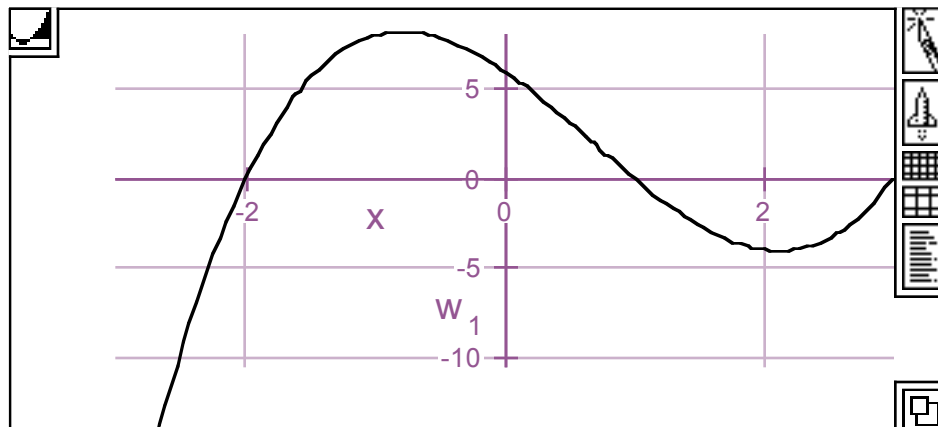
### **Fewer Points**

 A graph of an expression, formula, or function is a bunch of points. Well, more than a bunch. There are an infinite number of points on any graph. A computer can't really draw an infinite number of points. Instead it draws some points and then connects those points with straight lines. **The more points you use the shorter the straight lines and the better the graph looks on your computer screen....long lines don't form curves very well.**

The More Points and Fewer Points buttons control the number of graphing points you want LiveMath to use.

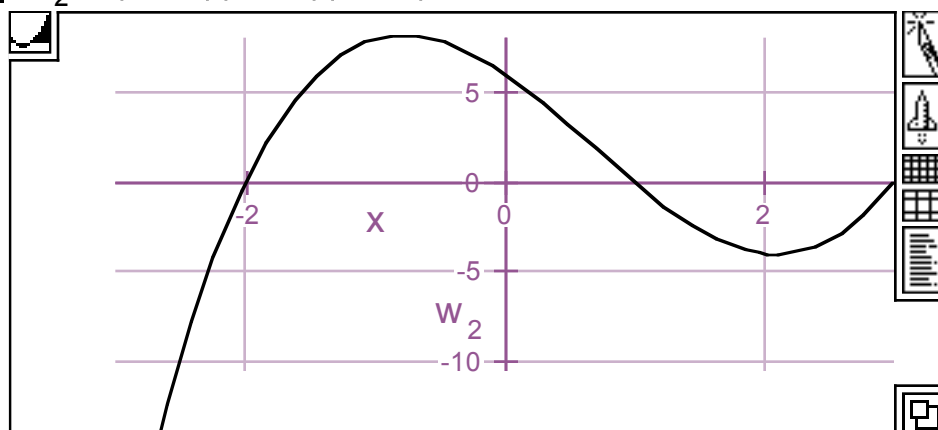
Here is a default graph.

  $w_1 = (x + 2)(x - 1)(x - 3)$



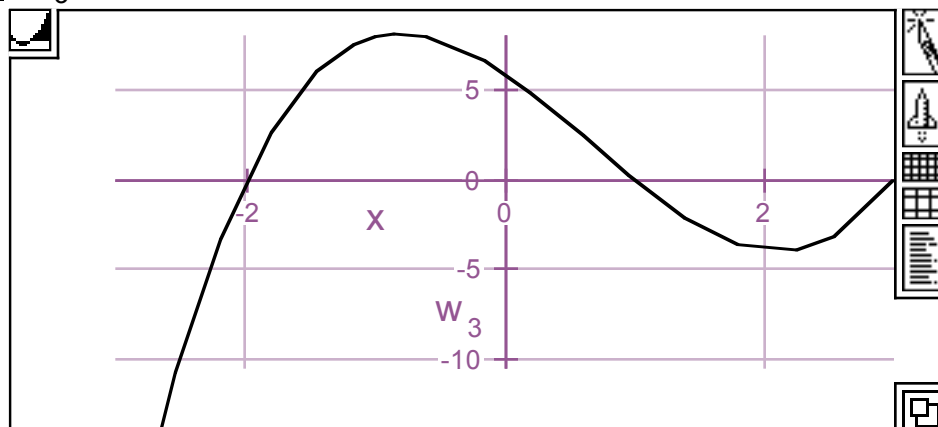
Here is what the same graph looks like after one click on the Fewer Points button.

$$w_2 = (x + 2)(x - 1)(x - 3)$$



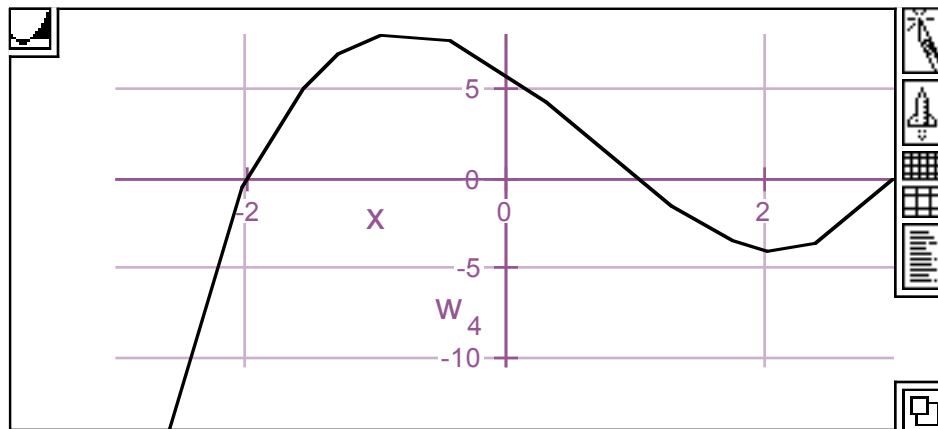
Here is what the same graph looks like after another click on the Fewer Points button.

$$w_3 = (x + 2)(x - 1)(x - 3)$$



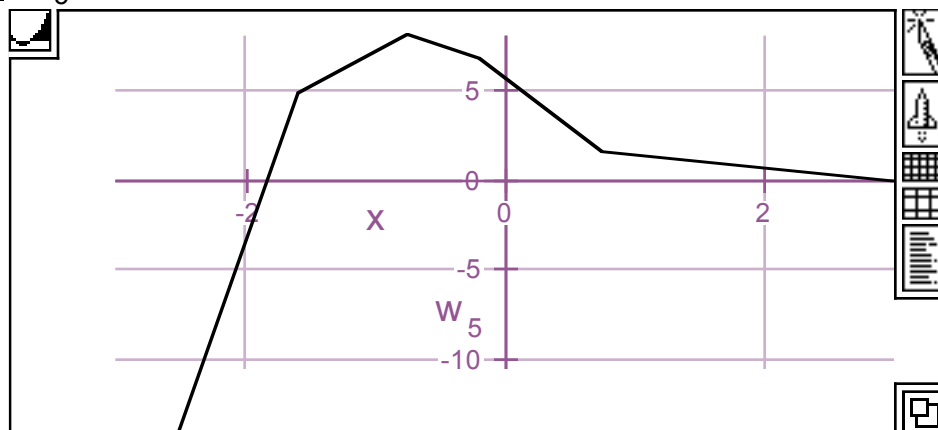
After three clicks:

$$w_4 = (x + 2)(x - 1)(x - 3)$$



After four clicks:


$$w_5 = (x + 2)(x - 1)(x - 3)$$



Clicking on the More Points button will have the opposite effect.



### Graphing Options Box

 We have seen the Graphing Options box already and will see more of it in future lessons. It contains statements that define what you see in the viewing window.



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



Graph the expression

$$z = \sin(x)$$

then use the knife to zoom in on the top of the first hump in the first quadrant.