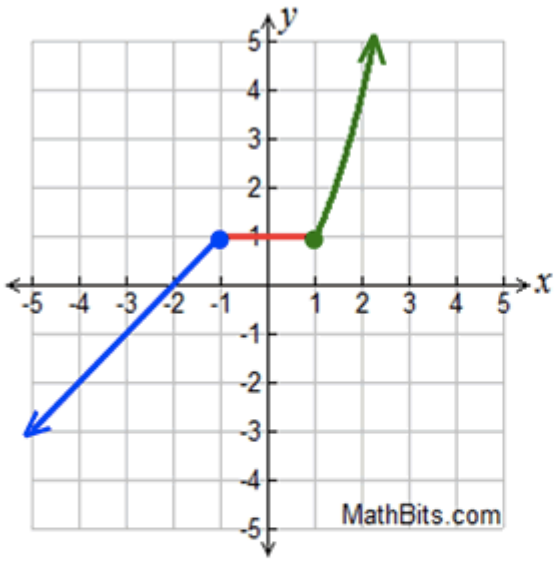
Piecewise Function

A piecewise defined function is a function defined by at least two equations ("pieces"), each of which applies to a different part of the domain. Piecewise defined functions can take on a variety of forms. Their "pieces" may be all linear, or a combination of functional forms (such as constant, linear, quadratic, cubic, square root, cube root, exponential, etc.). Due to this diversity, there is no "parent function" for piecewise defined functions. The example below will contain linear, quadratic and constant "pieces".



$$f(x)=\begin{cases} x+2; & x\le -1 \\ 1; & -1<x<1 \\ x^2; & x\ge 1 \end{cases}$$

Notice that each "piece" of the function has a specific constraint.

Description:

Notice that the "changes" focus around the x-values of 1 and -1.

♦ ***Hint:*** When graphing, focus on where the changes in the graph occur.

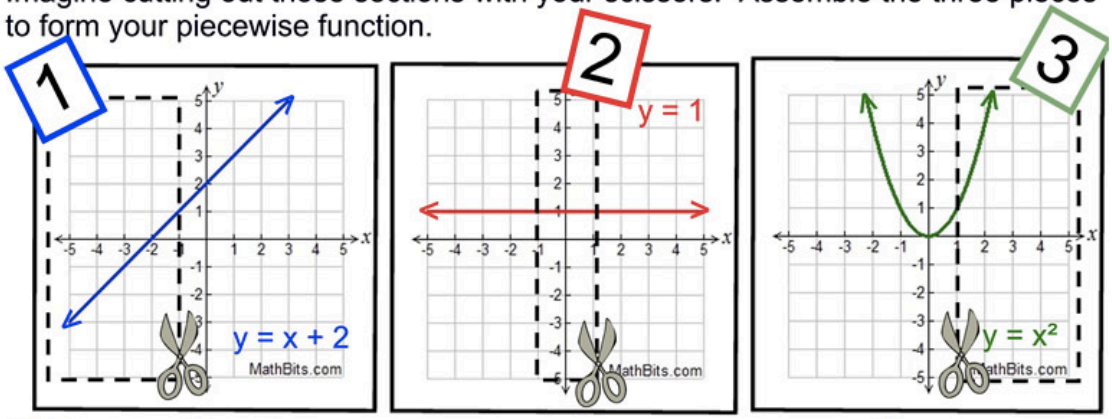
From x-values of $-\infty$ to -1, the graph is a *straight line*.

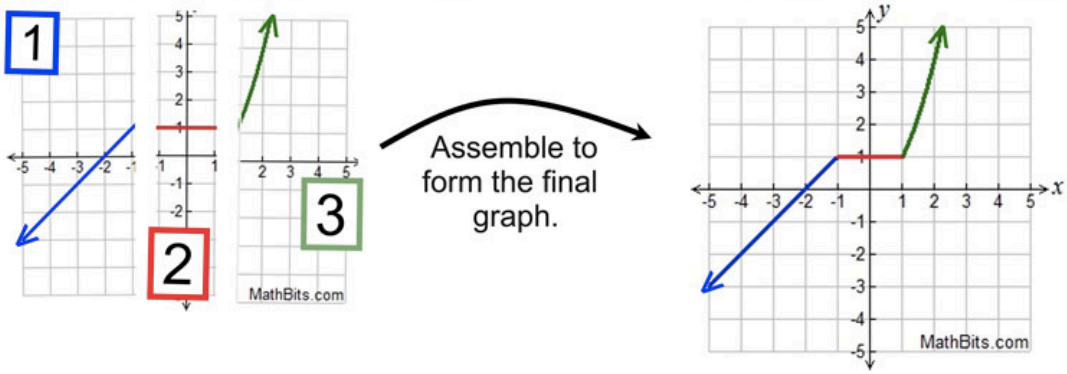
From x-values of -1 to 1, the graph is *constant*.

From x-values 1 to ∞, the graph is *quadratic* (part of a parabola).

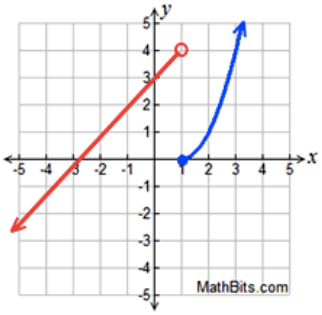
Still confused about what is happening in these piecewise defined functions?
Try taking a look at each section as a "separate" graph, and grab your scissors!

Draw each of the three graphs. Mark off the sections that you want to consider. Imagine cutting out those sections with your scissors. Assemble the three pieces to form your piecewise function.



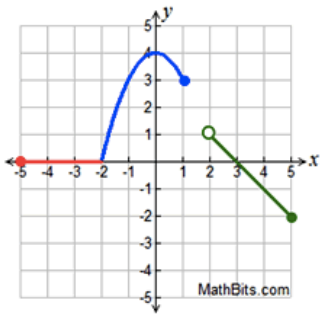


Other Examples of Piecewise Defined Functions:



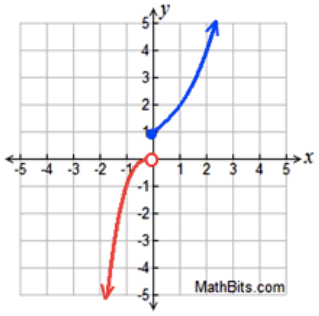
$$f(x)=\begin{cases}(x-1)^2; & x\geq 1\\ x+3; & x<1\end{cases}$$

Domain: All Reals
Range: All Reals



$$g(x)=\begin{cases}0; & -5\leq x<-2\\ -x^2+4; & -2\leq x\leq 1\\ -x+3; & 2<x\leq 5\end{cases}$$

Domain: [-5,1] U (2,5]
Range: [-2,4]



$$f(x)=\begin{cases}2^x; & x\geq 0\\ x^3; & x<0\end{cases}$$

Domain: All Reals
Range: $(-\infty,0)\cup[1,\infty)$

From:
http://mathbitsnotebook.com/Algebra1/FunctionGraphs/FNGTypePiecewise.html