
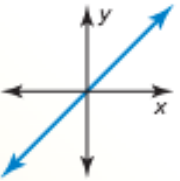
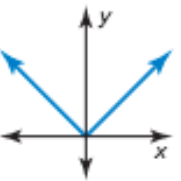
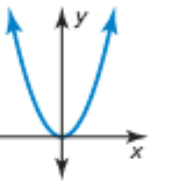
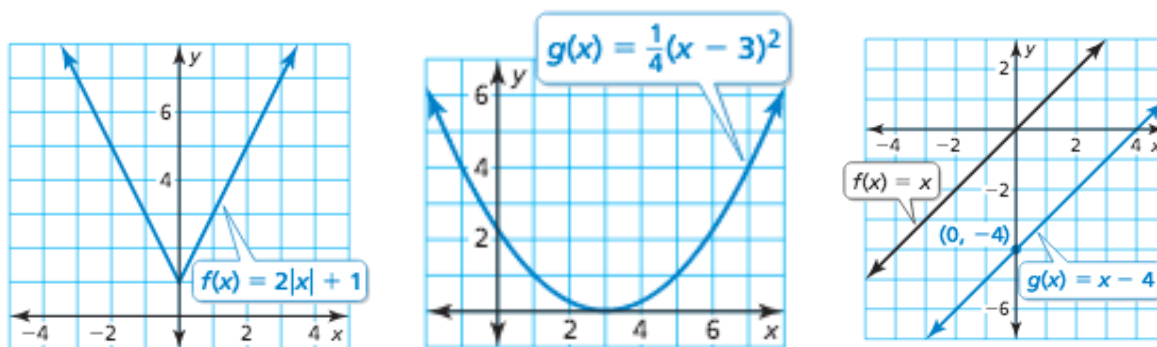


Functions that belong to the same family share key characteristics. The parent function is the most basic function in a family. Functions in the same family are transformations of their parent function.

### Parent Functions

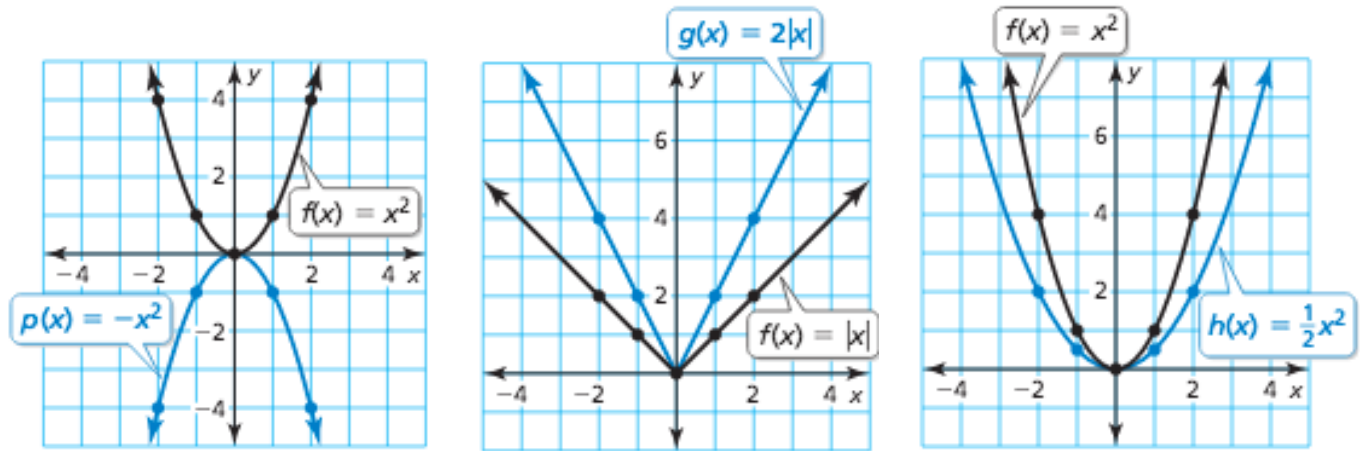
Family	Constant	Linear	Absolute Value	Quadratic
Rule	$f(x) = 1$	$f(x) = x$	$f(x) =  x $	$f(x) = x^2$
Graph				
Domain	All real numbers	All real numbers	All real numbers	All real numbers
Range	$y = 1$	All real numbers	$y \geq 0$	$y \geq 0$

- To Translate Up by  $k$  units, replace all occurrences of  $y$  with  $(y - k)$ , and all  $y$ -coordinates of the original graph are increased by  $k$  units. To translate Down, reverse the process.
- To Translate Right by  $h$  units, replace all occurrences of  $x$  with  $(x - h)$ , and all  $x$ -coordinates of the original graph are increased by  $h$  units. To translate Left, reverse the process.
- To Reflect in the  $x$ -axis, replace all occurrences of  $y$  with  $(-y)$ , and all  $y$ -coordinates of the original graph become their opposites.
- To Reflect in the  $y$ -axis, replace all occurrences of  $x$  with  $(-x)$ , and all  $x$ -coordinates of the original graph become their opposites.
- To Stretch a Graph Vertically, Multiply all  $y$ -coordinates by a number greater than 1.
- To Shrink a Graph Vertically, Multiply all  $y$ -coordinates by a number between 0 and 1.
- To Stretch a Graph Horizontally, Multiply all  $x$ -coordinates by a number between 0 and 1.
- To Shrink a Graph Horizontally, Multiply all  $x$ -coordinates by a number greater than 1.



- The first graph has an absolute value parent function  $f(x) = |x|$ . It has been Vertically Stretched by a factor of 2, so all  $y$ -coordinates have been doubled. Then it has been translated up by one unit.
- The second graph has a quadratic parent function  $f(x) = x^2$ . It has been Vertically Shrunk by  $\frac{1}{4}$ , and translated 3 units to the right.
- The 3<sup>rd</sup> graph shows the linear parent function  $f(x) = x$  and also a translation down by 4 units.  $f(x) + 4 = x$  is equivalent to  $f(x) = x - 4$ .

The next graphs show a reflection, a vertical stretch, and a vertical shrink.



Assignment 002

01.01 – Parent Functions and Transformations

Page 8, #'s 1, 2, 3, 7, 8, 28-34 even, 35, 36, 38, 40, 44, 45, 48, 51, 52, 62