NAME _____ DATE _____ PERIOD _____

Study Guide

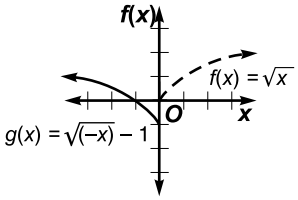
Families of Graphs

A **parent graph** is a basic graph that is transformed to create other members in a family of graphs. The transformed graph may appear in a different location, but it will resemble the parent graph.

A **reflection** flips a graph over a line called the *axis of symmetry.*
A **translation** moves a graph vertically or horizontally.
A **dilation** expands or compresses a graph vertically or horizontally.

Example 1 **Describe how the graphs of $f(x) = \sqrt{x}$ and $g(x) = \sqrt{-x} - 1$ are related.**

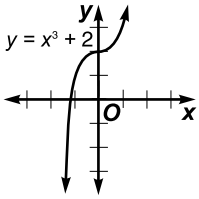
The graph of $g(x)$ is a reflection of the graph of $f(x)$ over the y-axis and then translated down 1 unit.



Example 2 **Use the graph of the given parent function to sketch the graph of each related function.**

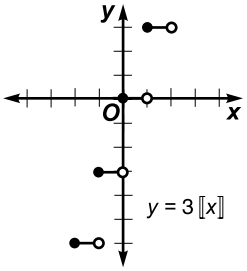
a. $f(x) = x^3; y = x^3 + 2$

When 2 is added to the parent function, the graph of the parent function moves up 2 units.



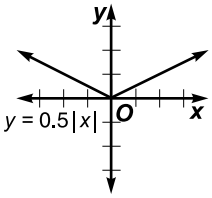
b. $f(x) = [\![x]\!]; y = 3[\![x]\!]$

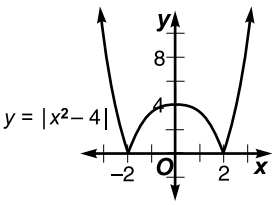
The parent function is expanded vertically by a factor of 3, so the vertical distance between the steps is 3 units.



c. $f(x) = |x|; y = 0.5|x|$

When $|x|$ is multiplied by a constant greater than 0 but less than 1, the graph compresses vertically, in this case, by a factor of 0.5.



d. $f(x) = x^2; y = |x^2 - 4|$

The parent function is translated down 4 units and then any portion of the graph below the x-axis is reflected so that it is above the x-axis.