

Date: _____

Section: 1.4

Objective: Learn what the graphs of important *parent functions* look like and what points they go through. Learn how *transforming* the equation changes the graph.

Parent Graphs - Fill in the table to find some **key points** for some important graphs. Use the table to generate ordered pairs for points on the graph, then sketch the graph.

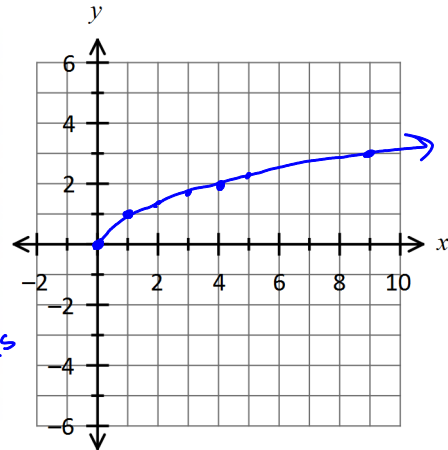
★ **Square Root Function:** $f(x) = \sqrt{x}$

Domain: $[0, \infty)$ Range: $[0, \infty)$

x	$y = \sqrt{x}$	Point
-1	$\sqrt{-1}$ ← undefined	none
0	$\sqrt{0} = 0$	(0, 0)
1	$\sqrt{1} = 1$	(1, 1)
4	$\sqrt{4} = 2$	(4, 2)
9	$\sqrt{9} = 3$	(9, 3)

2 $\sqrt{2} \approx 1.4$ (2, 1.4)
 3 $\sqrt{3} \approx 1.7$ (3, 1.7)
 5 $\sqrt{5} \approx 2.2$ (5, 2.2)
 etc.

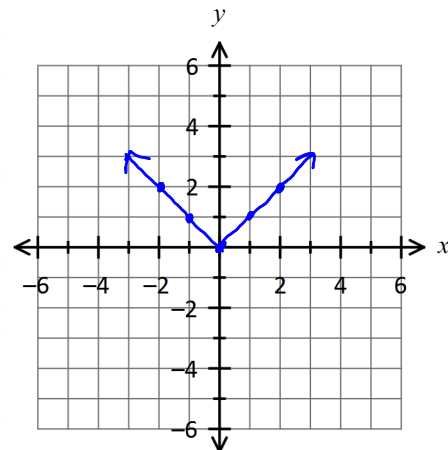
These points are easiest to find & are enough to see what the graph looks like. We call them **KEY POINTS**. They aren't the only points on the graph, but they're the most useful.



★ **Absolute Value Function:** $f(x) = |x|$

Domain: $(-\infty, \infty)$ Range: $[0, \infty)$

x	y	Point
-2	$ -2 = 2$	(-2, 2)
-1	$ -1 = 1$	(-1, 1)
0	$ 0 = 0$	(0, 0)
1	$ 1 = 1$	(1, 1)
2	$ 2 = 2$	(2, 2)



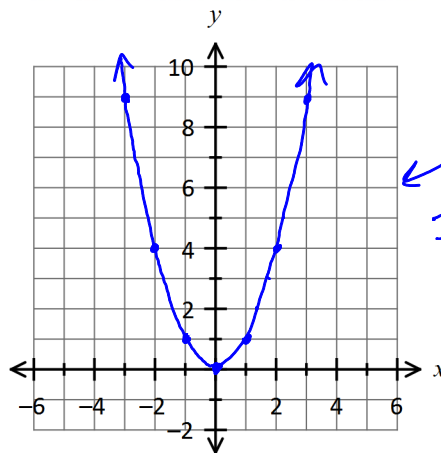
★ Quadratic Function: $f(x) = x^2$

Domain: $(-\infty, \infty)$ Range: $[0, \infty)$

x	y	Point
-2	$(-2)^2 = 4$	$(-2, 4)$
-1	$(-1)^2 = 1$	$(-1, 1)$
0	$0^2 = 0$	$(0, 0)$
1	$1^2 = 1$	$(1, 1)$
2	$2^2 = 4$	$(2, 4)$

-3 $(-3)^2 = 9$ $(-3, 9)$

3 $3^2 = 9$ $(3, 9)$



Transformations of the parent graph:

	$f(x) = x $	$f(x) = x^2$	$f(x) = \sqrt{x}$	Effect on Parent Graph
$y = -f(x)$	$y = - x $	$y = -x^2$	$y = -\sqrt{x}$	reflection over x-axis (flip upside down)
$y = 2f(x)$	$y = 2 x $	$y = 2x^2$	$y = 2\sqrt{x}$	vertical stretch (graph gets taller) multiply y-coords by # in front
$y = \frac{1}{2}f(x)$	$y = \frac{1}{2} x $	$y = \frac{1}{2}x^2$	$y = \frac{1}{2}\sqrt{x}$	vertical compression (graph gets shorter) multiply y-coords by # in front
$y = f(x) + 2$	$y = x + 2$	$y = x^2 + 2$	$y = \sqrt{x} + 2$	shifts graph up
$y = f(x) - 2$	$y = x - 2$	$y = x^2 - 2$	$y = \sqrt{x} - 2$	shifts graph down
$y = f(x + 2)$	$y = x + 2 $	$y = (x + 2)^2$	$y = \sqrt{x + 2}$	shifts graph <u>left</u> (opposite of + sign)
$y = f(x - 2)$	$y = x - 2 $	$y = (x - 2)^2$	$y = \sqrt{x - 2}$	shifts graph <u>right</u> (opposite of - sign)