Parent Functions

By the end of this lesson, I will be able to answer the following questions…

1. What is a **parent function**?

2. What is the algorithm for *changing* the graph of a parent function?
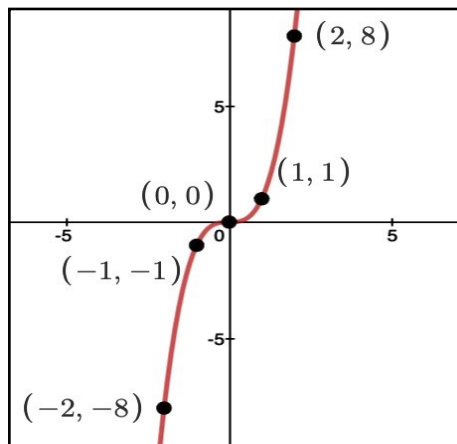
Vocabulary

1. **Parent Function:** A set of basic functions used as building blocks for more complicated functions.

2. **Graphical Transformations:** Any movement of a graph based on a **SHIFT**, **STRETCH**, **ROTATION** or **REFLECTION** - (Usually from a parent function.)

Holy shift!
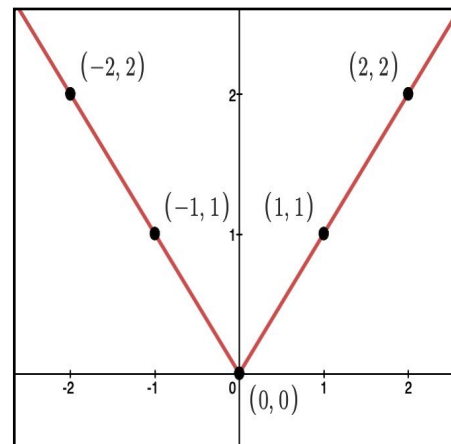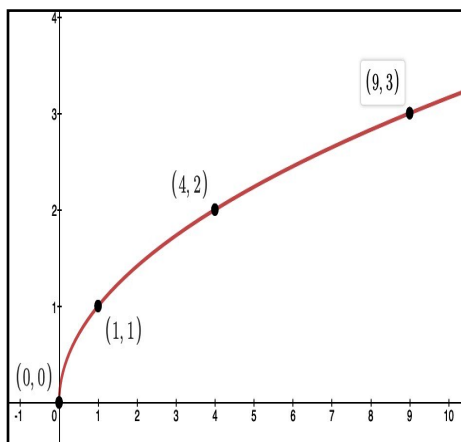**Look at the asymptote on that mother *function*!**
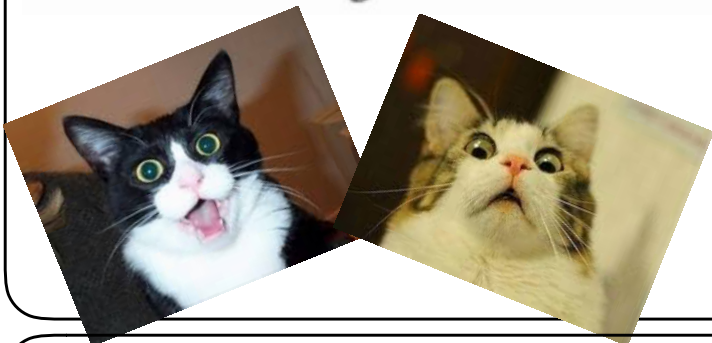
Common Parent Functions
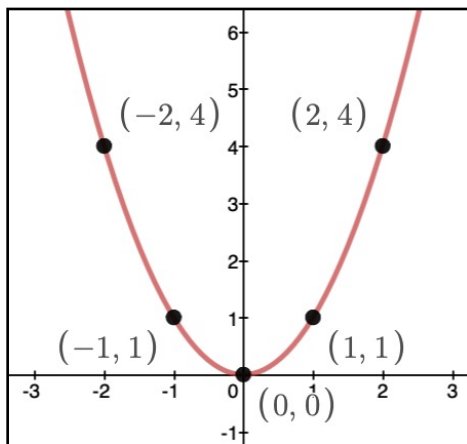
$$f(x) = x^2$$

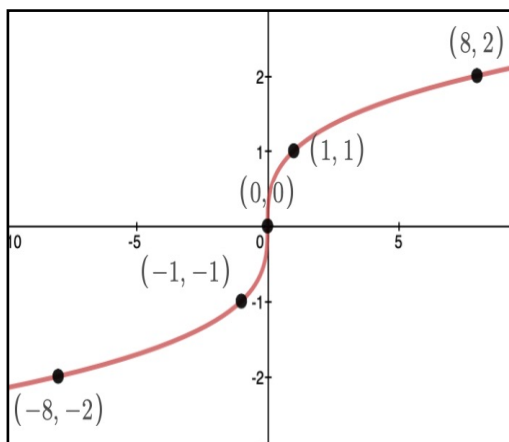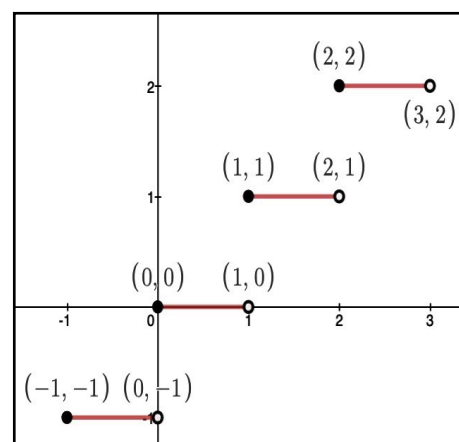$$f(x) = x^3$$

$$f(x) = |x|$$

$$f(x) = \sqrt{x}$$

$$f(x) = \sqrt[3]{x}$$

$$f(x) = [\![x]\!]$$

Graphing Using Parent-Multiplier-Shift Method

The Notation

$f(x) \rightarrow$ parent graph

$c \cdot f(x) \rightarrow$ parent graph's "y" values are multiplied by "c."

$f(c \cdot x) \rightarrow$ parent graph's "x" values are divided by "c."

$-f(x) \rightarrow$ parent graph is reflected over x-axis

$f(-x) \rightarrow$ parent graph is reflected over y-axis

MULTIPLIERS

$f(x) + c \rightarrow$ parent graph is shifted UP "c" units.

$f(x) - c \rightarrow$ parent graph is shifted DOWN "c" units.

$f(x + c) \rightarrow$ parent graph is shifted LEFT "c" units.

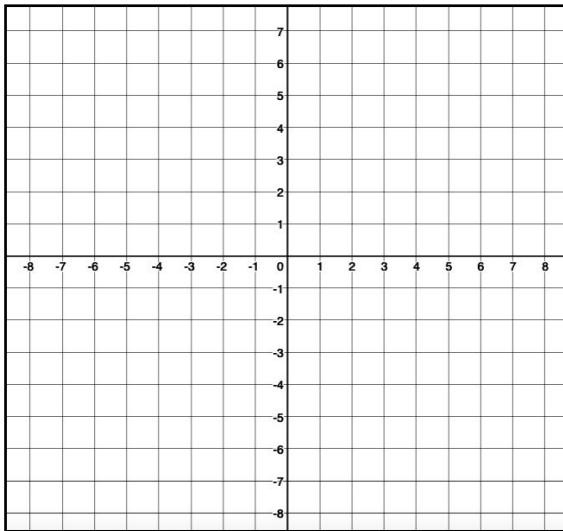$f(x - c) \rightarrow$ parent graph is shifted RIGHT "c" units.
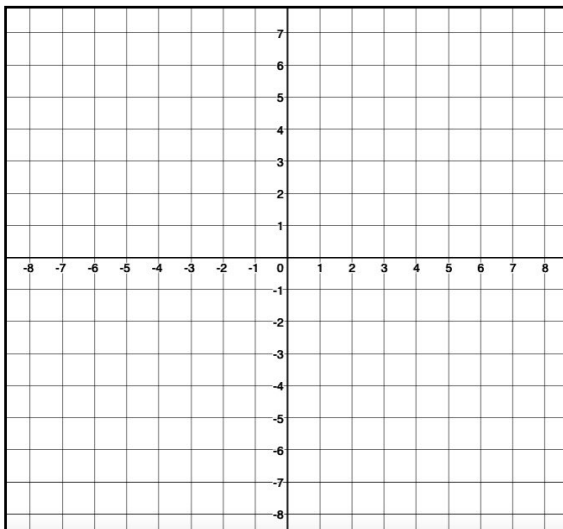
SHIFTS

The Steps

1. Recognize and graph the parent function

2. Apply the multiplier to the parent graph

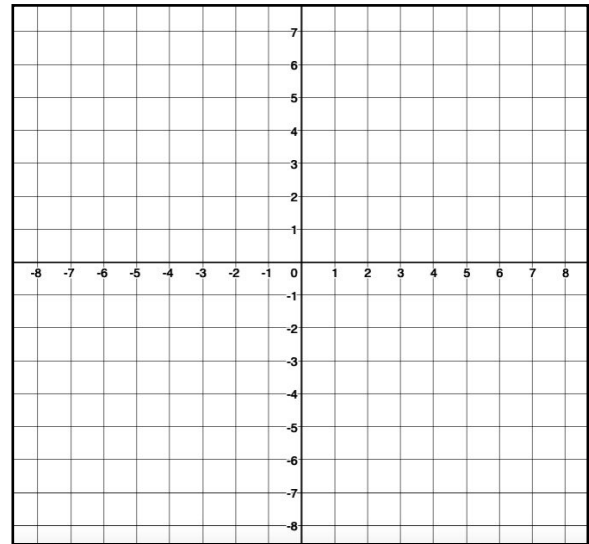3. Apply the shift to the graph you applied the multiplier to.

$f(x) = a(x - h)^2 + k$ Multiplier: _____
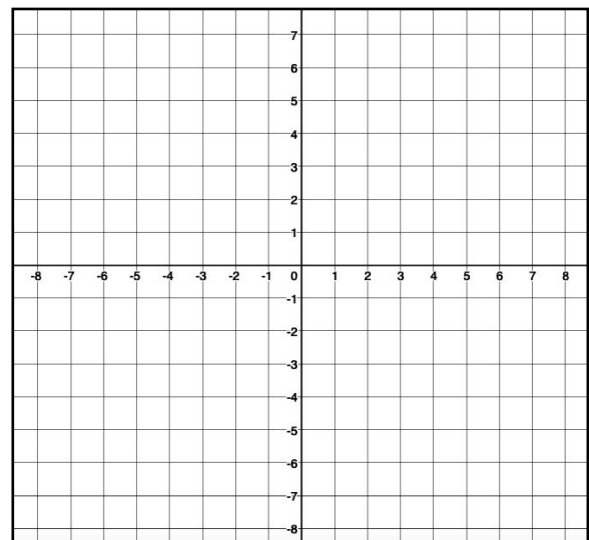
$f(x) = -\dfrac{1}{2}(x + 3)^2 + 1$ Shift: _____

$f(x) = a\sqrt{x - h} + k$ Multiplier: _____

$f(x) = 2\sqrt{x + 1} - 4$ Shift: _____

$f(x) = a|x - h| + k$ Multiplier: _____

$f(x) = -3|x - 4| + 1$ Shift: _____

$f(x) = a\sqrt[3]{x - h} + k$ Multiplier: _____
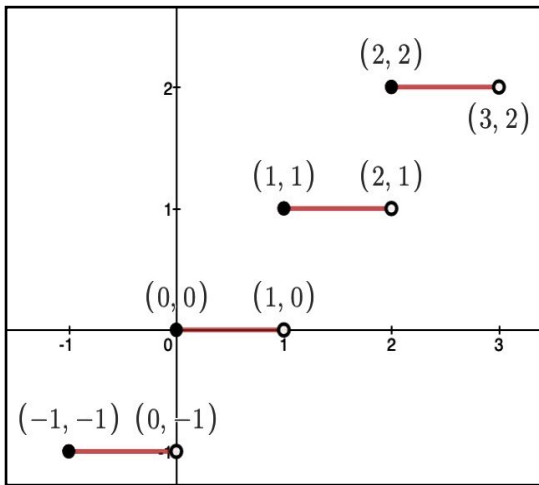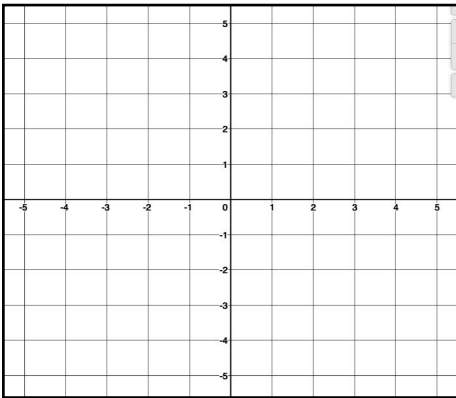
$f(x) = 3\sqrt[3]{x} + 1$ Shift: _____

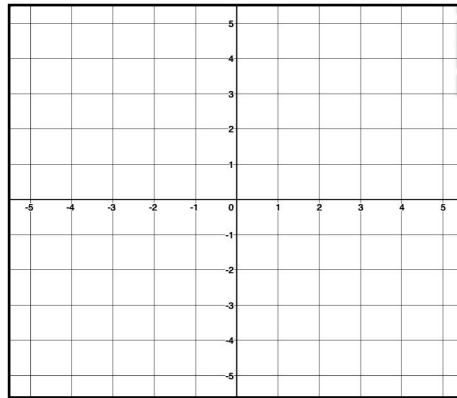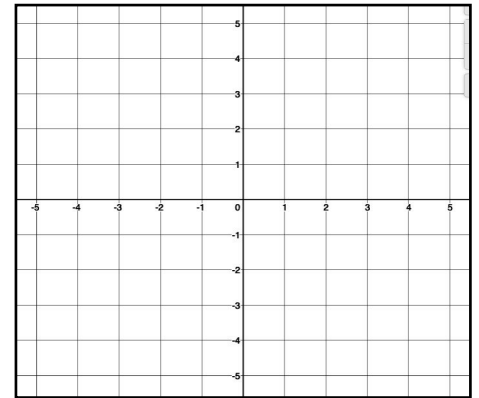# Understanding and Graphing the Greatest Integer Function

$(2,2)$
$(3,2)$
$(1,1)$ $(2,1)$
$(0,0)$ $(1,0)$
$(-1,-1)$ $(0,-1)$

$f(x)=[\![x]\!]$

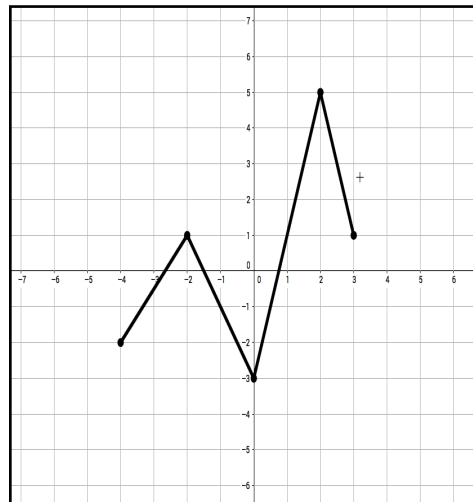| x	$f(x)=[\![x]\!]$	y

$f(x)=[\![x-4]\!]-1$

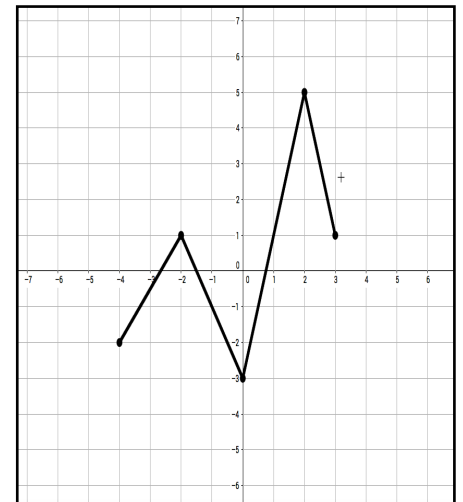$f(x)=[\![2x]\!]$

$f(x)=2[\![x]\!]$

Applying Transformations Through Function Notation

$-f(x-2)+1$

$f(3x)$

$0.5f(x)+3$