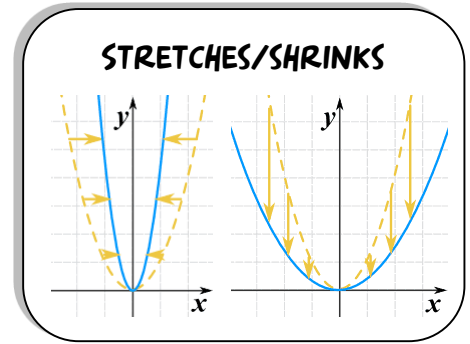
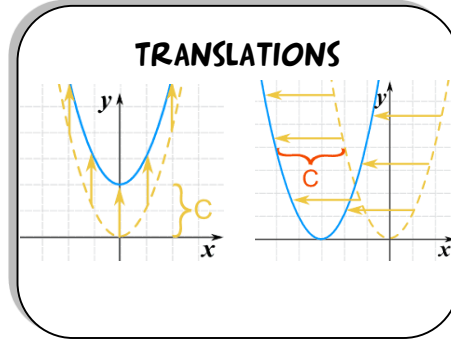
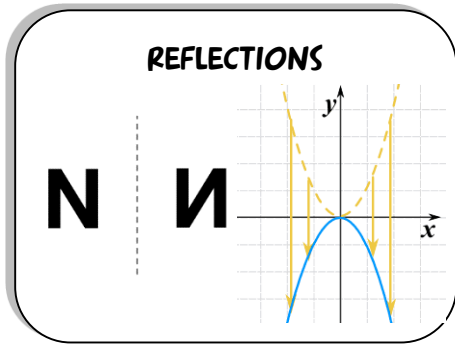


LINEAR TRANSFORMATIONS

OBJECTIVE: Define translations and parent/mother functions. Determine the transformations of linear and absolute value functions.

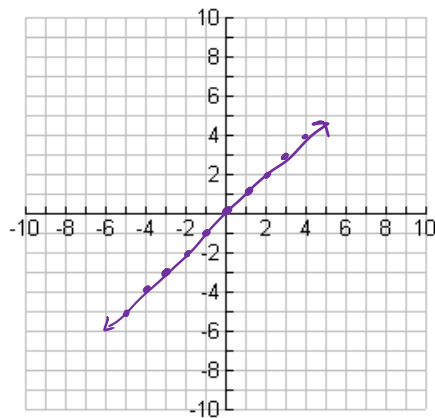
DEFINITIONS

A transformation is a change in an image in the coordinate plane. There are:

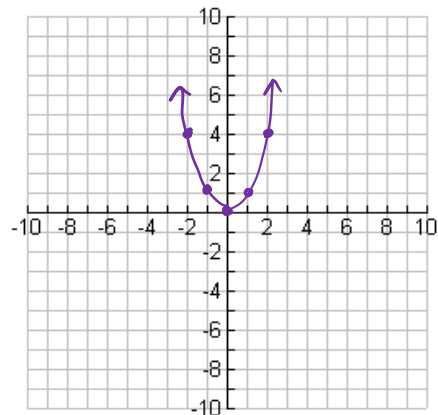


• **MOTHER/PARENT FUNCTION:** the most basic graph of each family

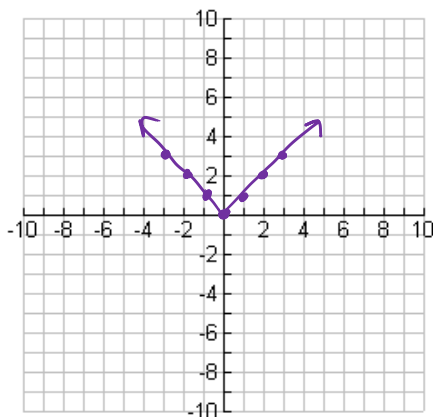
1) $y = x$ *linear/line*



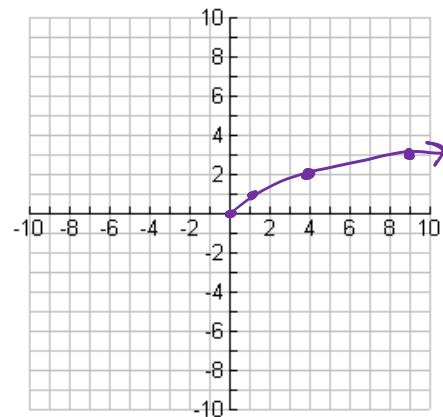
2) $y = x^2$ *quadratic/parabola*



3) $y = |x|$ *absolute value/V-shape*



4) $y = \sqrt{x}$ *Square root function/→*



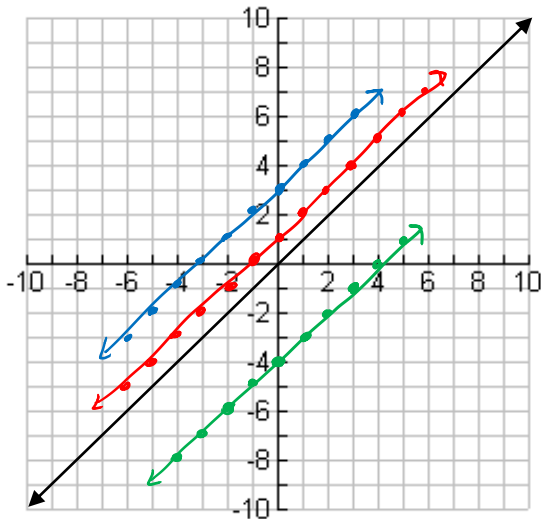
We will explore transformations with linear functions, and then your homework will be to explore transformations of absolute value functions.

1) Given: linear mother function $y = x$.

Now graph: $y = x + 1$ •

$y = x + 3$ •

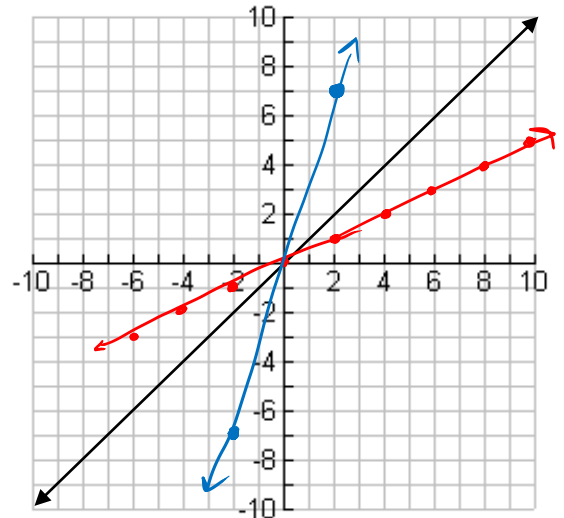
$y = x - 4$ •



What happened? $y = x$ was transformed vertically (every point shifted up or down)

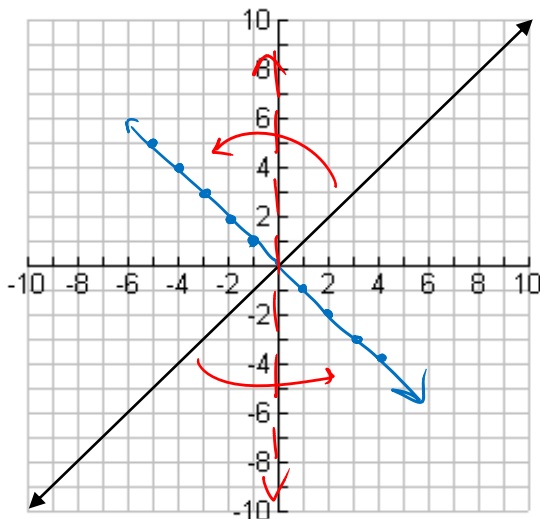
2) Graph: $y = \frac{1}{2}x$ •

$y = \frac{2}{7}x$ $y = \frac{7}{2}x$ •



What happened? $y = \frac{1}{2}x$ "shrunk" the y values. The graph is not as steep as $y = x$. $y = \frac{7}{2}x$ made the graph much steeper. The line was "stretched".

2) Graph: $y = -x$



What happened? The graph was "reflected" over the y -axis.

CRITICAL THINKING:

Explain the transformations that occur between the function $y = x$ and $y = \frac{1}{3}x - 2$.

Hint: Think ORDER OF OPERATIONS!

Hint #2: What did these numbers do to the graphs in the first two graphs?

Explain the transformations that occur between the functions $y = x$ and

$y = -3x + 1$. Hint: There are 3 transformations here!