

3.2 Families of Graphs

- Parent Graph Worksheet
- Reflection
Flips a figure over a line called the axis of symmetry.
- Linear Translation
Relocates a graph on the coordinate plane but does not change the shape or size.
- Geometric Transformation
Occurs when a nonlinear graph is stretched or shrunk. Sometimes called dilations.
- Summary of Translations and Transformations

If the equation of $y = f(x)$ is change to:	Then the graph of $y = f(x)$ is:
$y = -f(x)$	Reflected in the x-axis
$y = f(-x)$	Reflected in the y-axis
$y = cf(x), c > 1$	Stretched vertically by a factor of c
$y = cf(x), 0 < c < 1$	Shrunk vertically by a factor of c
$y = f(x - h)$	Translated h units horizontally
$y = f(x) k + k$	Translated k units vertically
$y = f(cx), c > 1$	Shrunk horizontally by a factor of $\frac{1}{c}$
$y = f(cx), 0 < c < 1$	Stretch horizontally by a factor of $\frac{1}{c}$

Realize numbers w/ x
do opposite of what
you think!

6. When listing translations/transformation, **ORDER MATTERS!!!!**
- all horizontal movements first
(reflect over y-axis always first)
 - then all vertical movements
- reflect over y-axis
 - horizontal stretch/comp
 - left/right
 - flip over x-axis
 - vert stretch/comp
 - up/down

7. List the transformations, in order, that have occurred when compared to the parent graph.

a. $g(x) = -x^2 - 2$

- reflect over x-axis
- down 2

b. $f(x) = x^2 + 1$

up 1

c. $h(x) = (x - 2)^2$

right 2

d. $n(x) = (x + 3)^2$

left 3

e. $m(x) = -(x - 3)^2$

- right 3
- reflected over x

f. $s(x) = -(x + 5)^2$

- left 5
- reflected over x

g. $t(x) = (x - 2)^2 + 3$

- right 2
- up 3

h. $h(x) = (x + 8)^2 - 6$

- left 8
- down 6

i. $a(x) = 3(x + 2)^2$

- left 2
- vert stretch by 3

j. $g(x) = \frac{1}{3}(x + 6)^2$

- left 6
- vert comp by $\frac{1}{3}$

k. $f(x) = (-x)^3$

↑
This is the reflection
over y

l. $h(x) = \left(\frac{1}{2}(x + 2)^2\right)$

- left 2
- vert comp by $\frac{1}{2}$