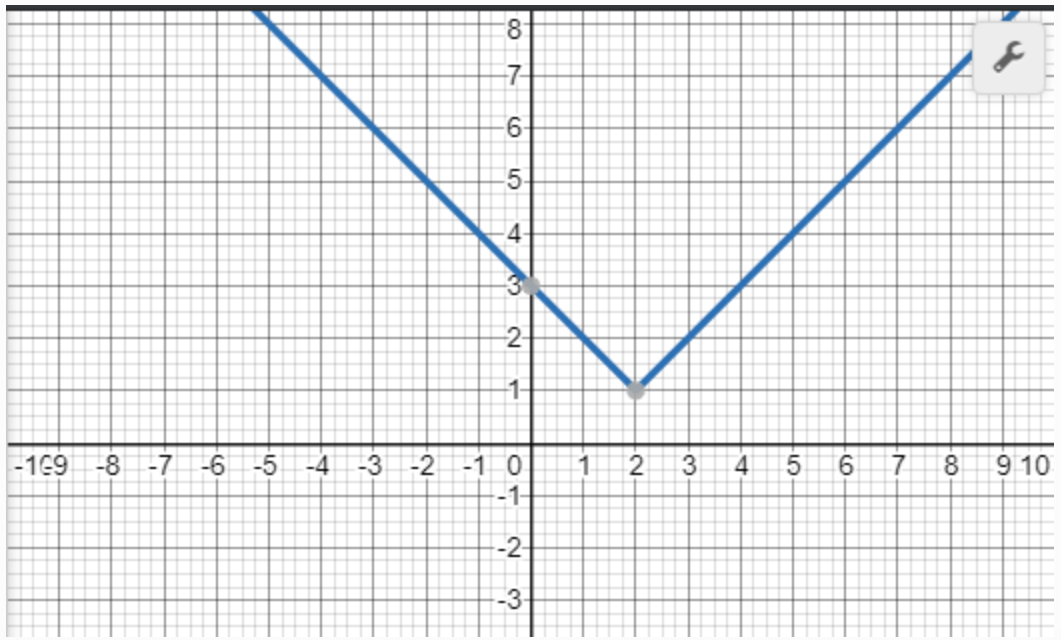
Do Now (8/22 & 8/23)

Using the function y = |x-2|+1, find the (a) domain, (b) range, (c) intervals of increase/decrease, (d) intercepts, (e) vertex, (f) line of symmetry, (g) positive/negative intervals, and (h) the rate of change over interval [2, 3]



1-2
Transformations of Functions

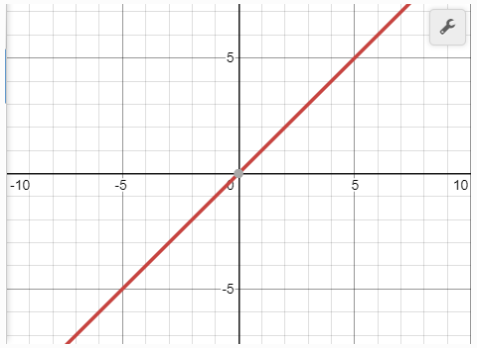
I CAN…

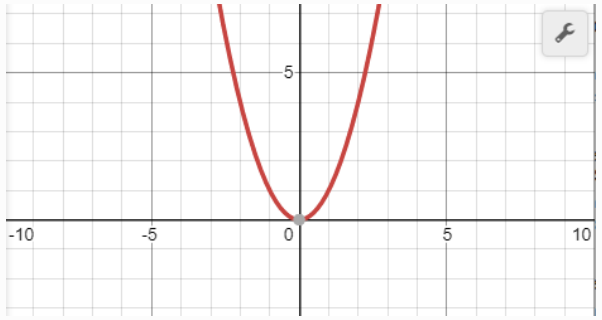
Apply transformations to graph functions and write equations

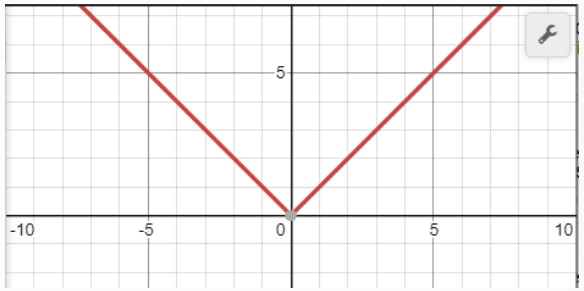
Standard

MAFS.912.F-BF.2.3: Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k; find the value of k given the graphs.

Graphs







Type of Function:

Parent Function Equation:

Example of transformed function:

Transformations

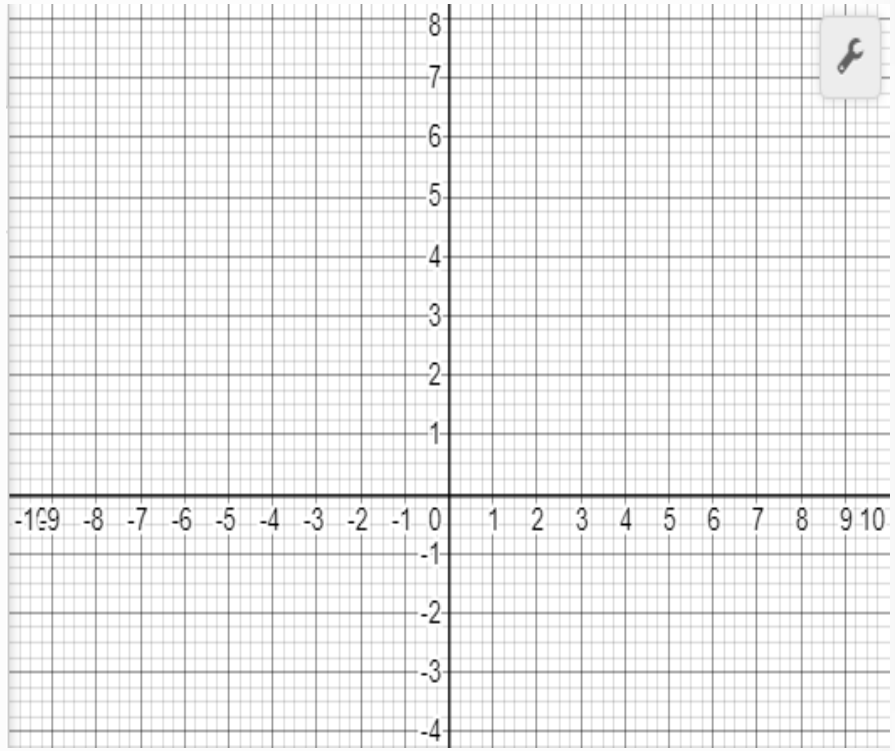
$$f(x) = a \cdot f[b(x - h)] + k$$

|a|	**Vertical Stretch:** **Vertical Compression:** **4f(x):** x | y | $4y$ -1 | $-\frac{1}{4}$ | -4 0 | 0 | 0 1 | $\frac{1}{4}$ | 4	**If a > 1, then vertical stretch by factor of a** **If 0 < a < 1, then vertical compression by factor of a** **y-coordinates stay the same, affects the x-coordinates** **Point notation:** **(x, y) → (x, ay) OR (x, f(x)) → (x, a·f(x))**
-a	Reflection across x-axis -f(x): x | y | $-y$ -1 | $\frac{1}{4}$ | -1 0 | 0 | 0 1 | $\frac{1}{4}$ | -1	x-coordinates stay the same, affects y-coordinates (x, y) → (x, -y) OR (x, f(x)) → (x, -f(x))
|b|	Horizontal Stretch: Horizontal Compression: f(4x): $\frac{1}{4}x$ | x | y $-\frac{1}{4}$ | $-\frac{1}{4}$ | -1 0 | 0 | 0 $\frac{1}{4}$ | $\frac{1}{4}$ | 1	If 0 < b < 1, then horizontal stretch by factor of 1/b If b > 1, then horizontal compression by factor of 1/b y-coordinates stay the same, affects the x-coordinates (x, y) → $\left(\frac{1}{b}x, y\right)$ OR (x, f(x)) → $\left(\frac{1}{b}x, f(bx)\right)$

-b	**Reflection across y-axis** **f(-x):** $-x$ | x | y 0 | 0 | 0 −1 | 1 | 1 −4 | 4 | 2	**y-coordinates stay the same, affects x-coordinates** **(x, y) → (-x, y)** **OR** **(x, f(x)) → (-x, f(-x))**
h	Horizontal Translation f(x-3): $x+3$ | x | y 3 | 0 | 0 4 | 1 | 1 7 | 4 | 2	y-coordinates stay the same, affects x-coordinates f(x + h): -graph moves left -subtract h from the x-coordinates (x, y) → (x – h, y) OR (x, f(x)) → (x – h, f(x + h)) f(x – h): -graph moves right -add h to the x-coordinates (x, y) → $(\mathbf{x+h}, \mathbf{y})$ OR (x, f(x)) → (x + h, f(x – h))
k	Vertical Translation f(x)-3: x | y | $y-3$ 0 | 0 | −3 1 | 1 | −2 4 | 2 | −1	x-coordinates stay the same, affects y-coordinates f(x) + k: -graph moves up -add k to the y-coordinates (x, y) → (x, y + k) OR (x, f(x)) → (x, f(x) + k) f(x) – k: -graphs moves down -subtract k from the y-coordinates (x, y) → (x, y – k) OR (x, f(x)) → (x, f(x) – k)

Example 1

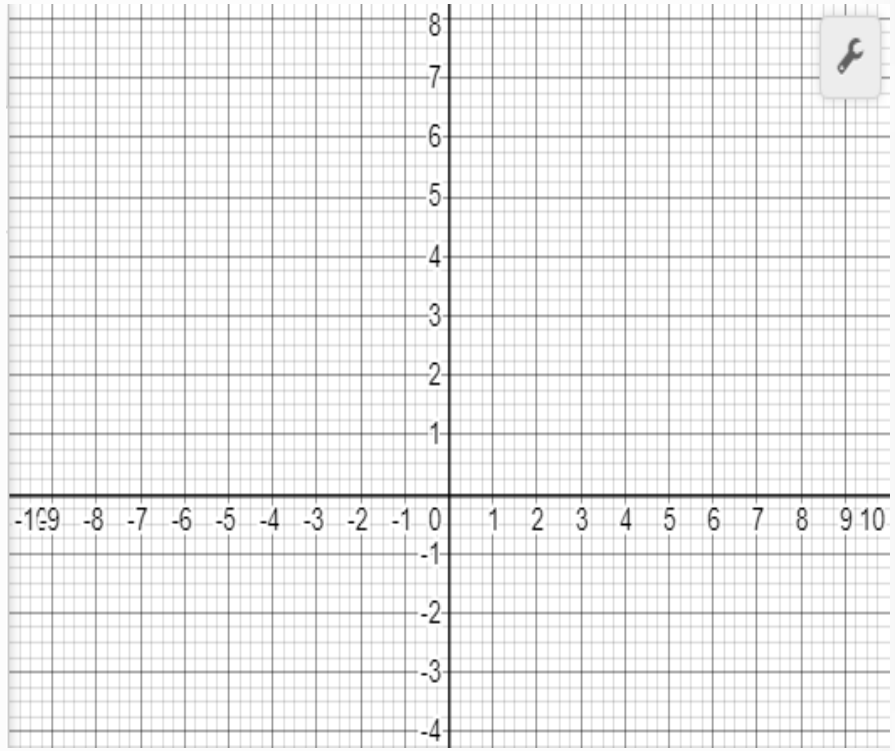
Graph y = -3$(x-1)^2$ and describe the transformations



Try It: #5 on workbook

Example 2

Graph f(x) = $|\frac{1}{3}x| + 1$ and describe the transformations



Try It: #11 on workbook

Example 3

Describe the transformations and make a table for $f(x) = |-2x + 4| - 3$

Classwork

1) Gluing Transformations Activity

2) #4-12 on workbook

Homework

- Online: 1-1 Adaptive HW (due 8/25 11:59 pm)

- Materials check (binder and TI-30XIIS or comparable calculator) next class