Pre-Calculus 12 Name _____

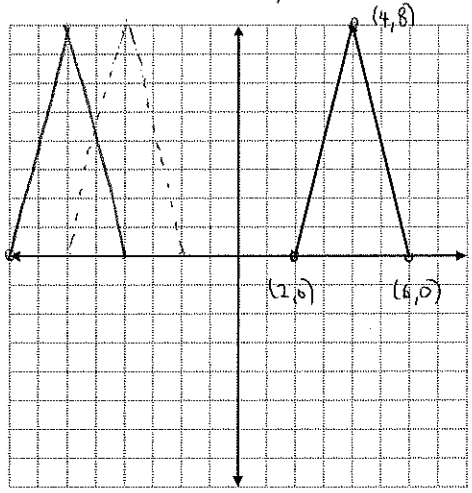
4.4 – Combining Transformations of Functions Block _____

Today we looked at **combining transformations** of graphs of functions.

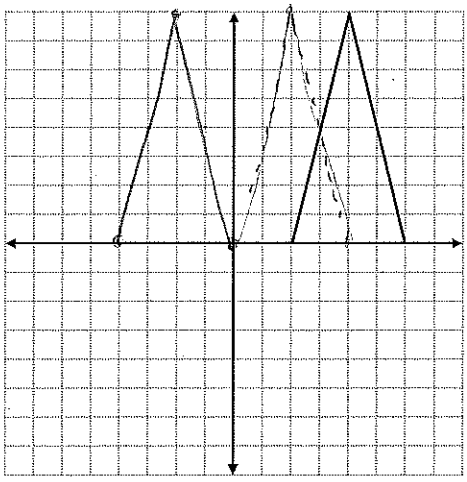
In order to do so, we used our knowledge of translations, reflections, expansions & compressions.

Consider the graph of $y = f(x)$.

a) Reflect the graph in the y-axis, then shift 2 left



b) Shift 2 left, then reflect in the y-axis.



Does the order of transformations matter? Explain.

Yes! The resulting graphs are different.

note: make sure the final graph is clear! Erase the in between steps or draw them faintly.

The most general way that we can describe a combination of transformations to a function $f(x)$ is:

$$y = af(b(x-h)) + k$$

For this general representation, what affect(s) does each variable have?

a: vertical expansion / compression + reflect in x-axis

b: horizontal expansion / compression + reflect in y-axis

h *c*: translation left / right

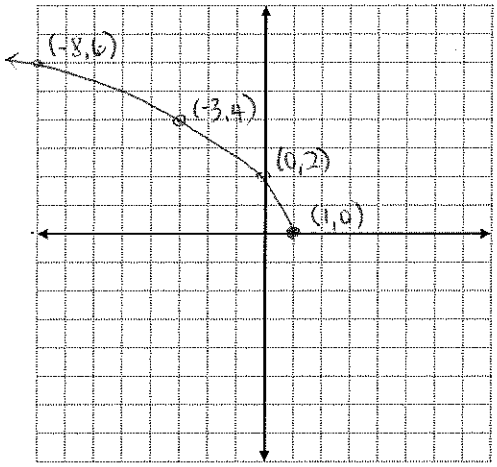
k *d*: translation up / down

★ Follow BEDMAS rules when looking at an equation.

EXP / comp / reflection (multiplication)

then translation (addition/subtraction)

Example #1: For the function, $y = 2\sqrt{-(x-1)}$ list all transformations from $y = \sqrt{x}$, then graph each function on the same grid. **Do not use a table of values.**



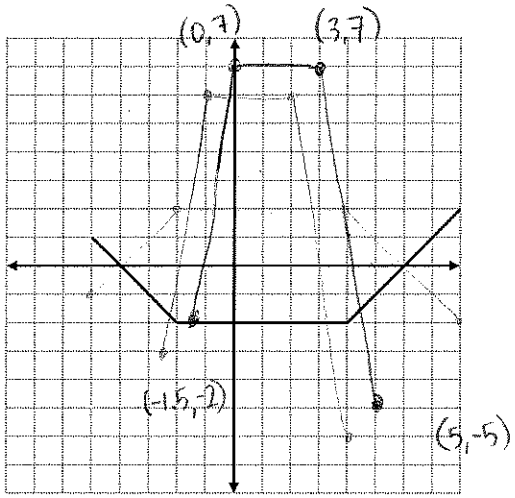
VE by 2
reflect y-axis
1 right

In which order did you perform the transformations? How do you know this is correct?

BEDMAS: exp/comp/reflection, then translation.

Example #2: Given the graph of $y = f(x)$, sketch the graph of $y = -3f(2x-2)+1$. List all transformations (in appropriate order) before graphing.

↳ $-3f(2(x-1))+1$ * make sure the equation is in factored form!



reflect x-axis
VE by 3
HC by $\frac{1}{2}$
1 right
1 up

Example #3: If $(4,-3)$ is on the graph of $y = g(x)$, find the corresponding point on the graph of:

a) $y = 2g(x-4)+1$ (4,-3)
VE by 2 (4,-6)
right 4 (8,-6)
up 1 (8,-5)

b) $y = -\frac{1}{3}g(-2x-4)$ $(-2(x+2))$ (4,-3)
reflect x-axis (4,3)
VE by $\frac{1}{3}$ (4,1)
reflect y-axis (-4,1)
HC by $\frac{1}{2}$ (-2,1)
left 2 (-4,1)

Homework: ~~p.226 #3-11(not 10)~~ p.246 #3-10, MC #1,2