Today's Learning Goal(s):

By the end of the class, I will be able to:

a) Identify the "order of the moves" when graphing using transformations.
b) State the domain and range for "multiple move" transformations.

MCF 3MI

3.1.5 Graphing Quadratic Functions Using Transformations

Date: Mar. 8/19
(**Every** lesson)

$$f(x) = a(x-h)^2 + k$$

Correct yesterday's worksheet:

a -- p. 39 E,F ***h -- p. 39 C,D*** ***k -- p. 38 A,B***

You will be completing an EXIT card 10 minutes before class finishes.

Possible Transformations: (RST)

R: reflection in the x-axis

S: vertical stretch (v.s.) by a factor of a

OR vertical compression (v.c.) by a factor of _____

T: horizontal translation (h.t.) h units to the right or left

T: vertical translation (v.t.) k units to up or down

$y = a(x-h)^2 + k$

$V(h,k)$

Ex. 1 i) Identify the values of the parameters a, h, and k.
ii) Identify the transformations.
iii) Use transformations to sketch each graph.
iv) State the Domain and Range.

$(x-(-2))^2$

a) $f(x) = (x-3)^2 + 4$ vertex $(3, 4)$

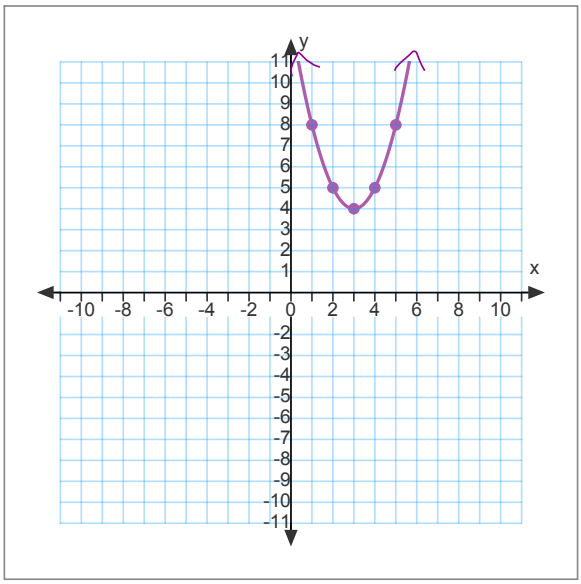
$a = 1$, $h = 3$, $k = 4$

h.t. 3 units to the right

v.t. 4 units up

MG
1 1
2 4
3 9

$y = (x-3)^2 + 4$



Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid y \geq 4\}$

b) $g(x) = (x+2)^2 + 1$ vertex $(-2, 1)$

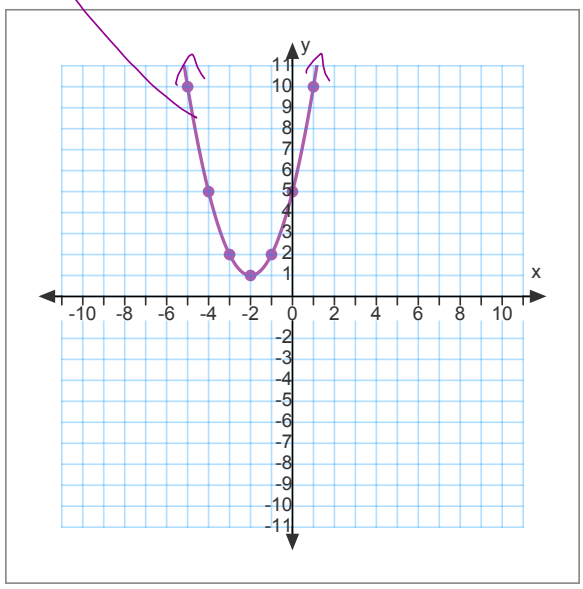
$a = 1$, $h = -2$, $k = 1$

h.t. 2 units left

v.t 1 unit up

MG
1 1
2 4
3 9

$y = (x+2)^2 + 1$



Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid y \geq 1\}$

Ex. 1 (cont'd)

i) Identify the values of the parameters a, h, and k.
ii) Identify the transformations.
iii) Use transformations to sketch each graph.
iv) State the Domain and Range.

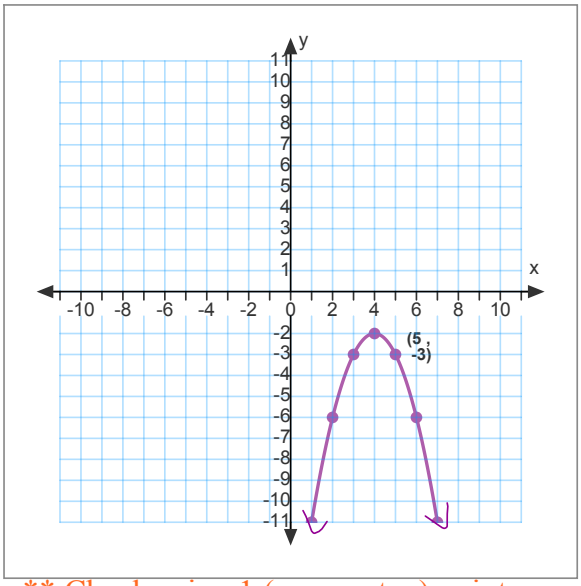
c) $h(x) = -(x-4)^2 - 2$ vertex (4 , -2)

$a =$ -1 , $h =$ 4 , $k =$ -2

reflection in the x-axis
h.t. 4 units right
v.t. 2 units down

MG
1 -1
2 -4
3 -9

$y = -(x-4)^2 - 2$



** Check using 1 (non-vertex) point

Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid y \leq -3\}$

$h(x) = -(x-4)^2 - 2$

$h(5) = -(5-4)^2 - 2$
$= -(1)^2 - 2$
$= -1 - 2$
$= -3$

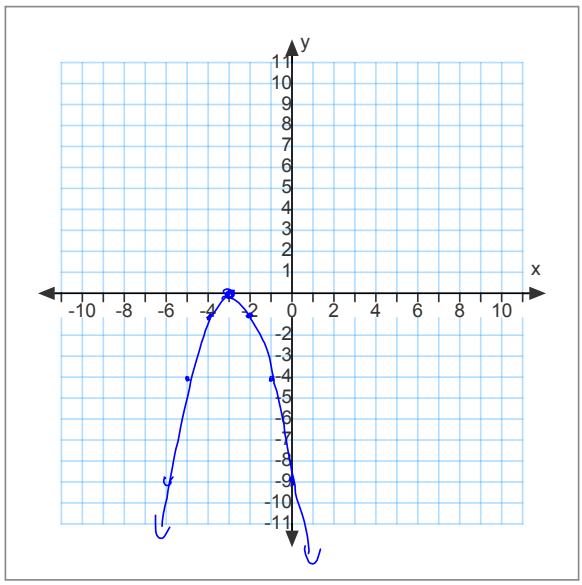
d) $i(x) = -(x+3)^2 + 0$ vertex (-3 , 0)

$a =$ -1 , $h =$ -3 , $k =$ 0

reflection in the x-axis
h.t. 3 units left

MG
1 -1
2 -4
3 -9

$y = -(x+3)^2$



Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid y \leq 0\}$

Ex. 1 (cont'd)

i) Identify the values of the parameters a, h, and k.
ii) Identify the transformations.
iii) Use transformations to sketch each graph.
iv) State the Domain and Range.

e) $j(x) = x^2 + 2$ vertex (0 , 2)

$a =$ 1 , $h =$ 0 , $k =$ 2

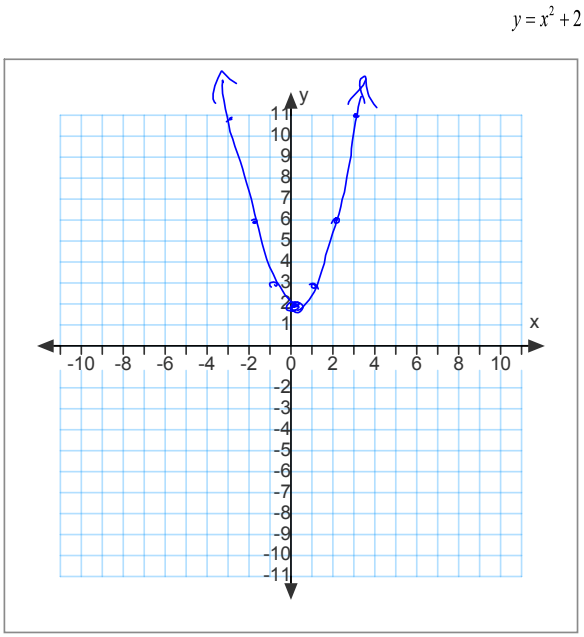
v.t. 2 units up

f) $k(x) = -x^2 + 2$ vertex (0 , 2)

$a =$ -1 , $h =$ 0 , $k =$ 2

reflection in the x-axis
v.t. up 2 units

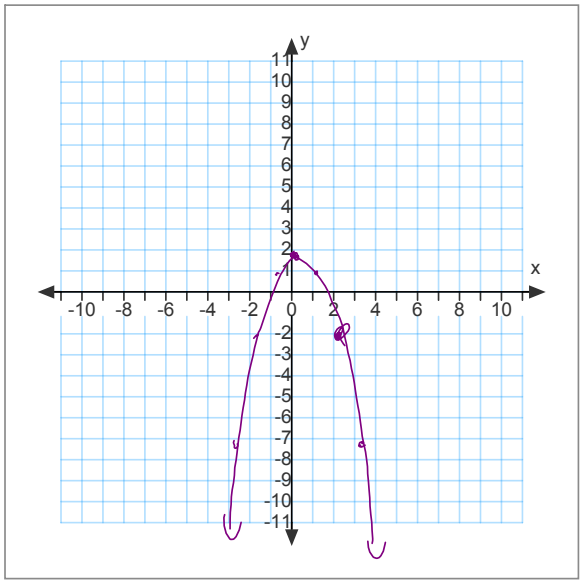
MG



Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid y \geq 2\}$

MG



Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid y \leq 2\}$

Homework today is modified as follows:

READ p.46 "In Summary" **CAREFULLY**, and ask me if anything is unclear!

i) Complete the CheckPoint/Exit Card and submit it to the teacher **BEFORE the end of class**!

ii) Sketch the 2 functions on the bottom of the handout. (on next screen, and tomorrow's file.)

ii) Complete: p. 40 # 1
pp. 47-49 # 1, 2*, 9
*for 2iii) use graph paper to sketch by hand, then check using **desmos**

Distribute EXIT CARD: **Put your name on it!**

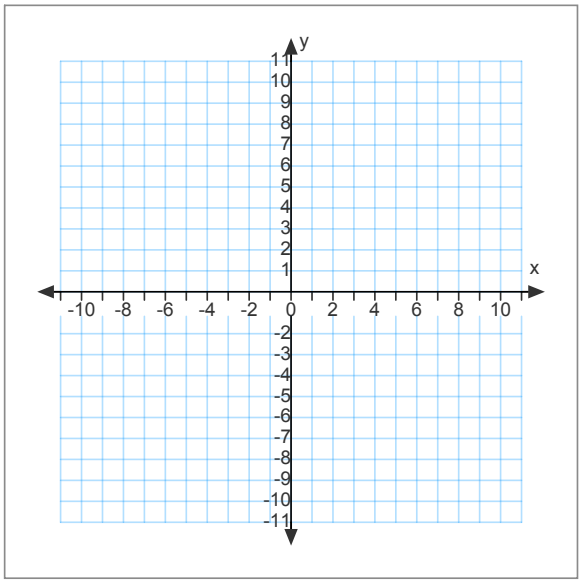
Additional homework questions from the bottom of the handout:

1. $a(x) = -(x+5)^2 - 3$ vertex (,)

$a =$ _____ , $h =$ _____ , $k =$ _____

MG

$y = -(x+5)^2 - 3$



Domain: _____

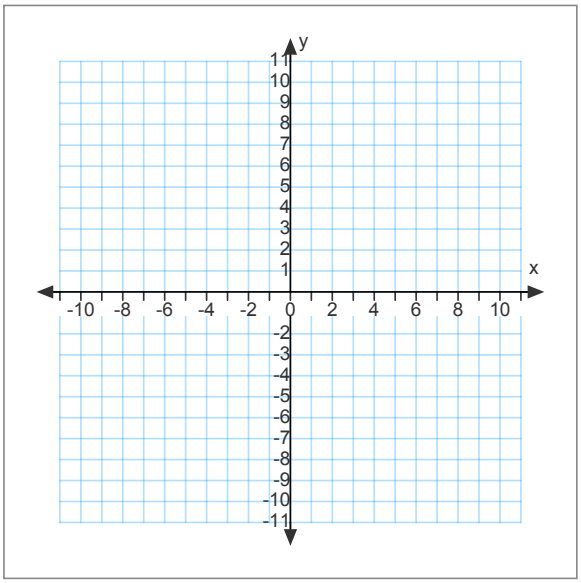
Range: _____

2. $b(x) = 2(x-1)^2 - 7$ vertex (,)

$a =$ _____ , $h =$ _____ , $k =$ _____

MG

$y = 2(x-1)^2 - 7$



Domain: _____

Range: _____