

First correct the 2 homework graphing questions from the worksheet:

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

MG

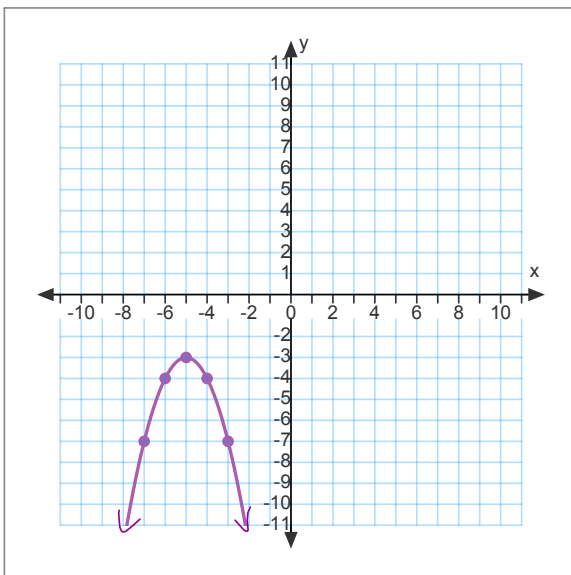
1 \rightarrow 1

2 \rightarrow 4

3 \rightarrow 9

vertex $(-5, -3)$

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



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

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

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

MG $\rightarrow a=2$

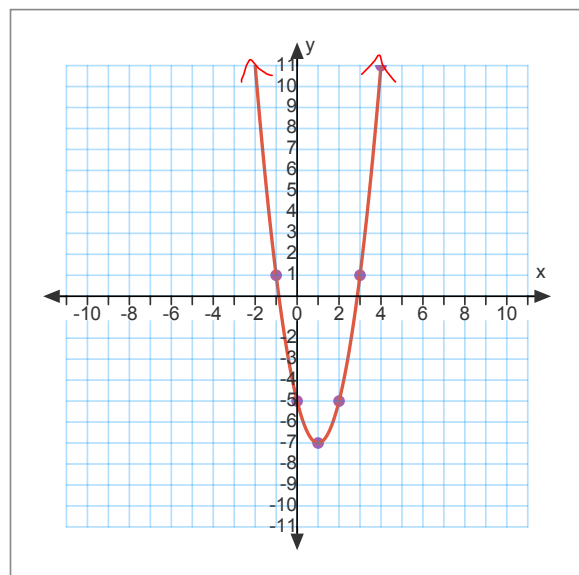
1 \rightarrow 5 \rightarrow 2

2 \rightarrow 8 \rightarrow 8

3 \rightarrow 9 \rightarrow 18

vertex $(1, -7)$

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



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

Range: $\{y \in \mathbb{R} \mid y \geq -7\}$

Today's Learning Goal(s):

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

- Identify the “order of the moves” when graphing using transformations.
- State the domain and range for “multiple move” transformations.

Quadratic Transformation Summary:

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

When you use transformations to graph $y = a(x - h)^2 + k$
apply the transformations like this:

RST

Method:

Plot the vertex first.

Modify the “mother graph” (y) values by multiplying the “up” number by “a”

When “a” is a fraction, only use the exact multiples.

i.e. If $\frac{1}{3}$, then don't use over 1 OR 2, but use 3 and 6 to get:

From vertex: over 3 up 3, over 6 up 12

Ex.1: Given: $f(x) = -\frac{1}{3}(x+2)^2 + 6$ $(x - (-2))^2$

- a) Describe the transformations, using appropriate mathematical language.
 b) Graph the function.

$$y = -\frac{1}{3}(x+2)^2 + 6 \quad \cup(-2, 6)$$

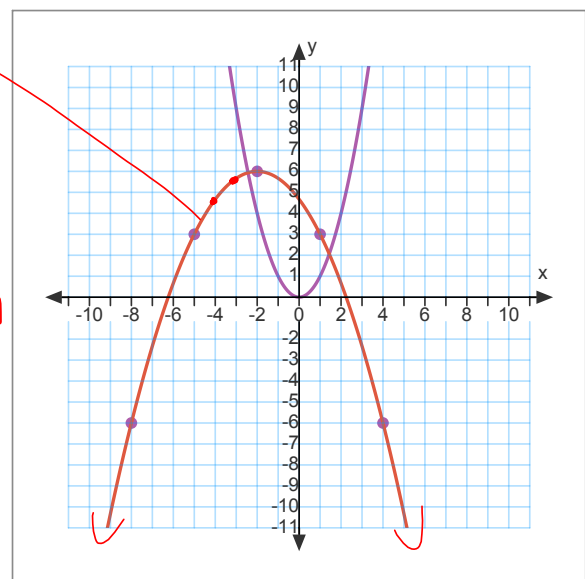
$$y = x^2$$

V.C. by a factor of $\frac{1}{3}$
 reflection in the x-axis
 h.t. 2 units to the LEFT
 v.t. 6 units up.

MG $a = \frac{1}{3}$

OVER	UP	
1	1	$\rightarrow \frac{1}{3}$
2	4	
3	9	$\rightarrow -3$
4	16	
5	25	
6	36	$\rightarrow +2$

down



Ex.2:

Write the quadratic relation that has had a **vertical stretch by a factor of 6**,
 a **vertical translation down 3 units**, and a **horizontal translation 8 units to the left**.

$$y = 6(x+8)^2 - 3$$

Ex. 3 i) Use transformations to sketch each graph.
 ii) State the Domain and Range.

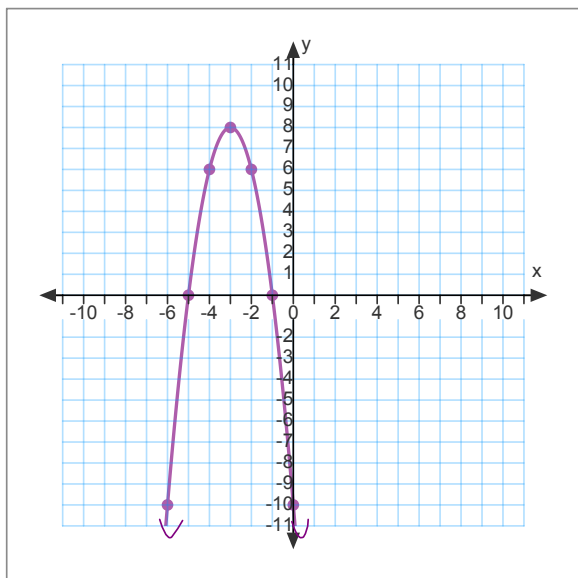
a) $f(x) = -2(x+3)^2 + 8$

MG $a = -2$

1 → 1
 2 → 4
 3 → 9

vertex $(-3, 8)$

$y = -2(x+3)^2 + 8$



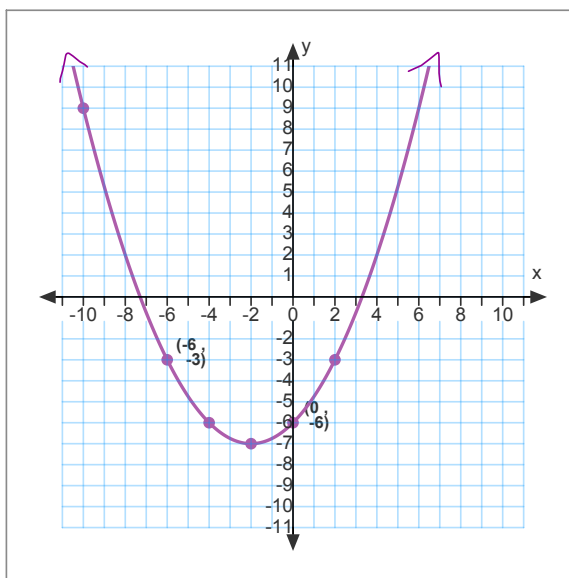
Domain $\{x \in \mathbb{R}\}$

Range $\{y \in \mathbb{R} \mid y \leq 8\}$

b) $g(x) = -7 + \frac{1}{4}(x+2)^2$
 MG $a = \frac{1}{4}$
 vertex $(-2, -7)$

1 → 1
 2 → 4
 3 → 9
 4 → 16

$y = \frac{1}{4}(x+2)^2 - 7$



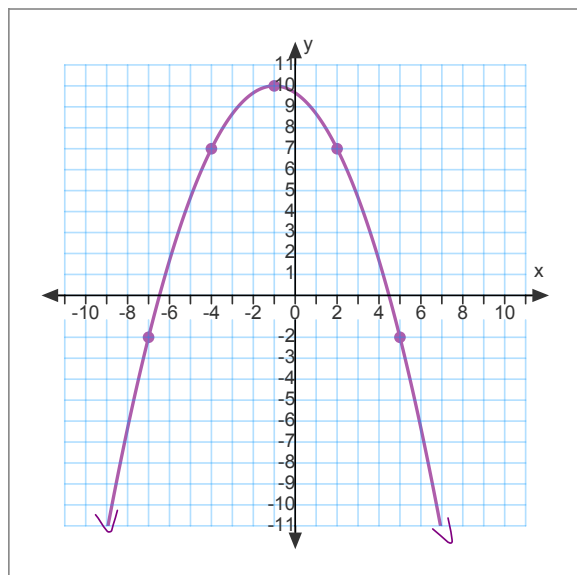
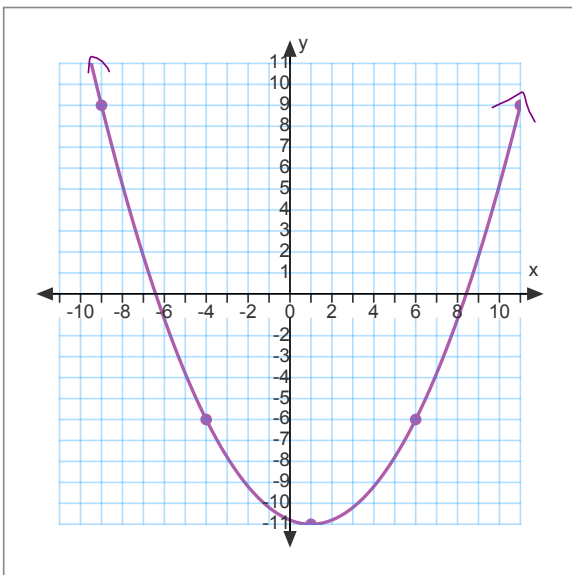
Domain $\{x \in \mathbb{R}\}$

Range $\{y \in \mathbb{R} \mid y \geq -7\}$

Ex. 3 i) Use transformations to sketch each graph.
 ii) State the Domain and Range.

c) $h(x) = \frac{1}{5}(x-1)^2 - 11$ ~~11~~ vertex (1, -11)
 MG $a = \frac{1}{5}$
 $1 \rightarrow 1$
 $2 \rightarrow 4$
 $3 \rightarrow 9$
 $5 \rightarrow 25 \rightarrow 5$
 $10 \rightarrow 100 \rightarrow 20$
 $y = \frac{1}{5}(x-1)^2 - 11$

d) $d(x) = -\frac{1}{3}(x+1)^2 + 10$ vertex (-1, 10)
 MG
 $1 \rightarrow 1$
 $2 \rightarrow 4$
 $3 \rightarrow 9 \rightarrow -3$
 $6 \rightarrow 36 \rightarrow -12$
 $y = -\frac{1}{3}(x+1)^2 + 10$



Domain $\{x \in \mathbb{R}\}$
 Range $\{y \in \mathbb{R} \mid y \geq -11\}$

Domain $\{x \in \mathbb{R}\}$
 Range $\{y \in \mathbb{R} \mid y \leq 10\}$

Practice: pp. 56-58 #1 - 7