

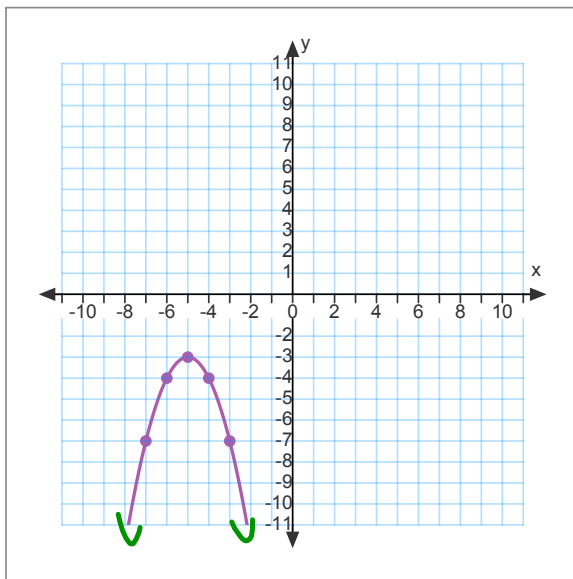
First correct the 2 homework graphing questions from the worksheet:

ii) Sketch the 2 functions below.

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

- 1 $\rightarrow -1$
- 2 $\rightarrow -4$
- 3 $\rightarrow -9$
- 4 $\rightarrow -16$

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



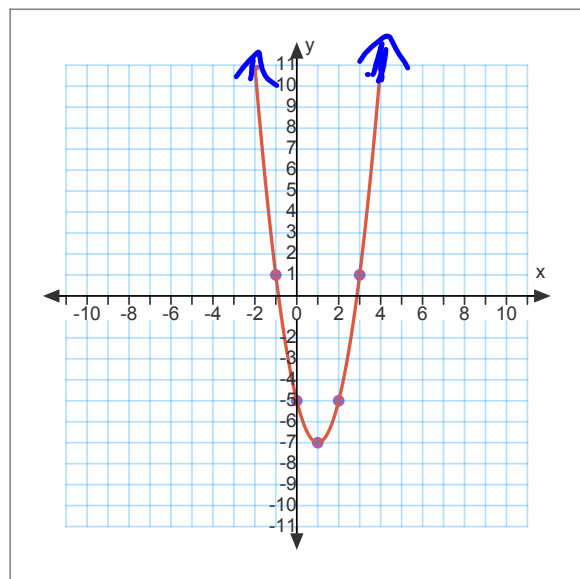
Domain: $\{x \in \mathbb{R}\}$

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

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

- 1 $\rightarrow 2$
- 2 $\rightarrow 8$
- 3 $\rightarrow 18$
- 4 $\rightarrow 32$

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



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.

1.6 Graphing Quadratic Functions Using Multiple 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: **R S T**

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

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

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

$y = x^2$

reflection in the x-axis

V.t. up 6 units

h.t. 2 units left

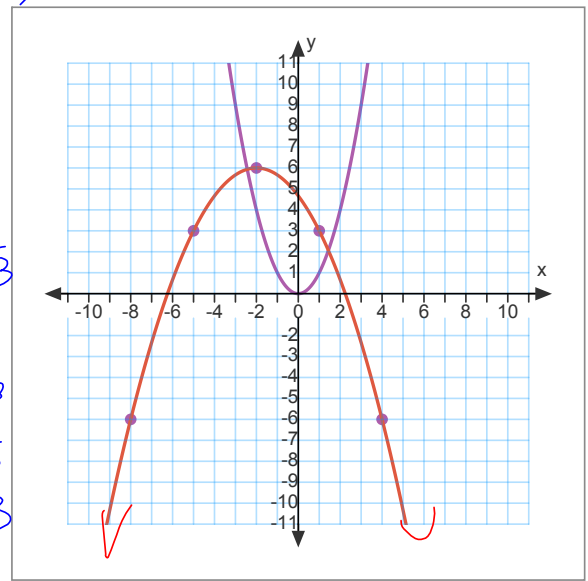
V.C. by a factor of $\frac{1}{3}$

$v(-2, 6)$

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

OVER	UP
1	1
2	4
3	9
4	16
5	25
6	36

$\rightarrow -\frac{1}{3}$
 $\rightarrow -\frac{1}{3}$
 $\rightarrow -3$
 $\rightarrow -12$



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**.

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

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

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

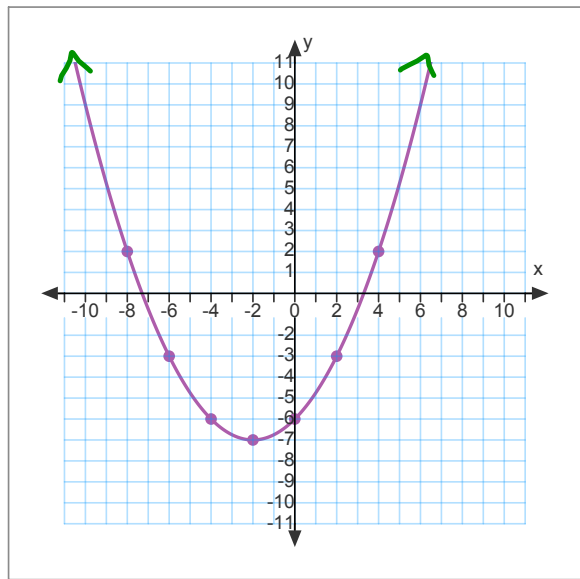
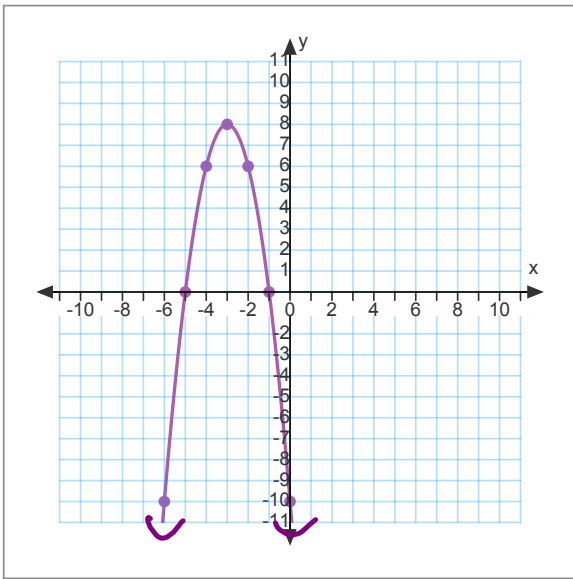
- 1 $\rightarrow -2$
- 2 $\rightarrow -8$
- 3 $\rightarrow -18$

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

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

- 1 $\rightarrow 1$
- 2 $\rightarrow 1$
- 3 $\rightarrow 9$
- 4 $\rightarrow 4$
- 5 $\rightarrow 9$
- 6 $\rightarrow 9$

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



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

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

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

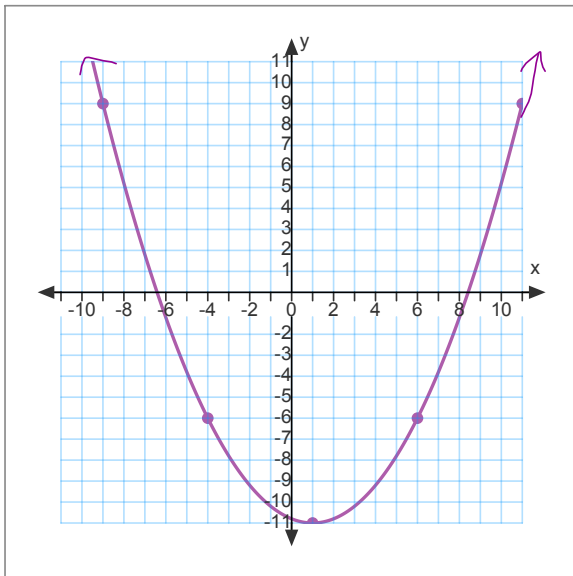
Range: $\{y \in \mathbb{R} \mid y \geq -7\}$

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

c) $h(x) = \frac{1}{5}(x-1)^2 - 11$ vertex (1 , -11)
 MG $a = \frac{1}{5}$

1 1
~~2 4~~
~~3 9~~
~~4 16~~
 5 25 → 5
 10 100 → 20

$y = \frac{1}{5}(x-1)^2 - 11$



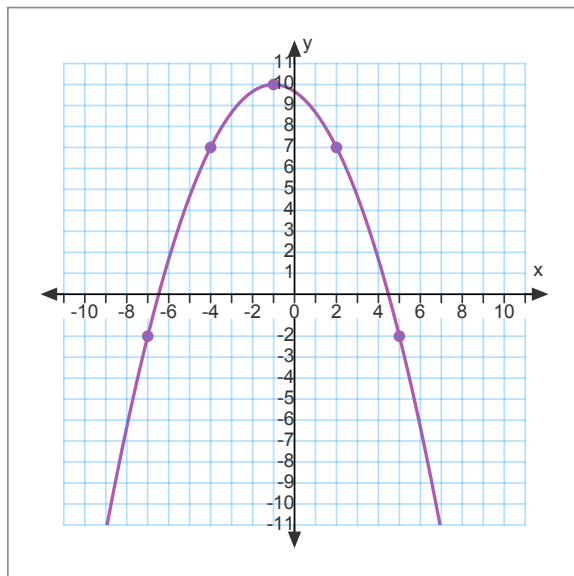
Domain: $\{x \in \mathbb{R}\}$

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

d) $d(x) = -\frac{1}{3}(x+1)^2 + 10$ vertex (-1 , 10)
 MG $a = -\frac{1}{3}$

~~x 6~~ →
~~2 4~~ →
 3 9 → -3
~~y 16~~
~~5 25~~
 6 36 → -12
 9 81 → -27

$y = -\frac{1}{3}(x+1)^2 + 10$



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

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

Practice: pp. 56-58 #1 – 7