Today's Learning Goal(s):

Date: ______________________

By the end of the class, I will be able to:
a) represent and interpret quadratic functions in a number of different forms.

Last day's work: pp. 76-77 #1 – 5, 7, 8, 10, 12* – 19
*use web fix

8b
5c a
19
12a
17a

p. 76 #5ac

5. a) Graph the function $f(x) = -2(x-3)^2 + 4$, and state its domain and range.

   b) What does $f(1)$ represent on the graph? Indicate, on the graph, how you would find $f(1)$. $f(x)$

   c) Use the equation to determine each of the following.

   i) $f(3) - f(2)$ iii) $f(1-x)$

   ii) $2f(5) + 7$

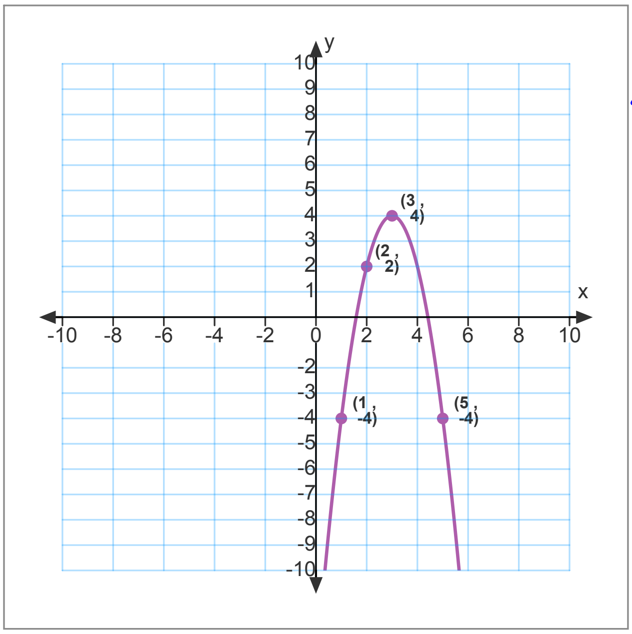
$f(3) = 4$

$\therefore (3,4)$

$f(2) = 2$

$D = \{x \in \mathbb{R}\}$

$R: \{y \in \mathbb{R} \mid y \leq 4\}$



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

i) $f(3) - f(2)$

$= 4 - 2$

$= 2$

ii) $2f(5) + 7$

$= 2(-4) + 7$

$= -8 + 7$

$= -1$

iii) $f(1-x) = -2((1-x)-3)^2 + 4$

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

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

$= -2x^2 - 8x - 8 + 4$

$= -2x^2 - 8x - 4$

p. 76 #8b

8. State the domain and range of each function.

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

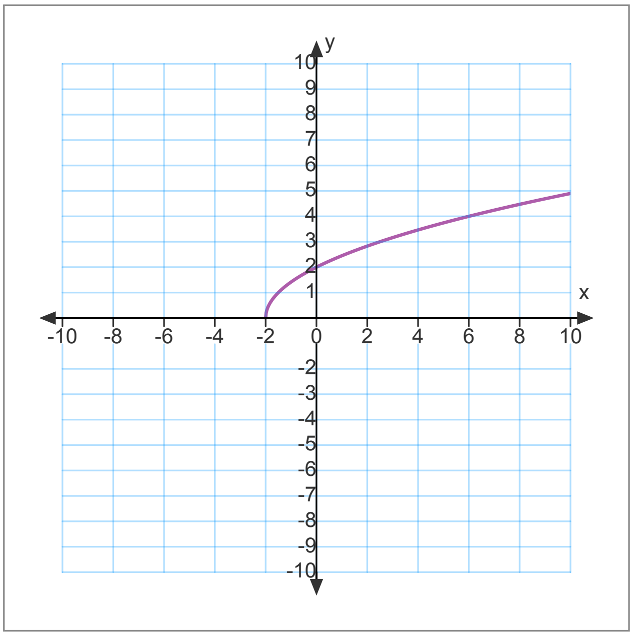
b) $f(x) = \sqrt{2x+4}$

$= \sqrt{2(x+2)}$

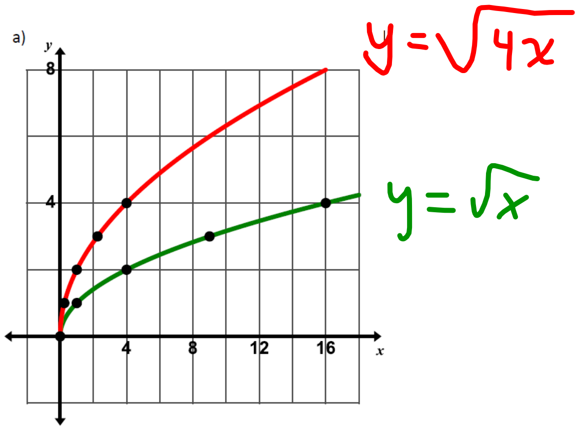
$y = \sqrt{2x+4}$

$D: \{x \in \mathbb{R} \mid x \geq -2\}$

$R: \{y \in \mathbb{R} \mid y \geq 0\}$



p. 76 #12a see webfix

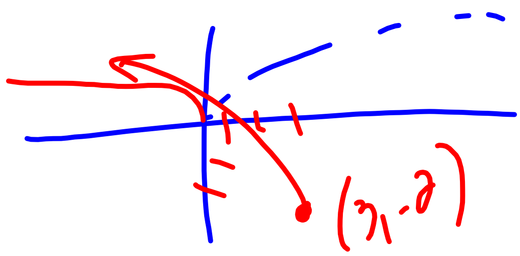


p. 77 #17a

17. In each case, write the equation for the transformed function, sketch its graph, and state its domain and range.

a) The graph of $f(x) = \sqrt{x}$ is compressed horizontally by the factor $\frac{1}{2}$, reflected in the y-axis, and translated 3 units right and 2 units down.

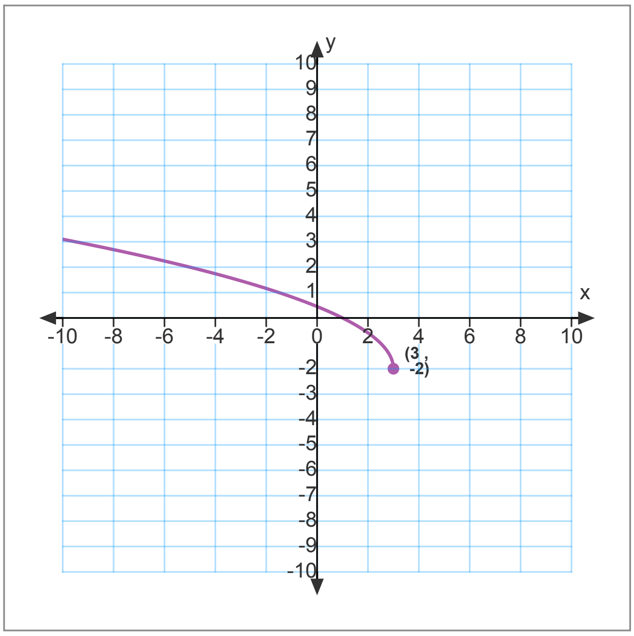
$$g(x) = \sqrt{-2(x-3)} - 2$$



$\therefore$ D: $\{x \in \mathbb{R} \mid x \leq 3\}$

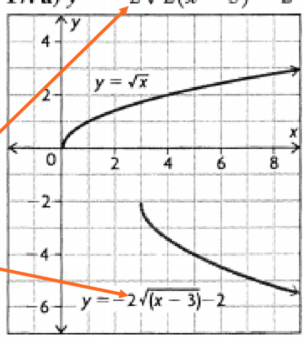
R: $\{y \in \mathbb{R} \mid y \geq -2\}$

$$y = \sqrt{-2(x-3)} - 2$$



Note: The textbook answer is incorrect.
Their answer is based on incorrectly reflecng in x-axis.
I'm also not sure why a=2 in the graph ?

17. a) $y = -2\sqrt{2(x-3)} - 2$



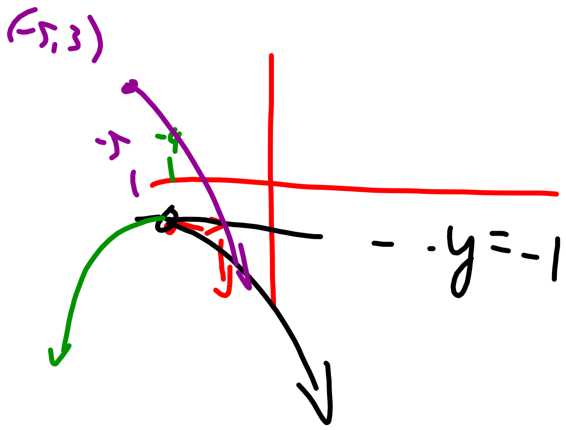
domain $= \{x \in \mathbf{R} \mid x \geq 3\}$,
range $= \{y \in \mathbf{R} \mid y \leq -2\}$

p. 77 #19

19. A function $f(x)$ has domain $\{x \in \mathbf{R} \mid x \geq -4\}$ and range $\{y \in \mathbf{R} \mid y < -1\}$. Determine the domain and range of each function.

a) $y = 2f(x)$ **c)** $y = 3f(x + 1) + 4$

b) $y = f(-x)$ **d)** $y = -2f(-x + 5) + 1$



19. a) This is a vertical stretch by a factor of 2, so it expands the upper bound of the range by a factor of 2.
Domain = $\{x \in \mathbf{R} \mid x \geq -4\}$,
range = $\{y \in \mathbf{R} \mid y < -2\}$

b) This is a reflection in the y-axis, so it will change the sign of the bound of the domain, and the direction of the inequality.
Domain = $\{x \in \mathbf{R} \mid x \leq 4\}$,
range = $\{y \in \mathbf{R} \mid y < -1\}$

c) This is a vertical stretch of 3, followed by translations of left 1 unit and up 4 units.
Domain = $\{x \in \mathbf{R} \mid x \geq -5\}$,
range = $\{y \in \mathbf{R} \mid y < 1\}$

d) First, rewrite the equation $y = -2f(-x - 5) + 1$. This is a reflection in both the x- and y-axes, so it will change the signs of the bounds of the domain and range, and the direction of their inequalities. There is also a vertical stretch by a factor of 2, followed by translations of 5 right and 1 up.
Domain = $\{x \in \mathbf{R} \mid x \leq -1\}$,
range = $\{y \in \mathbf{R} \mid y > 3\}$

3.1 Properties of Quadratic Functions

Date: Mar. 7/17

Ex. 1: A rocket is launched. It's height is given by the following table.

t (sec)	0	1	2	3	4	5	6	7	8	9	10
height (m)	0	44.1	78.4	102.9	117.6	122.5	117.6	102.9	78.4	44.1	0

44.1 34.3 24.5 14.7 4.9 -4.9 -14.7 -24.5 -34.3 -44.1

Note $2a = -9.8$ -9.8 -9.8 -9.8

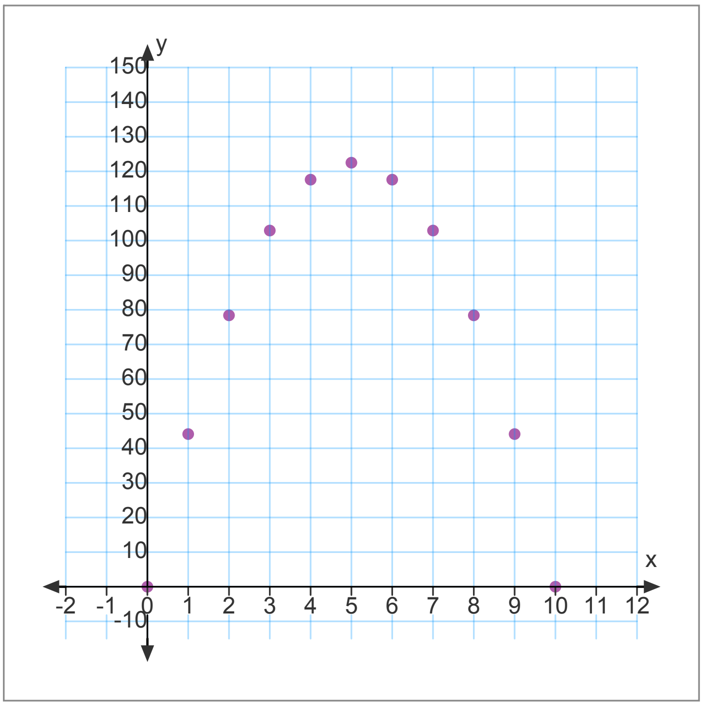
$a = -4.9$

a) What type of relation is this? How can you tell?

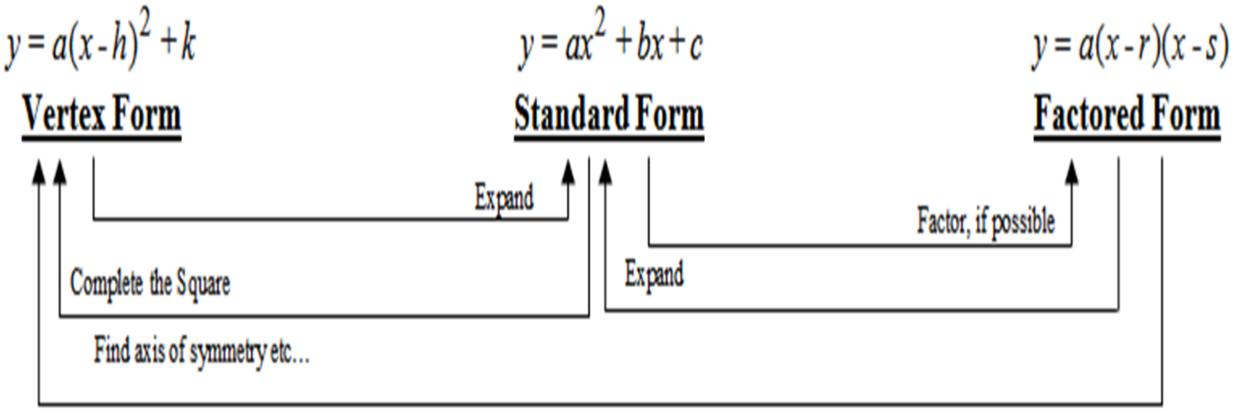
This is a quadratic relation because the second differences are **constant**.

b) Graph the relation.

t	h
0	0
1	44.1
2	78.4
3	102.9
4	117.6
5	122.5
6	117.6
7	102.9
8	78.4
9	44.1
10	0



Recall: Three forms of a **quadratic relation**:



c) Find the equation of the relation.

Vertex form

$y = a(x-h)^2 + k \quad v(5, 122.5)$

$\therefore y = a(x-5)^2 + 122.5$

$0 = a(0-5)^2 + 122.5$ use $(0,0)$

$0 = 25a + 122.5$

$\frac{-122.5}{25} = a$

$-4.9 = a$

the equation is

$y = -4.9(x-5)^2 + 122.5$

$h = -4.9(t-5)^2 + 122.5$

$h(t) = -4.9(t-5)^2 + 122.5$

$(0,0)$ + $(10,0)$

Factored form

$y = a(x-r)(x-s)$

$= a(x-0)(x-10)$

$= ax(x-10)$

$44.1 = a(1)(1-10)$ use $(1, 44.1)$

$44.1 = -9a$

$\frac{44.1}{-9} = a$

$a = -4.9$

the equation is $y = -4.9x(x-10)$

$h(t) = -4.9t(t-10)$

Check this solution using next slide

Ex. 2: For the relation, create a difference table and use it to findthe equation.

x	0	1	2	3	4	5	6
y	15	0	-9	-12	-9	0	15

-15 -9 -3 3 9 15

$2a = 6$ 6 6 6 6

$-9-(-15)$
$-9+15$
$=6$

$y = ax^2+bx+c$ ← y-intercept (0, 15)
$\therefore c = 15$

$\therefore 2a = 6$
$\therefore a = 3$

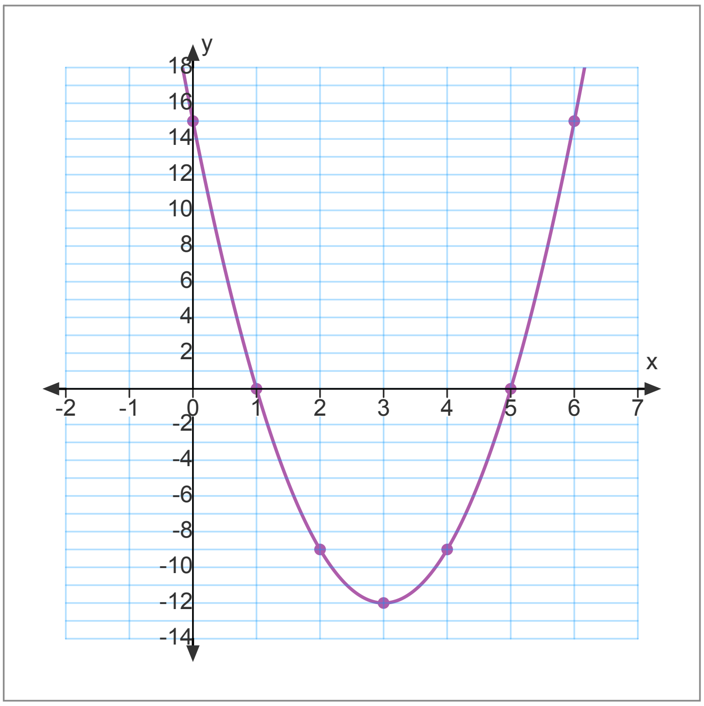
$\therefore y = 3x^2+bx+15$ use (1, 0)
$0 = 3(1)^2+b(1)+15$
$0 = 3+b+15$
$-18 = b$
$\therefore y = 3x^2-18x+15$ is the equation.

Ex. 2: For the relation, create a difference table and use it to findthe equation.

x	0	1	2	3	4	5	6
y	15	0	-9	-12	-9	0	15

t	h
0	15
1	0
2	-9
3	-12
4	-9
5	0
6	15

$$y = 3x^2 - 18x + 15$$



$$y = 3(x-3)^2 - 12$$

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 76-77 #1 – 5, 7, 8, 10, 12* – 19
*use web fix

Be ready for Unit 2 Summave Tomorrow!!

Today's Homework Practice includes:

READ pp. 140-145

p. 138 #1 – 7

p. 139 A – F

pp. 145-146 #1 – 8, 9ac, 10

Use Google Classroom Link to watch video proof