

Are there any questions from last day's assigned work you would like to see on the board?

pp. 76-77 #1 – 5, 7, 8, 10, 12* – 19

*use web fix

No questions asked?

Today's Learning Goal(s):

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

- a) represent and interpret quadratic functions in a number of different forms.

3.1 Properties of Quadratic Functions

Date: Mar. 3/20

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

t/h
 s
 s
 s

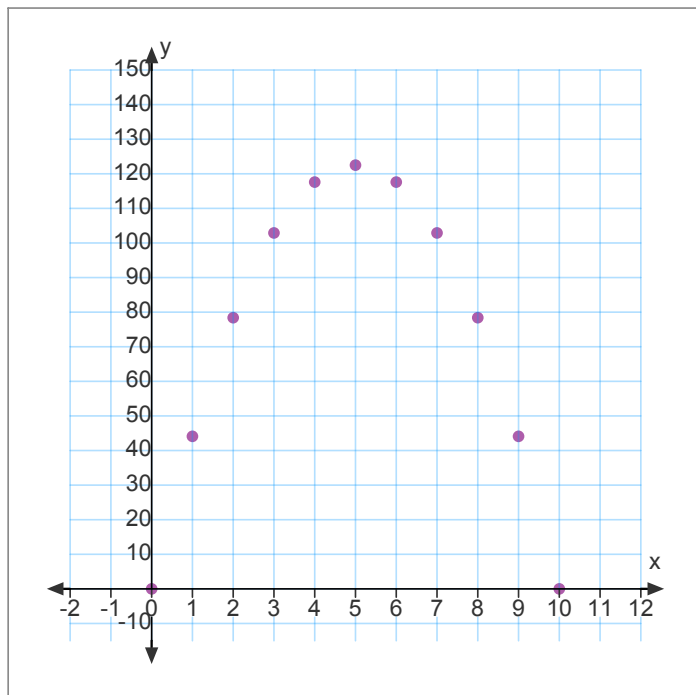
1st Diff. 44.1 34.3 24.5 14.7 4.9 -4.9 -14.7 -24.5 -34.3 -44.1
 2nd Diff. -9.8 -9.8

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

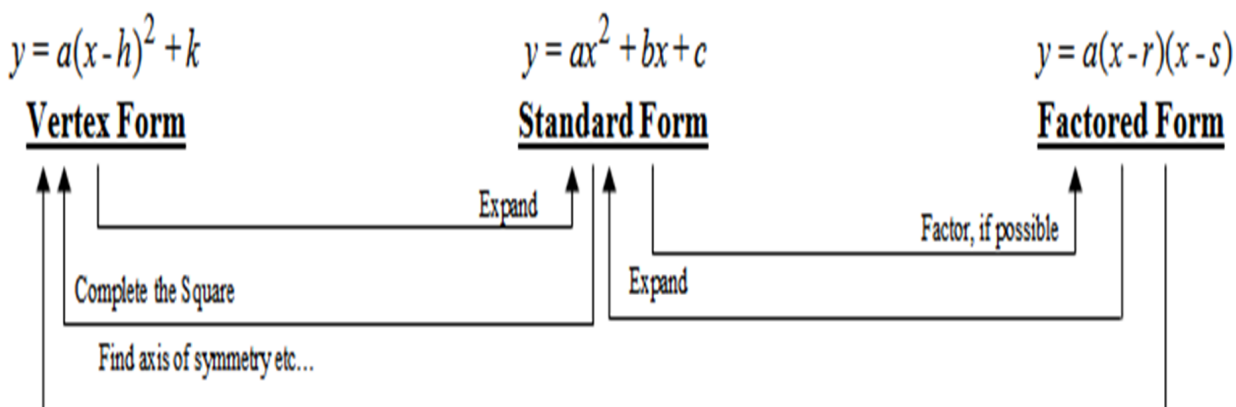
This is a quadratic relation because the second differences are **constant**.

- 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

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

$$V(5, 122.5)$$

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

$$44.1 = a(1-5)^2 + 122.5$$

$$44.1 = a(-4)^2 + 122.5$$

$$44.1 - 122.5 = 16a$$

$$\frac{-78.4}{16} = \frac{16a}{16}$$

$$a = -4.9$$

the equation is

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

Factored form

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

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

$$y = ax(x-10)$$

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

$$44.1 = a(-9)$$

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

$$a = -4.9$$

the equation is

$$y = -4.9x(x-10)$$

c) Find the equation of the relation.

Vertex form

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

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

$$0 = a(0-5)^2 + 122.5 \quad \text{use } (0,0)$$

$$0 = 25a + 122.5$$

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

$$-4.9 = a$$

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

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

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

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

$$44.1 = a(1)(1-10) \quad \text{use } (1, 44.1)$$

$$44.1 = -9a$$

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

$$a = -4.9$$

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

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

Ex. 2: For the relation, create a difference table and use it to find the equation. *Check this solution using next slide*

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

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

-15 -9 -3 3 9 15
 $2a = 6$ 6 6 6 6

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

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

$\therefore y = 3x^2 + bx + 15$
 $0 = 3(1)^2 + b(1) + 15$
 $0 = 3 + b + 15$

use $(1, 0)$

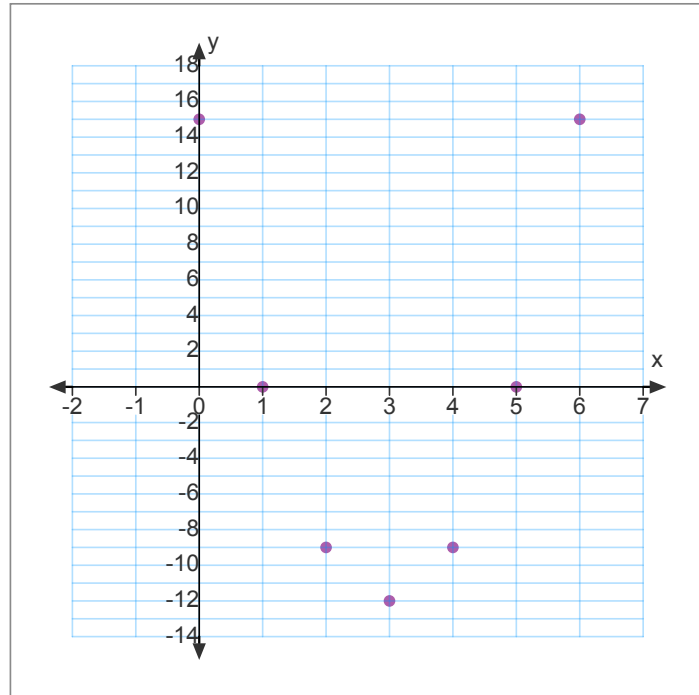
$-18 = b$

$\therefore y = 3x^2 - 18x + 15$ is the equation.

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



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

$$+3^2 - 3^2$$

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

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

$$\begin{aligned}
 \left(\frac{1}{2}b\right)^2 &= 3(x^2 - 6x) + 15 \\
 &= 3(x^2 - 6x + 9 - 9) + 15 \\
 &= 3(x-3)^2 + 3(-9) + 15 \\
 &= 3(x-3)^2 - 27 + 15 \\
 &= 3(x-3)^2 - 12
 \end{aligned}$$

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](#)