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. 6, 2018

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

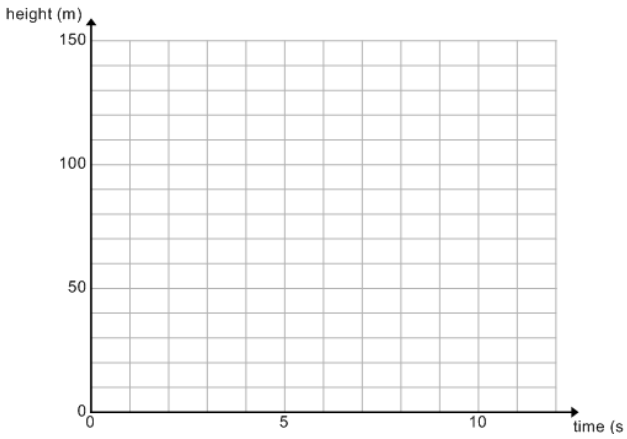
44.1 34.3 24.5 14.7 4.9 -4.9 -14.7 -24.5 -34.3 -44.1

-9.8 -9.8 -9.8 -9.8 -9.8 -9.8 -9.8 -9.8 -9.8

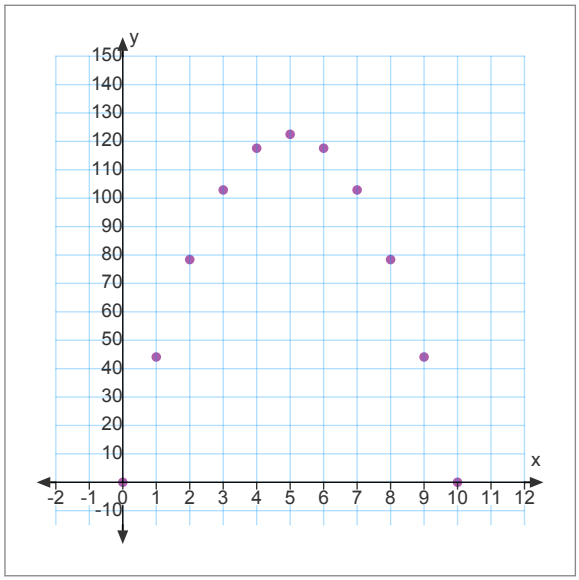
a) What type of relation is this? How can you tell?

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

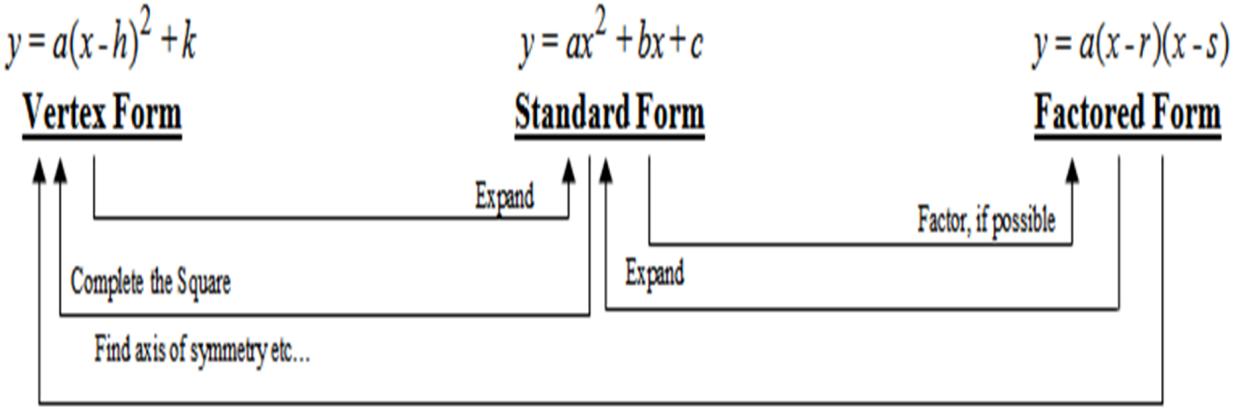
b) Graph the relation.



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 $v(5, 122.5)$

$f(x) = a(x-h)^2 + k$ use $(1, 44.1)$

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

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

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

$44.1 - 122.5 = 16a$

$-78.4 = 16a$

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

$\therefore a = -4.9$

the equation is $f(x) = -4.9(x-5)^2 + 122.5$

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

Factored form $(0,0)$ & $(10,0)$ use $(1, 44.1)$

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

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

$44.1 = a(1-0)(1-10)$

$44.1 = a(1)(-9)$

$44.1 = -9a$

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

$\therefore a = -4.9$

the equation is $f(x) = -4.9(x-0)(x-10)$

$= -4.9x(x-10)$

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

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

$-15 \quad -9 \quad -3 \quad 3 \quad 9 \quad 15$
$\quad 6 \quad 6 \quad 6 \quad 6$

$2a = 6$

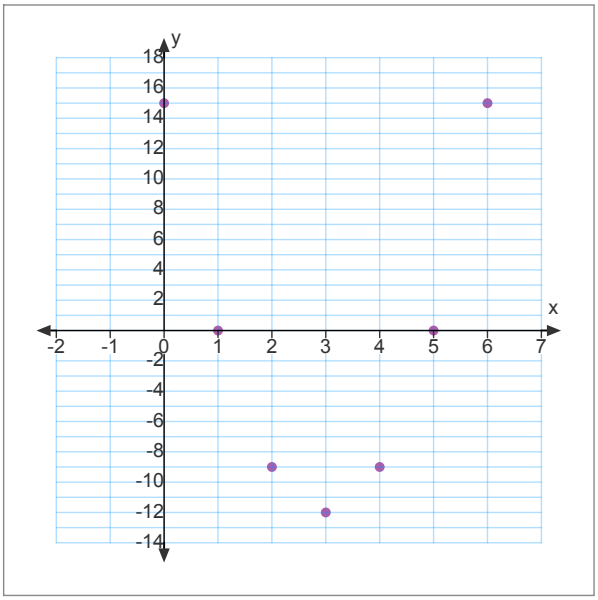
$\therefore 2a = 6$
$\therefore a = 3$

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

use $(1,0)$

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

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



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

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

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