DAY 1 – Modelling Quadratic Relations

1. Use the mathematical models to determine whether the relation is linear, quadratic or neither (circle the appropriate answer). Give a reason for each answer.

a.

$$y = 9x^2 + 6x - 7$$

linear or *quadratic* or *neither*?

Reason: highest exponent is a 2

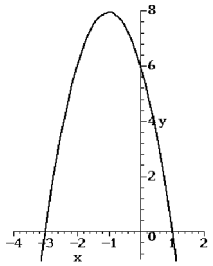
b.

x	y	1st	2nd
4	5	2-5=-3	-1-(-3)=2
2	2	1-2=-1	3-(-1)=4
0	1	4-1=3	3-3=0
-2	4	7-4=3	
-4	7		

linear or *quadratic* or *neither*?

Reason: 1st or 2nd dif not constant

c.



linear or *quadratic* or *neither*?

Reason: it is a parabola

d.

$$y = 6x^1$$

linear or *quadratic* or *neither*?

Reason: highest exponent 1

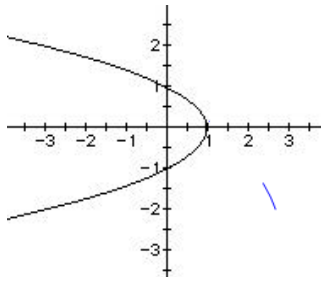
e.

x	y	1st	2nd
2	12	3-12=-9	-3+9=6
1	3	0-3=-3	3+3=6
0	0	3-0=3	9-3=6
-1	3	12-3=9	
-2	12		

linear or *quadratic* or *neither*?

Reason: 2nd diff constant

f.



linear or *quadratic* or *neither*?

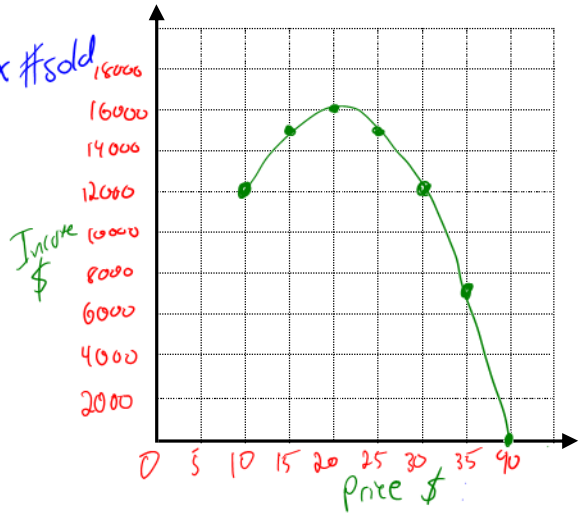
Reason: not a normal parabola

2. Last year a clothing boutique sold 1200 t-shirts for $10 each. Market research suggests that for every $5 increase in price, 200 fewer t-shirts will be sold.

   a. Complete the table until the price is $40 in the table below.

   b. Graph the data below. Plot *Price* against *Income*. Label axes and give graph a title.

Price	Number of T-shirts Sold	Income = $ x #sold
$10	1200	$12 000
$15	1000	15000
$20	800	16000
$25	600	15000
$30	400	12000
$35	200	7000
$40	0	0

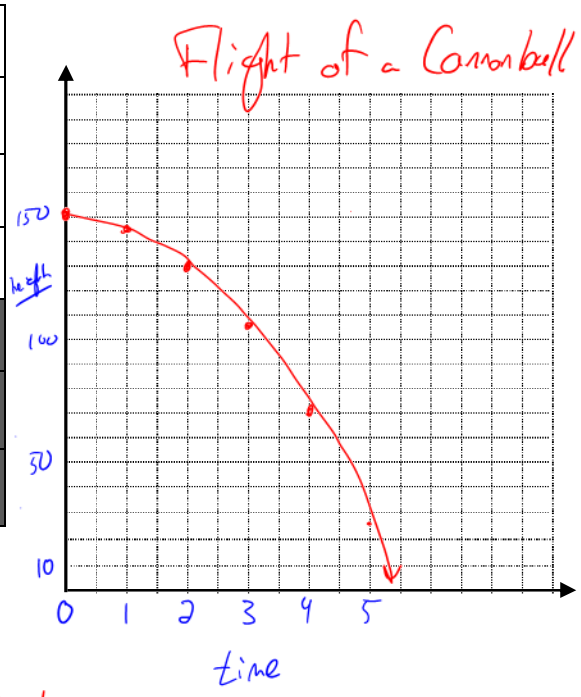


   c. Which price results in the maximum income? $20

3. A cannonball is shot horizontally from the top of a cliff. Its path can be modelled by the relation where *h* is the cannonball's height above the ground, in metres, and *t* is the time, in seconds.

   a. Complete the table below.

time	$h = 150 - 5t^2$	*height*	1st	2nd
0	$150-5(0)^2$	150	5	10
1	$150-5(1)^2$	145	15	10
2	$150-5(2)^2$	130	25	10
3	$150-5(3)^2$	105	35	
4	$150-5(4)^2$	70		
5	$150-5(5)^2$	25		



   b. Is the relation quadratic? How do you know?

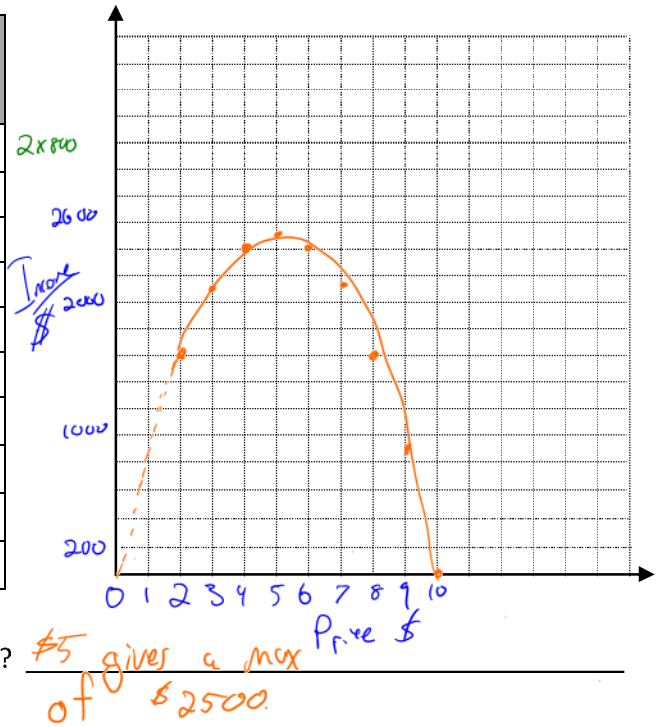
The second differences are constant.

   c. Graph the relation in the grid above. Label axes and give graph a title.

4. A craft store sold 800 ornaments for $2 each. A survey suggests that every $1 increase in price will reduce sales by 100.

   a. Complete the table below until no ornaments are sold.
   b. Graph the data Price versus Income. Label axes and give graph a title.

Price	Number of Ornaments Sold	Income
2	800	1600
3	700	2100
4	600	2400
5	500	2500
6	400	2400
7	300	2100
8	200	1600
9	100	900
10	0	0



   c. Which price results in the maximum income? $5 gives a max of $2500.