Name: _____   Date: _____

Section 4.1 Modelling With Quadratic Relations

1. Graph each relation. Use the graph to determine if the relation is linear, quadratic, or neither.

a)

x	y
−5	25
−3	9
−1	1
1	1
3	9
5	25
7	49

b)

x	y
3	5
4	6
5	7
6	8
7	9
8	10
9	11

c)

x	y
−3	−7
−2	−2
−1	1
0	2
1	1
2	−2
3	−7

d)

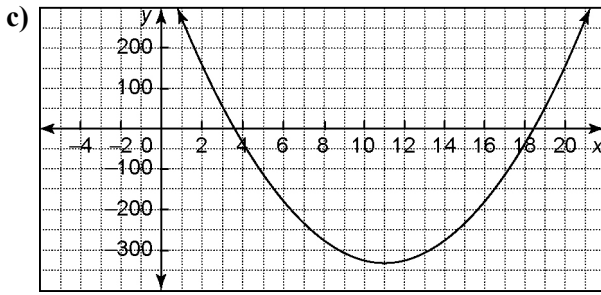| x	y
0	1
1	2
2	9
3	28
4	65
5	126
6	217

2. Use first and second differences to check your answers to question 1.

3. Which of these relations are quadratic? Explain.
a) $y = x^3 + 4$ **b)** $y = 2x^2 + 5x - 6$
c) $y = 3^{x+1}$ **d)** $y = 6 + x^2$
e) $y = x + 7$ **f)** $y = -4x^2 + 4$

4. Estimate the maximum or minimum value for each relation, and state if it is a maximum or a minimum.

a)

b)

c)
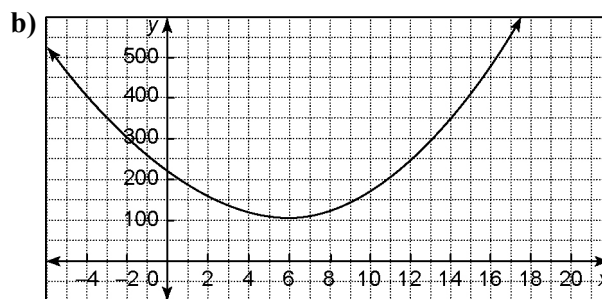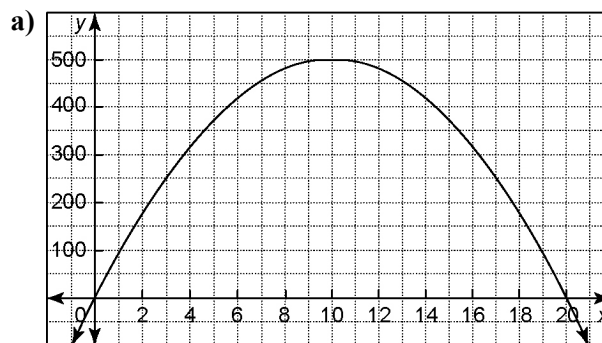
5. A box of food supplies is parachuted from a cargo plane over a remote village in Africa. The height, h, of the box, in metres, t seconds after being dropped from the plane is given by the relation $h = -0.5t^2 + 1000$.

a) Complete the table of values.

Time (s)	Height (m)
0	
10	
20	
30	
40	

b) Graph the relation.

c) Is the relation quadratic? Explain.

6. A clothesline is suspended between two poles, 10 m apart. To decide if the shape of the clothesline can be modelled by a quadratic relation, Jeffery takes these measurements:

Horizontal Distance From Pole (m)	Height From Ground (m)
0	2.7
1	2.2
2	1.8
3	1.5
4	1.3
5	1.2
6	1.3
7	1.5
8	1.8
9	2.2
10	2.7

a) Graph the data.

b) Is this relation quadratic? Explain

7. A daycare owner wants to use 160 m of fencing to build a small rectangular playground. She wants the playground to have the greatest possible area.

a) Complete the table of values.

Length (m)	Width (m)	Perimeter (m)
70	10	160
	20	
	30	
	40	
	50	
	60	
	70	

b) Add a fourth column to the table. Calculate the area for each pair of dimensions.

c) Draw a graph to compare the length and the area.

d) Use the graph to determine the dimensions of the playground with the greatest possible area.

8. A golf warehouse sold 200 sleeves of golf balls for $3 each. A survey suggests that for every $1 increase in price, sales will drop by 40 sleeves.

a) Complete the table of values.

Price ($)	Number Sold	Revenue ($)
3	200	600
4		
5		
6		
7		

b) Draw a graph to compare price and revenue.

c) Which price will result in a maximum revenue?

d) What is the maximum revenue?