DAY ~~8~~ 6 - Application in Real Life

1.
The shape of one of the skateboard ramps to be built in the park can be modelled by the quadratic relation $d = 0.08l^2 - 0.8l$, where d represents the depth in metres and l represents the horizontal distance in metres.

a) Factor to find the zeros

$d = \frac{0.08L^2}{0.08L} - \frac{0.8L}{0.08L}$

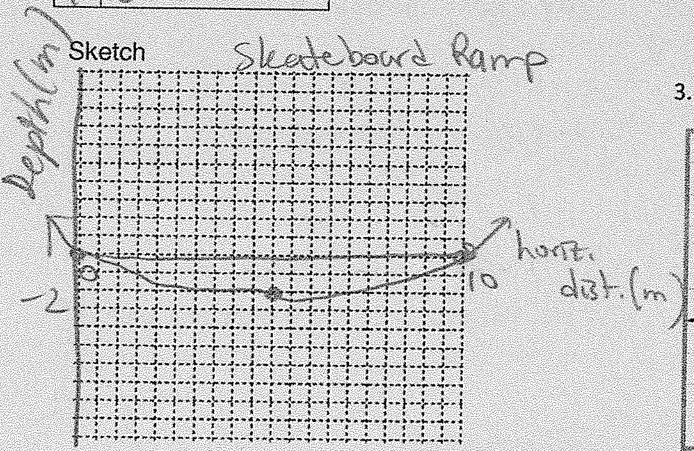
$d = -0.08L(L - 10)$

$\therefore -0.08L = 0$ → $L = 0$ $L - 10 = 0$ → $L = 10$

b) Fill in table using zeros and middle point

l	d
0	0
5	$0.08(5)^2 - 0.8(5) = 0.08(25) - 4 = -2$
10	0

Sketch   Skateboard Ramp



c) Find the minimum value of this skateboard ramp.

−2m

d) What is the horizontal distance to this minimum point?

5m

e) How wide is the ramp?

10m

2. Are the relations linear or quadratic or neither?

a) $y = x + 4$ linear

b) $y = 4x(x-1)$ $4x^2 - 4x$ quad

c) $y = 2^{2+x}$ neither

d)

Δx	x	y	Δy
	−3	15	
+1	−2	8	−7
+1	−1	1	−7
	0	−6	−7
	1	−13	−7
	2	−20	−7

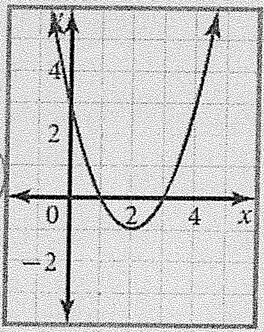
∴ Linear

e)

Δx	x	y	Δy
	−3	19	
+1	−2	17	−2
+1	−1	15	−2
	0	13	−2
	1	11	−2
	2	9	−2

∴ Linear

3.



Max or Min ? MIN

Optimal Value $y = -1$

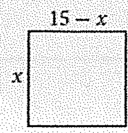
Axis of symm $x = 2$

Vertex $(2, -1)$

Zeros/x-int $(1, 0)$ $(3, 0)$

Y-intercept $(0, 3)$

4. Find the maximum area, in square metres, of a rectangle whose area can be represented by the relation $A = x(15 - x)$.



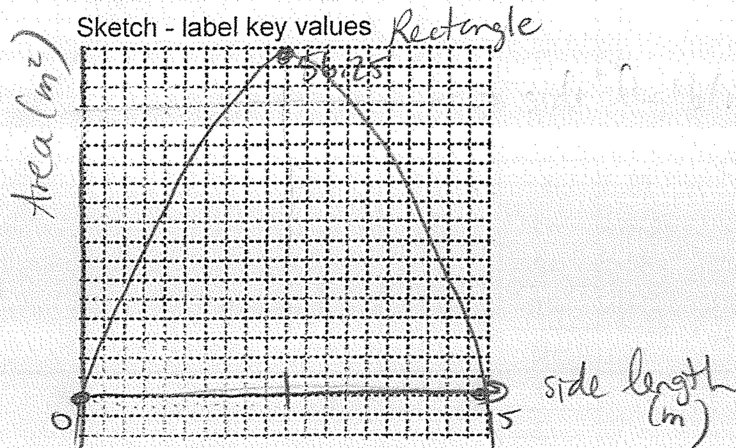
a) The equation is already factored, find zeros

$x = 0$ $15 - x = 0$ $15 = x$

b) Fill in table using zeros and middle point

x	A
0	0
7.5	7.5(15−7.5) = 7.5(+7.5) = +56.25
15	0

Sketch - label key values Rectangle



c) What is the maximum area?

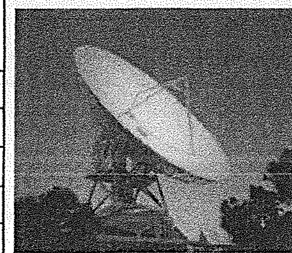
56.25

d) What dimensions of the rectangle give this maximum area? 7.5 m (L and W)

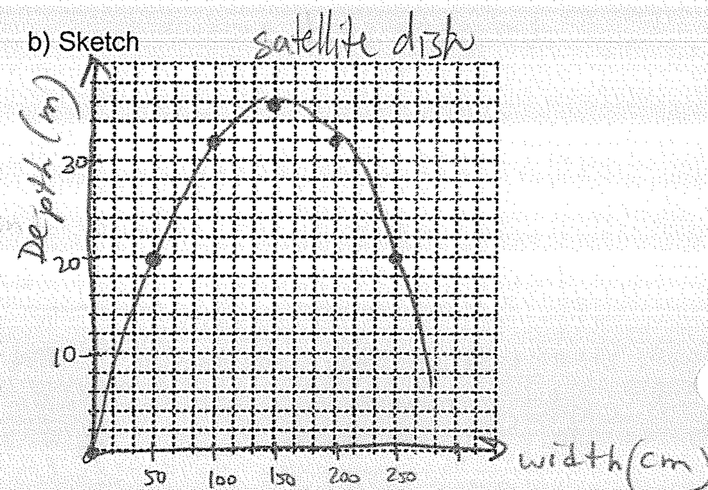
5. A cross-section of a satellite dish can be modelled by the quadratic relation $d = -0.0016w(w - 300)$, where w represents the horizontal distance across the dish in centimetres and d represents the depth of the dish in centimetres.

a) Copy and complete the table.

w (cm)	d (cm)
0	−0.0016(0)(0−300) = 0
50	−0.0016(50)(50−300) = 20
100	−0.0016(100)(100−300) = 32
150	−0.0016(150)(150−300) = 36
200	−0.0016(200)(200−300) = 32
250	20



b) Sketch satellite dish



c) What is the maximum depth?

36 cm

d) Find the zeros from the equation.

(0, 0) (300, 0)

d) Use the zeros to find the width at the base.

300 cm

6. Factor.

a. $x^2 - 2x - 35$

(x+5)(x−7)

b. $x^2 - 64$

(x+8)(x−8)

c. $0.5x^2 + 5x + 12.5$

$0.5\left(\frac{0.5x^2}{0.5} + \frac{5x}{0.5} + \frac{12.5}{0.5}\right)$

$= 0.5(x^2 + 10x + 25)$

$= 0.5(x+5)(x+5)$

d. $2x^2 - 8$

$2\left(\frac{2x^2}{2} - \frac{8}{2}\right)$

$= 2(x^2 - 4)$

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