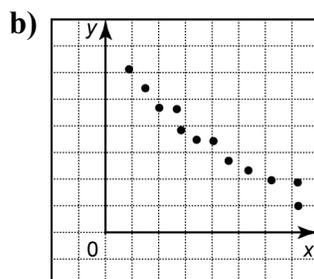
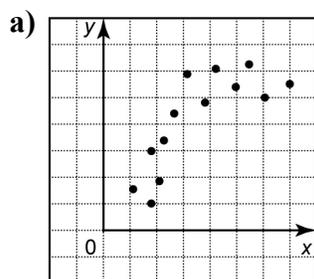


## Chapter 4 Review

### 4.1 Investigate Non-Linear Relations

1. Identify whether each scatter plot can be modelled using a line of best fit or a curve of best fit.



2. Use the data in the table to answer the questions below.

Time (years)	Value of the Investment (\$)
0	100
1	105
2	108
3	114
4	121
5	135
6	150
7	171
8	195
9	225

- a) Make a scatter plot of the data and draw a curve of best fit.  
 b) Describe the relation between value and time.  
 c) Use your curve of best fit to estimate the value of the investment after 10 years.

### 4.2 Quadratic Relations

3. Use finite differences to determine whether each relation is linear, quadratic, or neither.

a) 

x	y
1	3
2	10
3	29
4	66
5	127

b) 

x	y
-2	12
-1	3
0	0
1	3
2	12

c) 

x	y
1	5
3	13
5	21
7	29
9	37

4. Susan throws a rock off a cliff that is 210 m tall. The height,  $h$ , in metres, of the rock above the ground can be related to the time,  $t$ , in seconds by the equation  $h = -5t^2 + 10t + 210$ .
- a) Graph the relation.  
 b) What is the maximum height of the rock?  
 c) When does the rock reach its maximum height?

**4.3 Investigate Transformations of Quadratics and 4.4 Graph  $y = a(x - h)^2 + k$** 

5. Sketch the graph of each parabola and describe its transformations from the relation  $y = x^2$ .

a)  $y = (x + 3)^2$     b)  $y = x^2 + 2$

c)  $y = \frac{1}{3}x^2$     d)  $y = -3x^2$

6. Copy and complete the table for each parabola. Replace the heading for the second column with the equation for the parabola.

a)  $y = (x + 2)^2 + 3$

b)  $y = 4(x - 5)^2 - 1$

c)  $y = -\frac{1}{3}(x + 2)^2 - 3$

d)  $y = -(x - 3)^2 - 4$

Property	$y = a(x - h)^2 + k$
vertex	
axis of symmetry	
stretch or compression	
direction of opening	
values that x may take	
values that y may take	

7. Sketch each parabola in question 6.
8. A store can increase revenue by increasing the price of its T-shirts. The revenue,  $R$ , in dollars, can be modelled by the relation  $R = -50(d - 3.5)^2 + 4000$ , where  $d$  represents the dollar increase in price.
- a) Graph the relation for  $0 \leq d \leq 10$ .
- b) What is the maximum revenue?
- c) What dollar increase corresponds to the maximum revenue?

**4.5 Quadratic Relations of the Form**

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

9. Sketch a graph for each quadratic relation. Label the vertex and the  $x$ -intercepts.

a)  $y = -(x - 2)(x + 6)$

b)  $y = \frac{1}{2}(x + 8)(x - 2)$

c)  $y = x(x + 10)$

10. The path of a jet plane in training manoeuvres is given by the relation  $h = -5(t + 20)(t - 100)$ , where  $h$  represents the height, in metres, above the ground and  $t$  is time, in seconds.

- a) Sketch a graph for this relation.

- b) At what time does the plane reach its maximum height?

- c) What is the maximum height?

**4.6 Negative and Zero Exponents**

11. Evaluate.

a)  $6^{-3}$     b)  $8^{-2}$

c)  $\left(-\frac{2}{3}\right)^0$     d)  $\left(\frac{1}{2}\right)^{-4}$

e)  $(-3)^{-2}$     f)  $\left(-\frac{3}{5}\right)^{-3}$

g)  $-7^0$     h)  $\left(\frac{1}{3}\right)^{-3}$

12. Evaluate.

a)  $6^2 - 6^{-1}$     b)  $(4 + 5)^0$     c)  $4^{-2} + 4^{-1}$

13. Solve for  $x$ .

a)  $3^x = \frac{1}{27}$     b)  $\left(\frac{2}{5}\right)^x = \frac{25}{4}$     c)  $x^{-3} = \frac{27}{64}$

14. The half-life of sodium-24 is 16 h.

- a) What fraction of a sample of sodium-24 will remain after 32 h?

- b) What fraction of a sample of sodium-24 will remain after 4 days?

- c) Write the fractions in parts a) and b) with a negative exponent with a base of 2.