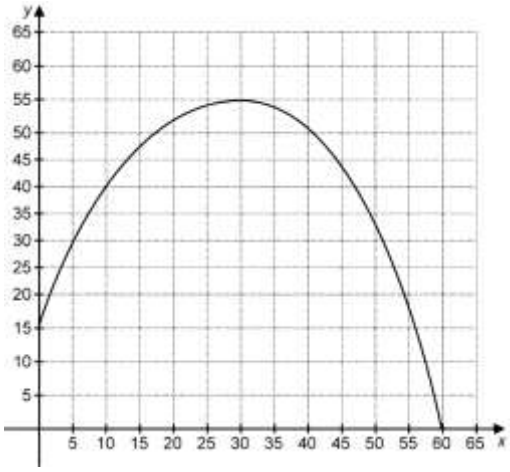
CHAPTER 8 REVIEW

8.1 – INTERPRET QUADRATIC RELATIONS



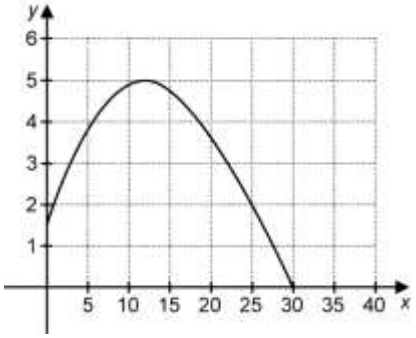
1. A sprinkler system sprays a stream of water onto the grass. The path of the water can be modelled by the quadratic relation shown below. The **height** and the **horizontal distance** are measured in centimetres

(a) What is the **maximum height** reached by the stream of water? _____

(b) **How far** from the sprinkler does the stream of water reach this maximum height? _____

(c) Suppose a dog stands **20 cm** away from the sprinkler and does not get wet. What is the **maximum height** of the dog? _____

(d) **How high** above the ground is the sprinkler head? _____



2. The graph below shows the height of a basketball (in metres) over time (in seconds) after it was thrown

(a) What was the **maximum height** reached by the basketball? _____

(b) **How long** did it take for the ball to reach this maximum height? _____

(c) **At what height** was the ball thrown from? _____

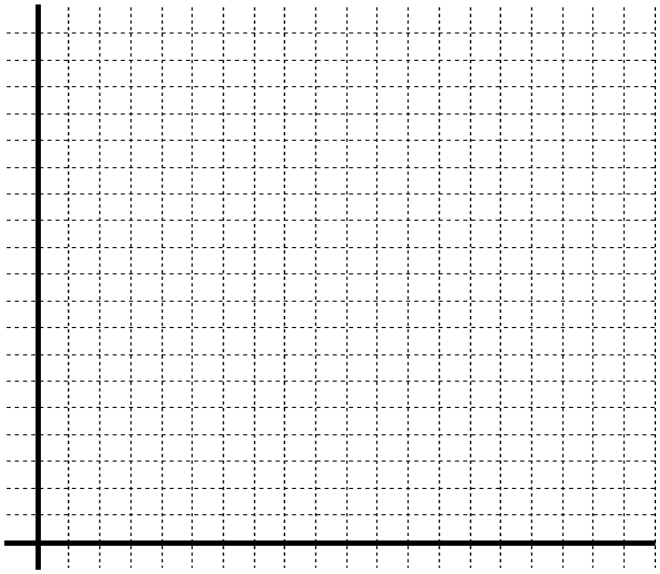
3. The table below shows the **horizontal distance** travelled and the **height** reached by a baseball after it was hit with a bat

(a) Graph the data on the grid provided

(b) What was the **maximum height** achieved by the ball? _____

(c) At what **horizontal distance** was the maximum height achieved at? _____

Horizontal distance (m)	***Height (m)***
0	0
10	10
20	30
30	60
40	30



8.2 – REPRESENT QUADRATIC RELATIONS IN DIFFERENT WAYS

1. Determine the **zeros** of each relation. Remember to let **y = 0** then solve for each *x* separately!

(a) $y = (x + 2)(x – 3)$
$0 = (x + 2)(x – 3)$

(b) $y = (x – 5)(x + 4)$

$0 = x + 2$ $0 = x – 3$
$– 2 = x$ **$3 = x$**

(c) $y = (x + 1)(x + 6)$

(d) $y = (x – 9)(x – 8)$

2. **Factor** each equation using the **"product and sum"** method and determine the **zeros**

(a) $y = x^2 + 6x + 8$ P = 8
$y = (x + 4)(x + 2)$ S = 6
$0 = (x + 4)(x + 2)$

(b) $y = x^2 – 3x – 10$ P = ____
S = ____

$0 = x + 4$ $0 = x + 2$
$– 4 = x$ **$– 2 = x$**

(c) $y = x^2 – 11x + 30$ P = ____
S = ____

(d) $y = x^2 + x – 12$ P = ____
S = ____

3. Consider the quadratic relation **y = (x + 3)(x + 5)**

(a) Determine the **zeros** of the relation

(b) **Expand** the quadratic relation to the form $y = ax^2 + bx + c$

(c) What is the **y-intercept** of this relation? _____

(d) What is the **a** value of this relation? _____ Does this relation have a **maximum** or **minimum value**? _____

4. Consider the quadratic relation **y = (x + 6)(x – 1)**

(a) Determine the **zeros** of the relation

(b) **Expand** the quadratic relation to the form $y = ax^2 + bx + c$

(c) What is the **y-intercept** of this relation? _____

(d) What is the **a** value of this relation? _____ Does this relation have a **maximum** or **minimum value**? _____

5. Consider the quadratic relation **$y = x^2 – 6x – 16$**

(a) What is the **a** value? _____ Does this relation have a **maximum** or **minimum value**? _____

(b) What is the **y-intercept**? _____

(c) **Factor** this equation to the form y = (x – r)(x – s) (use “Product and sum” method)

(d) Determine the **zeros** of the relation

6. (a) For the relation **$y = x^2 + 5x + 6$**, does the parabola open **upward** or **downward**? _____ Explain

(b) For the relation **$y = – 2x^2 – 10x – 12$**, does the parabola open **upward** or **downward**? _____ Explain

8.4 – THE QUADRATIC RELATION $y = ax^2 + c$

1. Consider the relation **$y = x^2 – 16$**

(a) What is the **y-intercept**? _____

(b) What is the **a** value? _____ Will the parabola have a **maximum** or **minimum** value? _____

(c) **Factor** the equation using **difference of squares** and determine the **zeros**

2. Consider the relation **$y = 9x^2 – 81$**

(a) What is the **y-intercept**? _____

(b) What is the **a** value? _____ Will the parabola have a **maximum** or **minimum** value? _____

(c) **Factor** the equation using **difference of squares** and determine the **zeros**

3. The path of a volleyball after it is served can be modelled by the relation **$h = – 4t^2 + 256$**, where **h** represents the **height** of the ball (in metres) and **t** represents the **time** (in seconds)

(a) From **what height** is the ball served from? (Hint: We let t = ___ and solve for *h*)

(b) **How long** does the ball take to reach the ground (after being served)?

** When the ball hit the ground, we let h = _____*

4. The path of a skydiver can be modelled by the relation $\mathbf{h = -20t^2 + 2420}$, where **h** represents the **height** (in metres) and **t** represents the **time** (in seconds)

(a) From **what height** does the skydiver jump out of the plane? (Hint: We let t = ___ and solve for *h*)

(b) **How long** does the skydiver take to reach the ground (after jumping out of the plane)?

** When the ball hit the ground, we let h = _____*

5. The graph of the quadratic relation $\mathbf{y = ax^2 + 7}$ passes through the point **(7, – 140)**. Find the value of **a** and the **equation** for this quadratic relation.

SOLUTIONS

8.1

1. (a) 55 cm (b) 30 cm (c) 53 cm (d) 15 cm

2. (a) 5m (b) 13 s (c) 1.5 m

3. (b) 60 m (c) 30 m

8.2

1. (b) $x = 5$ and $x = -4$ (c) $x = -1$ and $x = -6$

   (d) $x = 9$ and $x = 8$

2. (b) $y = (x - 5)(x + 2)$; zeros are $x = 5$ and $x = -2$

   (c) $y = (x - 5)(x - 6)$; zeros are $x = 5$ and $x = 6$

   (d) $y = (x + 4)(x - 3)$; zeros are $x = -4$ and $x = 3$

3. (a) $x = -3$ and $x = -5$ (b) $y = x^2 + 8x + 15$

   (c) y-intercept = 15 (d) a = 1, minimum

4. (a) $x = -6$ and $x = 1$ (b) $y = x^2 + 5x - 6$

   (c) y-intercept = – 6 (d) a = 1, minimum

5. (a) a = 1, minimum (b) y-intercept = – 16

   (c) $y = (x - 8)(x + 2)$ (d) $x = 8$ and $x = -2$

6. (a) Upward, a is positive (b) Downward, a is negative

8.4

1. (a) y-intercept = – 16 (b) a = 1, minimum

   (c) $y = (x + 4)(x - 4)$; zeros are $x = -4$ and $x + 4$

2. (a) y-intercept = – 81 (b) a = 9, minimum

(c) $y = (3x + 9)(3x – 9)$; zeros are $x = – 3$ and $x = 3$

3. (a) 256 m (b) 8 s

4. (a) 2420 m (b) 11 s

5. $a = – 3$, Equation: $y = – 3x^2 + 7$