

Quadratic Formula

Mark Scheme

Level	GCSE
Subject	Maths
Exam Board	Edexcel GCSE
Topic	Quadratic Formula
Grade Level	Grade 7
Booklet	Mark Scheme

Time Allowed: 51 minutes

Score: /42

Percentage: /100

Grade Boundaries:

1. Solve $3x^2 + 7x - 13 = 0$
Give your solutions correct to 2 decimal places.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-7) \pm \sqrt{(-7)^2 - 4(3)(-13)}}{2(3)}$$

$$x = \dots 1.22 \dots \text{ or } x = \dots -3.55 \dots$$

(3 marks)

2. Solve the equation

$$2x^2 + 6x - 95 = 0$$

Give your solutions correct to 3 significant figures.

$$x = \frac{-(6) \pm \sqrt{(6)^2 - 4(2)(-95)}}{2(2)}$$

$$x = \dots 5.55 \dots \text{ or } x = \dots -8.55 \dots$$

(3 marks)

3. Solve $x^2 + 3x - 5 = 0$
Give your solutions correct to 4 significant figures.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-5)}}{2(1)}$$

$$x = 1.193 \text{ and } -4.193$$

.....

(3 marks)

4. Solve this quadratic equation.

$$x^2 - 5x - 8 = 0$$

Give your answers correct to 3 significant figures.

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-8)}}{2(1)}$$

$$x = 6.27 \text{ or } x = -1.27$$

(3 marks)

5. (a) Solve $x^2 - 2x - 1 = 0$

Give your solutions correct to 2 decimal places.

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-1)}}{2(1)}$$

$$x = 2.41 \quad \text{and} \quad -0.41$$

..... (3)

(b) Write down the solutions, correct to 2 decimal places, of $3x^2 - 6x - 3 = 0$

$$2.41 \quad \text{and} \quad -0.41$$

..... (2)

(5 marks)

6. (a) Solve $x^2 + x + 11 = 14$
Give your solutions correct to 3 significant figures.

$$x^2 + x + 11 = 14$$

$$x^2 + x - 3 = 0$$

$$x = \frac{- (1) \pm \sqrt{(1)^2 - 4(1)(-3)}}{2(1)}$$

$$x = 1.30 \quad \text{and} \quad -2.30$$

.....
(3)

$$y = x^2 + x + 11$$

The value of y is a prime number when $x = 0, 1, 2$ and 3

The following statement is **not** true.

' $y = x^2 + x + 11$ is **always** a prime number when x is an integer'

- (b) Show that the statement is not true.

$$(10)^2 + (10) + 11 = 121$$

121 is not prime (11×11)

(2)

(5 marks)

7. The diagram below shows a 6-sided shape.
All the corners are right angles.
All the measurements are given in centimetres.

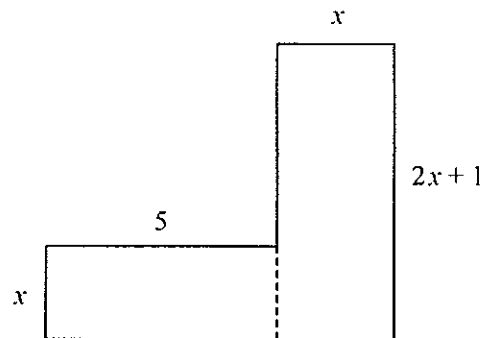


Diagram **NOT** accurately drawn

The area of the shape is 95 cm^2 .

- (a) Show that $2x^2 + 6x - 95 = 0$

$$\begin{aligned} \text{Area} &= 5x + x(2x+1) \\ 95 &= 5x + 2x^2 + x \\ 0 &= 2x^2 + 6x - 95 \end{aligned}$$

(3)

- (b) Solve the equation

$$2x^2 + 6x - 95 = 0$$

Give your solutions correct to 3 significant figures.

$$x = \frac{-6 \pm \sqrt{(6)^2 - 4(2)(-95)}}{2(2)}$$

$$x = 5.55 \text{ or } x = -8.55$$

(3)

(6 marks)

8. The diagram below shows a 6-sided shape.

All the corners are right angles.

All measurements are given in centimetres.

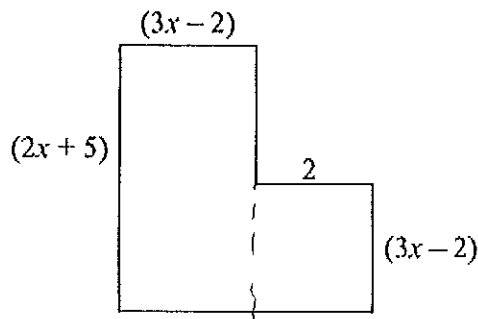


Diagram **NOT**
accurately drawn

The area of the shape is 25 cm^2 .

- (a) Show that $6x^2 + 17x - 39 = 0$

$$\begin{aligned} (3x-2)(2x+5) + 2(3x-2) &= 25 \\ 6x^2 + 15x - 4x - 10 + 6x - 4 &= 25 \\ 6x^2 + 17x - 14 &= 25 \end{aligned}$$

(3)

- (b) (i) Solve the equation $6x^2 + 17x - 39 = 0$

$$6x^2 + 17x - 39 = 0$$

$$x = \frac{-(17) \pm \sqrt{(17)^2 - 4(6)(-39)}}{2(6)}$$

$$x = \dots 1.5 \dots \text{ or } x = \dots -\frac{13}{3} \dots$$

- (ii) Hence work out the length of the longest side of the shape.

$$2(1.5) + 5$$

$$\dots 8 \dots \text{cm}$$

(4)

(7 marks)

9. The diagram shows a 6-sided shape.
All the corners are right angles.
All the measurements are given in centimetres.

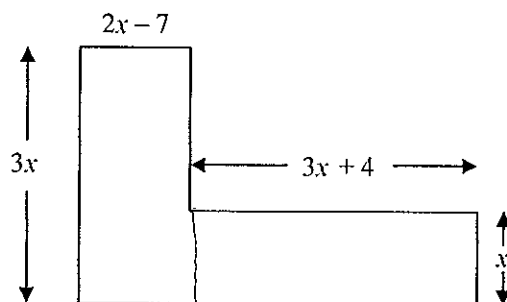


Diagram NOT
accurately drawn

The area of the shape is 85 cm^2 .

- (a) Show that $9x^2 - 17x - 85 = 0$

$$\begin{aligned} 3x(2x-7) + x(3x+4) &= 85 \\ 6x^2 - 21x + 3x^2 + 4x &= 85 \\ 9x^2 - 17x - 85 &= 0 \end{aligned}$$

(3)

- (b) (i) Solve $9x^2 - 17x - 85 = 0$

Give your solutions correct to 3 significant figures.

$$x = \frac{-(-17) \pm \sqrt{(-17)^2 - 4(9)(-85)}}{2(9)}$$

$$x = -2.27 \text{ or } x = 4.16$$

- (ii) Hence, work out the length of the shortest side of the 6-sided shape.

$$1.32 \text{ (3 sf) cm}$$

(4)

(7 marks)