Quadratic problems

Time: 1 hour and 15 minutes

Score: _____/87

Surname: .....

Other names: .....

Mark Scheme and revision available:
www.addvancemaths.com/revision/quadratics/

Instructions

- Use black ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided
- If blank paper is used, write down the question's number
- You must show all your working out.

Information

- The marks for each question are shown in brackets.
- Blank paper is provided at the end if extra space is needed.
- The questions are arranged in order of increasing difficulty.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Quadratic problems

Addvance

Need help?

1) Solve the following equations:

a) $x^2 - 8x = 0$

b) $(x - 2)(x + 3) = 0$

c) $x^2 - 6x + 8 = 0$

d) $x^2 - 5x - 14 = 0$

e) $2x^2 - 10x - 28 = 0$

f) $3x^2 - 42 = 15x$

(12)

2) Solve the following equations, giving your answer to 3 significant figures:

a) $x^2 - 8x = 1$

b) $(x - 2)(x + 3) = 1$

c) $x^2 - 6x + 8 = 1$

d) $x^2 - 5x - 14 = 1$

e) $2x^2 - 10x - 28 = 2$

f) $3x^2 - 45 = 15x$

(12)

Quadratic problems

2a) Solve the following equation:

$$x(2x + 5) - 3 = 0$$

_____ **(3)**

2b) Solve the following equation:

$$2x = 6 + \frac{80}{x}$$

_____ **(3)**

Quadratic problems

3) *In this question, we are going to solve the same quadratic equation using three different methods.*

Consider the following equation:

$$x^2 - 4x - 60 = 0$$

3ai) Factorise $x^2 - 4x - 60 =$

_____ **(1)**

3aii) Hence solve $x^2 - 4x - 60 = 0$

_____ **(1)**

3bi) Write the equation $x^2 - 4x - 60$ in the form $(x - a)^2 + b$ *(complete the square).*

_____ **(2)**

3bii) Hence solve $x^2 - 4x - 60 = 0$

_____ **(2)**

Quadratic problems

3c) Solve $x^2 - 4x - 60 = 0$ using the quadratic formula.

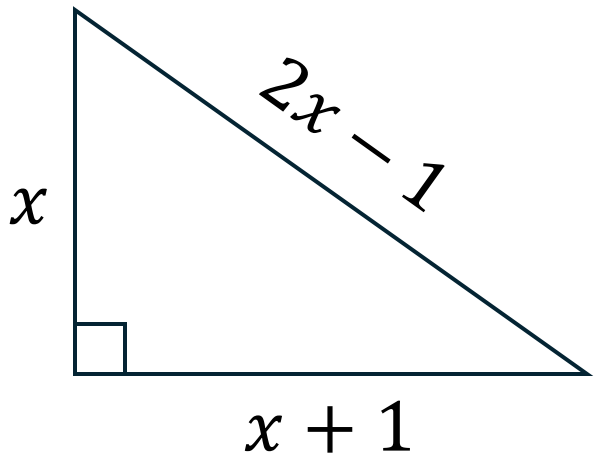
The quadratic equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

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

_____ **(2)**

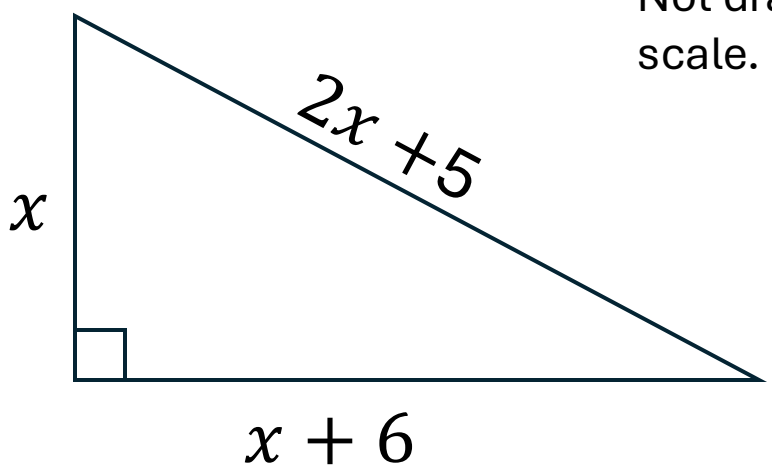
4a) Find the area of the triangle in square centimeters.



_____ **(5)**

4b) On a map, a piece of land is in the shape of a right-angled triangle with sides of length x cm, $(x + 6)$ and $(2x + 5)$ cm. Find the perimeter of the triangle to 3 s.f.

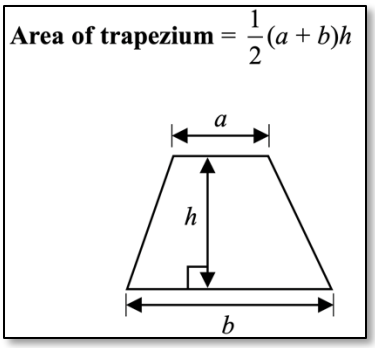
Not drawn to scale.

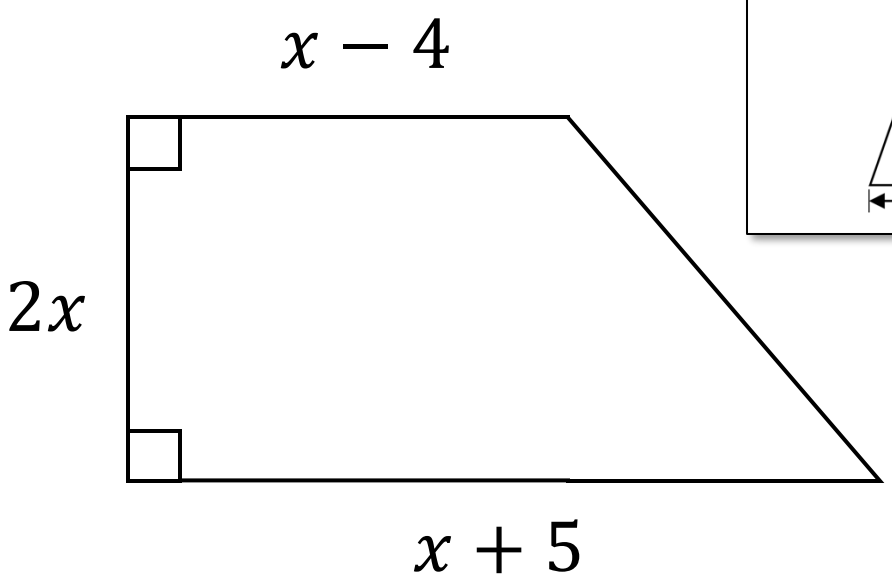


_____ **(5)**

Quadratic problems

4c) The area of the trapezium is 351 square centimeters. Find the perimeter.



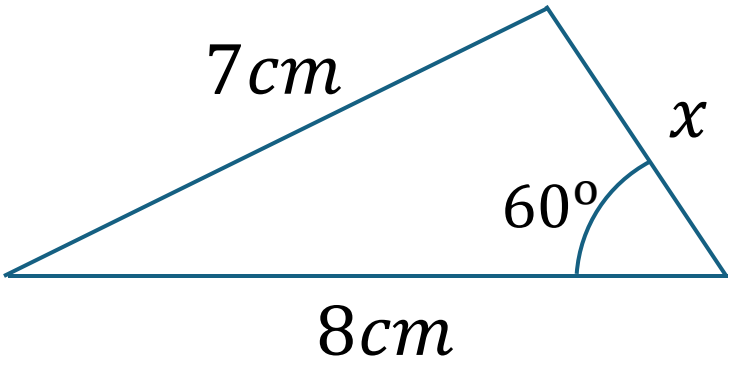


_____ **(7)**

Quadratic problems

5) Find the possible values of x

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$



Not drawn to scale.

_____ **(5)**

6) There are only green and blue candies in a box. There are three more blue candies than green candies in the box. There are more than 12 candies in the box.
Mark is going to take at random two candies from the box. The probability that Mark will take two candies of the same colour is $\frac{27}{55}$.
Work out the number of green candies in the box.

_____ **(5)**

Quadratic problems

7) On a map, a rectangular pool with length 3m and width 4m is surrounded by a garden of uniform width. The total area of the pool and the garden is 172 square meters. Find the width of the garden to 3 s.f.

Not drawn to scale.

_____ **(5)**

Quadratic problems

8) Bob the builder and his assistant laid 1500 bricks in x hours. Had they laid 25 more bricks per hour on average, and worked 2 less hours, they would have laid 1400 bricks.
Find x.

_____ **(4)**

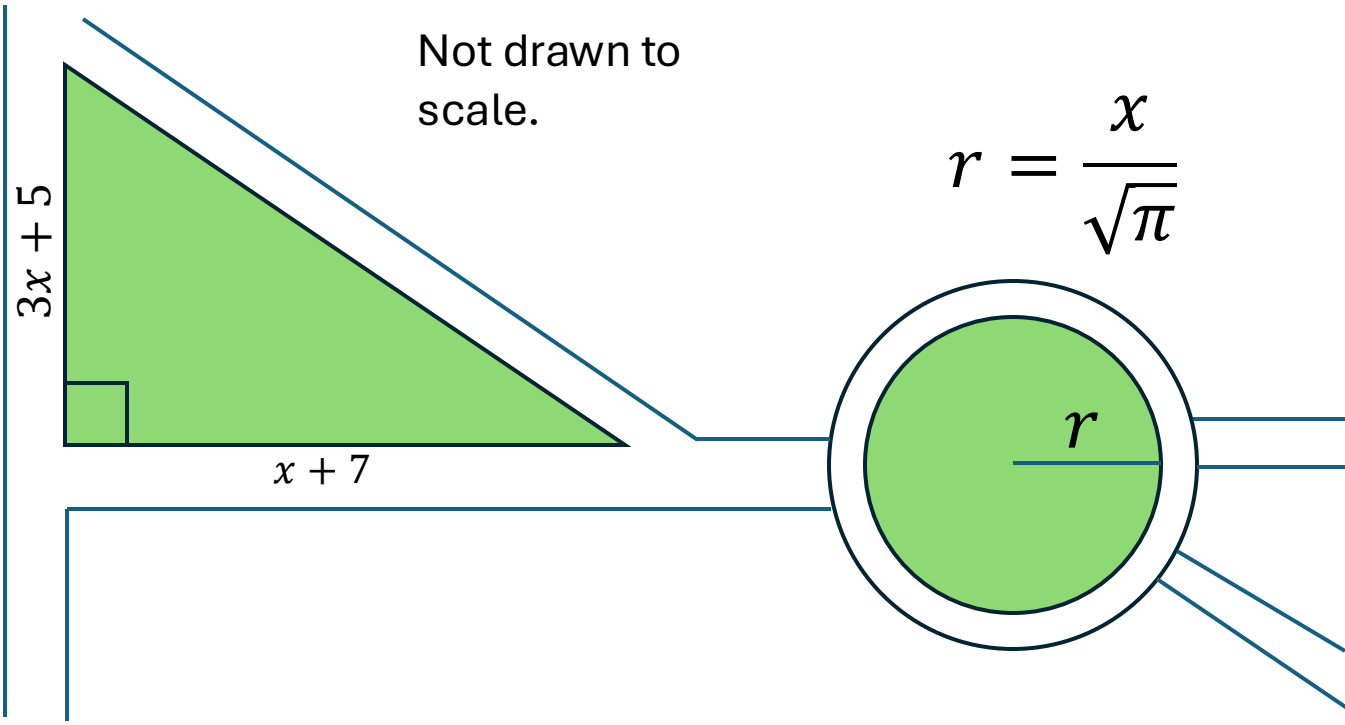
Quadratic problems

9) Below is the diagram of a road system. The government wants to plant vegetation in the shaded areas. All measurements are in km.

The triangular region is twice as big as the circular region.

You are given that $r = \frac{x}{\sqrt{\pi}}$.

Find the total plantation area correct to 3 significant figures.



_____ **(7)**

Blank paper

Blank paper