



**eClassroom**

GCSE Mathematics

# **Quadratic Equations**

**Questions**

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Pearson Edexcel GCSE & iGCSE Mathematics



## Section A — Foundation

### Worked Examples

#### [Fluency]

Solve  $x^2 + 7x + 12 = 0$  by factorising.

$$(x + 3)(x + 4) = 0 \Rightarrow x = -3 \text{ or } x = -4$$

#### [Reasoning]

Solve  $x^2 - 7x + 12 = 0$  by factorising.

$$(x - 3)(x - 4) = 0 \Rightarrow x = 3 \text{ or } x = 4$$

#### [Problem Solving]

Solve  $x^2 = 16$ .

$$x = \pm 4$$

#### [Fluency]

1. Solve by factorising:  $x^2 + 5x + 6 = 0$

(2 marks)

#### [Fluency]

2. Solve by factorising:  $x^2 - 7x + 12 = 0$

(2 marks)

#### [Fluency]

3. Solve by factorising:  $x^2 - x - 6 = 0$

(2 marks)

#### [Fluency]

4. Solve:  $x^2 = 25$

(2 marks)

#### [Fluency]

5.

Solve by factorising:  $x^2 + 3x = 0$

Hint: take out a common factor first.

(2 marks)



**[Reasoning]****6.**

A rectangle has area  $24 \text{ cm}^2$ . Its length is  $(x + 2)$  cm and width is  $x$  cm.  
Form and solve a quadratic equation to find  $x$ .

**(4 marks)****[Reasoning]****7.**

Solve by factorising:  $x^2 - 9 = 0$

**(2 marks)****[Reasoning]****8.**

The product of two consecutive even numbers is 48.  
Let the smaller number be  $n$ .  
Form and solve a quadratic equation to find  $n$ .

**(4 marks)****[Problem Solving]****9.**

Solve:  $2x^2 + 6x = 0$   
Show all your working.

**(3 marks)****[Problem Solving]****10.**

A right-angled triangle has legs  $x$  cm and  $(x + 3)$  cm.  
Its hypotenuse is  $(x + 6)$  cm.  
Form and solve an equation to find  $x$ .

**(4 marks)**



## Section B — Higher

### Worked Examples

#### [Fluency]

Solve  $2x^2 + 5x - 3 = 0$  using the quadratic formula.

$$x = \frac{-5 \pm \sqrt{25 + 24}}{4} = \frac{-5 \pm 7}{4}$$

$$x = \frac{1}{2} \text{ or } x = -3$$

#### [Reasoning]

Complete the square:  $x^2 + 6x + 7$

$$(x + 3)^2 - 9 + 7 = (x + 3)^2 - 2$$

Minimum value =  $-2$  at  $x = -3$

#### [Problem Solving]

Complete the square:  $2x^2 + 8x + 3$

$$2(x^2 + 4x) + 3 = 2(x + 2)^2 - 8 + 3 = 2(x + 2)^2 - 5$$

#### [Fluency]

1.

Solve using the quadratic formula:  $2x^2 + 5x - 3 = 0$

(3 marks)

#### [Fluency]

2.

Solve using the quadratic formula:  $3x^2 - 2x - 1 = 0$

(3 marks)

#### [Fluency]

3.

Complete the square:  $x^2 + 6x + 7$

Hence solve  $x^2 + 6x + 7 = 0$ . Give answers in surd form.

(4 marks)



**[Fluency]**

4.

Complete the square:  $2x^2 + 8x + 3$ Hence find the minimum value and the value of  $x$  at which it occurs.

(5 marks)

**[Reasoning]**

5.

Solve:  $x^2 + 2x + 5 = 0$ 

Show that this equation has no real solutions using the discriminant.

(3 marks)

**[Reasoning]**

6.

Solve:  $3x^2 + 5x - 2 = 0$  by factorising.

(3 marks)

**[Reasoning]**

7.

Find the values of  $k$  for which  $kx^2 + 4x + 1 = 0$  has equal roots.

(4 marks)

**[Problem Solving]**

8.

Solve:  $x^2 - 6x + 2 = 0$ .Give your answers in the form  $p \pm \sqrt{q}$  where  $p$  and  $q$  are integers.

(4 marks)

**[Problem Solving]**

9.

Solve:  $\frac{x+1}{x-2} + \frac{x-3}{x+1} = 3$ 

(6 marks)

**[Problem Solving]**

10.

Use the discriminant to determine the number of real solutions for each:

(a)  $x^2 + 4x + 4 = 0$  (1)

(b)  $2x^2 - 3x + 5 = 0$  (1)

(c)  $x^2 - 5x + 6 = 0$  (1)

(3 marks)

