Quadratic Equations questions and answers

8 questions · Extended · 6 non-calculator · worked answers

Name _____ Date _____ Score _____

- Original questions in the style of the Cambridge 0580 papers, each labelled Core or Extended and calculator or non-calculator. Try every question before you look at the answers.
- Worked answers start after the questions. Questions with marks come from our 0580 practice bank (M method, A accuracy, B independent marks).
- Online, with more practice: igcsemathrevision.com/igcse-frontend/0580/quadratic-equations-questions

Extended: for Papers 2 and 4

1. **Extended · non-calculator · easy**

Solve the equation $x^2 - 9x + 20 = 0$ by factorising.

2. **Extended · non-calculator · medium**

Solve the equation $3x^2 - 7x + 2 = 0$.

3. **Extended · calculator · medium**

Solve $3x^2 - 5x - 4 = 0$. Give your answers correct to 2 decimal places.

4. **Extended · non-calculator · medium**

(a) Express $x^2 + 10x + 16$ as $(x + a)^2 + b$.
(b) Use your answer to solve $x^2 + 10x + 16 = 0$.

5. **Extended · non-calculator · hard**

Solve $x^2 - 4x - 1 = 0$ by completing the square. Give your answers in surd form.

6. **Extended · non-calculator · hard**

Express $3x^2 - 12x + 7$ as $a(x + b)^2 + c$, where a, b and c are integers.

7. **Extended · calculator · hard**

A rectangle is x cm wide and $(x + 3)$ cm long. Its area is 40 cm².
Find the perimeter of the rectangle.

8. **Extended · non-calculator · hard**

The sides of a right-angled triangle are x cm, $(x + 7)$ cm and $(x + 8)$ cm, where $(x + 8)$ cm is the hypotenuse.

Find x.

Answers and worked solutions

Question 1

Answer: $x = 4$ or $x = 5$

1. Two numbers that multiply to 20 and add to -9: -4 and -5.
2. $(x - 4)(x - 5) = 0$

Question 2

Answer: $x = \frac{1}{3}$ or $x = 2$

1. $(3x - 1)(x - 2) = 0$
2. $3x - 1 = 0$ gives $x = \frac{1}{3}$; $x - 2 = 0$ gives $x = 2$.

Question 3

Answer: $x = 2.26$ or $x = -0.59$

1. $a = 3$, $b = -5$, $c = -4$.
2. $x = \frac{5 \pm \sqrt{25 + 48}}{6} = \frac{5 \pm \sqrt{73}}{6}$
3. $x = 2.2573\ldots$ or $x = -0.5906\ldots$

Question 4

Answer: (a) $(x + 5)^2 - 9$ (b) $x = -2$ or $x = -8$

1. (a) Half of 10 is 5: $(x + 5)^2 = x^2 + 10x + 25$, so $x^2 + 10x + 16 = (x + 5)^2 - 9$.
2. (b) $(x + 5)^2 = 9$, so $x + 5 = \pm 3$.

Question 5

Answer: $x = 2 + \sqrt{5}$ or $x = 2 - \sqrt{5}$

1. $x^2 - 4x = (x - 2)^2 - 4$, so $(x - 2)^2 - 5 = 0$.
2. $(x - 2)^2 = 5$, so $x - 2 = \pm\sqrt{5}$.

Question 6

Answer: $3(x - 2)^2 - 5$

1. $3x^2 - 12x + 7 = 3(x^2 - 4x) + 7$
2. $x^2 - 4x = (x - 2)^2 - 4$
3. $3((x - 2)^2 - 4) + 7 = 3(x - 2)^2 - 5$

Question 7

Answer: 26 cm

1. $x(x + 3) = 40$, so $x^2 + 3x - 40 = 0$.
2. $(x + 8)(x - 5) = 0$. A width cannot be negative, so $x = 5$.
3. The rectangle is 5 cm by 8 cm: perimeter $= 26$ cm.

Question 8

Answer: $x = 5$

1. Pythagoras: $x^2 + (x + 7)^2 = (x + 8)^2$.
2. $2x^2 + 14x + 49 = x^2 + 16x + 64$, so $x^2 - 2x - 15 = 0$.
3. $(x - 5)(x + 3) = 0$; a length is positive, so $x = 5$ (sides 5, 12, 13).

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