

Boost Free Lessons - Year 10 Maths

Lesson 5: Solving Quadratics by the Quadratic Formula

Name: _____ Grade: _____ Date: _____

Worked Example 1

Solve $x^2 + 5x + 3 = 0$, correct to 2 decimal places.

1. For any equation $ax^2 + bx + c = 0$, the formula is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.
2. Write down the values first, watching the signs: $a = 1$, $b = 5$, $c = 3$.
3. Work out $b^2 - 4ac = 25 - 12 = 13$, and $\sqrt{13} = 3.6056$.
4. $x = \frac{-5 \pm 3.6056}{2}$, which gives two answers.

$x \approx -0.70$ or $x \approx -4.30$

Worked Example 2

Solve $2x^2 - 7x + 3 = 0$

1. Here $a = 2$, $b = -7$ and $c = 3$. Note that b is negative.
2. $b^2 - 4ac = 49 - 24 = 25$, and $\sqrt{25} = 5$.
3. $x = \frac{7 \pm 5}{4}$.
4. That gives $\frac{12}{4} = 3$ or $\frac{2}{4} = 0.5$. Because 25 was a perfect square, this could also have been factorised.

$x = 3$ or $x = 0.5$

Remember: Write down a , b and c before you substitute, and keep the signs with them. If $b^2 - 4ac$ is a perfect square, the quadratic could have been factorised instead.



Question 1: State the values of a, b and c for each equation.

1. $x^2 + 3x + 2 = 0$

2. $2x^2 - 5x + 1 = 0$

3. $x^2 - 4x - 7 = 0$

4. $3x^2 + x - 2 = 0$

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

6. $x^2 - 9 = 0$

7. $4x^2 + 7x + 3 = 0$

8. $-x^2 + 6x - 5 = 0$



Question 2: Solve using the quadratic formula, correct to 2 decimal places.

1. $x^2 + 4x + 1 = 0$

2. $x^2 - 6x + 4 = 0$

3. $2x^2 + 3x - 1 = 0$

4. $x^2 + x - 5 = 0$

5. $3x^2 - 5x + 1 = 0$

6. $x^2 - 2x - 6 = 0$



Question 3: Answer the following questions.

1. Solve $x^2 - 3x - 4 = 0$ with the formula, then check by factorising.
2. Solve $2x^2 + 5x - 3 = 0$.
3. A rectangle has length $(x + 2)$ and width x , and an area of 20. Find x , correct to 2 decimal places.
4. What does it mean if $b^2 - 4ac$ is negative?
5. Solve $x^2 + 6x + 9 = 0$ and explain what is unusual about the answer.





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Answers: Solving Quadratics by the Quadratic Formula**Question 1**

1. $a = 1, b = 3, c = 2$
2. $a = 2, b = -5, c = 1$
3. $a = 1, b = -4, c = -7$
4. $a = 3, b = 1, c = -2$
5. $a = 5, b = -2, c = 0$
6. $a = 1, b = 0, c = -9$
7. $a = 4, b = 7, c = 3$
8. $a = -1, b = 6, c = -5$

Question 2

1. $x \approx -0.27$ or -3.73
2. $x \approx 5.24$ or 0.76
3. $x \approx 0.28$ or -1.78
4. $x \approx 1.79$ or -2.79
5. $x \approx 1.43$ or 0.23
6. $x \approx 3.65$ or -1.65

Question 3

1. $x = 4$ or $x = -1$, and $(x - 4)(x + 1) = 0$ gives the same answers
2. $x = 0.5$ or $x = -3$
3. $x \approx 3.58$
4. There are no real solutions, because the parabola never crosses the x-axis.
5. $x = -3$ only. $b^2 - 4ac = 0$, so there is one repeated solution.

