

Solving Quadratic Equations

All solutions must be in the simplest radical form i.e. $x = \frac{a \pm b\sqrt{c}}{d}$ where a, b, c and d are integers and c is the lowest possible value.

Level 1 – 2

1. Solve the following:

a) $x^2 = 25$

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

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c) $x^2 - 16 = 0$

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d) $(x + 1)(x - 3) = 0$

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e) $5(x - 2)(x + 4) = 0$

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f) $-(x + 1)(x + 6) = 0$

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Level 3 – 4

2. Solve the following. You must use all three methods once: factorizing, completing the square, quadratic formula.

a) $2x^2 - 3x - 1 = 0$

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b) $x^2 + 8x + 14 = 0$

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c) $3x^2 + 7x + 2 = 0$

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3. Solve $(x + 4)(x + 7) = 4$ without using guess and check.

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Level 5 – 6

4. Determine which of the following have a real solution (you do not have to calculate the solutions but you must justify your answer.).

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

Solution: Yes / No

b) $x^2 + 2x - 4 = 0$

Solution: Yes / No

c) $-x^2 + 3x + 1 = 0$

Solution: Yes / No

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

Solution: Yes / No

5. If $ax^2 + bx + c = 0$ has only one solution, determine the relationship between a , b and c . **Explain your reasoning.**

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6. Solve the equation $2x + 1 = \frac{x + 3}{x - 2}$.

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7. Paul thinks of a number, multiplies it by itself, adds three times the original number and the result is 10. Determine the original number.

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8. A number is 2 greater than its reciprocal. Determine the value(s) of the number.

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Level 7 – 8

9. Solve $3x^4 + 5x^2 - 2 = 0$ by completing the square.

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10. Given that $x = \sqrt{3 + \sqrt{3 + \sqrt{3 + \sqrt{3 + \dots}}}}$ determine the exact (positive) value of x .

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11. Given that $x = \sqrt{x + \sqrt{x + \sqrt{x + \sqrt{x + \dots}}}}$ determine the exact (positive) value of x .

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