

Solving Quadratic Equations (No Calculator)

All solutions to quadratics must be in the simplest radical form

Level 1 – 2

1. Solve the following.

a) $x^2 = 1$

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b) $2x(x + 4) = 0$

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c) $x^2 - 16 = 0$

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

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e) $4(3 - x)(x + 5) = 0$

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f) $x^2 - 2x = 0$

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

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

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c) $4x^2 - 11x - 3 = 0$

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3. Use the discriminant to determine how many solutions the following equations have.

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

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b) $-x^2 + 2x - 5 = 0$

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

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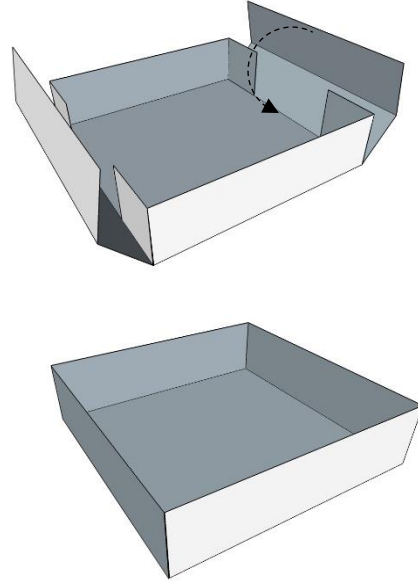
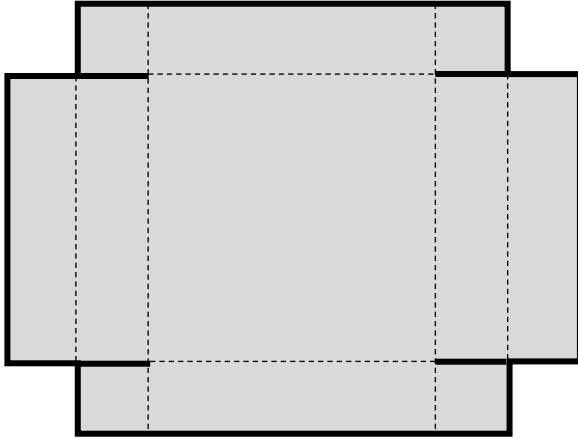
d) $2x^2 + 4x + 1 = 0$

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e) $3x^2 + 2x + 5 = 0$

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4. A sheet of card is cut into a rectangle. Four identical 5 cm by 5 cm squares are then removed from each corner of the rectangle. The sheet is then folded to make a box in the shape of a square prism, as shown in the images below. Each solid line in the image on the left represents a cut.



The volume of the box is 2000 cm^3 . Determine the dimensions of the original rectangular sheet of card.

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5. Solve the equation

$$3 + \frac{2}{x} - 3x = 2$$

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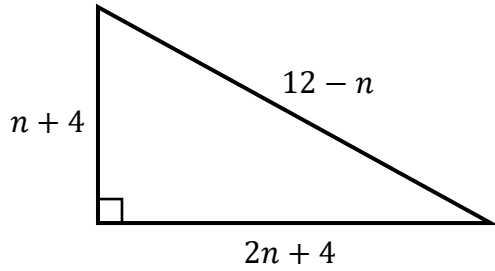
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6. Determine the possible values of n in the following triangle:



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Level 7 – 8

7.) A ball is thrown into the air. Its height h in metres after t seconds is given by the equation

$$h(t) = -5t^2 + 20t + 2$$

a) By writing the equation in the form $h(t) = a(t + b)^2 + c$ determine the maximum height of the ball and the time when this occurs. Explain your answer clearly.

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b) Determine when the ball hits the ground.

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8. The graphs of $y = 2x^2 + kx - 3$ and $y = kx^2 - x + 1$ intersect in two places. Determine the restrictions on the value of k .

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9. Determine all five solutions to the equation $(x^2 - 4)^5(8 - 5x)^4 + (x^2 - 4)^4(8 - 5x)^5 = 0$.

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