FOUNDATION & HIGHER

HIGHER EXTENDS

Name ..... Class .....

A18: Quadratic equations

Reason with solving quadratic equations

20 marks · 25 minutes · Non-calculator

1) Show that $x = 3$ is a solution of $x^2 - 5x + 6 = 0$ and find the other solution.

[Question 1: 2 marks]

2) Kai solves $x^2 = 5x$ by dividing both sides by x to get $x = 5$. Explain what he has missed.

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[Question 2: 2 marks]

3) By completing the square, show that the solutions of $x^2 + 6x + 4 = 0$ are $x = -3 \pm \sqrt{5}$

[Question 3: 3 marks]

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4) Explain why $x^2 + 2x + 5 = 0$ has no real solutions.

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[Question 4: 2 marks]

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5) Explain why $(x - 3)(x + 2) = 0$ means that $x = 3$ or $x = -2$

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[Question 5: 2 marks]

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6) Ben says $(x - 2)(x + 1) = 4$, so $x - 2 = 4$ or $x + 1 = 4$, giving $x = 6$ or $x = 3$. Explain his mistake and solve the equation.

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[Question 6: 3 marks]

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7) A rectangle is x cm wide and $(x + 3)$ cm long. Its area is $40\,\text{cm}^2$. Show that $x = 5$

[Question 7: 3 marks]

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8) Show that the solutions of $2x^2 - 3x - 2 = 0$ are $x = 2$ and $x = -\frac{1}{2}$

[Question 8: 2 marks]

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9) Explain why $x^2 = -9$ has no real solutions.

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[Question 9: 1 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Shown, $x = 2$	$9 - 15 + 6 = 0$ (M1); $(x - 2)(x - 3)$, other solution 2 (C1).
2	$x = 0$	Dividing by x loses $x = 0$ (C1); $x(x - 5) = 0$ (B1).
3	Shown	$(x + 3)^2 - 5 = 0$ (M1); $x + 3 = \pm\sqrt{5}$ (M1); C1.
4	Explanation	$(x + 1)^2 + 4$ is always positive, or $b^2 - 4ac = -16 < 0$ (M1); C1.
5	Explanation	If a product is 0, one factor must be 0 (C2).
6	$x = 3$ or -2	Only works when the product equals 0 (C1); $x^2 - x - 6 = 0$ (M1); 3, -2 (C1).
7	Shown	$x^2 + 3x - 40 = 0$ (M1); $(x + 8)(x - 5)$ (M1); length is positive so $x = 5$ (C1).
8	Shown	$(2x + 1)(x - 2)$ (M1); C1.
9	Explanation	No real number squares to a negative (C1).