GRADE 11 · EQUATIONS AND INEQUALITIES

Solving Quadratic Equations: Factorising, Formula and Completing the Square

MEMORANDUM

Name: ..... Class: .....

Date: .....

MARK ____ / 36

Answer all questions. Show all your working — marks are awarded for method as well as the final answer. **Teacher copy: accept any correct equivalent method.**

1 Solve $x^2 - 7x + 12 = 0$. *(factorise)* (2)

$(x-3)(x-4)=0 \rightarrow x = 3$ **or** 4 ✓✓ (2)

2 Solve $x^2 + 2x - 8 = 0$. *(factorise)* (2)

$(x+4)(x-2)=0 \rightarrow x = -4$ **or** 2 ✓✓ (2)

3 Solve $x^2 - 9x = 0$. *(common factor)* (2)

$x(x-9)=0 \rightarrow x = 0$ **or** 9 ✓✓ (2)

4 Solve $x^2 - 16 = 0$. *(difference of squares)* (2)

$(x-4)(x+4)=0 \rightarrow x = \pm 4$ ✓✓ (2)

5 Solve $x^2 + 4x + 1 = 0$ (formula, 2 decimal places). *(formula)* (3)

$x = \frac{-4 \pm \sqrt{12}}{2} \approx -0{,}27$ **or** $-3{,}73$ ✓✓✓ (3)

6 Solve $2x^2 - 5x + 1 = 0$ (formula, 2 decimal places). *(formula)* (3)

$x = \frac{5 \pm \sqrt{17}}{4} \approx 2{,}28$ **or** $0{,}22$ ✓✓✓ (3)

7 Solve $x^2 + 8x - 9 = 0$ by **completing the square**. *(complete the square)* (3)

$x^2 + 8x = 9$; half of 8 is 4 and $4^2 = 16$, so $x^2 + 8x + 16 = 9 + 16 = 25$; $(x+4)^2 = 25$; $x + 4 = \pm 5 \rightarrow \boldsymbol{x = 1}$ **or** $\boldsymbol{x = -9}$ ✓✓✓ (3)

8 Solve $3x^2 - 12x + 5 = 0$ by completing the square, correct to TWO decimal places. *(complete the square)* (4)

> $\div 3$: $x^2 - 4x + \frac{5}{3} = 0 \rightarrow x^2 - 4x = -\frac{5}{3}$; add 4: $(x-2)^2 = \frac{7}{3}$; $x - 2 = \pm 1{,}5275 \rightarrow$ **$x \approx 3{,}53$ or $x \approx 0{,}47$** ✓✓✓✓ (4)

9 Write $x^2 - 10x + 3$ in the form $(x + p)^2 + q$. *(complete the square)* (2)

> Half of -10 is -5 and $(-5)^2 = 25$, so $x^2 - 10x + 3 = (x-5)^2 - 25 + 3 =$ **$(x-5)^2 - 22$** ✓✓ (2)

10 Solve $x^2 = 2x + 15$. *(rearrange)* (3)

> $x^2 - 2x - 15 = 0 \rightarrow (x-5)(x+3) = 0 \rightarrow x =$ **5 or −3** ✓✓✓ (3)

11 Solve $2x^2 + 7x + 3 = 0$. *(leading coeff)* (3)

> $(2x+1)(x+3) = 0 \rightarrow x =$ **$-\frac{1}{2}$ or −3** ✓✓✓ (3)

12 Solve $x + \frac{5}{x} = 6$. *(fraction)* (4)

> $x^2 - 6x + 5 = 0 \rightarrow (x-1)(x-5) = 0 \rightarrow x =$ **1 or 5** ✓✓✓✓ (4)

13 Solve $(x-2)(x+1) = 4$. *(expand first)* (3)

> $x^2 - x - 2 = 4 \rightarrow x^2 - x - 6 = 0 \rightarrow (x-3)(x+2) = 0 \rightarrow x =$ **3 or −2** ✓✓✓ (3)

TOTAL: 36 marks

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