QT Factorise Harder Quadratics

1. Factorise $2a^2 + 7a + 6$ (2 marks)

$+12$

$1 \quad 1$

$+4 \quad +3$

$2a^2 + 4a + 3a + 6$

$2a(a+2) + 3(a+2)$

$(a+2)(2a+3)$

2. Factorise $2d^2 + 3d - 9$ (2 marks)

-18

$1 \quad 1$

$+6 \quad -3$

$2d^2 + 6d - 3d - 9$

$2d(d+3) - 3(d+3)$

$(d+3)(2d-3)$

3. Solve $2t^2 + 18t + 28 = 0$ (2 marks)

56

$14 \quad 4$

$2t^2 + 14t + 4t + 28 = 0$

$2t(t+7) + 4(t+7) = 0$

$(t+7)(2t+4) = 0$

$\therefore t+7 = 0$

$t = -7$

$2t + 4 = 0$

$2t = -4$

$t = -2$

4. Factorise $2x^2 + 18x + 36$ (2 marks)

$+72$

$1 \quad 1$

$+6 \quad +12$

$2x^2 + 6x + 12x + 36$

$2x(x+3) + 12(x+3)$

$(x+3)(2x+12)$

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5. Factorise $3x^2 - 8x - 3$ (2 marks)

$3x^2 - 9x + 1x - 3$

$3x(x-3) + 1(x-3)$

$(x-3)(3x+1)$

-9

$-9 \quad +1$

6. Solve $3d^2 + 39d + 120 = 0$ (2 marks)

$3a^2 + 15a + 24a + 120 = 0$

$3a(a+5) + 24(a+5) = 0$

$(a+5)(3a+24) = 0$

$+360$

$+15 \quad +24$

$\therefore a + 5 = 0$

$a = -5$

$3a + 24 = 0$

$3a = -24$

$a = -8$

7. Factorise $5p^2 - 36p + 7$ (2 marks)

$5p^2 - 35p - 1p + 7$

$5p(p-7) - 1(p-7)$

$(p-7)(5p-1)$

$+35$

$-35 \quad -1$

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8. Factorise $5w^2 - 11w + 6$ (2 marks)

$5w^2 - 5w - 6w + 6$

$5w(w-1) - 6(w-1)$

$(w-1)(5w-6)$

$+30$

$-5 \quad -6$

9. Solve $7x^2 + 66x + 80 = 0$ (3 marks)

$7x^2 + 56x + 10x + 80 = 0$

$7x(x+8) + 10(x+8) = 0$

$(x+8)(7x+10) = 0$

$+560$

$+10 \quad +56$

$\therefore x + 8 = 0$

$x = -8$

$7x + 10 = 0$

$7x = -10$

$x = \frac{-10}{7}$

10. Solve $15e^2 - 22e + 8 = 0$ (3 marks)

$15e^2 - 12e - 10e + 8 = 0$

$3e(5e-4) - 2(5e-4) = 0$

$(5e-4)(3e-2) = 0$

120

$-12 \quad -10$

$\therefore 5e - 4 = 0$

$5e = 4$

$e = \frac{4}{5}$

$3e - 2 = 0$

$3e = 2$

$e = \frac{2}{3}$

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11. Factorise fully $2x^2 - 128$ (3 marks)

$2(x^2 - 64)$

$2(x+8)(x-8)$

12. Factorise fully $5x^2 - 125$ (3 marks)

$5(x^2 - 25)$

$5(x+5)(x-5)$

13. Factorise $p^2 + 2pq + q^2$ (3 marks)

$p^2 + 2p + 1$

$(p+1)(p+1) \rightarrow (p+1q)(p+1q)$

$\rightarrow (p+q)(p+q)$

14. Factorise $2a^2 - 18ab + 28b^2$ (3 marks)

$2a - 18a + 28$

56

$-14 \quad -4$

$2a^2 - 14a - 4a + 28$

$2a(a-7) - 4(a-7)$

$(a-7)(2a-4) \rightarrow (a-7b)(2a-4b)$