

QT Factorise Harder Quadratics



1. Factorise $2a^2 + 7a + 6$

$$\begin{array}{l}
 2a^2 + 4a + 3a + 6 \\
 2a(a+2) + 3(a+2) \\
 \underline{(a+2)(2a+3)}
 \end{array}$$

(2 marks)

2. Factorise $2d^2 + 3d - 9$

$$\begin{array}{l}
 2d^2 + 6d - 3d - 9 \\
 2d(d+3) - 3(d+3) \\
 \underline{(d+3)(2d-3)}
 \end{array}$$

(2 marks)

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

$$\begin{array}{l}
 2t^2 + 14t + 4t + 28 = 0 \\
 2t(t+7) + 4(t+7) = 0 \\
 (t+7)(2t+4) = 0 \\
 \therefore t+7 = 0 \\
 \underline{\underline{t = -7}}
 \end{array}$$

(2 marks)

$$\begin{array}{l}
 2t+4 = 0 \\
 2t = -4 \\
 \underline{\underline{t = -2}}
 \end{array}$$

4. Factorise $2x^2 + 18x + 36$

$$\begin{array}{l}
 2x^2 + 6x + 12x + 36 \\
 2x(x+3) + 12(x+3) \\
 \underline{\underline{(x+3)(2x+12)}}
 \end{array}$$

(2 marks)

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5. Factorise $3x^2 - 8x - 3$

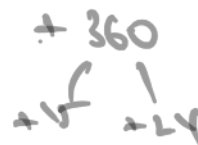
$$\begin{aligned}
 &3x^2 - 9x + 1x - 3 \\
 &3x(x-3) + 1(x-3) \\
 &(x-3)(3x+1)
 \end{aligned}$$



(2 marks)

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

$$\begin{aligned}
 &3d^2 + 15d + 24d + 120 = 0 \\
 &3d(d+5) + 24(d+5) = 0 \\
 &(d+5)(3d+24) = 0
 \end{aligned}$$



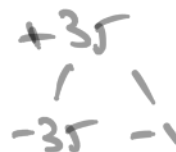
(2 marks)

$$\begin{aligned}
 &\therefore d+5=0 \\
 &\underline{\underline{d = -5}}
 \end{aligned}$$

$$\begin{aligned}
 &3d+24=0 \\
 &3d = -24 \\
 &\underline{\underline{d = -8}}
 \end{aligned}$$

7. Factorise $5p^2 - 36p + 7$

$$\begin{aligned}
 &5p^2 - 35p - 1p + 7 \\
 &5p(p-7) - 1(p-7) \\
 &\underline{\underline{(p-7)(5p-1)}}
 \end{aligned}$$



(2 marks)

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

(2 marks)

$$\begin{aligned}
 &5w^2 - 5w - 6w + 6 \\
 &5w(w-1) - 6(w-1) \\
 &(w-1)(5w-6)
 \end{aligned}$$

$\begin{array}{r} +30 \\ -5 \quad -6 \end{array}$

9. Solve $7x^2 + 66x + 80 = 0$

(3 marks)

$$\begin{aligned}
 &7x^2 + 56x + 10x + 80 = 0 \\
 &7x(x+8) + 10(x+8) = 0 \\
 &(x+8)(7x+10) = 0 \\
 &\therefore x+8=0 \\
 &\underline{\underline{x = -8}}
 \end{aligned}$$

$\begin{array}{r} +560 \\ +10 \quad +56 \end{array}$

$$\begin{aligned}
 &7x+10=0 \\
 &7x=-10 \\
 &\underline{\underline{x = -\frac{10}{7}}}
 \end{aligned}$$

10. Solve $15e^2 - 22e + 8 = 0$

(3 marks)

$$\begin{aligned}
 &15e^2 - 12e - 10e + 8 = 0 \\
 &3e(5e-4) - 2(5e-4) = 0 \\
 &(5e-4)(3e-2) = 0 \\
 &\therefore 5e-4=0 \\
 &5e=4 \\
 &\underline{\underline{e = \frac{4}{5}}}
 \end{aligned}$$

$\begin{array}{r} -12 \\ -10 \end{array}$

$$\begin{aligned}
 &3e-2=0 \\
 &3e=2 \\
 &\underline{\underline{e = \frac{2}{3}}}
 \end{aligned}$$

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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)

$$p^2 + 2pq + q^2$$
$$(p + 1)q + 1) \rightarrow (p + 1q)(p + 1q)$$
$$\rightarrow \underline{\underline{(p + q)(p + q)}}$$

14. Factorise $2a^2 - 18ab + 28b^2$

(3 marks)

$$2a^2 - 18ab + 28b^2$$
$$2a^2 - 14ab - 4ab + 28b^2$$
$$2a(a - 7) - 4b(a - 7)$$
$$(a - 7)(2a - 4) \rightarrow \underline{\underline{(a - 7b)(2a - 4b)}}$$

$\begin{array}{c} \sqrt{6} \\ \swarrow \quad \searrow \\ -4 \quad -4 \end{array}$