

Solving Quadratic Equations By Factorising

Ex1 $x^2 + 7x + 6 = 0$
 $(x+1)(x+6) = 0$

+1 +6 ✓
-1 -6
+2 +3
-2 -3

Either $x+1=0$ or $x+6=0$
 $x = -1$ $x = -6$

Ex2 $x^2 - 5x - 24 = 0$
 $(x+3)(x-8) = 0$

+1 -24
-1 +24
+2 -12
-2 +12
+3 -8 ✓

Either $x+3=0$ or $x-8=0$
 $x = -3$ $x = 8$

Exercise Solve

1) $x^2 - 3x - 4 = 0$
 $(x+1)(x-4) = 0$

Either $x+1=0$ or $x-4=0$
 $x = -1$ $x = 4$

2) $x^2 - 9x + 14 = 0$
 $(x-2)(x-7) = 0$

Either $x-2=0$ or $x-7=0$
 $x = 2$ $x = 7$

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

$$(x+1)(x-2) = 0$$

Either $x+1=0$ or $x-2=0$

$$\underline{x = -1}$$

$$\underline{x = 2}$$

Difference of Two Squares

$$a^2 - b^2 = (a+b)(a-b)$$

Solve $x^2 - 16 = 0$

$$x^2 - 4^2 = 0$$

$$(x+4)(x-4) = 0$$

Either $x+4=0$ or $x-4=0$

$$\underline{x = -4}$$

$$\underline{x = 4}$$

Exercise Solve

1) $x^2 - 1 = 0$

$$x^2 - 1^2 = 0$$

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

Either $x+1=0$ or $x-1=0$

$$\underline{x = -1}$$

$$\underline{x = 1}$$

2) $x^2 - 49 = 0$

$$x^2 - 7^2 = 0$$

$$(x+7)(x-7)=0$$

Either $x+7=0$ or $x-7=0$
 $x=-7$ $x=7$

Higher Tier Questions

Factorising quadratic expressions with multiple x^2

Ex 1 $2x^2 + 7x + 3$

$2 \times 3 = 6$ $2x^2 + x + 6x + 3$
 $+1 \quad +6 \checkmark$ $= x(2x+1) + 3(2x+1)$
 $-1 \quad -6$
 $+2 \quad +3$
 $-2 \quad -3$
 $= (x+3)(2x+1)$

Ex 2 $3x^2 + 2x - 8$

$3x-8 = -24$ $= 3x^2 - 4x + 6x - 8$
 $+1 \quad -24$
 $-1 \quad +24$ $= x(3x-4) + 2(3x-4)$
 $+2 \quad -12$
 $-2 \quad +12$
 $+3 \quad -8$
 $-3 \quad +8$
 $+4 \quad -6$
 $-4 \quad +6 \checkmark$
 $= (x+2)(3x-4)$

Exercise

$$\begin{aligned} 1) \quad & 5x^2 + 17x + 6 \\ & 5 \times 6 = 30 \\ & \begin{array}{l} +1 \quad +30 \\ +2 \quad +15 \checkmark \end{array} \\ & = 5x^2 + 2x + 15x + 6 \\ & = x(5x + 2) + 3(5x + 2) \\ & = (x + 3)(5x + 2) \end{aligned}$$

$$\begin{aligned} 2) \quad & 4x^2 - 4x - 15 \\ & 4x - 15 = -60 \\ & \begin{array}{l} +1 \quad -60 \\ -1 \quad +60 \\ +2 \quad -30 \\ -2 \quad +30 \\ +3 \quad -20 \\ -3 \quad +20 \\ +4 \quad -15 \\ -4 \quad +15 \\ +5 \quad -12 \\ -5 \quad +12 \\ +6 \quad -10 \checkmark \\ -6 \quad +10 \end{array} \\ & = 4x^2 + 6x - 10x - 15 \\ & = 2x(2x + 3) - 5(2x + 3) \\ & = (2x - 5)(2x + 3) \end{aligned}$$

$$\begin{aligned} 3) \quad & \text{Solve } 7x^2 - x - 8 = 0 \\ & 7x - 8 = -56 \\ & \begin{array}{l} -7 \quad +8 \\ +7 \quad -8 \checkmark \end{array} \\ & 7x^2 + 7x - 8x - 8 = 0 \\ & 7x(x + 1) - 8(x + 1) = 0 \\ & (7x - 8)(x + 1) = 0 \\ & \text{Either } 7x - 8 = 0 \quad \text{or } x + 1 = 0 \\ & \quad 7x = 8 \quad \quad \quad x = -1 \\ & \quad \underline{x = \frac{8}{7}} \quad \quad \quad \underline{\quad} \end{aligned}$$

4) Solve $6x^2 - 17x + 5 = 0$

$6 \times 5 = 30$

$-2 \quad -15 \checkmark$

$6x^2 - 2x - 15x + 5 = 0$

$2x(3x - 1) - 5(3x - 1) = 0$

$(2x - 5)(3x - 1) = 0$

Entweder $2x - 5 = 0$ or $3x - 1 = 0$

$2x = 5$

$x = \frac{5}{2}$

$3x = 1$

$x = \frac{1}{3}$

5)

$3x^2 + 13x - 100 = 0$

$3x - 100 = -300$

$+10 \quad -30$

$-10 \quad +30$

$+15 \quad -20$

$-15 \quad +20$

$+12 \quad -25$

$-12 \quad +25$

$3x^2 - 12x + 25x - 100 = 0$

$3x(x - 4) + 25(x - 4) = 0$

$(3x + 25)(x - 4) = 0$

Entweder $3x + 25 = 0$ or $x - 4 = 0$

$3x = -25$

$x = -\frac{25}{3}$

$x = 4$