Factorising

Examples

$$6x + 3 = 3(2x+1)$$

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

$$10p^3q^2r^5 - 15p^4q^3r^3 + 20p^3q^3r^3$$

$$= 5p^3q^2r^3(2r^2 - 3pq + 4q)$$

Basic Quadratics

Exs

$$x^2 + 5x + 6$$
$$= (x+2)(x+3)$$

+1	+6
−1	−6
+2	+3 ✓
−2	−3

$$x^2 - 7x + 12$$
$$= (x-3)(x-4)$$

+1	+12
−1	−12
+2	+6
−2	−6
+3	+4
−3	−4 ✓

$$x^2 - x - 6$$
$$= (x+2)(x-3)$$

+1	−6
−1	+6
+2	−3 ✓
−2	+3

$$x^2 + 3x - 10$$
$$= (x-2)(x+5)$$

+1	−10
−1	+10
+2	−5
−2	+5 ✓

Exercise

1) $x^2 + 11x + 24 = (x+3)(x+8)$

2) $x^2 - 15x + 14 = (x-1)(x-14)$

3) $x^2 + x - 30 = (x-5)(x+6)$

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

Harder Quadratics

Ex 1 $\quad 2x^2 + 11x + 15$

$2 \times 15 = 30$

$+5 \quad +6$

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

$= x(2x+5) + 3(2x+5)$

$= (x+3)(2x+5)$

Ex 2 $\quad 3x^2 + 13x - 10 = 0$

$3 \times -10 = -30$

$-2 \quad +15$

$3x^2 - 2x + 15x - 10$

$x(3x-2) + 5(3x-2)$

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

Either $x + 5 = 0$, $x = -5$ or $3x - 2 = 0$, $3x = 2$

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

Difference of Two Squares

Consider $(a+b)(a-b)$

$$= a^2 + \cancel{ab} - \cancel{ab} - b^2$$

$$= a^2 - b^2$$

$\therefore$ Factorising gives

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

Examples

1) $4x^2 - 9y^2$

$$= (2x)^2 - (3y)^2$$

$$= (2x+3y)(2x-3y)$$

2) $16x^2 - 9$ $= 0$

$$= (4x)^2 - 3^2$$

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

Exercise Factorise

1) $x^2 - 25$ $= (x+5)(x-5)$

2) $25x^2 - 36$

$= (5x)^2 - 6^2 \quad = (5x+6)(5x-6)$

3) $81x^2 - 100y^2$

$= (9x)^2 - (10y)^2 \quad = (9x+10y)(9x-10y)$