

The Factorisation Formula

$$T_1 \pm T_2 \pm \dots \pm T_n = \text{HCF} \left(\frac{T_1}{\text{HCF}} \pm \frac{T_2}{\text{HCF}} \pm \dots \pm \frac{T_n}{\text{HCF}} \right)$$

where T_1, T_2, \dots, T_n are the terms of an algebraic expression and **HCF** is the highest common factor.

Examples

Factorise the following algebraic expressions:

1. $6x + 8$
2. $10ab - 4a$
3. $5xy^2 - 10xy + 15x$

Solutions

For each question we find the HCF and the terms T_1, T_2, \dots, T_n and apply the Factorisation Formula.

1. HCF = 2, $T_1 = 6x$ and $T_2 = 8$

$$6x + 8 = 2 \left(\frac{6x}{2} + \frac{8}{2} \right) = 2(3x + 4)$$

We can check the answer by expanding which is opposite factorisation :

$$2(3x + 4) = 2 \times 3x + 2 \times 4 = 6x + 8$$

2. HCF = $2a$, $T_1 = 10ab$ and $T_2 = 4a$

$$10ab - 4a = 2a \left(\frac{10ab}{2a} - \frac{4a}{2a} \right) = 2a(5b - 2)$$

Check by expanding :

$$2a(5b - 2) = 2a \times 5b - 2a \times 2 = 10ab - 4a$$

3. HCF = $5x$, $T_1 = 5xy^2$, $T_2 = 10xy$ and $T_3 = 15x$

$$5xy^2 - 10xy + 15x = 5x \left(\frac{5xy^2}{5x} - \frac{10xy}{5x} + \frac{15x}{5x} \right) = 5x(y^2 - 2y + 3)$$

Check by expanding :

$$5x(y^2 - 2y + 3) = 5x \times y^2 - 5x \times 2y + 5x \times 3 = 5xy^2 - 10xy + 15x$$