Algebraic Identities:

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

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

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

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

(v) $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

(vi) $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$

(vii) $(a-b)^3 = a^3 - b^3 - 3ab(a - b) = a^3 - 3a^2b + 3ab^2 - b^3$

(viii) $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

Examples:

1. Use suitable identity to find $(x + 2)(x - 3)$.

2. Evaluate (102×107) without multiplying directly.

3. Factorise $(a + b + c)^2 = 4a^2 + 16b^2 + 64c^2 + 16ab + 64bc + 32ca$.

4. Write $(x - \frac{2}{3}y)^3$ in expanded form.

5. Factorise $8a^3 + 27b^3 + 64c^3 - 72abc$.

6. If $\frac{a}{b} + \frac{b}{a} = 1$ (a, b are non-zero), the value of $a^3 - b^3$. (Ans: 0)