

CBSE Class –VIII Mathematics

NCERT Solutions

CHAPTER - 9

Algebraic Expressions and Identities (Ex. 9.4)

1. Multiply the binomials:

(i) $(2x+5)$ and $(4x-3)$

(ii) $(y-8)$ and $(3y-4)$

(iii) $(2.5l-0.5m)$ and $(2.5l+0.5m)$

(iv) $(a+3b)$ and $(x+5)$

(v) $(2pq+3q^2)$ and $(3pq-2q^2)$

(vi) $\left(\frac{3}{4}a^2+3b^2\right)$ and $4\left(a^2-\frac{2}{3}b^2\right)$

Ans.

(i) $(2x+5) \times (4x-3)$

$$= 2x(4x-3) + 5(4x-3)$$

$$= 2x \times 4x - 2x \times 3 + 5 \times 4x - 5 \times 3$$

$$= 8x^2 - 6x + 20x - 15$$

$$= 8x^2 + 14x - 15$$

(ii) $(y-8) \times (3y-4) = y(3y-4) - 8(3y-4)$

$$= y \times 3y - y \times 4 - 8 \times 3y - 8 \times -4$$

$$= 3y^2 - 4y - 24y + 32$$

$$= 3y^2 - 28y + 32$$

$$(iii) (2.5l - 0.5m) \times (2.5l + 0.5m)$$

$$= 2.5l \times (2.5l + 0.5m) - 0.5m \times (2.5l + 0.5m)$$

$$= 2.5l \times 2.5l + 2.5l \times 0.5m - 0.5m \times 2.5l - 0.5m \times 0.5m$$

$$= 6.25l^2 + 1.25lm - 1.25lm - 0.25m^2$$

$$= 6.25l^2 - 0.25m^2$$

$$(iv) (a + 3b) \times (x + 5) = a(x + 5) + 3b(x + 5)$$

$$= a \times x + a \times 5 + 3b \times x + 3b \times 5$$

$$= ax + 5a + 3bx + 15b$$

$$(v) (2pq + 3q^2)(3pq - 2q^2)$$

$$= 2pq \times (3pq - 2q^2) + 3q^2(3pq - 2q^2)$$

$$= 2pq \times 3pq - 2pq \times 2q^2 + 3q^2 \times 3pq - 3q^2 \times 2q^2$$

$$= 6p^2q^2 - 4pq^3 + 9pq^3 - 6q^4$$

$$= 6p^2q^2 + 5pq^3 - 6q^4$$

$$(vi) \left(\frac{3}{4}a^2 + 3b^2\right) \times 4\left(a^2 - \frac{2}{3}b^2\right)$$

$$= \left(\frac{3}{4}a^2 + 3b^2\right) \times \left(4a^2 - \frac{8}{3}b^2\right)$$

$$= \frac{3}{4}a^2 \times \left(4a^2 - \frac{8}{3}b^2\right) + 3b^2 \times \left(4a^2 - \frac{8}{3}b^2\right)$$

$$\begin{aligned}&= \frac{3}{4}a^2 \times 4a^2 - \frac{3}{4}a^2 \times \frac{8}{3}b^2 + 3b^2 \times 4a^2 - 3b^2 \times \frac{8}{3}b^2 \\&= 3a^4 - 2a^2b^2 + 12a^2b^2 - 8b^4 \\&= 3a^4 + 10a^2b^2 - 8b^4\end{aligned}$$

2. Find the product:

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

(ii) $(x + 7y)(7x - y)$

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

(iv) $(p^2 - q^2)(2p + q)$

Ans. (i) $(5 - 2x)(3 + x)$

$$= 5 \times (3 + x) - 2x(3 + x)$$

$$= 5 \times 3 + 5 \times x - 2x \times 3 - 2x \times x$$

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

(ii) $(x + 7y)(7x - y)$

$$= x(7x - y) + 7y \times (7x - y)$$

$$= x \times 7x - x \times y + 7y \times 7x - 7y \times y$$

$$= 7x^2 - xy + 49xy - 7y^2$$

$$= 7x^2 + 48xy - 7y^2$$

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

$$= a^2 \times (a + b^2) + b \times (a + b^2)$$

$$= a^2 \times a + a^2 \times b^2 + b \times a + b \times b^2$$

$$= a^3 + a^2b^2 + ab + b^3$$

$$\text{(iv)} \quad (p^2 - q^2)(2p + q)$$

$$= p^2 \times (2p + q) - q^2 (2p + q)$$

$$= p^2 \times 2p + p^2 \times q - q^2 \times 2p - q^2 \times q$$

$$= 2p^3 + p^2q - 2pq^2 - q^3$$

3. Simplify:

$$\text{(i)} \quad (x^2 - 5)(x + 5) + 25$$

$$\text{(ii)} \quad (a^2 + 5)(b^2 + 3) + 5$$

$$\text{(iii)} \quad (t + s^2)(t^2 - s)$$

$$\text{(iv)} \quad (a + b)(c - d) + (a - b)(c + d) + 2(ac + bd)$$

$$\text{(v)} \quad (x + y)(2x + y) + (x + 2y)(x - y)$$

$$\text{(vi)} \quad (x + y)(x^2 - xy + y^2)$$

$$\text{(vii)} \quad (1.5x - 4y)(1.5x + 4y + 3) - 4.5x + 12y$$

$$\text{(viii)} \quad (a + b + c)(a + b - c)$$

$$\text{Ans. (i)} \quad (x^2 - 5)(x + 5) + 25$$

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

$$= x^2 \times x + x^2 \times 5 - 5 \times x - 5 \times 5 + 25$$

$$= x^3 + 5x^2 - 5x - 25 + 25$$

$$= x^3 + 5x^2 - 5x$$

$$(ii) (a^2 + 5)(b^3 + 3) + 5$$

$$= a^2(b^3 + 3) + 5(b^3 + 3) + 5$$

$$= a^2 \times b^3 + a^2 \times 3 + 5 \times b^3 + 5 \times 3 + 5$$

$$= a^2b^3 + 3a^2 + 5b^3 + 15 + 5$$

$$= a^2b^3 + 3a^2 + 5b^3 + 20$$

$$(iii) (t + s^2)(t^2 - s) = t(t^2 - s) + s^2(t^2 - s)$$

$$= t \times t^2 - t \times s + s^2 \times t^2 - s^2 \times s$$

$$= t^3 - st + s^2t^2 - s^3$$

$$(iv) (a + b)(c - d) + (a - b)(c + d) + 2(ac + bd)$$

$$= a(c - d) + b(c - d) + a(c + d) - b(c + d) + 2ac + 2bd$$

$$= ac - ad + bc - bd + ac + ad - bc - bd + 2ac + 2bd$$

$$= ac + ac - ad + ad + bc - bc - bd - bd + 2ac + 2bd$$

$$= 2ac - 2bd + 2ac + 2bd$$

$$= 4ac$$

$$(v) (x + y)(2x + y) + (x + 2y)(x - y)$$

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

$$= 2x^2 + xy + 2xy + y^2 + x^2 - xy + 2xy - 2y^2$$

$$= 2x^2 + x^2 + xy + 2xy - xy + 2xy + y^2 - 2y^2$$

$$= 3x^2 + 4xy - y^2$$

$$\text{(vi)} (x+y)(x^2-xy+y^2)$$

$$= x(x^2-xy+y^2) + y(x^2-xy+y^2)$$

$$= x^3 - x^2y + xy^2 + x^2y - xy^2 + y^3$$

$$= x^3 - x^2y + x^2y + xy^2 - xy^2 + y^3$$

$$= x^3 + y^3$$

$$\text{(vii)} (1.5x-4y)(1.5x+4y+3) - 4.5x+12y$$

$$= 1.5x(1.5x+4y+3) - 4y(1.5x+4y+3) - 4.5x+12y$$

$$= 2.25x^2 + 6.0xy + 4.5x - 6.0xy - 16y^2 - 12y - 4.5x + 12y$$

$$= 2.25x^2 + 6.0xy - 6.0xy + 4.5x - 4.5x - 16y^2 - 12y + 12y$$

$$= 2.25x^2 - 16y^2$$

$$\text{(viii)} (a+b+c)(a+b-c)$$

$$= a(a+b-c) + b(a+b-c) + c(a+b-c)$$

$$= a^2 + ab - ac + ab + b^2 - bc + ac + bc - c^2$$

$$= a^2 + ab + ab - ac + ac - bc + bc + b^2 - c^2$$

$$= a^2 + b^2 - c^2 + 2ab$$