



SpeedLabs

MATHS

CBSE 8th

TEEVRA EDUTECH PVT. LTD.

Algebraic Expressions and Identities

Exercise 9.4

Q.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 $4\left(a^2 - \frac{2}{3}b^2\right)$

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

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

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

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

$$= 8x^2 + 14x - 15 \quad (\because 6x \text{ and } 20x \text{ are like terms})$$

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

$$= y(3y - 4) - 8(3y - 4)$$

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

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

$$= 3y^2 - 28y + 32 \quad (\because -4y \text{ and } -24y \text{ are like terms})$$

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

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

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

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

$$= 6.25l^2 - 0.25m^2 \quad (\because 1.25lm \text{ and } -1.25lm \text{ are like terms})$$

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

$$= a(x + 5) + 3bx + 5)$$

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

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

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

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

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

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

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

(\because - $4pq^3$ and $9pq^3$ are like terms with opposite signs)

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

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

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

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

$$= 3a^4 - 2a^2b^2 + 12a^2b^2 - 8b^4$$

$$= 3a^4 + 10a^2b^2 - 8b^4.$$

Q.2 Find the product.

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

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

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

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

Sol: (i) $(5 - 2x)(3 + x) = 5(3 + x) - 2x(3 + x)$

$$= 5 \times 3 + 5 \times x - 2x \times 3 - 2x \times x = 15 + 5x - 6x - 2x^2$$

$$= 15 - x - 2x^2$$

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

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

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

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

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

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

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

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

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

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

Q.3: Simplify.

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

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

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

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

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

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

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

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

Sol: (i) $(x^2 - 5)(x + 5) + 25$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$= a \times c - a \times d + b \times c - b \times d + a \times c + a \times d - b \times c - b \times d + 2ac + 2bd$$

$$= ac - ad + bc - bd + ac + ad - bc - bd + 2ac + 2bd = 4ac$$

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

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

$$= x \times 2x + x \times y + y \times 2x + y \times y + x \times x - x \times y + 2y \times x - 2y \times y$$

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

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

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

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

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

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

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

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

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

$$= 1.5x \times 1.5x + 1.5x \times 4y + 1.5x \times 3 - 4y \times 1.5x - 4y \times 4y$$

$$= 4y \times 3 - 4.5x + 12y$$

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

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

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

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

$$= a \times a + a \times b - a \times c + b \times a + b \times b - b \times c + c \times a + c \times b - c \times c$$

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

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

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