

Mathematics

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(Chapter – 9) (Algebraic Expressions and Identities)

(Class – VIII)

Exercise 9.4

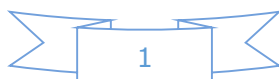
Question 1:

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

Answer 1:

- (i)
$$\begin{aligned}(2x+5) \times (4x-3) &= 2x(4x-3) + 5(4x-3) \\&= 2x \times 4x - 2x \times 3 + 5 \times 4x - 5 \times 3 \\&= 8x^2 - 6x + 20x - 15 \\&= 8x^2 + 14x - 15\end{aligned}$$
- (ii)
$$\begin{aligned}(y-8) \times (3y-4) &= y(3y-4) - 8(3y-4) \\&= y \times 3y - y \times 4 - 8 \times 3y - 8 \times -4 \\&= 3y^2 - 4y - 24y + 12 \\&= 3y^2 - 28y + 12\end{aligned}$$
- (iii)
$$\begin{aligned}(2.5l-0.5m) \times (2.5l+0.5m) &= 2.5l \times (2.5l+0.5m) - 0.5m \times (2.5l+0.5m) \\&= 2.5l \times 2.5l + 0.5l \times 0.5m - 0.5m \times 2.5l - 0.5m \times 0.5m \\&= 6.25l^2 + 1.25lm - 1.25lm - 0.25m^2 \\&= 6.25l^2 - 0.25m^2\end{aligned}$$
- (iv)
$$\begin{aligned}(a+3b) \times (x+5) &= a(x+5) + 3b(x+5) \\&= a \times x + a \times 5 + 3b \times x + 3b \times 5 \\&= ax + 5a + 3bx + 15b\end{aligned}$$
- (v)
$$\begin{aligned}(2pq+3q^2)(3pq-2q^2) &= 2pq \times (3pq-2q^2) + 3q^2(3pq-2q^2) \\&= 2pq \times 3pq - 2pq \times 2q^2 + 3q^2 \times 3pq - 3q^2 \times 2q^2 \\&= 6p^2q^2 - 4pq^3 + 9pq^3 - 6q^4 \\&= 6p^2q^2 + 5pq^3 - 6q^4\end{aligned}$$



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$$\begin{aligned} \text{(vi)} \quad \left(\frac{3}{4}a^2 + 3b^2\right) \times 4\left(a^2 - \frac{2}{3}b^2\right) &= \left(\frac{3}{4}a^2 + 3b^2\right) \times \left(4a^2 - \frac{8}{3}b^2\right) \\ &= \frac{3}{4}a^2 \times \left(4a^2 - \frac{8}{3}b^2\right) + 3b^2 \times \left(4a^2 - \frac{8}{3}b^2\right) \\ &= \frac{3}{4}a^2 \times 4a^2 - \frac{3}{4}a^2 \times \frac{8}{3}b^2 + 3b^2 \times 4a^2 - 3b^2 \times \frac{8}{3}b^2 \\ &= 3a^4 - 2a^2b^2 + 12a^2b^2 - 8b^4 \\ &= 3a^4 + 10a^2b^2 - 8b^4 \end{aligned}$$

Question 2:

Find the product:

$$\text{(i)} \quad (5 - 2x)(3 + x)$$

$$\text{(ii)} \quad (x + 7y)(7x - y)$$

$$\text{(iii)} \quad (a^2 + b)(a + b^2)$$

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

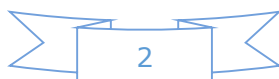
Answer 2:

$$\begin{aligned} \text{(i)} \quad (5 - 2x)(3 + x) &= 5 \times (3 + x) - 2x(3 + x) = 5 \times 3 + 5 \times x - 2x \times 3 - 2x \times x \\ &= 15 + 5x - 6x - 2x^2 = 15 - x - 2x^2 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad (x + 7y)(7x - y) &= x(7x - y) + 7y \times (7x - y) \\ &= x \times 7x - x \times y + 7y \times 7x - 7y \times y \\ &= 7x^2 - xy + 49xy - 7y^2 \\ &= 7x^2 + 48xy - 7y^2 \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad (a^2 + b)(a + b^2) &= a^2 \times (a + b^2) + b \times (a + b^2) \\ &= a^2 \times a + a^2 \times b^2 + b \times a + b \times b^2 \\ &= a^3 + a^2b^2 + ab + b^3 \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad (p^2 - q^2)(2p + q) &= p^2 \times (2p + q) - q^2(2p + q) \\ &= p^2 \times 2p + p^2 \times q - q^2 \times 2p - q^2 \times q \\ &= 2p^3 + p^2q - 2pq^2 - q^3 \end{aligned}$$



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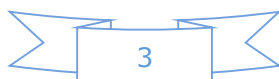
Question 3:

Simplify:

- (i) $(x^2 - 5)(x + 5) + 25$
- (ii) $(a^2 + 5)(b^2 + 3) + 5$
- (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) $(a + b + c)(a + b - c)$

Answer 3:

- (i)
$$\begin{aligned}(x^2 - 5)(x + 5) + 25 &= x^2(x + 5) - 5(x + 5) + 25 \\&= x^2 \times x + x^2 \times 5 - 5 \times x - 5 \times 5 + 25 \\&= x^3 + 5x^2 - 5x - 25 + 25 \\&= x^3 + 5x^2 - 5x\end{aligned}$$
- (ii)
$$\begin{aligned}(a^2 + 5)(b^3 + 3) + 5 &= a^2(b^3 + 3) + 5(b^3 + 3) + 5 \\&= a^2 \times b^3 + a^2 \times 3 + 5 \times b^3 + 5 \times 3 + 5 \\&= a^2b^3 + 3a^2 + 5b^3 + 15 + 5 \\&= a^2b^3 + 3a^2 + 5b^3 + 20\end{aligned}$$
- (iii)
$$\begin{aligned}(t + s^2)(t^2 - s) &= t(t^2 - s) + s^2(t^2 - s) \\&= t \times t^2 - t \times s + s^2 \times t^2 - s^2 \times s \\&= t^3 - st + s^2t^2 - s^3\end{aligned}$$
- (iv)
$$\begin{aligned}(a + b)(c - d) + (a - b)(c + d) + 2(ac + bd) \\&= a(c - d) + b(c - d) + a(c + d) - b(c + d) + 2ac + 2bd \\&= ac - ad + bc - bd + ac + ad - bc - bd + 2ac + 2bd \\&= ac + ac - ad + ad + bc - bc - bd - bd + 2ac + 2bd \\&= 2ac - 2bd + 2ac + 2bd \\&= 4ac\end{aligned}$$



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$$\begin{aligned} \text{(v)} \quad (x+y)(2x+y) + (x+2y)(x-y) &= x(2x+y) + y(2x+y) + x(x-y) + 2y(x-y) \\ &= 2x^2 + xy + 2xy + y^2 + x^2 - xy + 2xy - 2y^2 \\ &= 2x^2 + x^2 + xy + 2xy - xy + 2xy + y^2 - 2y^2 \\ &= 3x^2 + 4xy - y^2 \end{aligned}$$

$$\begin{aligned} \text{(vi)} \quad (x+y)(x^2 - xy + y^2) &= x(x^2 - xy + y^2) + y(x^2 - xy + y^2) \\ &= x^3 - x^2y + xy^2 + x^2y - xy^2 + y^3 \\ &= x^3 - x^2y + x^2y + xy^2 - xy^2 + y^3 \\ &= x^3 + y^3 \end{aligned}$$

$$\begin{aligned} \text{(vii)} \quad (1.5x - 4y)(1.5x + 4y + 3) - 4.5x + 12y \\ &= 1.5x(1.5x + 4y + 3) - 4y(1.5x + 4y + 3) - 4.5x + 12y \\ &= 2.25x^2 + 6.0xy + 4.5x - 6.0xy - 16y^2 - 12y - 4.5x + 12y \\ &= 2.25x^2 + 6.0xy - 6.0xy + 4.5x - 4.5x - 16y^2 - 12y + 12y \\ &= 2.25x^2 - 16y^2 \end{aligned}$$

$$\begin{aligned} \text{(viii)} \quad (a+b+c)(a+b-c) &= a(a+b-c) + b(a+b-c) + c(a+b-c) \\ &= a^2 + ab - ac + ab + b^2 - bc + ac + bc - c^2 \\ &= a^2 + ab + ab - ac + ac - bc + bc + b^2 - c^2 \\ &= a^2 + b^2 - c^2 + 2ab \end{aligned}$$

