

FlexiPrep

NCERT Class 9 Mathematics Solutions: Chapter 9 – Algebraic Expressions and Identities Exercise 9.3 Part 3 (For CBSE, ICSE, IAS, NET, NRA 2022)

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Product of a sum and difference

$$\begin{aligned}(x+3)(x-3) &= x^2 - 3x + 3x - 9 \\ &= x^2 - 9\end{aligned}$$

$$\begin{aligned}(4x+5)(4x-5) &= 16x^2 - 20x + 20x - 25 \\ &= 16x^2 - 25\end{aligned}$$

Pattern: $(a+b)(a-b) = a^2 - b^2$

$$\begin{aligned}(x+7)(x-7) &= x^2 - 7^2 \\ &= x^2 - 49\end{aligned}$$

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Question 4:

(a) Simplify: $3x(4x-5) + 3$ and find values for (i) $x = 3$ (ii) $x = \frac{1}{2}$.

(b) Simplify: $a(a^2 + a + 1) + 5$ and find its value for (i) $a = 0$ (ii) $a = 1$ (iii) $a = -1$

Answer:

(a) $3x(4x - 5) + 3$

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

$$= 12x^2 - 15x + 3$$

(i) For $x = 3$, put the value of $x = 3$

$$= 12x^2 - 15x + 3$$

$$= 12(3)^2 - 15(3) + 3$$

$$= 12 \times 9 - 45 + 3$$

$$= 108 - 48$$

$$= 60$$

(ii) For $x = \frac{1}{2}$ Put the value of $x = \frac{1}{2}$

$$= 12x^2 - 15x + 3$$

$$= 12\left(\frac{1}{2}\right)^2 - 15\left(\frac{1}{2}\right) + 3$$

$$= \frac{12}{4} - \frac{15}{2} + 3$$

$$= 3 - \frac{15}{2} + 3$$

$$= 6 - \frac{15}{2}$$

$$= \frac{12 - 15}{2}$$

$$= -\frac{3}{2}$$

(b) $a(a^2 + a + 1) + 5 = a \times a^2 + a \times a + a \times 1 + 5$

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

(i) For $a = 0$,

$$a^3 + a^2 + a + 5 = (0)^3 + (0)^2 + (0) + 5$$

$$= 0 + 0 + 0 + 5 = 5$$

(ii) For $a = 1$,

$$a^3 + a^2 + a + 5 = (1)^3 + (1)^2 + (1) + 5$$

$$= 1 + 1 + 1 + 5 = 8$$

(iii) For $a = -1$,

$$a^3 + a^2 + a + 5 = (-1)^3 + (-1)^2 + (-1) + 5$$

$$= -1 + 1 - 1 + 5$$

$$= -2 + 6 = 4$$

Question 5:(a) Add: $p(p - q)$, $q(q - r)$ and $r(r - p)$.(b) Add: $2x(z - x - y)$ and $2y(z - y - zx)$.(c) Subtract: $3l(l - 4m + 5n)$ from $4l(10n - 3m + 2l)$.(d) Subtract: $3a(a + b + c) - 2b(a - b + c)$ from $4c(-a + b + c)$ **Answer: 5****(a)** $p(p - q) + q(q - r) + r(r - p)$

$$= p^2 - pq + q^2 - qr + r^2 - rp$$

$$= p^2 + q^2 + r^2 - pq - qr - rp$$

(b) $2x(z - x - y) + 2y(z - y - zx)$

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

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

$$= -2x^2 - 2y^2 - 4xy + 2yz + 2xz$$

(c) $4l(10n - 3m + 2l) - 3l(l - 4m + 5n)$

$$= 40ln - 12lm + 8l^2 - 3l^2 + 12lm - 15ln$$

$$= 8l^2 - 3l^2 - \cancel{12lm} + \cancel{12lm} + 40ln - 15ln$$

$$= 5l^2 + 25ln$$

(d) $4c(-a + b + c) - [3a(a + b + c) - 2b(a - b + c)]$

$$= -4ac + 4bc + 4c^2 - [3a^2 + 3ab + 3ac - 2ab + 2b^2 - 2bc]$$

$$= -4ac + 4bc + 4c^2 - [3a^2 + 2b^2 + 3ab - 2bc + 3ac - 2ab]$$

$$= -4ac + 4bc + 4c^2 - 3a^2 - 2b^2 - ab - 3ac + 2bc$$

$$= -3a^2 - 2b^2 + 4c^2 - ab + 4bc + 2bc - 4ac - 3ac$$

$$= -3a^2 - 2b^2 + 4c^2 - ab + 6bc - 7ac$$