CLASS VIII: Maths
Chapter 8: Algebraic Expressions and Identities

Questions and Solutions | Exercise 8.3 - NCERT Books

Q 1. Carry out the multiplication of the expressions in each of the following pairs.

(i) $4p, q + r$ (ii) $ab, a - b$ (iii) $a + b, 7a^2b^2$

(iv) $a^2 - 9, 4a$ (v) $pq + qr + rp, 0$

Answer :

(i) $(4p) \times (q + r) = (4p \times q) + (4p \times r) = 4pq + 4pr$

(ii) $(ab) \times (a - b) = (ab \times a) + [ab \times (- b)] = a^2b - ab^2$

(iii) $(a + b) \times (7a^2 b^2) = (a \times 7a^2b^2) + (b \times 7a^2b^2) = 7a^3b^2 + 7a^2b^3$

(iv) $(a^2 - 9) \times (4a) = (a^2 \times 4a) + (- 9) \times (4a) = 4a^3 - 36a$

(v) $(pq + qr + rp) \times 0 = (pq \times 0) + (qr \times 0) + (rp \times 0) = 0$

Q2 : Complete the table

---	First expression	Second Expression	Product
(i)	a	$b + c + d$	-
(ii)	$x + y - 5$	$5xy$	-
(iii)	p	$6p^2 - 7p + 5$	-
(iv)	$4p^2q^2$	$p^2 - q^2$	-
(v)	$a + b + c$	abc	-

Answer :

The table can be completed as follows.

-	First expression	Second Expression	Product
(i)	a	$b + c + d$	$ab + ac + ad$
(ii)	$x + y - 5$	$5xy$	$5x^2y + 5xy^2 - 25xy$
(iii)	p	$6p^2 - 7p + 5$	$6p^3 - 7p^2 + 5p$
(iv)	$4p^2q^2$	$p^2 - q^2$	$4p^4q^2 - 4p^2q^4$
(v)	$a + b + c$	abc	$a^2bc + ab^2c + abc^2$

Q3 :

Find the product.

(i) $(a^2) \times (2a^{22}) \times (4a^{26})$

(ii) $\left(\frac{2}{3}xy\right)\times\left(\frac{-9}{10}x^2y^2\right)$

(iii) $\left(-\frac{10}{3}pq^3\right)\times\left(\frac{6}{5}p^3q\right)$

(iv) $x \times x^2 \times x^3 \times x^4$

Answer :

(i) $(a^2) \times (2a^{22}) \times (4a^{26}) = 2 \times 4 \times a^2 \times a^{22} \times a^{26} = 8a^{50}$

(ii) $\left(\frac{2}{3}xy\right)\times\left(\frac{-9}{10}x^2y^2\right)=\left(\frac{2}{3}\right)\times\left(\frac{-9}{10}\right)\times x\times y\times x^2\times y^2=\frac{-3}{5}x^3y^3$

(iii) $\left(\frac{-10}{3}pq^3\right)\times\left(\frac{6}{5}p^3q\right)=\left(\frac{-10}{3}\right)\times\left(\frac{6}{5}\right)\times pq^3\times p^3q=-4p^4q^4$

(iv) $x \times x^2 \times x^3 \times x^4 = x^{10}$

Q4 :

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

(b) $a(a^2 + a + 1) + 5$ and find its values for (i) $a = 0$, (ii) $a = 1$, (iii) $a = -1$.

Answer :

(a) $3x(4x - 5) + 3 = 12x^2 - 15x + 3$

(i) For $x = 3$, $12x^2 - 15x + 3 = 12(3)^2 - 15(3) + 3$

$= 108 - 45 + 3$

$= 66$

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

$$= 12 \times \frac{1}{4} - \frac{15}{2} + 3$$
$$= 3 - \frac{15}{2} + 3 = 6 - \frac{15}{2}$$
$$= \frac{12 - 15}{2} = \frac{-3}{2}$$

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

(i) For $a = 0$, $a^3 + a^2 + a + 5 = 0 + 0 + 0 + 5 = 5$

(ii) For $a = 1$, $a^3 + a^2 + a + 5 = (1)^3 + (1)^2 + 1 + 5$

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

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

$= -1 + 1 - 1 + 5 = 4$

Q5 :

(a) Add: $p(p - q)$, $q(q - r)$ and $r(r - p)$

(b) Add: $2x(z - x - y)$ and $2y(z - y - x)$

(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 :

(a) First expression = $p(p - q) = p^2 - pq$

Second expression = $q(q - r) = q^2 - qr$

Third expression = $r(r - p) = r^2 - pr$

Adding the three expressions, we obtain

$$\begin{array}{r} p^2 - pq \\ + \quad q^2 - qr \\ + \quad r^2 - pq \\ \hline p^2 - pq + q^2 - qr + r^2 - pq \end{array}$$

Therefore, the sum of the given expressions is $p^2 + q^2 + r^2 - pq - qr - rp$.

(b) First expression = $2x(z - x - y) = 2xz - 2x^2 - 2xy$

Second expression = $2y(z - y - x) = 2yz - 2y^2 - 2yx$

Adding the two expressions, we obtain

$$\begin{array}{r} 2xz - 2x^2 - 2xy \\ + \quad -2yx + 2yz - 2y^2 \\ \hline 2xz - 2x^2 - 4xy + 2yz - 2y^2 \end{array}$$

Therefore, the sum of the given expressions is $- 2x^2 - 2y^2 - 4xy + 2yz + 2zx$.

(c) $3l\ (l - 4m + 5n) = 3l^2 - 12lm + 15ln$

$4l\ (10n - 3m + 2l) = 40ln - 12lm + 8l^2$

Subtracting these expressions, we obtain

$$\begin{array}{l} 40ln - 12lm + 8l^2 \\ 15ln - 12lm + 3l^2 \\ (-)\quad (+)\quad (-) \\ \hline +25ln \qquad +5l^2 \end{array}$$

Therefore, the result is $5l^2 + 25ln$.

(d) $3a\ (a + b + c) - 2b\ (a - b + c) = 3a^2 + 3ab + 3ac - 2ba + 2b^2 - 2bc$

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

$4c\ (-a + b + c) = -4ac + 4bc + 4c^2$

Subtracting these expressions, we obtain

$$\begin{array}{l} -4ac + 4bc + 4c^2 \\ 3ac - 2bc \qquad +3a^2 + 2b^2 + ab \\ (-)\quad (+)\qquad (-)\quad (-)\quad (-) \\ \hline -7ac + 6bc + 4c^2 - 3a^2 - 2b^2 - ab \end{array}$$

Therefore, the result is $-3a^2 - 2b^2 + 4c^2 - ab + 6bc - 7ac$.