Algebraic Expressions And Identities

Ex-6.1

6. Algebraic Expressions And Identities

Exercise - 6.1

(1)

(i) $7x^2yz - 5xy$

This equation consists two terms

ie., $7x^2y$ and $-5xy$.

The coefficient of $7x^2yz$ is 7

The coefficient of $-5xy$ is -5

(ii) $x^2 + x + 1$

This eq consists of three terms

ie., x^2, x, 1

The coefficient of x^2 is 1

The coefficient of x is 1

The costanst term 1 is 1

(iii) $3x^2y - 5x^2y^2z^2 + z^2$

This eqce consists of three terms

ie., $3x^2y$, $-5x^2y^2z^2$ & z^2

The coefficient of $3x^2y$ is 3

The coefficient of $-5x^2y^2z^2$ is -5

The coefficient of z^2 is 1

(iv) $9 - ab + bc - ca$

The terms	coefficients
9	9
$-ab$	-1
bc	1
ca	-1

(v) $\frac{a}{2} + \frac{b}{2} - ab$

terms	coefficients
$\frac{a}{2}$	1
$\frac{b}{2}$	1
$-ab$	1

(vi) $0.2x - 0.3xy + 0.5y$

terms	coefficients
$0.2x$	0.2
$-0.3xy$	-0.3
$0.5y$	0.5

(2)

(i) $x + y$

This expression contains two terms x & y so it is called 'Binomial.'

(ii) 1000
It contains one terms And it is called Monomial.

(iii) $x + x^2 + x^3 + x^4$.
It contains four terms. So it is not a monomial, binomial, trinomial.

(iv) $7 + a + 5b$
It contains three terms ie, 7, a, 5b is called trinomial.

(v) $2b - 3b^2$.
It contains two terms. It is called as Binomial

(vi) $2y - 3y^2 + 4y^3$.
It contains three terms. It is called as Trinomial

(vii) $5x - 4y + 3x$
$\Rightarrow 8x - 4y$
It contains two terms. Then it is called as Binomial

(viii) $4a - 15a^2$.
It is Binomial because it contains two terms.

(ix) $xy + yz + zt + tx$. (4)
It contains four terms. It is not as monomial, binomial, trinomial.

(x) pq^2.
It is monomial because it contains only one term.

(xi) $p^2q + pq^2$
It is Binomial. because it contains two terms

(xii) $2p + 2q$.
It is Binomial because it contains two terms.

Algebraic Expressions And Identities
Ex 6.2

Exercise - 8.2

(1) Add the following Expressions.

(i) $3a^2b, -4a^2b, 9a^2b$

$\Rightarrow 3a^2b + (-4a^2b) + 9a^2b$

$\Rightarrow 3a^2b - 4a^2b + 9a^2b$

$\Rightarrow 8a^2b.$

(ii) $\frac{2}{3}a, \frac{3}{5}a, -\frac{6}{5}a.$

$\Rightarrow \frac{2}{3}a + \frac{3}{5}a - \frac{6}{5}a$

Taking LCM 3, 5, 5 is 15

$\Rightarrow \frac{10a + 9a - 18a}{15}$

$\Rightarrow \frac{19a - 18a}{15}$

$\Rightarrow \frac{a}{15}$

(iii) $4xy^2 - 7x^2y, 12x^2y - 6xy^2, -3x^2y + 5x^2y^2$

Add $\Rightarrow 4xy^2 - 7x^2y + 12x^2y - 6xy^2 - 3x^2y + 5xy^2$

$\Rightarrow 4xy^2 + 12x^2y - 3x^2y - 7x^2y - 6xy^2 + 5xy^2$

$\Rightarrow 3xy^2 + 2x^2y$

(iv) $\frac{3}{5}a - \frac{5}{4}b + \frac{2}{5}c,\ \frac{2}{3}a - \frac{7}{2}b + \frac{7}{2}c,\ \frac{5}{3}a + \frac{5}{2}b - \frac{5}{4}c$ ④

Add

$\Rightarrow \frac{3}{2}a + \frac{2}{3}a + \frac{5}{3}a - \frac{5}{4}b - \frac{7}{2}b + \frac{5}{2}b + \frac{2}{5}c + \frac{7}{2}c - \frac{5}{4}c$

$\Rightarrow \frac{9a + 4a + 10a}{6} + \frac{-5b - 14b + 10b}{4} + \frac{8c + 70c - 25c}{20}$

$\Rightarrow \frac{23a}{6} - \frac{9b}{4} + \frac{53c}{20}$

(v) $\frac{11}{2}xy + \frac{12}{5}y + \frac{13}{7}x,\ -\frac{11}{2}y - \frac{12}{5}x - \frac{13}{7}xy$

Add

$\Rightarrow \frac{11}{2}xy - \frac{13}{7}xy + \frac{12}{5}y - \frac{11}{2}y + \frac{13}{7}x - \frac{12}{5}x$

$\Rightarrow \frac{77xy - 26xy}{14} + \frac{24y - 55y}{10} + \frac{65x - 84x}{35}$

$\Rightarrow \frac{51}{14}xy - \frac{19}{35}x - \frac{31}{10}y$

(vi) $\frac{7}{2}x^3 - \frac{1}{2}x^2 + \frac{5}{3},\ \frac{3}{2}x^3 + \frac{7}{4}x^2 - x + \frac{1}{5},\ \frac{3}{2}x^2 - \frac{5}{2}x - 2$

Add

$\Rightarrow \frac{7}{2}x^3 + \frac{3}{2}x^3 + \frac{7}{4}x^2 - \frac{1}{2}x^2 + \frac{3}{2}x^2 - x - \frac{5}{2}x + \frac{5}{3} + \frac{1}{3} - 2$

$\Rightarrow \frac{7x^3 + 3x^3}{2} + \frac{7x^2 - 2x^2 + 6x^2}{4} - \frac{2x - 5x}{2} + \frac{5 + 1 - 6}{6}$

$\Rightarrow \frac{10x^3}{2} + \frac{11x^2}{4} - \frac{7x}{2} + \frac{0}{6}$

$\Rightarrow 5x^3 + \frac{11x^2}{4} - \frac{7x}{2}$

(2) Subtract

(i) $-5xy$ from $12xy$

Subtract $\Rightarrow 12xy - (-5xy)$

$\Rightarrow +5xy + 12xy$

$\Rightarrow +17xy$

(ii) $2a^2$ from $-7a^2$

Subtract

$\Rightarrow 2a^2 + (-7a^2)$

$\Rightarrow -2a^2 + 7a^2$

$\Rightarrow -9a^2$

(iii) $2a-b$ from $3a-5b$

Subtract

$\Rightarrow -(2a-b) + (3a-5b)$

$\Rightarrow -2a-b+3a+5b$

$\Rightarrow +a+4b \Rightarrow a-4b.$

(iv) $2x^3-4x^2+3x+5$ from $4x^3+x^2+x+6$

Subtract

$\Rightarrow -(2x^3-4x^2+3x+5) + (4x^3+x^2+x+6)$

$\Rightarrow -2x^3+4x^2+3x+5+4x^3+x^2+x+6$

$\Rightarrow +2x^3+5x^2+2x+1$

$\Rightarrow 2x^3+5x^2-2x+1$

(iv) $2x^3 - 4x^2 + 3x + 5$ from $4x^3 + x^2 + x + 6$

Subtract

$\Rightarrow 4x^3 + x^2 + x + 6 - (2x^3 - 4x^2 + 3x + 5)$

$\Rightarrow 4x^3 - 2x^3 + x^2 + 4x^2 + x - 3x + 6 - 5$

$\Rightarrow 2x^3 + 5x^2 - 2x + 1$

(v) $\frac{2}{3}y^3 - \frac{2}{7}y^2 - 5$ from $\frac{1}{3}y^3 + \frac{5}{7}y^2 + y - 2$

Subtract

$\Rightarrow \frac{1}{3}y^3 + \frac{5}{7}y^2 + y - 2 - \left(\frac{2}{3}y^3 - \frac{2}{7}y^2 - 5\right)$

$\Rightarrow \frac{1}{3}y^3 - \frac{2}{3}y^3 + \frac{5}{7}y^2 + \frac{2}{7}y^2 + y - 2 + 5$

$\Rightarrow \frac{y^3 - 2y^3}{3} + \frac{5y^2 + 2y^2}{7} + y + 3$

$\Rightarrow -\frac{y^3}{3} + \frac{7y^2}{7} + y + 3$

$\Rightarrow \frac{-y^3}{3} + y^2 + y + 3$

(vi) $\frac{3}{2}x - \frac{5}{4}y - \frac{7}{2}z$ from $\frac{2}{3}x + \frac{3}{2}y - \frac{4}{3}z$

Subtract

$\Rightarrow \frac{2}{3}x + \frac{3}{2}y - \frac{4}{3}z - \left(\frac{3}{2}x - \frac{5}{4}y - \frac{7}{2}z\right)$

$\Rightarrow \frac{2}{3}x - \frac{3}{2}x + \frac{3}{2}y + \frac{5}{4}y - \frac{4}{3}z + \frac{7}{2}z$

$\Rightarrow \frac{4x - 9x}{6} + \frac{6y + 5y}{4} + \frac{-8z + 21z}{6}$

$\Rightarrow -\frac{5x}{6} + \frac{11y}{4} + \frac{13z}{6}$

(vii) $x^2y - \frac{4}{5}xy^2 + \frac{4}{3}xy$ from $\frac{2}{3}x^2y + \frac{3}{2}xy^2 - \frac{1}{3}xy$

subtract

$\Rightarrow \frac{2}{3}x^2y + \frac{3}{2}xy^2 - \frac{1}{3}xy - \left(x^2y - \frac{4}{5}xy^2 + \frac{4}{3}xy\right)$

$\Rightarrow \frac{2}{3}x^2y - x^2y + \frac{3}{2}xy^2 + \frac{4}{5}xy^2 - \frac{1}{3}xy - \frac{4}{3}xy$

$\Rightarrow \frac{2x^2y - 3x^2y}{3} + \frac{15xy^2 + 10xy^2}{10} + \frac{-xy - 4xy}{3}$

$\Rightarrow -\frac{x^2y}{3} + \frac{25xy^2}{10} - \frac{5xy}{3}$

(viii) $\frac{ab}{7} - \frac{35}{3}bc + \frac{6}{5}ac$ from $\frac{3}{5}bc - \frac{4}{5}ac$

subtract

$\Rightarrow \frac{3}{5}bc - \frac{4}{5}ac - \left(\frac{ab}{7} - \frac{35}{3}bc + \frac{6}{5}ac\right)$

$\Rightarrow \frac{3}{5}bc + \frac{35}{3}bc - \frac{4}{5}ac - \frac{6}{5}ac - \frac{ab}{7}$

$\Rightarrow \frac{9bc + 175bc}{15} + \frac{-4ac - 6ac}{5} - \frac{ab}{7}$

$\Rightarrow \frac{184bc}{15} + \frac{-10ac}{5} - \frac{ab}{7}$

$\Rightarrow \frac{184bc}{15} - \frac{10ac}{5} - \frac{ab}{7}$

$\Rightarrow \frac{184bc}{15} - 2ac - \frac{ab}{7}$

(3) Take away

(i) $\frac{6}{5}x^2 - \frac{4}{5}x^3 + \frac{5}{6} + \frac{3}{2}x$ from $\frac{x^3}{3} - \frac{5}{2}x^2 + \frac{3}{5}x + \frac{1}{4}$

$\Rightarrow \frac{x^3}{3} - \frac{5}{2}x^2 + \frac{3}{5}x + \frac{1}{4} - \left(\frac{6}{5}x^2 - \frac{4}{5}x^3 + \frac{5}{6} + \frac{3}{2}x\right)$

$\Rightarrow \frac{x^3}{3} + \frac{4}{5}x^3 - \frac{5}{2}x^2 - \frac{6}{5}x^2 + \frac{3}{5}x - \frac{3}{2}x + \frac{1}{4} - \frac{5}{6}$

$\Rightarrow \frac{5x^3 + 12x^3}{15} - \frac{25x^2 - 12x^2}{10} + \frac{6x - 15x}{10} + \frac{6 - 20}{24}$

$\Rightarrow \frac{17x^3}{15} - \frac{37x^2}{10} - \frac{9x}{10} - \frac{14}{24}$

$\Rightarrow \frac{17}{15}x^3 - \frac{37}{10}x^2 - \frac{9}{10}x - \frac{7}{12}$

(ii) $\frac{5a^2}{2} + \frac{3a^2}{2} + \frac{a}{3} - \frac{6}{5}$ from $\frac{1}{3}a^3 - \frac{3}{4}a^2 - \frac{5}{2}$

$\Rightarrow \frac{1}{3}a^3 - \frac{3}{4}a^2 - \frac{5}{2} - \left(\frac{5a^2}{2} + \frac{3a^3}{2} + \frac{a}{3} - \frac{6}{5}\right)$

$\Rightarrow \frac{1}{3}a^3 - \frac{3a^3}{2} - \frac{3}{4}a^2 - \frac{5a^2}{2} - \frac{a}{3} - \frac{5}{2} + \frac{6}{5}$

$\Rightarrow \frac{2a^3 - 9a^3}{6} - \frac{3a^2 - 10a^2}{4} - \frac{a}{3} + \frac{-25 + 12}{10}$

$\Rightarrow \frac{-7a^3}{6} - \frac{13a^2}{4} - \frac{a}{3} - \frac{13}{10}$

(iii) $\frac{7}{4}x^3 + \frac{3}{5}x^2 + \frac{1}{2}x + \frac{9}{2}$ from $\frac{7}{2} - \frac{x}{3} - \frac{x^2}{5}$

$\Rightarrow \frac{7}{2} - \frac{x}{3} - \frac{x^2}{5} - \left[\frac{7}{4}x^3 + \frac{3}{5}x^2 + \frac{1}{2}x + \frac{9}{2}\right]$

$\Rightarrow -\frac{7}{4}x^3 - \frac{x^2}{5} - \frac{3}{5}x^2 - \frac{x}{3} - \frac{1}{2}x + \frac{7}{2} - \frac{9}{2}$

$\Rightarrow -\frac{7}{4}x^3 - \frac{4x^2}{5} - \frac{5x - 3x}{6} + \frac{7-9}{2}$

$\Rightarrow -\frac{7}{4}x^3 - \frac{4x^2}{5} - \frac{5x}{6} - 1$

(iv) $\frac{y^3}{3} + \frac{7}{3}y^2 + \frac{1}{2}y + \frac{1}{2}$ from $\frac{1}{3} - \frac{5}{3}y^2$

$\frac{1}{3} - \frac{5}{3}y^2 - \left[\frac{y^3}{3} + \frac{7}{3}y^2 + \frac{1}{2}y + \frac{1}{2}\right]$

$-\frac{y^3}{3} - \frac{5}{3}y^2 - \frac{7}{3}y^2 - \frac{1}{2}y + \frac{1}{3} - \frac{1}{2}$

$-\frac{y^3}{3} - \frac{5y^2 - 7y^2}{3} - \frac{1}{2}y + \frac{2-3}{2}$

$-\frac{y^3}{3} - \frac{12y^2}{3} - \frac{1}{2}y - \frac{1}{2}$

(v) $\frac{2}{3}ac - \frac{5}{7}ab + \frac{2}{3}bc$ from $\frac{3}{2}ab - \frac{7}{4}ac - \frac{5}{6}bc$

$\frac{3}{2}ab - \frac{7}{4}ac - \frac{5}{6}bc - \left[\frac{2}{3}ac - \frac{5}{7}ab + \frac{2}{3}bc\right]$

$\frac{3}{2}ab - \frac{5}{7}ab - \frac{7}{4}ac - \frac{2}{3}ac - \frac{5}{6}bc - \frac{2}{3}bc$

$\frac{21ab - 10ab}{14} - \frac{21ac - 8ac}{12} - \frac{5bc - 4bc}{6}$

$\frac{11ab}{14} - \frac{29ac}{12} - \frac{3}{2}bc$

④ Ans

Sum of $x - 3y + 2z$ and $-4x + 9y - 11z$

$\Rightarrow (x - 3y + 2z) + (-4x + 9y - 11z)$

$\Rightarrow x - 4x - 3y + 9y + 2z - 11z$

$\Rightarrow -3x + 6y - 9z$

The resultant expression has to be subtracted.

i.e., $3x - 4y - 7z$

$\Rightarrow (-3x + 6y - 9z) - (3x - 4y - 7z)$

$\Rightarrow -3x - 3x + 6y + 4y - 9z + 7z$

$\Rightarrow -6x + 10y - 2z$.

⑤ Sum of $9l + 2m - 3n^2$ and $-3l + m + 4n^2$

$\Rightarrow 9l + 2m - 3n^2 + (-3l + m + 4n^2)$

$\Rightarrow 9l - 3l + 2m + m - 3n^2 + 4n^2$

$\Rightarrow 6l + 3m + n^2$ ... ①

subtract Sum of $3l - 4m - 7n^2$ and $2l + 3m - 4n^2$

$\Rightarrow 3l - 4m - 7n^2 + 2l + 3m - 4n^2$

$\Rightarrow l - m - 11n^2$ ... ②

② − ①

(22) ⇒ ① − ②

⇒ $6l + 3m + n^2 - (5l - m - 11n^2)$

⇒ $6l - 5l + 3m + m + n^2 + 12n^2$

⇒ $l + 4m + 13n^2$

(6) Sum of $2x - x^2 + 5$ and $-4x - 3 + 7x^2$

⇒ $2x - x^2 + 5 - 4x - 3 + 7x^2$

⇒ $2x - 4x - x^2 + 7x^2 + 5 - 3$

⇒ $-2x + 6x^2 + 2$ ---①

and 5 ----②

(22) ⇒ ② − ①

⇒ $-(-2x + 6x^2 + 2) + 5$

⇒ $2x - 6x^2 - 2 + 5$

⇒ $2x - 6x^2 + 3$

∴ The resultant expression is $2x - 6x^2 + 3$

(7) Simplify

(i) $x^2 - 3x + 5 - \frac{1}{2}(3x^2 - 5x + 7)$

$\rightarrow x^2 - \frac{1}{2}\cdot 3x^2 - 3x + \frac{1}{2}\cdot 5x + 5 - \frac{1}{2}\cdot 7$

$\rightarrow \frac{2x^2 - 3x^2}{2} - \frac{6x + 5x}{2} + \frac{10 - 7}{2}$

$\rightarrow \frac{-x^2}{2} - \frac{x}{2} + \frac{3}{2}$

$\rightarrow -\frac{1}{2}\cdot x^2 - \frac{1}{2}x + \frac{3}{2}$

(ii) $[5 - 3x + 2y - (2x - y)] - (3x - 7y + 9)$

$\rightarrow 5 - 3x + 2y - 2x + y - 3x + 7y - 9$

$\rightarrow -8x + 10y - 4$

(iii) $\frac{11}{2}x^2y - \frac{9}{4}xy^2 + \frac{1}{4}xy - \frac{1}{14}y^2x + \frac{1}{15}yx^2 + \frac{1}{2}xy$

$\rightarrow \frac{11}{2}x^2y + \frac{1}{15}yx^2 - \frac{9}{4}xy^2 - \frac{1}{14}xy^2 + \frac{1}{4}xy + \frac{1}{2}xy$

$\rightarrow \frac{165x^2y + 2x^2y}{30} - \frac{126xy^2 - 4xy^2}{56} + \frac{xy + 2xy}{4}$

$\rightarrow \frac{167}{30}x^2y - \frac{130xy^2}{56} + \frac{3xy}{4}$

$\rightarrow \frac{167}{30}x^2y - \frac{65}{28}xy^2 + \frac{3xy}{4}$

(iv) $\left(\frac{1}{3}y^2 - \frac{4}{7}y + 11\right) - \left(\frac{1}{7}y^4 - 3 + 2y^2\right) - \left(\frac{2}{7}y - \frac{2}{5}y + 2\right)$

$\frac{1}{3}y^2 - 2y^2 - \frac{2}{3}y^2 - \frac{4}{7}y - \frac{1}{7}y - \frac{2}{7}y + 11 + 3 - 2$

$\frac{y^2 - 6y^2 + 2y^2}{3} - \frac{4y - y - 2y}{7} + 14 - 2$

$-\frac{3}{3}y^2 - \frac{7}{7}y + 12$

$-\frac{3}{3}y^2 - y + 12$

$\Rightarrow -y^2 - y + 12$

(v) $-\frac{1}{2}a^2b^2c + \frac{1}{3}ab^2c - \frac{1}{4}abc^2 - \frac{1}{5}cb^2a^2 + \frac{1}{6}cb^2a - \frac{1}{7}c^2ab + \frac{1}{8}ca^2b$

$\Rightarrow -\frac{1}{2}a^2b^2c - \frac{1}{5}a^2b^2c + \frac{1}{3}ab^2c + \frac{1}{6}ab^2c - \frac{1}{4}abc^2 - \frac{1}{7}c^2ab + \frac{1}{8}a^2bc$

$\Rightarrow \frac{-5a^2b^2c - 2a^2b^2c}{10} + \frac{2ab^2c + ab^2c}{6} \quad \frac{7abc^2 - 4abc^2}{7} + \frac{1}{8}a^2bc$

$\Rightarrow -\frac{7a^2b^2c}{10} + \frac{1}{2}ab^2c - \frac{11}{28}abc^2 + \frac{1}{8}a^2bc$

Algebraic Expressions And Identities
Ex 6.3

Exercise – 6·3 (16)

(1) $5x^2 \times 4x^3$

$5 \times x \times x \times 4 \times x \times x \times x$

$5 \times 4 \times x^5$

$20x^5$

(2) $-3a^2 \times 4b^2$

$-3 \times 4 \times a^2 b^2$

$-12a^2b^2$

(3) $(-5xy) \times (-3x^2yz)$

$(-5) \times (-3) \times x \times x^2 \times y \times y \times z$

$15x^3y^2z$

(4) $\frac{1}{3}xy \times \frac{2}{3}x^2yz^2$

$\frac{1}{3} \times \frac{2}{3} \times x \times x \times x^2 \times y \times y \times z^2$

$\frac{1}{3} \times x^3 \times y^2 \times z^2$

$\frac{1}{3}x^3y^2z^2$

(5) $\left(-\frac{7}{5}xy^2z\right) \times \left(\frac{13}{3}x^2y^2z^2\right)$

$-\frac{7}{5} \times \frac{13}{3} \times x \times x \times x^2 \times y^2 \times y \times z \times z^2$

$-\frac{91}{15}x^3 \times y^3 \times z^3$

$-\frac{91}{15}x^3y^3z^3$

6) $\left(\frac{-24}{25}x^3z\right) \times \left(\frac{-15}{16}xz^2y\right)$

$\frac{-24}{25} \times \frac{-15}{16} \times x^3 \times x \times z \times z^2 \times y$

$\frac{9}{10} \times x^4 \times z^3 \times y$

$\frac{9}{10}x^4z^3y$

7) $\left(\frac{-1}{27}a^2b^2\right) \times \left(\frac{9}{2}a^3b^2c^2\right)$

$\frac{-1}{27} \times \frac{9}{2} \times a^2 \times a^3 \times b^2 \times b^2 \times c^2$

$\frac{-1}{6}a^5b^4c^2$

8) $(-7xy) \times \left(\frac{1}{4}x^2y^2\right)$

$-7 \times \frac{1}{4} \times x \times xy \times x^2 \times y \times z$

$-\frac{7}{4}x^3y^3z$

9) $(7ab) \times (-5ab^2c) \times (6abc^2)$

$7 \times -5 \times 6 \times a \times a \times a \times b \times b^2 \times b \times c \times c^2$

$210\,a^3b^4c^3$

10) $(-5a) \times (-10a^2) \times (-2a^3)$

$(-5) \times (-10) \times (-2) \times a \times a^2 \times a^3$.

$-100 \times a^6$

$-100a^6$

11) $(-4x^2) \times (-6xy^2) \times (-3yz^2)$

$(-4) \times (-6) \times (-3) \times x^2 \times x \times y^2 \times y \times z^2$

$-72 \times x^3 \times y^3 \times z^2$

$-72\, x^3y^3z^2$

12) $\left(\frac{-2}{7}a^4\right) \times \left(\frac{-3}{4}a^2b\right) \times \left(\frac{-14}{5}b^2\right)$

$\frac{-2}{7} \times \frac{-3}{4_2} \times \frac{-14^2}{5} \times a^4 \times a^2 \times b \times b^2$

$-\frac{6^3}{10_5} \times a^6 \times b^3$

$-\frac{3}{5}a^6b^3$

13) $\left(\frac{7}{9}ab^2\right) \times \left(\frac{15}{7}ac^2b\right) \times \left(\frac{-3}{5}a^2c\right)$

$\frac{7}{9_3} \times \frac{15^1}{7} \times \frac{-3}{5} \times a \times a \times a^2 \times b^2 \times b \times c^2 \times c$

$-1 \; a^4 \times b^3 \times c^3$

$-a^4b^3c^3$.

14) $\left(\frac{4}{3}u^2vw\right) \times (-5uvw^2) \times \left(\frac{1}{3}v^2wu\right)$

$\frac{4}{3} \times -5 \times \frac{1}{3} \times u^2 \times u \times u \times v \times v \times v^2 \times w \times w^2 \times w$

$\frac{-20}{9} \times u^4 \times v^4 \times w^4$

$-\frac{20}{9} u^4 v^4 w^4$

15) $(0.5x) \times \left(\frac{1}{3}xy^2z^4\right) \times (24x^2yz)$

$0.5 \times \frac{1}{3} \times 24 \times x \times x \times x \times y^2 \times y \times x^2 \times z^4 \times z$

$\frac{12}{3} \times x^4 \times y^3 \times z^5$

$4x^4y^3z^5$

16) $\left(\frac{4}{3}pq^2\right) \times \left(-\frac{1}{4}p^2r\right) \times \left(16p^2q^2r^2\right)$

$\frac{4}{3} \times -\frac{1}{4} \times 16 \times p \times p^2 \times p^2 \times q^2 \times q^2 \times r \times r \times r^2$

$-\frac{16}{3} \times p^5 \times q^4 \times r^3$

$-\frac{16}{3} p^5 q^4 r^3$

17) $(2.3xy) \times (0.1x) \times (0.16)$

$2.3 \times 0.1 \times 0.16 \times x \times x \times y$

$0.0368 \times x^2 \times y$

$0.0368x^2y$

(18) $(3x)\times(4x)\times(-5x)$

$3\times4\times-5\times x\times x\times x$

$-60x^3$

(19) $(4x^2)\times(-3x)\times\left(\frac{4}{5}x^3\right)$

$4\times-3\times\frac{4}{5}\times x^2\times x\times x^3$

$\frac{-48}{5}\times x^6$

$-\frac{48}{5}x^6$

(20) $5x^4\times(x^2)^3\times(2x)^2$

$5x^4\times x^6\times 4\times x^2$

$5\times4\times x^4\times x^6\times x^2$

$20\cdot x^{12}$

$20x^{12}$

(21) $(x^2)^3\times(2x)\times(-4x)\times 5$

$x^6\times 2x\times(-4x)\times 5$

$2\times-4\times5\times x^6\times x\times x$

$-40\times x^8$

$-40x^8$

(22) $(-8x^2y^6) \times (-20xy)$

$-8 \times -2 \times x^2 \times x \times y^6 \times y$

$16 x^3 \times y^7$

$16 x^3 y^7$

Verification :- when $x = 2.5$, $y = 1$

RHS $\Rightarrow$ $16(2.5)^3 \times (1)^7$

$\Rightarrow$ 16×15.625

$\Rightarrow$ 250

LHS $= -8 \times 2.5^2 \times 1^6 \times -20 \times 1 \times 2.5$

$= 250$

LHS = RHS

(23) $(3.2x^6y^3) \times (2.1x^2y^2)$

$3.2 \times 2.1 \times x^6 \times x^2 \times y^3 \times y^2$

$6.72 \times x^8 \times y^5$

$6.72 x^8 y^5$

Verify $\Rightarrow$ when $x = 1$ and $y = 0.5$

RHS $= 6.72 x^8 y^5 \Rightarrow 6.72 \times 1^8 \times 0.5^5$

$\Rightarrow 0.21$

LHS $= 3.2 \times 1^6 \times (0.5)^3 \times 2.1 \times 1^2 \times 0.5^2$

$= 0.21$

$\therefore$ LHS = RHS

(24) $5x^6 \times (-1.5x^2y^3) \times (-12xy^2)$

$5 \times -1.5 \times -12 \times x^6 \times x^2 \times x \times y^3 \times y^2$

$90 \times x^9 \times y^5$

$90x^9y^5$

Verification :- $x = 1$, $y = 0.5$

RHS $\Rightarrow 90x^9y^5 \Rightarrow 90(1)^9(0.5)^5$

$\Rightarrow 2.8125$

LHS $\Rightarrow 2.8125$

LHS = RHS

(25) $2.3a^5b^2 \times 1.2a^2b^2$

$2.3 \times 1.2 \times a^5 \times a^2 \times b^2 \times b^2$

$2.76 \times a^7 \times b^4$

$2.76\ a^7b^4$

verification :-

$a = 1$; $b = 0.5$

$2.76\ a^7b^4 = 2.76(1)^7(0.5)^4$

$2.76 \times 1 \times 0.0625$

$\Rightarrow 0.1725$

(26) $(-8x^2y^6) \times (-20xy)$

$-8 \times -20 \times x^2 \times x \times y^6 \times y$

$160\ x^3y^7$

verify when $x = 2.5$; $y = 1$

RHS $160x^3y^7 = 160 \times (2.5)^3 \times (1)^7$

$= 2500$

LHS $= -8 \times 2.5^2 \times 1^1 \times -20 \times 1 \times 2.5 = 2500$

(27) $-xy^3 \times yx^3 \times xy$

$-x \times x^3 \times x \times y^3 \times y \times y$

$-x^5 y^5$

Verify when $x = 1$, $y = 2$

RHS : $-x^5y^5 \rightarrow (-1)^5 \times 2^5 \Rightarrow -1 \times 32 \Rightarrow -32$

LHS : $(-1) \times 2^3 \times 2 \times 1^3 \times 1^2$

$= -32$

LHS = RHS

(28) $\left(\frac{1}{8}x^2y^4\right) \times \left(\frac{1}{4}x^4y^2\right) \times (xy) \times 5$

$\frac{1}{8} \times \frac{1}{4} \times 5 \times x^2 \times x^4 \times x \times y^4 \times y^2 \times y$

$\frac{5}{32} \times x^6 \times y^6$

$\frac{5}{32} x^6 y^6$

Verification : when $x = 1$, $y = 2$

RHS : $\frac{5}{32} x^6 y^6 = \frac{5}{32} \times 1^6 \times 2^6$

$= \frac{5}{32} \times 64^2$

$= 5 \times 2$

$= 10$

LHS : $\frac{1}{8} \times 1^2 \times 2^4 \times \frac{1}{4} \times 1^4 \times 2^2 \times 1 \times 2 \times 5$

$= 10$

$\therefore$ LHS = RHS.

(29) $\left(\frac{2}{5}a^2b\right) \times \left(-15b^2ac\right) \times \left(-\frac{1}{2}c^2\right)$

$\frac{2}{8} \times -15^{3} \times -\frac{1}{2} \times a^2 \times a \times b \times b^2 \times c \times c^3$

$3\ a^3 \times b^3 \times c^3$

$3\ a^3b^3c^3$

(30) $\left(-\frac{4}{7}a^2b\right) \times \left(\frac{-2}{3}b^2c\right) \times \left(-\frac{7}{6}c^2a\right)$

$\frac{-4^{2}}{7} \times \frac{-2}{3} \times \frac{-7}{6_{3}} \times a^2 \times a \times b \times b^2 \times c \times c^2$

$\frac{-4}{9} \times a^3 \times b^3 \times c^3$

$-\frac{4}{9}\ a^3b^3c^3$

(31) $\left(\frac{4}{9}abc^3\right) \times \left(-\frac{27}{5}a^3b^2\right) \times \left(-8b^3c\right)$

$\frac{4}{9} \times -\frac{27^{3}}{5} \times -8 \times a \times a^3 \times b \times b^2 \times b^3 \times c^3 \times c$

$-\frac{96}{5} \times a^4 \times b^6 \times c^4$

$-\frac{96}{5}\ a^4b^6c^4$

(32) $(2xy) \times \left(\frac{x^2y}{4}\right) \times (x^2)(y^2)$

$2 \times \frac{1}{4_2} \times x \times x^2 \times x^2 \times xy \times y^2 \times y$

$\frac{1}{2} x^5 \times y^5$

$\frac{1}{2} x^5 y^5$

Verification :- when $x = 2$; $y = -1$

RHS = $\frac{1}{2} x^5 y^5 = \frac{1}{2}(2)^5 (-1)^5$

$= \frac{1}{2} \times 32^{16} \times -1$

$= -16$

LHS = RHS

(33) $\left(\frac{3}{5} x^2 y\right) \times \left(-\frac{15}{4} xy^2\right) \times \left(\frac{7}{9} x^2 y^2\right)$

$\frac{3}{8} \times -\frac{15}{4} \times \frac{7}{9} \times x^2 \times x \times x^2 \times xy \times y^2 \times y^2$

$-\frac{7}{4} x^5 \times y^5$

$-\frac{7}{4} x^5 y^5$

Verification : when $x = 2$, $y = -1$

RHS = $-\frac{7}{4} x^5 y^5 = -\frac{7}{4}(2)^5 (-1)^5$

$= +\frac{7}{4} \times 32^8 \times +1$

$= 56$

LHS = RHS

Algebraic Expressions And Identities
Ex 6.4

Exercise – 6.4

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

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

$6 \times a^4 + 10 \times a^3 \times b$

$6a^4 + 10a^3b$.

2) $-11a(3a+2b)$

$-11a \times 3a + -11a \times 2b$

$-33a^2 - 2 \times 11 \times a \times b$

$-33a^2 - 22ab$.

3) $-5a\ (7a-2b)$

$-5a \times 7a - (-5a) \times (+2b)$

$-5 \times 7 \times a \times a + 5 \times 2 \times a \times b$

$-35a^2 + 10ab$

4) $-11y^2(3y+7)$

$-11y^2 \times 3y - 11y^2 \times 7$

$-11 \times 3 \times y^2 \times y - 11y^2 \times 7$

$-33y^3 - 77y^2$.

(5) $\frac{6x}{5}(x^3+y^3)$

$\frac{6x}{5}\times x^3 + \frac{6x}{5}\times y^3$

$\frac{6}{5}x^4 + \frac{6}{5}xy^3$

(6) $xy(x^3-y^3)$

$xy\times x^3 - xy\times y^3$

$x^4y - xy^4$

(7) $0.1y\,(0.1x^5+0.1y)$

$0.1y\times 0.1x^5 + 0.1y\times 0.1\times y$

$0.01\times x^5\times y + 0.01\times y^2$

$0.01x^5y + 0.01y^2$

(8) $\left(-\frac{7}{4}ab^2c - \frac{6}{25}a^2c^2\right)(-50a^2b^2c^2)$

$-\frac{7}{4}ab^2c\times -50a^2b^2c^2 - \frac{6}{25}a^2c^2\times -50a^2b^2\times c^2$

$+\frac{7}{4}\times 50\, a^3\times b^4\times c^3 - \frac{6}{25}\times -\frac{2}{50}\times a^4\times b^2\times c^4$

$\frac{350}{4}a^3b^4c^3 + 12a^4b^2c^4$

$\frac{175}{2}a^3b^4c^3 + 12a^4b^2c^4$.

(9) $\frac{-8}{27} xyz\left(\frac{3}{2}xyz^2 - \frac{9}{4}xy^2z^3\right)$

$-\frac{8}{27_9} xyz \times \frac{3}{2} xyz^2 - \frac{8}{27_3} xyz \times -\frac{9}{4} xy^2z^3$

$-\frac{4}{9} \times x^2 \times y^2 \times z^3 + \frac{2}{3} x^2 y^3 z^4$

$-\frac{4}{9} x^2y^2z^3 + \frac{2}{3} x^2y^3z^4$

(10) $\frac{-4}{27} xy^2\left(\frac{9}{2}x^2y^2 - \frac{3}{4}xy^2\right)$

$-\frac{4^2}{27_3} xy^2 \times \frac{9}{2} x^2y^2 - \frac{4}{27_9} xy^2 \times -\frac{3}{4} xy^2$

$-\frac{2}{3} \times x^3 \times y^2 \times z^2 + 9x^2 \times y^2 \times z^3$

$-\frac{2}{3} x^3y^2z^2 + 9x^2y^2z^3$

(11) $1.5x\left(10x^2y - 100xy^2\right)$

$1.5x \times 10x^2y - 1.5x \times 100xy^2$

$15x^3 \times y - 150x^2 \times y^2$

$15x^3y - 150x^2y^2$

(12) $4.1xy\left(1.1x - y\right)$

$4.1xy \times 1.1x - 4.1xy \times y$

$4.51x^2y - 4.1xy^2$