

# 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.,  $7x^2yz$  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 constant term 1 is 1

(iii)

$$3x^2y - 5x^2y^2z^2 + z^2$$

This eqn 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)  $9 - ab + bc - ca$  (2)

<u>terms</u>	<u>coefficients</u>
9	9
-ab	-1
bc	1
ca	-1

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

<u>terms</u>	<u>coefficients</u>
$\frac{a}{2}$	1
$\frac{b}{2}$	1
-ab	-1

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

<u>terms</u>	<u>coefficients</u>
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.'

- (i) 1000 ③  
It contains one term and it is called Monomial.
- (ii)  $x + x^2 + x^3 + x^4$ .  
It contains four terms. So it is not a monomial, binomial, trinomial.
- (iv)  $7 + a + 5b$   
It contains three terms i.e., 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

Q

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

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

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

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

$$(v) \quad \frac{3}{2}a - \frac{5}{4}b + \frac{2}{5}c, \quad \frac{2}{3}a - \frac{7}{2}b + \frac{1}{2}c, \quad \frac{5}{3}a + \frac{5}{2}b - \frac{5}{4}c \quad \textcircled{1}$$

Add

$$\rightarrow \frac{3}{2}a + \frac{2}{3}a + \frac{5}{3}a - \frac{5}{4}b - \frac{7}{2}b + \frac{5}{2}b + \frac{2}{5}c + \frac{1}{2}c - \frac{5}{4}c$$

$$\Rightarrow \frac{9a + 4a + 10a}{6} + \frac{-5b - 14b + 10b}{4} + \frac{8c + 7c - 25c}{20}$$

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

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

Add

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

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

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

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

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

(9)

(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  
 $\Rightarrow -(2x^3-4x^2+3x+5) + (4x^3+x^2+x+6)$   
 $\Rightarrow -2x^3+4x^2+3x+5 + 4x^3+x^2+x+6$   
 $\Rightarrow +2x^3+5x^2+2x+11$   
 $\Rightarrow 2x^3+5x^2+2x+11$

$$(iv) \quad 2x^3 - 4x^2 + 3x + 5 \quad \text{from} \quad 4x^3 + x^2 + x + 6 \quad \textcircled{8}$$

Subtract

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

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

$$\Rightarrow 2x^3 + 6x^2 - 2x + 1$$

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

Subtract

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

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

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

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

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

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

Subtract

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

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

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

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

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

subtract

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

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

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

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

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

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

①  $\frac{6}{5}x^2 - \frac{4}{5}x^3 + \frac{5}{6} + \frac{3}{2}x$  from  $\frac{x^3}{3} - \frac{5}{2}x^2 + \frac{3}{5}x + \frac{1}{4}$  ⑩

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

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

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

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

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

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

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

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

$$\Rightarrow \frac{2a^3 - 9a^3}{6} - \frac{3a^2 - 16a^2}{4} - \frac{a}{3} + \frac{-25 + 12}{10}$$

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

$$(iii) \quad \frac{7}{4}x^3 + \frac{3}{5}x^2 + \frac{1}{2}x + \frac{9}{2} \text{ from } \frac{7}{2} - \frac{x}{3} - \frac{x^2}{5} \quad (11)$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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.

$$\text{i.e. } 3x - 4y - 7z$$

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

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

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

⑤

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

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

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

$$\Rightarrow 6l + 3m + n^2 \dots \textcircled{1}$$

subtract sum of  ~~$8l + 2m$~~   $3l - 4m - 7n^2$  and  $2l + 3m - 4n^2$

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

$$\Rightarrow 5l - m - 11n^2 \dots \textcircled{2}$$

$$\textcircled{2} - \textcircled{1}$$

$$\textcircled{2} \Rightarrow \textcircled{1} - \textcircled{2}$$

(12)

$$\Rightarrow 6l + 3m + n^2 - (5l - m - 11n^2)$$

$$\Rightarrow 6l - 5l + 3m + m + n^2 + 12n^2$$

$$\Rightarrow l + 4m + 13n^2$$

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

$$\rightarrow 2x - x^2 + 5 - 4x - 3 + 7x^2$$

$$\Rightarrow 2x - 4x - x^2 + 7x^2 + 5 - 3$$

$$\Rightarrow -2x + 6x^2 + 2 \quad \dots \textcircled{1}$$

and  $5 \quad \dots \textcircled{2}$

$$\textcircled{1} \Rightarrow \textcircled{2} - \textcircled{1}$$

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

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

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

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

⑦ Simplify

⑭

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

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

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

$$\rightarrow \frac{-x^2}{2} - \frac{11x}{2} + \frac{3}{2}$$

$$\rightarrow -\frac{1}{2}x^2 - \frac{11}{2}x + \frac{3}{2}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$\Rightarrow \frac{-5a^2b^2c - 2a^2b^2c}{10} + \frac{2ab^2c + ab^2c}{6} + \frac{7abc^2 - 4abc^2 + \frac{1}{3}a^2bc}{7}$$

$$\Rightarrow \frac{-7a^2b^2c}{10} + \frac{1}{2}ab^2c - \frac{11}{23}abc^2 + \frac{1}{8}a^2bc$$

# Algebraic Expressions And Identities

## Ex 6.3

### Exercise - 6.3

(16)

$$\begin{aligned}(1) \quad & 5x^2 \times 4x^3 \\ & 5 \times x \times x \times 4 \times x \times x \times x \\ & 5 \times 4 \times x^5 \\ & 20x^5\end{aligned}$$

$$\begin{aligned}(2) \quad & -3a^2 \times 4b^2 \\ & -3 \times 4 \times a^2 b^2 \\ & -12a^2 b^2\end{aligned}$$

$$\begin{aligned}(3) \quad & (-5xy) \times (-3x^2yz) \\ & (-5) \times (-3) \times x \times x^2 \times y \times y \times z \\ & 15x^3y^2z\end{aligned}$$

$$\begin{aligned}(4) \quad & \frac{1}{2}xy \times \frac{2}{3}x^2yz^2 \\ & \frac{1}{2} \times \frac{2}{3} \times x \times x^2 \times y \times y \times z^2 \\ & \frac{1}{3} \times x^3 \times y^2 \times z^2 \\ & \frac{1}{3}x^3y^2z^2\end{aligned}$$

$$\begin{aligned}(5) \quad & \left(-\frac{7}{5}xy^2z\right) \times \left(\frac{13}{3}x^2yz^2\right) \\ & -\frac{7}{5} \times \frac{13}{3} \times x \times x^2 \times y^2 \times y \times z \times z^2 \\ & -\frac{91}{15}x^3y^3z^3 \\ & -\frac{91}{15}x^3y^3z^3\end{aligned}$$

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

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

$$\frac{18}{20} \times x^4 \times z^3 \times y$$

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

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

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

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

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

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

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

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

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

$$-210 a^3 b^4 c^3$$



$$\begin{aligned}
 10) \quad & (-5a) \times (-10a^2) \times (-2a^3) \\
 & (-5) \times (-10) \times (-2) \times a \times a^2 \times a^3 \\
 & -100 \times a^6 \\
 & -100a^6
 \end{aligned}$$

$$\begin{aligned}
 11) \quad & (-4x^2) \times (-6xy^2) \times (-3yz^2) \\
 & (-4) \times (-6) \times (-3) \times x^2 \times x \times y^2 \times y \times z^2 \\
 & -72 \times x^3 \times y^3 \times z^2 \\
 & -72 x^3 y^3 z^2
 \end{aligned}$$

$$\begin{aligned}
 12) \quad & \left(-\frac{2}{7} a^4\right) \times \left(-\frac{3}{4} a^2 b\right) \times \left(-\frac{14}{5} b^2\right) \\
 & -\frac{2}{7} \times -\frac{3}{4} \times -\frac{14}{5} \times a^4 \times a^2 \times b \times b^2 \\
 & -\frac{6^3}{10^3} \times a^6 \times b^3 \\
 & -\frac{3}{5} a^6 b^3
 \end{aligned}$$

$$\begin{aligned}
 13) \quad & \left(\frac{7}{9} ab^2\right) \times \left(\frac{15}{7} ac^2 b\right) \times \left(-\frac{3}{5} a^2 c\right) \\
 & \frac{7}{9} \times \frac{15}{7} \times -\frac{3}{5} \times a \times a \times a^2 \times b^2 \times b \times c^2 \times c \\
 & -1 a^4 \times b^3 \times c^3 \\
 & -a^4 b^3 c^3
 \end{aligned}$$

$$\begin{aligned}
 14) \quad & \left(\frac{4}{3} u^2 v \omega\right) \times (-5 u v \omega^2) \times \left(\frac{1}{3} v^2 \omega u\right) \\
 & \frac{4}{3} \times -5 \times \frac{1}{3} \times u^2 \times u \times u \times v \times v \times v^2 \times \omega \times \omega^2 \times \omega \\
 & \frac{-20}{9} \times u^4 \times v^4 \times \omega^4 \\
 & \frac{-20}{9} u^4 v^4 \omega^4
 \end{aligned}$$

$$\begin{aligned}
 15) \quad & (0.5x) \times \left(\frac{1}{3} x y^2 z^4\right) \times (24 x^2 y z) \\
 & 0.5 \times \frac{1}{3} \times 24 \times x \times x \times y^2 \times y \times x^2 \times z^4 \times z \\
 & \frac{12^4}{2} \times x^4 \times y^3 \times z^5 \\
 & 4 x^4 y^3 z^5
 \end{aligned}$$

$$\begin{aligned}
 16) \quad & \left(\frac{4}{3} p^2 v^2\right) \times \left(-\frac{1}{4} p^2 r\right) \times (16 p^2 q^2 r^2) \\
 & \frac{4}{3} \times -\frac{1}{4} \times 16 \times p \times p^2 \times p^2 \times v^2 \times v^2 \times r \times r^2 \\
 & \frac{-16}{3} \times p^5 \times v^4 \times r^3 \\
 & \frac{-16}{3} p^5 v^4 r^3
 \end{aligned}$$

$$\begin{aligned}
 17) \quad & (2.32y) \times (0.1x) \times (0.16) \\
 & 2.3 \times 0.1 \times 0.16 \times x \times x \times y \\
 & 0.0368 \times x^2 \times y \\
 & 0.0368 x^2 y
 \end{aligned}$$

$$\begin{aligned} (18) \quad & (3x) \times (4x) \times (-5x) \\ & 3 \times 4 \times -5 \times x \times x \times x \\ & -60x^3 \end{aligned}$$

$$\begin{aligned} (19) \quad & (4x^2) \times (-3x) \times \left(\frac{4}{5}x^3\right) \\ & 4 \times -3 \times \frac{4}{5} \times x^2 \times x \times x^3 \\ & -\frac{48}{5}x^6 \\ & -\frac{48}{5}x^6 \end{aligned}$$

$$\begin{aligned} (20) \quad & 5x^4 \times (x^2)^3 \times (2x)^2 \\ & 5x^4 \times x^6 \times 4x^2 \\ & 5 \times 4 \times x^4 \times x^6 \times x^2 \\ & 20x^{12} \\ & 20x^{12} \end{aligned}$$

$$\begin{aligned} (21) \quad & (x^2)^3 \times (2x) \times (-4x) \times 5 \\ & x^6 \times 2x \times (-4x) \times 5 \\ & 2 \times -4 \times 5 \times x^6 \times x \times x \\ & -40x^8 \\ & -40x^8 \end{aligned}$$

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

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

$$16x^3y^7$$

$$16x^3y^7$$

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

$$\text{RHS} \rightarrow 16(2.5)^3 \times (1)^7$$

$$\Rightarrow 16 \times 15.625$$

$$\Rightarrow 250$$

$$\text{LHS} = -8 \times 2.5^2 \times 1^6 \times -20 \times 1 \times 2.5$$
$$= 250$$

$$\text{LHS} = \text{RHS}$$

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

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

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

$$6.72x^8y^5$$

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

$$\text{RHS} = 6.72x^8y^5 \Rightarrow 6.72 \times 1^8 \times 0.5^5$$
$$\Rightarrow 0.21$$

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

$$= 0.21$$

$$\therefore \text{LHS} = \text{RHS}$$

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 :-  $x=1, y=0.5$

$$\text{RHS} \rightarrow 90x^9y^5 \Rightarrow 90(1)^9(0.5)^5$$

$$\text{LHS} \Rightarrow 2.8125 \rightarrow 2.8125$$

$$\text{LHS} = \text{RHS}$$

25

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

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

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

$$2.76a^7b^4$$

verification:-

$$a=1, b=0.5$$

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

$$2.76 \times 1 \times 0.0625$$

$$\Rightarrow 0.1725$$

26

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

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

$$160x^3y^7$$

verify : when  $x=2.5, y=1$

$$\text{RHS} \quad 160x^3y^7 = 160 \times (2.5)^3 \times (1)^7$$

$$= 2500$$

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

$$\begin{aligned} (27) \quad & -xy^3 \times y^2^3 \times xy \\ & -x \times x^3 \times x \times y^2 \times y \times y \\ & -x^5 y^5 \end{aligned}$$

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

$$\begin{aligned} \text{RHS} = -x^5 y^5 & \rightarrow (-1)^5 \times 2^5 \\ & \Rightarrow -1 \times 32 \\ & \Rightarrow -32 \end{aligned}$$

$$\begin{aligned} \text{LHS} & \rightarrow (-1) \times 2^3 \times 2 \times 2^2 \times 2 \\ & = -32 \end{aligned}$$

$$\text{LHS} = \text{RHS}$$

$$\begin{aligned} (28) \quad & \left(\frac{1}{8} x^2 y^4\right) \times \left(\frac{1}{4} x^4 y^2\right) \times (xy)^5 \\ & \frac{1}{8} \times \frac{1}{4} \times 5 \times x^2 \times x^4 \times x \times y^4 \times y^2 \times y \\ & \frac{5}{32} x^6 y^6 \\ & \frac{5}{32} x^6 y^6 \end{aligned}$$

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

$$\begin{aligned} \text{RHS} = \frac{5}{32} x^6 y^6 & = \frac{5}{32} \times 1^6 \times 2^6 \\ & = \frac{5}{32} \times 64 \\ & = 5 \times 2 \end{aligned}$$

$$= 10$$

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

$$= 10$$

$$\therefore \text{LHS} = \text{RHS}$$

$$\textcircled{29} \quad \left(\frac{2}{5}a^2b\right) \times (-15b^2ac) \times \left(-\frac{1}{2}c^2\right) \quad \textcircled{24}$$

$$\frac{2}{5} \times 15 \times \frac{1}{2} \times a^2 \times a \times b \times b^2 \times c \times c^3$$

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

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

$$\textcircled{30} \quad \left(-\frac{4}{9}a^2b\right) \times \left(-\frac{2}{3}b^2c\right) \times \left(-\frac{7}{6}c^2a\right)$$

$$\frac{-4}{9} \times \frac{-2}{3} \times \frac{-7}{6} \times a^2 \times a \times b \times b^2 \times c \times c^2$$

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

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

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

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

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

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

(25)

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

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

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

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

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

$$\begin{aligned} \text{RHS} &= \frac{1}{2} x^5 y^5 = \frac{1}{2} (2)^5 (-1)^5 \\ &= \frac{1}{2} \times 32 \times -1 \end{aligned}$$

$$\text{LHS} = \text{RHS} = -16$$

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

$$\frac{3}{5} \times \frac{-15}{4} \times \frac{7}{9} \times x^2 \times x \times x^2 \times y \times y^2 \times y^2$$

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

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

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

$$\begin{aligned} \text{RHS} &= -\frac{7}{4} x^5 y^5 = -\frac{7}{4} (2)^5 (-1)^5 \\ &= +\frac{7}{4} \times 32 \times 1 \end{aligned}$$

$$= 56$$

$$\text{LHS} = \text{RHS}$$



# Algebraic Expressions And Identities

## Ex 6.4

### Exercise - 6.4

(26)

$$\begin{aligned} 1) \quad & 2a^3(3a+5b) \\ & 2a^3 \times 3a + 2a^3 \times 5b \\ & 6a^4 + 10a^3b \\ & 6a^4 + 10a^3b. \end{aligned}$$

$$\begin{aligned} 2) \quad & -11a(3a+2b) \\ & -11a \times 3a + -11a \times 2b \\ & -33a^2 - 2 \times 11 \times a \times b \\ & -33a^2 - 22ab. \end{aligned}$$

$$\begin{aligned} 3) \quad & -5a(7a-2b) \\ & -5a \times 7a - (-5a) \times (+2b) \\ & -5 \times 7 \times a \times a + 5 \times 2 \times a \times b \\ & -35a^2 + 10ab \end{aligned}$$

$$\begin{aligned} 4) \quad & -11y^2(3y+7) \\ & -11y^2 \times 3y - 11y^2 \times 7 \\ & -11 \times 3 \times y^2 \times y - 11y^2 \times 7 \\ & -33y^3 - 77y^2. \end{aligned}$$

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

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

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

(27)

$$\textcircled{6} \quad xy(x^3 - y^3)$$

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

$$x^4y - xy^4$$

$$\textcircled{7} \quad 0.1y(0.1x^5 + 0.1y)$$

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

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

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

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

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

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

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

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

$$\begin{aligned} \textcircled{a} \quad & \frac{-8}{27}xyz \left( \frac{3}{2}xy^2z^2 - \frac{9}{4}xy^2z^3 \right) \\ & \frac{-8^4}{27^9}xyz \times \frac{3}{2}xy^2z^2 - \frac{8^4}{27^9}xyz \times \frac{-9}{4}xy^2z^3 \\ & -\frac{4}{9}x^2xy^2xz^3 + \frac{2}{3}x^2y^3z^4 \\ & -\frac{4}{9}x^2y^2z^3 + \frac{2}{3}x^2y^3z^4 \end{aligned}$$

$$\begin{aligned} \textcircled{b} \quad & \frac{-4}{27}xyz \left( \frac{9}{2}x^2yz - \frac{3}{4}xy^2z^2 \right) \\ & \frac{-4^2}{27^3}xyz \times \frac{9}{2}x^2yz - \frac{4}{27}xyz \times \frac{-3}{4}xy^2z^2 \\ & -\frac{2}{3}x^3xy^2xz^2 + 9x^2xy^2xz^3 \\ & -\frac{2}{3}x^3y^2z^2 + 9x^2y^2z^3 \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad & 1.5x(10x^2y - 100xy^2) \\ & 1.5x \times 10x^2y - 1.5x \times 100xy^2 \\ & 15x^3xy - 150x^2xy^2 \\ & 15x^3y - 150x^2y^2 \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad & 4.1xy(1.1x - y) \\ & 4.1xy \times 1.1x - 4.1xy \times y \\ & 4.51x^2y - 4.1xy^2 \end{aligned}$$