

Algebraic Expressions

Exercise 6A

Q1

Answer :

(i)

$$\begin{aligned} & 5x + 7x + (-6x) \\ &= 5x + 7x - 6x \\ &= 6x \end{aligned}$$

(ii)

$$\begin{aligned} & \frac{3}{5}x + \frac{2}{3}x + \frac{-4}{5}x \\ &= \frac{9x + 10x - 12x}{15} = \frac{7x}{15} \end{aligned}$$

(iii)

$$\begin{aligned} & 5a^2b + (-8a^2b) + 7a^2b \\ &= 5a^2b - 8a^2b + 7a^2b \\ &= 4a^2b \end{aligned}$$

(iv)

$$\begin{aligned} & \frac{3}{4}x^2 + 5x^2 + (-3x^2) + \left(-\frac{1}{4}x^2\right) \\ &= \frac{3}{4}x^2 - \frac{1}{4}x^2 + 5x^2 - 3x^2 \\ &= \frac{1}{2}x^2 + 2x^2 = \frac{5}{2}x^2 \end{aligned}$$

(v)

$$\begin{aligned} & x - 3y + 4z + y - 2x - 8z + 5x - 2y - 3z \\ &= x - 2x + 5x - 3y + y - 2y + 4z - 8z - 3z \\ &= 4x - 4y - 7z \end{aligned}$$

(vi) Collecting like terms and adding them:

$$\begin{aligned} & 2x^2 - 3y^2 + 5x^2 + 6y^2 + (-3x^2 - 4y^2) \\ &= 2x^2 + 5x^2 - 3x^2 - 3y^2 + 6y^2 - 4y^2 \\ &= 4x^2 - y^2 \end{aligned}$$

(vii) Collecting like terms and adding them:

$$5x - 2x^2 - 8 + 8x^2 - 7x - 9 + 3 + 7x^2 - 2x$$

(viii) Collecting like terms and adding them:

$$\begin{aligned} & \frac{2}{3}a - \frac{4}{5}b + \frac{3}{5}c + \left(-\frac{3}{4}a - \frac{5}{2}b + \frac{2}{3}c\right) + \frac{5}{2}a + \frac{7}{4}b - \frac{5}{6}c \\ & b - \frac{5}{2}b + \frac{7}{4}b + \frac{3}{5}c + \frac{2}{3}c - \frac{5}{6}c \\ & = \frac{(8-9+30)a}{12} + \frac{(-16-50+35)b}{20} + \frac{(18+20-25)c}{30} \\ & = \frac{29}{12}a - \frac{31}{20}b + \frac{13}{30}c \end{aligned}$$

(ix) Collecting like terms and adding them:

$$\begin{aligned} & \frac{8}{5}x + \frac{11}{7}y + \frac{9}{4}xy + \left(-\frac{3}{2}x - \frac{5}{3}y - \frac{9}{5}xy\right) \\ & = \frac{8}{5}x - \frac{3}{2}x + \frac{11}{7}y - \frac{5}{3}y + \frac{9}{4}xy - \frac{9}{5}xy \\ & = \frac{1}{10}x - \frac{2}{21}y + \frac{9}{20}xy \end{aligned}$$

(x) Collecting like terms and adding them:

$$\begin{aligned} & \frac{3}{2}x^3 - \frac{1}{4}x^2 + \frac{5}{3} + \left(-\frac{5}{4}x^3 + \frac{3}{5}x^2 - x + \frac{1}{5}\right) + \left(-x^2 + \frac{3}{8}x - \frac{8}{15}\right) \\ & = \frac{3}{2}x^3 - \frac{5}{4}x^3 - \frac{1}{4}x^2 + \frac{3}{5}x^2 - x^2 - x + \frac{3}{8}x + \frac{5}{3} + \frac{1}{5} - \frac{8}{15} \\ & = \frac{1}{4}x^3 - \frac{13}{20}x^2 - \frac{5}{8}x + \frac{4}{3} \end{aligned}$$

Q2

Answer :

(i) $7xy - (-8xy)$

$$= 7xy + 8xy$$

$$= 15xy$$

(ii) $-3x^2 - x^2$

$$= -4x^2$$

(iii) $(4y - 5x) - (x - y)$

$$= 4y - 5x - x + y$$

$$= 5y - 6x$$

(iv) $(a^2 + b^2 + 2ab) - (a^2 + b^2 - 2ab)$

$$= a^2 - a^2 + b^2 - b^2 + 2ab + 2ab \quad (\text{Collecting like terms and adding them})$$

$$= 4ab$$

(v) $(2x^2 - 3y^2 + 6xy) - (x^2 - y^2)$

$$2x^2 - x^2 - 3y^2 + y^2 + 6xy \quad (\text{Collecting like terms and adding them})$$

$$= x^2 - 2y^2 + 6xy$$

(vi) $(2z - x - 3y) - (x - y + 3z)$

$$= 2z - 3z - x - x - 3y + y \quad (\text{Collecting like terms and adding them})$$

$$= -z - 2x - 2y$$

Q4

Answer :

$$\begin{aligned}(8m - 7n + 6p^2) + (-3m - 4n - p^2) \\= 8\mathbf{m} - 3\mathbf{m} - 7\mathbf{n} - 4\mathbf{n} + 6\mathbf{p}^2 - \mathbf{p}^2 \\= 5\mathbf{m} - 11\mathbf{n} + 5\mathbf{p}^2\end{aligned}$$

$$\begin{aligned}(2m + 4n - 3p^2) + (-m - n - p^2). \\= 2\mathbf{m} - \mathbf{m} + 4\mathbf{n} - \mathbf{n} - 3\mathbf{p}^2 - \mathbf{p}^2 \\= \mathbf{m} + 3\mathbf{n} - 4\mathbf{p}^2\end{aligned}$$

$$\begin{aligned}\text{Now, } (\mathbf{m} + 3\mathbf{n} - 4\mathbf{p}^2) - (5\mathbf{m} - 11\mathbf{n} + 5\mathbf{p}^2) \\= -4\mathbf{m} + 14\mathbf{n} - 9\mathbf{p}^2\end{aligned}$$

Q5

Answer :

$$(8a - 6a^2 + 9) + (-10a - 8 + 8a^2)$$

Collecting like terms and adding them:

$$\begin{aligned}8\mathbf{a} - 10\mathbf{a} - 6\mathbf{a}^2 + 8\mathbf{a}^2 + 9 - 8 \\= -2\mathbf{a} + 2\mathbf{a}^2 + 1 \\ \text{Now, } -3 - (-2\mathbf{a} + 2\mathbf{a}^2 + 1) \\= 2\mathbf{a} - 2\mathbf{a}^2 - 4\end{aligned}$$

Q6

Answer :

Collecting like terms and adding them:

$$\begin{aligned}(\text{i}) \quad 5x + 7x - 9y - y \\= 12x - 10y\end{aligned}$$

$$\begin{aligned}(\text{ii}) \\ \mathbf{x}^2 - \frac{3}{2}\mathbf{x}^2 - \mathbf{x} - \frac{1}{2}\mathbf{x} + \frac{3}{2} \\= -\frac{1}{2}\mathbf{x}^2 - \frac{3}{2}\mathbf{x} + \frac{3}{2}\end{aligned}$$

$$\begin{aligned}(\text{iii}) \quad 7 + 7 - 2x - x - 5x + 5y + y - 3y \\= 14 - 8x - 3y\end{aligned}$$

$$\begin{aligned}(\text{iv}) \\ \frac{1}{3}\mathbf{y}^2 + \frac{2}{3}\mathbf{y}^2 - 2\mathbf{y}^2 - \frac{4}{7}\mathbf{y} - \frac{2}{7}\mathbf{y} - \frac{1}{7}\mathbf{y} + 5 - 2 + 3 \\= -\mathbf{y}^2 - \mathbf{y} + 6\end{aligned}$$

Algebraic Expressions

Exercise 6B

Q1

Answer :

$$\begin{aligned} & 3a^2 \times 8a^4 \\ &= (3 \times 8) \times (a^2 \times a^4) \\ &= 24 \times a^{(2+4)} \\ &= 24a^6 \end{aligned}$$

Q2

Answer :

$$\begin{aligned} & -6x^3 \times 5x^2 \\ &= (-6 \times 5) \times (x^3 \times x^2) \\ &= (-30) \times (x^{(3+2)}) \\ &= -30x^5 \end{aligned}$$

Q3

Answer :

$$\begin{aligned} & (-4ab) \times (-3a^2bc) \\ &= (-4 \times -3) \times (a \times a^2 \times b \times b \times c) \\ &= 12 \times (a^3b^2c) \\ &= 12a^3b^2c \end{aligned}$$

Q4

Answer :

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

Q5

Answer :

$$\begin{aligned} &= \left(\frac{2}{3} \times \frac{3}{5} \right) \times \left(x^2 \times x \times y \times y^2 \right) \\ &= \frac{2}{5} \times x^{(2+1)} \times y^{(1+2)} \\ &= \frac{2}{5} x^3 y^3 \end{aligned}$$

Q6

Answer :

$$\begin{aligned} &= \left(\frac{-3}{4} \times \frac{-2}{3} \right) \times \left(a \times a^2 \times b^3 \times b^4 \right) \\ &= \frac{1}{2} \times a^{(1+2)} \times b^{(3+4)} \\ &= \frac{1}{2} a^3 b^7 \end{aligned}$$

Q7

Answer :

$$\begin{aligned} &= \left(\frac{-1}{27} \times \frac{-9}{2} \right) \times \left(a^2 \times a^3 \times b^2 \times b \times c^2 \right) \\ &= \frac{1}{6} \times a^{(2+3)} \times b^{(2+1)} \times c^2 \\ &= \frac{1}{6} a^5 b^3 c^2 \end{aligned}$$

Q8

Answer :

$$\begin{aligned} &= \left(\frac{-13}{5} \times \frac{7}{3} \right) \times \left(a \times a^2 \times b^2 \times b \times c \times c^2 \right) \\ &= \frac{-91}{15} a^{(1+2)} \times b^{(2+1)} \times c^{(1+2)} \\ &= \frac{-91}{15} a^3 b^3 c^3 \end{aligned}$$

Q9

Answer :

$$\begin{aligned} &= \left(-\frac{18}{5} \times \frac{-25}{6} \right) \times \left(x^2 \times x \times z \times z^2 \times y \right) \\ &= 15 \times x^{(2+1)} \times y \times z^{(1+2)} \\ &= 15x^3 yz^3 \end{aligned}$$

Q10

Answer :

$$\begin{aligned} &= \left(\frac{-3}{14} \times \frac{7}{6} \right) \times \left(x \times x^3 \times y^4 \times y \right) \\ &= \frac{-1}{4} x^{(1+3)} \times y^{(4+1)} \\ &= \frac{-1}{4} x^4 y^5 \end{aligned}$$

Q11

Answer :

$$\begin{aligned} &= \left(\frac{-7}{5} \times \frac{3}{2} \times \frac{-6}{5} \right) \times \left(x^2 \times x \times x^3 \times y \times y^2 \times y^3 \right) \\ &= \frac{63}{25} \times x^{(2+1+3)} \times y^{(1+2+3)} \\ &= \frac{63}{25} x^6 y^6 \end{aligned}$$

Q12

Answer :

$$\begin{aligned} &= \left(2 \times (-5) \times (-6) \right) \times \left(a^2 \times a \times b \times b^2 \times b \times c \times c^2 \right) \\ &= 60 \times a^{(2+1)} \times b^{(1+2+1)} \times c^{(1+2)} \\ &= 60a^3 b^4 c^3 \end{aligned}$$

Q13

Answer :

$$\begin{aligned}
&= \left(-4 \times (-6) \times (-3) \right) \times \left(x^2 \times x \times y^2 \times y \right) \\
&= -72 \times x^{(2+1)} \times y^{(2+1)} \\
&= -72x^3y^3
\end{aligned}$$

Q14

Answer :

$$\begin{aligned}
&= \left(-\frac{3}{5} \times \frac{15}{7} \times \frac{7}{9} \right) \times \left(s^2 \times s \times s \times t \times t^2 \times u \times u^2 \right) \\
&= -1 \times s^{(2+1+1)} \times t^{(1+2)} \times u^{(1+2)} \\
&= -s^4t^3u^3
\end{aligned}$$

Q15

Answer :

$$\begin{aligned}
&= \left(-\frac{2}{7} \times -\frac{14}{5} \times -\frac{3}{4} \right) \times \left(u^4 \times u \times u^2 \times v \times v^3 \times v^3 \right) \\
&= -\frac{3}{5} \times u^{(4+1+2)} \times v^{(1+3+3)} \\
&= -\frac{3}{5} u^7v^7
\end{aligned}$$

Q16

Answer :

$$\begin{aligned}
&= \left(-3 \times -1 \times -1 \right) \times \left(a \times a^2 \times a \times b^2 \times b^2 \times b \times c \times c^3 \times c \right) \\
&= -3 \times a^{(1+2+1)} \times b^{(2+2+1)} \times c^{(1+4+1)} \\
&= -3a^4b^5c^5
\end{aligned}$$

Q17

Answer :

$$\begin{aligned}
&= \left(\frac{4}{3} \times \frac{1}{3} \times (-6) \right) \times \left(x^2 \times x \times x \times y \times y^2 \times y \times z \times z \times z^2 \right) \\
&= -\frac{8}{3} \times x^{(2+1+1)} \times y^{(1+2+1)} \times z^{(1+1+2)} \\
&= -\frac{8}{3} x^4y^4z^4
\end{aligned}$$

Q18

Answer :

$$\begin{aligned}
&\frac{-2}{3} a^2b \times \frac{6}{5} a^3b^2 \\
&= \left(-\frac{2}{3} \times \frac{6}{5} \right) \times \left(a^2 \times a^3 \times b \times b^2 \right) \\
&= -\frac{4}{5} \times a^{(2+3)} \times b^{(1+2)} \\
&= -\frac{4}{5} a^5b^3
\end{aligned}$$

When a =2 and b =3, we get:

$$\begin{aligned}
\frac{-2}{3} a^2b &= \frac{-2}{3} \times 2^2 \times 3 = -8 \\
\frac{6}{5} a^3b^2 &= \frac{6}{5} \times 2^3 \times 3^2 = \frac{432}{5} \\
\text{L.H.S.} &= \frac{-2}{3} a^2b \times \frac{6}{5} a^3b^2 = -8 \times \frac{432}{5} = \frac{-3456}{5} \\
\text{R.H.S.} &= -\frac{4}{5} a^5b^3 = -\frac{4}{5} \times 2^5 \times 3^3 = \frac{-3456}{5}
\end{aligned}$$

L.H.S. = R.H.S.

Hence, the result is verified.

Q19

Answer :

$$\frac{-8}{21}x^2y^3 \times \frac{-7}{16}xy^2 = \left(\frac{-8}{21} \times \frac{-7}{16}\right)(x^{2+1})(y^{3+2}) = \frac{1}{6} \times x^3 \times y^5$$

When $x = 3$ and $y = 2$, we get :

$$\text{L.H.S.} = \frac{-8}{21}x^2y^3 \times \frac{-7}{16}xy^2 = \frac{-192}{7} \times \frac{-21}{4} = 144$$

$$\text{R.H.S.} = \frac{1}{6}x^3y^5 = \frac{1}{6} \times 3^3 \times 2^5 = 144$$

L.H.S. = R.H.S.

$$\therefore \frac{-8}{21}x^2y^3 \times \frac{-7}{16}xy^2 = \frac{1}{6}x^3y^5$$

Q20

Answer :

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

$$= 2.76 \times a^{(5+2)} \times b^{(2+2)}$$

$$= 2.76a^7b^4$$

When $a = 1$ and $b = 0.5$, we get :

$$2.76a^7b^4 = 2.76 \times 1^7 \times 0.5^4 = 0.1725$$

Q21

Answer :

$$= (-8 \times (-20)) \times (u^2 \times u \times v^6 \times v)$$

$$= 160 \times u^{(2+1)} \times v^{(6+1)}$$

$$= 160u^3v^7$$

$$160u^3v^7 = 160 \times 2.5^3 \times 1^7 = 2500$$

Q22

Answer :

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

$$= 3 \times a^{(2+1)} \times b^{(1+2)} \times c^{(1+2)}$$

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

When $a = 1$, $b = 2$ and $c = 3$, we get :

$$\frac{2}{5}a^2b = \frac{2}{5} \times 1^2 \times 2 = \frac{4}{5}$$

$$-15b^2ac = -15 \times 2^2 \times 1 \times 3 = -180$$

$$\frac{-1}{2}c^2 = \frac{-1}{2} \times 3^2 = \frac{-9}{2}$$

$$\text{L.H.S.} = \frac{2}{5}a^2b \times -15b^2ac \times \frac{-1}{2}c^2 = \frac{4}{5} \times -180 \times \frac{-9}{2} = 648$$

$$\text{R.H.S.} = 3a^3b^3c^3 = 3 \times 1^3 \times 2^3 \times 3^3 = 648$$

L.H.S. = R.H.S.

$$\therefore \frac{2}{5}a^2b \times -15b^2ac \times \frac{-1}{2}c^2 = 3a^3b^3c^3$$

Q23

Answer :

$$= \left(\frac{1}{4} \times -6 \times -\frac{1}{3}\right) \times (a \times b \times b^2 \times c \times c \times c^3)$$

$$= \frac{1}{2} \times a \times b^{(1+2)} \times c^{(1+1+3)}$$

$$= \frac{1}{2}ab^3c^5$$

When $a = 1$, $b = 2$ and $c = 3$, we get :

$$\frac{1}{4}abc = \frac{1}{4} \times 1 \times 2 \times 3 = \frac{3}{2}$$

$$-6b^2c = -6 \times 2^2 \times 3 = -72$$

$$-\frac{1}{3}c^3 = \frac{-1}{3} \times 3^3 = -9$$

$$\text{L.H.S.} = \frac{1}{4}abc \times -6b^2c \times -\frac{1}{3}c^3 = \frac{3}{2} \times -72 \times -9 = 972$$

$$\text{R.H.S.} = \frac{1}{2}ab^3c^5 = \frac{1}{2} \times 1 \times 2^3 \times 3^5 = 972$$

L.H.S. = R.H.S.

$$\therefore \frac{1}{4}abc \times -6b^2c \times -\frac{1}{3}c^3 = \frac{1}{2}ab^3c^5$$

Q24

Answer :

$$\begin{aligned} &= \left(\frac{4}{9} \times \frac{-27}{5} \times -8 \right) \times \left(a \times a^3 \times b \times b^2 \times b^3 \times c^3 \times c \right) \\ &= \frac{96}{5} \times a^{(1+3)} \times b^{(1+2+3)} \times c^{(3+1)} \\ &= \frac{96}{5} a^4 b^6 c^4 \end{aligned}$$

When $a = 1$, $b = 2$ and $c = 3$:

$$\begin{aligned} \text{L.H.S.: } &\left(\frac{4}{9} \times \frac{-27}{5} \times -8 \right) \times \left(a \times a^3 \times b \times b^2 \times b^3 \times c^3 \times c \right) \\ &= \left(\frac{4}{9} \times \frac{-27}{5} \times -8 \right) \times \left(1 \times 1^3 \times 2 \times 2^2 \times 2^3 \times 3^3 \times 3 \right) \\ &= \frac{497664}{5} \end{aligned}$$

$$\text{R.H.S.: } \frac{96}{5} a^4 b^6 c^4 = \frac{96}{5} (1^4 \times 2^6 \times 3^4) = \frac{497664}{5}$$

L.H.S. = R.H.S.

Hence, verified.

Q225

Answer :

$$\begin{aligned} &= \left(\frac{-4}{7} \times \frac{-2}{3} \times \frac{-7}{6} \right) \times \left(a^2 \times a \times b \times b^2 \times c \times c^2 \right) \\ &= -\frac{4}{9} a^{(2+1)} \times b^{(1+2)} \times c^{(1+2)} \\ &= -\frac{4}{9} a^3 b^3 c^3 \end{aligned}$$

$$\begin{aligned} \text{L.H.S.: } &\left(\frac{-4}{7} \times \frac{-2}{3} \times \frac{-7}{6} \right) \times \left(1^2 \times 1 \times 2 \times 2^2 \times 3 \times 3^2 \right) \\ &= -96 \end{aligned}$$

$$\text{R.H.S.: } -\frac{4}{9} \times 1^3 \times 2^3 \times 3^3 = -96$$

L.H.S. = R.H.S.

Hence, verified.

Algebraic Expressions

Exercise 6C

Q1

Answer :

$$\begin{aligned} &= 4a \times 3a + 4a \times 7b \\ &= 4 \times 3 \times a^{(1+1)} + 4 \times 7 \times a \times b \\ &= 12a^2 + 28ab \end{aligned}$$

Q2

Answer :

$$\begin{aligned} &= 5a \times 6a - 5a \times 3b \\ &= 5 \times 6 \times a \times a - (5 \times 3 \times a \times b) \\ &= 30a^2 - 15ab \end{aligned}$$

Q3

Answer :

$$\begin{aligned} &= 8a^2 \times 2a + 8a^2 \times 5b \\ &= 8 \times 2 \times a^2 \times a + 8 \times 5 \times a^2 \times b \\ &= 16a^{(2+1)} + 40a^2b \\ &= 16a^3 + 40a^2b \end{aligned}$$

Q4

Answer :

$$\begin{aligned} &= 9x^2 \times 5x + 9x^2 \times 7 \\ &= 9 \times 5 \times x^2 \times x + 9 \times 7 \times x^2 \\ &= 45x^{(2+1)} + 63x^2 \\ &= 45x^3 + 63x^2 \end{aligned}$$

Q5

Answer :

$$\begin{aligned} &= ab \times a^2 - ab \times b^2 \\ &= a^{(1+2)}b - ab^{(1+2)} \\ &= a^3b - ab^3 \end{aligned}$$

Q6

Answer :

$$\begin{aligned} &= 2x^2 \times 3x - 2x^2 \times 4x^2 \\ &= 2 \times 3 \times x^2 \times x - 2 \times 4 \times x^2 \times x^2 \\ &= 6 \times x^{(2+1)} - 8 \times x^{(2+2)} \\ &= 6x^3 - 8x^4 \end{aligned}$$

Q7

Answer :

$$\begin{aligned} &= \frac{3}{5}m^2n \times m + \frac{3}{5}m^2n \times 5n \\ &= \frac{3}{5} \times m^2 \times m \times n + \frac{3}{5} \times 5 \times m^2 \times n \times n \\ &= \frac{3}{5}m^{(2+1)} \times n + 3 \times m^2 \times n^{(1+1)} \\ &= \frac{3}{5}m^3n + 3m^2n^2 \end{aligned}$$

Q8

Answer :

$$\begin{aligned} &= -17x^2 \times 3x - (-17x^2 \times 4) \\ &= -17 \times 3 \times x^2 \times x + 17 \times 4 \times x^2 \\ &= -51 \times x^{(2+1)} + 68x^2 \\ &= -51x^3 + 68x^2 \end{aligned}$$

Q9

Answer :

$$\begin{aligned} &= \frac{7}{2}x^2 \times \frac{4}{7} \times x + \frac{7}{2}x^2 \times 2 \\ &= \frac{7}{2} \times \frac{4}{7} \times x^2 \times x + \frac{7}{2} \times 2 \times x^2 \\ &= 2 \times x^{(2+1)} + 7x^2 \\ &= 2x^3 + 7x^2 \end{aligned}$$

Q10

Answer :

$$\begin{aligned} &= -4x^2y \times 3x^2 - (-4x^2y \times 5y) \\ &= -4 \times 3 \times x^2 \times x^2 \times y + 4 \times 5 \times x^2 \times y \times y \\ &= -12 \times x^{(2+2)} \times y + 20 \times x^2 \times y^{(1+1)} \\ &= -12x^4y + 20x^2y^2 \end{aligned}$$

Q11

Answer :

$$\begin{aligned} &= \frac{-4}{27}xyz \times \frac{9}{2}x^2yz - \left(\frac{-4}{27}xyz \times \frac{3}{4}xyz^2 \right) \\ &= \frac{-4}{27} \times \frac{9}{2} \times x \times x^2 \times y \times y \times z \times z + \frac{4}{27} \times \frac{3}{4} \times x \times x \times y \times y \times z \times z^2 \\ &= \frac{-2}{3} \times x^{(1+2)} \times y^{(1+1)} \times z^{(1+1)} + \frac{1}{9} \times x^{(1+1)} \times y^{(1+1)} \times z^{(1+2)} \\ &= \frac{-2}{3}x^3y^2z^2 + \frac{1}{9}x^2y^2z^3 \end{aligned}$$

Q12

Answer :

$$\begin{aligned} &= 9t^2 \times t + 9t^2 \times 7t^3 \\ &= 9 \times t^2 \times t + 9 \times 7 \times t^2 \times t^3 \\ &= 9 \times t^{(2+1)} + 63 \times t^{(2+3)} \\ &= 9t^3 + 63t^5 \end{aligned}$$

Q13

Answer :

$$\begin{aligned} &= 10a^2 \times 0.1a - 10a^2 \times 0.5b \\ &= 10 \times 0.1 \times a^2 \times a - 10 \times 0.5 \times a^2 \times b \\ &= 1 \times a^{(2+1)} - 5a^2b \\ &= a^3 - 5a^2b \end{aligned}$$

Q14

Answer :

$$\begin{aligned} &= 1.5a \times 10a^2b - 1.5a \times 100ab^2 \\ &= 1.5 \times 10 \times a \times a^2b - 1.5 \times 100 \times a \times a \times b^2 \\ &= 15 \times a^{(1+2)}b - 150 \times a^{(1+1)} \times b^2 \\ &= 15a^3b - 150a^2b^2 \end{aligned}$$

Q15

Answer :

$$\begin{aligned} &= \frac{2}{3}abc \times a^2 + \frac{2}{3}abc \times b^2 - \frac{2}{3}abc \times 3c^2 \\ &= \frac{2}{3}a \times a^2 \times b \times c + \frac{2}{3}a \times b \times b^2 \times c - \frac{2}{3} \times 3 \times a \times b \times c \times c^2 \\ &= \frac{2}{3} \times a^{(1+2)} \times b \times c + \frac{2}{3} \times a \times b^{(1+2)} \times c - 2 \times a \times b \times c^{(1+2)} \\ &= \frac{2}{3}a^3bc + \frac{2}{3}ab^3c - 2abc^3 \end{aligned}$$

Q16

Answer :

$$\begin{aligned} &24x^2(1-2x) \\ &= 24x^2 \times 1 - 24x^2 \times 2x \\ &= 24x^2 - 24 \times 2 \times x^2 \times x \\ &= 24x^2 - 48x^3 \end{aligned}$$

When $x = 2$:

$$\text{L.H.S.} = 24x^2(1-2x) = 24 \times 2^2(1-2 \times 2) = 96(1-4) = 96 \times (-3) = -288$$

$$\text{R.H.S.} = 24x^2 - 48x^3 = 24 \times 2^2 - 48 \times 2^3 = 96 - 384 = -288$$

$$\text{L.H.S.} = \text{R.H.S.}$$

$$\therefore 24x^2(1-2x) = 24x^2 - 48x^3$$

Q17

Answer :

$$\begin{aligned} &ab\left(2 + b^2\right) \\ &= ab \times a^2 + ab \times b^2 \\ &= a \times a^2 \times b + a \times b \times b^2 \\ &= a^{(1+2)} \times b + a \times b^{(1+2)} \\ &= a^3b + ab^3 \end{aligned}$$

When $a = 2$ and $b = \frac{1}{2}$, we get :

$$\text{L.H.S.} = ab\left(a^2 + b^2\right) = 2 \times \frac{1}{2} \left(2^2 + \frac{1}{2^2}\right) = 4 + \frac{1}{4} = \frac{17}{4}$$

$$\text{R.H.S.} = a^3b + ab^3 = 2^3 \times \frac{1}{2} + 2 \times \left(\frac{1}{2}\right)^3 = 4 + \frac{1}{4} = \frac{17}{4}$$

$$\therefore \text{L.H.S.} = \text{R.H.S.}$$

Q18

Answer :

$$\begin{aligned} & s(s^2 - st) \\ &= s \times s^2 - s \times st \\ &= s^{(1+2)} - s^{(1+1)} \times t \\ &= s^3 - s^2t \end{aligned}$$

When $s = 2$ and $t = 3$, we get :

$$\text{L.H.S.} = s(s^2 - st) = 2(2^2 - 2 \times 3) = 2 \times (4 - 6) = -4$$

$$\text{R.H.S.} = s^3 - s^2t = 2^3 - 2^2 \times 3 = 8 - 12 = -4$$

$$\text{L.H.S.} = \text{R.H.S.}$$

$$\therefore s(s^2 - st) = s^3 - s^2t$$

Q19

Answer :

$$\begin{aligned} & -3y(xy + y^2) \\ &= -3y \times xy - 3y \times y^2 \\ &= -3 \times x \times y \times y - 3 \times y \times y^2 \\ &= -3 \times x \times y^{(1+1)} - 3 \times y^{(1+2)} \\ &= -3xy^2 - 3y^3 \end{aligned}$$

When $x = 4$ and $y = 5$, we get :

$$\text{L.H.S.} = -3y(xy + y^2) = -3 \times 5(4 \times 5 + 5^2) = -15 \times (20 + 25) = -675$$

$$\text{R.H.S.} = -3xy^2 - 3y^3 = -3 \times 4 \times 5^2 - 3 \times 5^3 = -300 - 375 = -675$$

$$\text{L.H.S.} = \text{R.H.S.}$$

$$\therefore -3y(xy + y^2) = -3xy^2 - 3y^3$$

Q20

Answer :

$$\begin{aligned} & a(b - c) + b(c - a) + c(a - b) \\ &= a \times b - a \times c + b \times c - b \times a + c \times a - c \times b \\ &= ab - ac + bc - ab + ac - bc \\ &= 0 \end{aligned}$$

Q21

Answer :

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

Q22

Answer :

$$\begin{aligned} & 3x^2 + 2(x + 2) - 3x(2x + 1) \\ &= 3x^2 + 2 \times x + 2 \times 2 - 3x \times 2x - 3x \\ &= 3x^2 + 2x + 4 - 6x^2 - 3x \\ &= -3x^2 - x + 4 \end{aligned}$$

Q23

Answer :

$$\begin{aligned} & x(x + 4) + 3x(2x^2 - 1) + 4x^2 + 4 \\ &= x \times x + x \times 4 + 3x \times 2x^2 - 3x + 4x^2 + 4 \\ &= x^{(1+1)} + 4x + 6 \times x^{(1+2)} - 3x + 4x^2 + 4 \\ &= x^2 + 4x + 6x^3 - 3x + 4x^2 + 4 \\ &= 6x^3 + 5x^2 + x + 4 \end{aligned}$$

Q24

Answer :

$$\begin{aligned}& 2x^2 + 3x(1 - 2x^3) + x(x + 1) \\&= 2x^2 + 3x - 3x \times 2x^3 + x^2 + x \\&= 2x^2 + 3x - 6 \times x^{(1+3)} + x^2 + x \\&= 2x^2 + 3x - 6x^4 + x^2 + x \\&= -6x^4 + 3x^2 + 4x\end{aligned}$$

Q25

Answer :

$$\begin{aligned}& a^2b(a - b^2) + ab^2(4ab - 2a^2) - a^3b(1 - 2b) \\&= a^2b \times a - a^2b \times b^2 + ab^2 \times 4ab - ab^2 \times 2a^2 - a^3b + a^3b \times 2b \\&= a^{(2+1)} \times b - a^2 \times b^{(1+2)} + 4 \times a^{(1+1)} \times b^{(2+1)} - 2 \times a^{(1+2)} \times b^2 - a^3b + 2 \times a^3 \\&\times b^{(1+1)} \\&= a^3b - a^2b^3 + 4a^2b^3 - 2a^3b^2 - a^3b + 2a^3b^2 \\&= 3a^2b^3\end{aligned}$$

Q26

Answer :

$$\begin{aligned}& 4st(s - t) - 6s^2(t - t^2) - 3t^2(2s^2 - s) + 2st(s - t) \\&= 4st \times s - 4st \times t - 6s^2 \times t - 6s^2 \times (-t^2) - 3t^2 \times 2s^2 - 3t^2 \times (-s) + 2st \times s - 2st \\&\times t \\&= 4 \times s^{(1+1)} \times t - 4 \times s \times t^{(1+1)} - 6s^2t + 6s^2t^2 - 6t^2s^2 + 3t^2s + 2 \times s^{(1+1)} \times t - 2 \times s \\&\times t^{(1+1)} \\&= 4s^2t - 4st^2 - 6s^2t + 6s^2t^2 - 6t^2s^2 + 3t^2s + 2s^2t - 2st^2 \\&= 4s^2t - 6s^2t + 2s^2t - 4st^2 + 3st^2 - 2st^2 \\&= -3st^2\end{aligned}$$