Algebraic Expressions
Exercise 6A

Q1

Answer :

(i)

$5x + 7x + (-6x)$

$= 5x + 7x - 6x$

$= 6x$

(ii)

$\frac{3}{5}x + \frac{2}{3}x + \frac{-4}{5}x$

$= \frac{9x + 10x - 12x}{15} = \frac{7x}{15}$

(iii)

$5a^2b + (-8a^2b) + 7a^2b$

$= 5a^2b - 8a^2b + 7a^2b$

$4a^2b$

(iv)

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

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

$= \frac{1}{2}x^2 + 2x^2 = \frac{5}{2}x^2$

(v)

$x - 3y + 4z + y - 2x - 8z + 5x - 2y - 3z$

$= x - 2x + 5x - 3y + y - 2y + 4z - 8z - 3z$

$= 4x - 4y - 7z$

(vi) Collecting like terms and adding them:

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

$= 2x^2 + 5x^2 - 3x^2 - 3y^2 + 6y^2 - 4y^2$

$= 4x^2 - y^2$

(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:

$$\frac{2}{3}a - \frac{4}{5}b + \frac{3}{5}c + \left(-\frac{3}{4}a - \frac{5}{2}b + \frac{2}{3}c\right) + \frac{5}{2}a + \frac{7}{4}b - \frac{5}{6}c$$

$$b - \frac{5}{2}b + \frac{7}{4}b + \frac{3}{5}c + \frac{2}{3}c - \frac{5}{6}c$$

$$= \frac{(8-9+30)a}{12} + \frac{(-16-50+35)b}{20} + \frac{(18+20-25)c}{30}$$

$$= \frac{29}{12}a - \frac{31}{20}b + \frac{13}{30}c$$

(ix) Collecting like terms and adding them:

$$\frac{8}{5}x + \frac{11}{7}y + \frac{9}{4}xy + \left(-\frac{3}{2}x - \frac{5}{3}y - \frac{9}{5}xy\right)$$

$$= \frac{8}{5}x - \frac{3}{2}x + \frac{11}{7}y - \frac{5}{3}y + \frac{9}{4}xy - \frac{9}{5}xy$$

$$= \frac{1}{10}x - \frac{2}{21}y + \frac{9}{20}xy$$

(x) Collecting like terms and adding them:

$$\frac{3}{2}x^3 - \frac{1}{4}x^2 + \frac{5}{3} + \left(-\frac{5}{4}x^3 + \frac{3}{5}x^2 - x + \frac{1}{5}\right) + \left(-x^2 + \frac{3}{8}x - \frac{8}{15}\right)$$

$$= \frac{3}{2}x^3 - \frac{5}{4}x^3 - \frac{1}{4}x^2 + \frac{3}{5}x^2 - x^2 - x + \frac{3}{8}x + \frac{5}{3} + \frac{1}{5} - \frac{8}{15}$$

$$= \frac{1}{4}x^3 - \frac{13}{20}x^2 - \frac{5}{8}x + \frac{4}{3}$$

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) $(a^2 + b^2 + 2ab) - (a^2 + b^2 - 2ab)$
$= a^2 - a^2 + b^2 - b^2 + 2ab + 2ab$ (Collecting like terms and adding them)

$= 4ab$

(v) $(2x^2 - 3y^2 + 6xy) - (x^2 - y^2)$
$2x^2 - x^2 - 3y^2 + y^2 + 6xy$ (Collecting like terms and adding them)
$= x^2 - 2y^2 + 6xy$

(vi) (2z -x -3y) - (x - y +3z)
= 2z -3z -x -x -3y +y   (Collecting like terms and adding them)
= -z -2x - 2y

Q4

Answer :

$(8m - 7n + 6p^2) + (-3m - 4n - p^2)$
$$= 8m - 3m - 7n - 4n + 6p^2 - p^2$$
$$= 5m - 11n + 5p^2$$

$(2m + 4n - 3p^2) + (-m - n - p^2).$
$$= 2m - m + 4n - n - 3p^2 - p^2$$
$$= m + 3n - 4p^2$$

Now, $(m + 3n - 4p^2) - (5m - 11n + 5p^2)$
$$= -4m + 14n - 9p^2$$

Q5

Answer :

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

Collecting like terms and adding them:

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

Q6

Answer :

Collecting like terms and adding them:

(i) 5x + 7x - 9y -y
= 12x -10y

(ii)
$$x^2 - \frac{3}{2}x^2 - x - \frac{1}{2}x + \frac{3}{2}$$
$$= -\frac{1}{2}x^2 - \frac{3}{2}x + \frac{3}{2}$$

(iii) 7 + 7 - 2x -x - 5x + 5y + y - 3y
= 14 - 8x -3y

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

Algebraic Expressions
Exercise 6B

Q1

Answer :

$3a^2 \times 8a^4$
$= \left(3 \times 8\right) \times \left(a^2 \times a^4\right)$
$= 24 \times a^{(2+4)}$
$= 24a^6$

Q2

Answer :

$-6x^3 \times 5x^2$
$= \left(-6 \times 5\right) \times \left(x^3 \times x^2\right)$
$= \left(-30\right) \times \left(x^{(3+2)}\right)$
$= -30x^5$

Q3

Answer :

$(-4ab) \times (-3a^2bc)$
$= \left(-4 \times -3\right) \times \left(a \times a^2 \times b \times b \times c\right)$
$= 12 \times \left(a^3 b^2 c\right)$
$= 12a^3 b^2 c$

Q4

Answer :

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

Q5

Answer :

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

Q6

Answer :

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

Q7

Answer :

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

Q8

Answer :

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

Q9

Answer :

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

Q10

Answer :

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

Q11

Answer :

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

Q12

Answer :

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

Q13

Answer :

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

Q14

Answer :

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

Q15

Answer :

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

Q16

Answer :

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

Q17

Answer :

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

Q18

Answer :

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

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

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

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

Hence, the result is verified.

Q19

Answer:

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

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

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

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

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

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

Q20

Answer:

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

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

$= 2.76 a^7 b^4$

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

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

Q21

Answer:

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

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

$= 160 u^3 v^7$

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

Q22

Answer:

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

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

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

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

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

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

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

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

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

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

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

Q23

Answer:

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

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

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

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

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

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

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

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

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

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

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

Q24

Answer :

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

$$= \frac{96}{5} \times a^{(1+3)} \times b^{(1+2+3)} \times c^{(3+1)}$$

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

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

L.H.S.: $\left(\frac{4}{9} \times \frac{-27}{5} \times -8\right) \times \left(a \times a^3 \times b \times b^2 \times b^3 \times c^3 \times c\right)$

$$= \left(\frac{4}{9} \times \frac{-27}{5} \times -8\right) \times \left(1 \times 1^3 \times 2 \times 2^2 \times 2^3 \times 3^3 \times 3\right)$$

$$= \frac{497664}{5}$$

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

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

Hence, verified.

Q225

Answer :

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

$$= -\frac{4}{9} a^{(2+1)} \times b^{(1+2)} \times c^{(1+2)}$$

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

L.H.S.: $\left(\frac{-4}{7} \times \frac{-2}{3} \times \frac{-7}{6}\right) \times \left(1^2 \times 1 \times 2 \times 2^2 \times 3 \times 3^2\right)$

$$= -96$$

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 :

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

Q2

Answer :

$$= 5a \times 6a - 5a \times 3b$$
$$= 5 \times 6 \times a \times a - (5 \times 3 \times a \times b)$$
$$= 30a^2 - 15\,ab$$

Q3

Answer :

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

Q4

Answer :

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

Q5

Answer :

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

Q6

Answer :

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

Q7

Answer :

$$= \tfrac{3}{5} m^2 n \times m + \tfrac{3}{5} m^2 n \times 5n$$
$$= \tfrac{3}{5} \times m^2 \times m \times n + \tfrac{3}{5} \times 5 \times m^2 \times n \times n$$
$$= \tfrac{3}{5} m^{(2+1)} \times n + 3 \times m^2 \times n^{(1+1)}$$
$$= \tfrac{3}{5} m^3 n + 3m^2 n^2$$

Q8

Answer :

$$= -17x^2 \times 3x - \left(-17x^2 \times 4\right)$$
$$= -17 \times 3 \times x^2 \times x + 17 \times 4 \times x^2$$
$$= -51 \times x^{(2+1)} + 68x^2$$
$$= -51x^3 + 68x^2$$

Q9

Answer :

$$= \tfrac{7}{2} x^2 \times \tfrac{4}{7} \times x + \tfrac{7}{2} x^2 \times 2$$
$$= \tfrac{7}{2} \times \tfrac{4}{7} \times x^2 \times x + \tfrac{7}{2} \times 2 \times x^2$$
$$= 2 \times x^{(2+1)} + 7x^2$$
$$= 2x^3 + 7x^2$$

Q10

Answer :

$$= -4x^2y \times 3x^2 - \left(-4x^2y \times 5y\right)$$
$$= -4 \times 3 \times x^2 \times x^2 \times y + 4 \times 5 \times x^2 \times y \times y$$
$$= -12 \times x^{(2+2)} \times y + 20 \times x^2 \times y^{(1+1)}$$
$$= -12x^4y + 20x^2y^2$$

Q11

Answer :

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

Q12

Answer :

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

Q13

Answer :

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

Q14

Answer :

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

Q15

Answer :

$$= \tfrac{2}{3}\,abc \times a^2 + \tfrac{2}{3}\,abc \times b^2 - \tfrac{2}{3}\,abc \times 3c^2$$
$$= \tfrac{2}{3}\,a \times a^2 \times b \times c + \tfrac{2}{3}\,a \times b \times b^2 \times c - \tfrac{2}{3} \times 3 \times a \times b \times c \times c^2$$
$$= \tfrac{2}{3} \times a^{(1+2)} \times b \times c + \tfrac{2}{3} \times a \times b^{(1+2)} \times c - 2 \times a \times b \times c^{(1+2)}$$
$$= \tfrac{2}{3}a^3\,bc + \tfrac{2}{3}\,ab^3\,c - 2abc^3$$

Q16

Answer :

$$24x^2\,(1-2x)$$
$$= 24x^2 \times 1 - 24x^2 \times 2x$$
$$= 24x^2 - 24 \times 2 \times x^2 \times x$$
$$= 24x^2 - 48x^3$$
When $x = 2$:
$$\text{L.H.S.} = 24x^2\left(1-2x\right) = 24 \times 2^2\left(1-2 \times 2\right) = 96\left(1-4\right) = 96 \times \left(-3\right) = -288$$
$$\text{R.H.S.} = 24x^2 - 48x^2 = 24 \times 2^2 - 48 \times 2^3 = 96 - 384 = -288$$
$$\text{L.H.S.} = \text{R.H.S.}$$
$$\therefore\ 24x^2\left(1-2x\right) = 24x^2 - 48x^3$$

Q17

Answer :

$$ab\left(^2 + b^2\right)$$
$$= ab \times a^2 + ab \times b^2$$
$$= a \times a^2 \times b + a \times b \times b^2$$
$$= a^{(1+2)} \times b + a \times b^{(1+2)}$$
$$= a^3b + ab^3$$
When $a = 2$ and $b = \tfrac{1}{2}$, we get :
$$\text{L.H.S.} = ab\left(a^2 + b^2\right) = 2 \times \tfrac{1}{2}\left(2^2 + \tfrac{1}{2^2}\right) = 4 + \tfrac{1}{4} = \tfrac{17}{4}$$
$$\text{R.H.S.} = a^3b + ab^3 = 2^3 \times \tfrac{1}{2} + 2 \times \left(\tfrac{1}{2}\right)^3 = 4 + \tfrac{1}{4} = \tfrac{17}{4}$$
$$\therefore\ \text{L.H.S.} = \text{R.H.S.}$$

Q18

Answer :

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

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

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

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

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

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

Q19

Answer :

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

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

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

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

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

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

Q20

Answer :

$a(b - c) + b(c - a) + c(a - b)$
$= a \times b - a \times c + b \times c - b \times a + c \times a - c \times b$
$= ab - ac + bc - ab + ac - bc$
$= 0$

Q21

Answer :

$a(b - c) - b(c - a) - c(a - b)$
$= a \times b - a \times c - b \times c + b \times a - c \times a + c \times b$
$= ab + ab - ac - ac - bc + bc$
$= 2ab - 2ac$
$= 2a(b - c)$

Q22

Answer :

$3x^2 + 2(x + 2) - 3x(2x + 1)$
$= 3x^2 + 2 \times x + 2 \times 2 - 3x \times 2x - 3x$
$= 3x^2 + 2x + 4 - 6x^2 - 3x$
$= -3x^2 - x + 4$

Q23

Answer :

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

Q24

Answer :

$$2x^2 + 3x\left(1 - 2x^3\right) + x\left(x + 1\right)$$
$$= 2x^2 + 3x - 3x \times 2x^3 + x^2 + x$$
$$= 2x^2 + 3x - 6 \times x^{(1+3)} + x^2 + x$$
$$= 2x^2 + 3x - 6x^4 + x^2 + x$$
$$= -6x^4 + 3x^2 + 4x$$

Q25

Answer :

$$a^2b\left(a - b^2\right) + ab^2\left(4ab - 2a^2\right) - a^3b\left(1 - 2b\right)$$
$$= a^2b \times a - a^2b \times b^2 + ab^2 \times 4ab - ab^2 \times 2a^2 - a^3b + a^3b \times 2b$$
$$= a^{(2+1)} \times b - a^2 \times b^{(1+2)} + 4 \times a^{(1+1)} \times b^{(2+1)} - 2 \times a^{(1+2)} \times b^2 - a^3b + 2 \times a^3 \times b^{(1+1)}$$
$$= a^3b - a^2b^3 + 4a^2b^3 - 2a^3b^2 - a^3b + 2a^3b^2$$
$$= 3a^2b^3$$

Q26

Answer :

$$4st\left(s - t\right) - 6s^2\left(t - t^2\right) - 3t^2\left(2s^2 - s\right) + 2st\left(s - t\right)$$
$$= 4st \times s - 4st \times t - 6s^2 \times t - 6s^2 \times \left(-t^2\right) - 3t^2 \times 2s^2 - 3t^2 \times \left(-s\right) + 2st \times s - 2st \times t$$
$$= 4 \times s^{(1+1)} \times t - 4 \times s \times t^{(1+1)} - 6s^2t + 6s^2t^2 - 6t^2s^2 + 3t^2s + 2 \times s^{(1+1)} \times t - 2 \times s \times t^{(1+1)}$$
$$= 4s^2t - 4st^2 - 6s^2t + 6s^2t^2 - 6t^2s^2 + 3t^2s + 2s^2t - 2st^2$$
$$= 4s^2t - 6s^2t + 2s^2t - 4st^2 + 3st^2 - 2st^2$$
$$= -3st^2$$