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:

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

$= -2a + 2a^2 + 1$

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 :

$(-4ab) \times (-3a^2bc)$

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

$= 12 \times \left(a^3b^2c\right)$

$= 12a^3b^2c$

Q4

Answer :

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

$= \left(2 \times \left(-3\right)\right) \times \left(a^2 \times a^3 \times b^3 \times b\right)$

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

$= -6a^5b^4$

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 :

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

$= 15 \times x^{(2+1)} \times y \times z^{(1+2)}$

$= 15 x^3 y z^3$

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 :

$= \left(2 \times \left(-5\right) \times \left(-6\right)\right) \times \left(a^2 \times a \times b \times b^2 \times b \times c \times c^2\right)$

$= 60 \times a^{(2+1)} \times b^{(1+2+1)} \times c^{(1+2)}$

$= 60 a^3 b^4 c^3$

Q13

Answer :

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

Q14

Answer :

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

Q15

Answer :

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

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 :

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

Q18

Answer :

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

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

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

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

Hence, the result is verified.

Q19

Answer :

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

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

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

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

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

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

Q20

Answer :

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

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

$= 2.76a^7b^4$

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 :

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

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

$= 160u^3v^7$

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

Q22

Answer :

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

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

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

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

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

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

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

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

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

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

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

Q23

Answer :

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

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

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

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

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

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

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

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

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

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

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

Q24

Answer :

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

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

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

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 :

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

Q2

Answer :

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

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 :

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

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 :

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

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 :

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

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 :

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

Q15

Answer :

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

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 $x = 2$:
L.H.S. $= 24x^2(1-2x) = 24 \times 2^2(1-2\times 2) = 96(1-4) = 96 \times (-3) = -288$
R.H.S. $= 24x^2 - 48x^2 = 24 \times 2^2 - 48 \times 2^3 = 96 - 384 = -288$
L.H.S. = R.H.S.
$\therefore\ 24x^2(1-2x) = 24x^2 - 48x^3$

Q17

Answer :

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

Q18

Answer :

$s\,(s^2 - st)$
$= s \times s^2 - s \times st$
$= s^{(1+2)} - s^{(1+1)} \times t$
$= s^3 - s^2t$
When $s = 2$ and $t = 3$, we get :
L.H.S. $= s\left(s^2 - st\right) = 2\left(2^2 - 2 \times 3\right) = 2 \times \left(4 - 6\right) = -4$
R.H.S. $= s^3 - s^2t = 2^3 - 2^2 \times 3 = 8 - 12 = -4$
L.H.S. = R.H.S.
$\therefore\ s\left(s^2 - st\right) = s^3 - s^2t$

Q19

Answer :

$-3y\left(xy + y^2\right)$
$= -3y \times xy - 3y \times y^2$
$= -3 \times x \times y \times y - 3 \times y \times y^2$
$= -3 \times x \times y^{(1+1)} - 3 \times y^{(1+2)}$
$= -3xy^2 - 3y^3$
When $x = 4$ and $y = 5$, we get :
L.H.S. $= -3y\left(xy + y^2\right) = -3 \times 5\left(4 \times 5 + 5^2\right) = -15 \times \left(20 + 25\right) = -675$
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.
$\therefore\ -3y\left(xy + y^2\right) = -3xy^2 - 3y^3$

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 :

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

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 :

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