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

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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 :

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

Q12

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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 :

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

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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

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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 :

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

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