Algebraic Expressions
Exercise 6B

Q1

Answer :

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

Q2

Answer :

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

Q3

Answer :

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

Q4

Answer :

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

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 :

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

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

$= 15 x^3 y z^3$

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 :

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

Q15

Answer :

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

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 :

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

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:

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

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 :

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

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 :

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

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

$= 2.76a^7b^4$

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 :

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

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

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

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

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 :

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

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

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

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

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

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

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

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

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 :

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

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

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

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.