Exponents Ex 6.2 Q5

Answer :

We have

(i) $(25)^3 \div 5^3$

$= (5^2)^3 \div 5^3$

$= 5^6 \div 5^3$

$= \frac{5^6}{5^3} = 5^{6-3} = 5^3$

(ii) $(81)^5 \div (3^2)^5$

$= (3^4)^5 \div (3^2)^5$

$= (3)^{20} \div (3)^{10}$

$= \frac{3^{20}}{3^{10}} = 3^{20-10} = 3^{10}$

(iii)

$$\frac{9^8 \times (x^2)^5}{(27)^4 \times (x^3)^2}$$

$$= \frac{(3^2)^8 \times (x^2)^5}{(3^3)^4 \times (x^3)^2}$$

$$= \frac{3^{16} \times (x)^{10}}{3^{12} \times (x)^6}$$

$= 3^{16-12} \times (x)^{10-6} = 3^4 \times x^4 = (3x)^4$

(iv)

$$\frac{3^2 \times 7^8 \times 13^6}{21^2 \times 91^3}$$
$$= \frac{3^2 \times 7^2 \times 7^6 \times 13^6}{21^2 \times (13 \times 7)^3}$$
$$= \frac{(21)^2 \times 7^6 \times 13^6}{21^2 \times 13^3 \times 7^3}$$
$$= \frac{7^6 \times 13^6}{13^3 \times 7^3}$$
$$= \frac{91^6}{91^3} = 91^{6-3} = 91^3$$

Exponents Ex 6.2 Q6

Answer :

We have

(i) $(3^5)^{11} \times (3^{15})^4 - (3^5)^{18} \times (3^5)^5$

$= 3^{55} \times 3^{60} - 3^{90} \times 3^{25}$

$= 3^{(55+60)} - 3^{(90+25)}$

$= 3^{115} - 3^{115}$

$= 0$

(ii) $\dfrac{16 \times 2^{n+1} - 4 \times 2^n}{16 \times 2^{n+2} - 2 \times 2^{n+2}}$

$= \dfrac{2^4 \times 2^{n+1} - 2^2 \times 2^n}{2^4 \times 2^{n+2} - 2^{n+1} \times 2^2}$

$= \dfrac{2^2 \times (2^{n+3} - 2^n)}{2^2 \times (2^{n+4} - 2^{n+1})}$

$= \dfrac{2^n \times 2^3 - 2^n}{2^n \times 2^4 - 2^n \times 2}$

$= \dfrac{2^n(2^3 - 1)}{2^n(2^4 - 2)} = \dfrac{8-1}{16-2} = \dfrac{7}{14} = \dfrac{1}{2}$

(iii)

$$\frac{10\times5^{n+1}+25\times5^{n}}{3\times5^{n+2}+10\times5^{n+1}}$$

$$= \frac{10\times5^{n+1}+\left(5\right)^{2}\times5^{n}}{3\times5^{n+2}+2\times5\times5^{n+1}}$$

$$= \frac{10\times5^{n+1}+5\times5^{n+1}}{3\times5^{n+2}+2\times5\times5^{n+1}}$$

$$= \frac{5^{n+1}\left(10+5\right)}{3\times5\times5^{n+1}+10\times5^{n+1}}$$

$$= \frac{5^{n+1}\left(15\right)}{5^{n+1}\left(15+10\right)} = \frac{5^{n+1}\times15}{5^{n+1}\times25} = \frac{15}{25} = \frac{3}{5}$$

Exponents Ex 6.2 Q7

Answer :

We have

(i) $5^{2n} \times 5^{3} = 5^{11}$

$= 5^{2n+3} = 5^{11}$

On equating the coefficients, we get

$2n + 3 = 11$

$\Rightarrow 2n = 11 - 3$

$\Rightarrow 2n = 8$

$\Rightarrow n = \frac{8}{2} = 4$

(ii) $9 \times 3^{n} = 3^{7}$

$= (3)^{2} \times 3^{n} = 3^{7}$

$= (3)^{2+n} = 3^{7}$

On equating the coefficients, we get

$2 + n = 7$

$\Rightarrow n = 7 - 2 = 5$

(iii) $8 \times 2^{n+2} = 32$

$= (2)^{3} \times 2^{n+2} = (2)^{5}$ [since $2^{3} = 8$ and $2^{5} = 32$]

$= (2)^{3+n+2} = (2)^{5}$

On equating the coefficients, we get

$3 + n + 2 = 5$

$\Rightarrow n + 5 = 5$

$\Rightarrow$ n = 5 -5

$\Rightarrow$ n = 0

(iv) $7^{2n+1} \div 49 = 7^3$

$= 7^{2n+1} \div 7^2 = 7^3$ [since $49 = 7^2$]

$$= \frac{7^{2n+1}}{7^2} = 7^3$$

$$= 7^{2n+1-2} = 7^3 \left[\text{since } \frac{a^m}{a^n} = a^{m-n}\right]$$

$= 7^{2n-1} = 7^3$

On equating the coefficients, we get

2n - 1 = 3

$\Rightarrow$ 2n = 3 + 1

$\Rightarrow$ 2n = 4

$\Rightarrow$ n = $\frac{4}{2} = 2$

(v) $\left(\frac{3}{2}\right)^4 \times \left(\frac{3}{2}\right)^5 = \left(\frac{3}{2}\right)^{2n+1}$

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

$$= \left(\frac{3}{2}\right)^9 = \left(\frac{3}{2}\right)^{2n+1}$$

On equating the coefficients, we get

2n + 1 = 9

$\Rightarrow$ 2n = 9 - 1

$\Rightarrow$ 2n = 8

$\Rightarrow$ n = $\frac{8}{2} = 4$

(vi) $\left(\frac{2}{3}\right)^{10} \times \left\{\left(\frac{3}{2}\right)^{2}\right\}^{5} = \left(\frac{2}{5}\right)^{2n-2}$

$= \left(\frac{2}{3}\right)^{10} \times \left(\frac{3}{2}\right)^{10} = \left(\frac{2}{5}\right)^{2n-2}$

$= \frac{2^{10} \times 3^{10}}{3^{10} \times 2^{10}} = \left(\frac{2}{5}\right)^{2n-2}$

$= 1 = \left(\frac{2}{5}\right)^{2n-2}$

$= \left(\frac{2}{5}\right)^{0} = \left(\frac{2}{5}\right)^{2n-2} \left[\textbf{since } \left(\frac{2}{5}\right)^{0} = 1\right]$

On equating the coefficients, we get

$\Rightarrow$ 0 = 2n - 2

$\Rightarrow$ 2n = 2

$\Rightarrow$ n = $\frac{2}{2} = 1$

Exponents Ex 6.2 Q8

Answer :

We have

$$\frac{9^n \times 3^2 \times 3^n - (27)^n}{(3^3)^5 \times 2^3} = \frac{1}{27}$$

$$= \frac{(3^2)^n \times 3^2 \times 3^n - (3^3)^n}{(3)^{15} \times 2^3} = \frac{1}{27}$$

$$= \frac{(3)^{2n+2+n} - (3)^{3n}}{(3)^{15} \times 2^3} = \frac{1}{27}$$

$$= \frac{(3)^{3n+2} - (3)^{3n}}{(3)^{15} \times 2^3} = \frac{1}{27}$$

$$= \frac{(3)^{3n} \times (3)^2 - (3)^{3n}}{(3)^{15} \times 2^3} = \frac{1}{27}$$

$$= \frac{(3)^{3n}(3^2 - 1)}{(3)^{15} \times 2^3} = \frac{1}{27}$$

$$= \frac{(3)^{3n} \times 8}{(3)^{15} \times 2^3} = \frac{1}{27}$$

$$= \frac{(3)^{3n} \times 2^3}{(3)^{15} \times 2^3} = \frac{1}{27}$$

$$= \frac{3^{3n}}{3^{15}} = \frac{1}{27}$$

$$= 3^{3n-15} = \frac{1}{3^3}$$

$$= 3^{3n-15} = 3^{-3}$$

On equating the coefficients, we get

3n -15 = -3

$$\Rightarrow 3n = -3 + 15$$

$$\Rightarrow 3n = 12$$

$$\Rightarrow n = \frac{12}{3} = 4$$

*********** END **********