

**RD SHARMA**

**Solutions**

**Class 7 Maths**

**Chapter 6**

**Ex 6.2**

**Q1. Using laws of exponents, simplify and write the answer in exponential form**

(i)  $2^3 \times 2^4 \times 2^5$

(ii)  $5^{12} \div 5^3$

(iii)  $(7^2)^3$

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

(v)  $3^7 \times 2^7$

(vi)  $(5^{21} \div 5^{13}) \times 5^7$

Sol:

(i)  $2^3 \times 2^4 \times 2^5$

We know that,  $a^m \times a^n \times a^p = a^{m+n+p}$

So,  $2^3 \times 2^4 \times 2^5 = 2^{3+4+5}$

$= 2^{12}$

(ii)  $5^{12} \div 5^3$

We know that,  $a^m \div a^n = a^{m-n}$

So,  $5^{12} \div 5^3 = 5^{12-3}$

$= 5^9$

(iii)  $(7^2)^3$

We know that,  $(a^m)^n = a^{mn}$

So,  $(7^2)^3 = 7^{(2)(3)}$

$= 7^6$

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

We know that,  $a^m \div a^n = a^{m-n}$  and  $(a^m)^n = a^{mn}$

So,  $(3^2)^5 \div 3^4 = 3^{10} \div 3^4$

$= 3^{10-4}$

$= 3^6$

(v)  $3^7 \times 2^7$

We know that,  $(a^m \times b^m) = (a \times b)^m$

So,  $3^7 \times 2^7 = (3 \times 2)^7$

$= 6^7$

(vi)  $(5^{21} \div 5^{13}) \times 5^7$

We know that,  $a^m \div a^n = a^{m-n}$  and  $(a^m \times a^n) = (a)^{m+n}$

So,  $(5^{21} \div 5^{13}) \times 5^7 = (5^{21-13}) \times 5^7$

$= (5^8) \times 5^7$

$= 5^{8+7}$

$= 5^{15}$

**Q2. Simplify and express each of the following in exponential form**

(i)  $((2^3)^4 \times 2^8) \div 2^{12}$

(ii)  $(8^2 \times 8^4) \div 8^3$

(iii)  $(\frac{5^7}{3^2}) \times 5^3$

$$(iv) \left( \frac{5^4 \times x^{10} y^5}{5^4 \times x^7 y^4} \right)$$

Sol:

$$(i) ((2^3)^4 \times 2^8) \div 2^{12}$$

$$\Rightarrow (2^{12} \times 2^8) \div 2^{12}$$

$$\Rightarrow 2^{12+8} \div 2^{12}$$

$$\Rightarrow 2^{20} \div 2^{12}$$

$$\Rightarrow 2^{20-12}$$

$$\Rightarrow 2^8$$

$$(ii) (8^2 \times 8^4) \div 8^3$$

$$\Rightarrow 8^{2+4} \div 8^3$$

$$\Rightarrow 8^6 \div 8^3$$

$$\Rightarrow 8^{6-3}$$

$$\Rightarrow 8^3 \quad (\text{or})$$

$$\Rightarrow 2^8$$

$$(iii) \left( \frac{5^7}{5^2} \right) \times 5^3$$

$$\Rightarrow 5^{7-2} \times 5^3$$

$$\Rightarrow 5^5 \times 5^3$$

$$\Rightarrow 5^{5+3}$$

$$\Rightarrow 5^8$$

$$(iv) \left( \frac{5^4 \times x^{10} y^5}{5^4 \times x^7 y^4} \right)$$

$$\Rightarrow 5^{4-4} \times x^{10-7} \times y^{5-4}$$

$$\Rightarrow 5^0 \times x^3 \times y^1$$

$$\Rightarrow 1 \times x^3 \times y$$

$$\Rightarrow x^3 y$$

**Q3. Simplify and express each of the following in exponential form**

$$(i) ((3^2)^3 \times 2^6) \times 5^6$$

$$(ii) \left( \frac{x}{y} \right)^{12} \times y^{24} \times (2^3)^4$$

$$(iii) \left( \frac{5}{2} \right)^6 \times \left( \frac{5}{2} \right)^2$$

$$(iv) \left( \frac{2}{3} \right)^5 \times \left( \frac{3}{5} \right)^5$$

Sol:

$$(i) ((3^2)^3 \times 2^6) \times 5^6$$

$$\Rightarrow (3^6 \times 2^6) \times 5^6$$

$$\Rightarrow 6^6 \times 5^6$$

$$\Rightarrow 30^6$$

$$(ii) \left( \frac{x}{y} \right)^{12} \times y^{24} \times (2^3)^4$$

$$\Rightarrow \left( \frac{x^{12}}{y^{12}} \right) \times y^{24} \times 2^{12}$$

$$\Rightarrow x^{12} \times y^{24-12} \times 2^{12}$$

$$\Rightarrow x^{12} \times y^{12} \times 2^{12}$$

$$\Rightarrow (2xy)^{12}$$

$$\text{(iii)} \left(\frac{5}{2}\right)^6 \times \left(\frac{5}{2}\right)^2$$

We know that,  $(a^m \times a^n) = (a)^{m+n}$

$$\text{Here } a = \frac{5}{2}$$

$$\Rightarrow \left(\frac{5}{2}\right)^{6+2}$$

$$\Rightarrow \left(\frac{5}{2}\right)^8$$

$$\text{(iv)} \left(\frac{2}{3}\right)^5 \times \left(\frac{3}{5}\right)^5$$

We know that,  $(a^m \times b^m) = (a \times b)^m$

$$\Rightarrow \left(\frac{2}{3} \times \frac{3}{5}\right)^5$$

$$\Rightarrow \left(\frac{2}{5}\right)^5$$

**Q4. Write  $9 \times 9 \times 9 \times 9 \times 9$  in exponential form with base 3**

Sol:

$$9 \times 9 \times 9 \times 9 \times 9 = (9)^5 = (3^2)^5$$

$$= 3^{10}$$

**Q5. Simplify and write each of the following in exponential form**

$$\text{(i)} (25)^3 \div 5^3$$

$$\text{(ii)} (81)^5 \div (3^2)^5$$

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

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

Sol:

$$\text{(i)} (25)^3 \div 5^3$$

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

$$\Rightarrow 5^6 \div 5^3$$

$$\Rightarrow 5^{6-3}$$

$$\Rightarrow 5^3$$

$$\text{(ii)} (81)^5 \div (3^2)^5$$

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

$$\Rightarrow 3^{20} \div 3^{10}$$

$$\Rightarrow 3^{20-10}$$

$$\Rightarrow 3^{10}$$

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

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

$$\Rightarrow \frac{3^{16} \times x^{10}}{3^{12} \times x^6}$$

$$\Rightarrow 3^{16-12} \times x^{10-6}$$

$$\Rightarrow 3^4 \times x^4$$

$$\Rightarrow (3x)^4$$

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

$$\Rightarrow \frac{3^2 \times 7^2 \times 7^6 \times (13)^6}{(21)^2 \times (13 \times 7)^3}$$

$$\Rightarrow \frac{(21)^2 \times 7^6 \times (13)^6}{(21)^2 \times (13)^3 \times (7)^3}$$

$$\Rightarrow \frac{7^6 \times (13)^6}{(13)^3 \times (7)^3}$$

$$\Rightarrow \frac{91^6}{91^3}$$

$$\Rightarrow (91)^{6-3}$$

$$\Rightarrow (91)^3$$

### Q6. Simplify

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

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

$$(iii) \frac{10 \times (5)^{n+1} + 25 \times 5^n}{3 \times (5)^{n+2} + 10 \times (5)^{n+1}}$$

$$(iv) \frac{(16)^7 \times (25)^5 \times (81)^3}{(15)^7 \times (24)^5 \times (80)^3}$$

Sol:

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

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

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

$$\Rightarrow 3^{(115)} - 3^{(115)}$$

$$\Rightarrow 0$$

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

$$\Rightarrow \frac{2^4 \times 2^{(n+1)} - 2^2 \times 2^n}{2^4 \times 2^{(n+2)} - 2^{n+1} \times 2^2}$$

$$\Rightarrow \frac{2^2 \times 2^{(n+3-2n)}}{2^2 \times 2^{(n+4-2n+1)}}$$

$$\Rightarrow \frac{2^n \times 2^3 - 2^n}{2^n \times 2^4 - 2^n \times 2}$$

$$\Rightarrow \frac{2^n(2^3-1)}{2^n(2^4-1)}$$

$$\Rightarrow \frac{8-1}{16-2}$$

$$\Rightarrow \frac{7}{14}$$

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

$$(iii) \frac{10 \times (5)^{n+1} + 25 \times 5^n}{3 \times (5)^{n+2} + 10 \times (5)^{n+1}}$$

$$\Rightarrow \frac{10 \times 5^{(n+1)} + 5^2 \times 5^n}{3 \times 5^{(n+2)} + (2 \times 5) \times 5^{(n+1)}}$$

$$\Rightarrow \frac{10 \times 5^{(n+1)} + 5 \times 5^{(n+1)}}{3 \times 5^{(n+2)} + (2 \times 5) \times 5^{(n+1)}}$$

$$\Rightarrow \frac{5^{(n+1)}(10+5)}{5^{(n+1)}(10+15)}$$

$$\Rightarrow \frac{15}{25}$$

$$\Rightarrow \frac{3}{5}$$

$$\begin{aligned}
& \text{(iv)} \frac{(16)^7 \times (25)^5 \times (81)^3}{(15)^7 \times (24)^5 \times (80)^3} \\
& \Rightarrow \frac{(16)^7 \times (5^2)^5 \times (3^4)^3}{(3 \times 5)^7 \times (3 \times 8)^5 \times (16 \times 5)^3} \\
& \Rightarrow \frac{(16)^7 \times (5^2)^5 \times (3^4)^3}{3^7 \times 5^7 \times 3^5 \times 8^5 \times 16^3 \times 5^3} \\
& \Rightarrow \frac{(16)^7 \times (5^2)^5 \times (3^4)^3}{3^{12} \times 5^{10} \times 8^5 \times 16^3} \\
& \Rightarrow \frac{(16)^7}{8^5 \times 16^3} \\
& \Rightarrow \frac{(16)^{7-3}}{8^5} \\
& \Rightarrow \frac{(16)^4}{8^5} \\
& \Rightarrow \frac{(2 \times 8)^4}{8^5} \\
& \Rightarrow \frac{2^4 \times 8^4}{8^5} \\
& \Rightarrow \frac{2^4}{8} \\
& \Rightarrow \frac{16}{8} \\
& \Rightarrow 2
\end{aligned}$$

**Q7. Find the values of n in each of the following**

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

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

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

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

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

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

Sol:

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

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

Equating the powers

$\Rightarrow 2n + 3 = 11$

$\Rightarrow 2n = 11 - 3$

$\Rightarrow 2n = 8$

$\Rightarrow n = 4$

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

$\Rightarrow 3^2 \times 3^n = 3^7$

$\Rightarrow 3^{2+n} = 3^7$

Equating the powers

$\Rightarrow 2 + n = 7$

$\Rightarrow n = 7 - 2$

$\Rightarrow n = 5$

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

$\Rightarrow 2^3 \times 2^{n+2} = 2^5$

$\Rightarrow 2^{3+n+2} = 2^5$

$\Rightarrow 2^{n+5} = 2^5$

Equating the powers

$$\Rightarrow n + 5 = 5$$

$$\Rightarrow n = 0$$

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

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

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

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

Equating the powers

$$\Rightarrow 2n - 1 = 3$$

$$\Rightarrow 2n = 4$$

$$\Rightarrow n = 2$$

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

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

Equating the powers

$$\Rightarrow 4 + 5 = 2n + 1$$

$$\Rightarrow 2n + 1 = 9$$

$$\Rightarrow 2n = 8$$

$$\Rightarrow n = 4$$

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

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

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

$$\Rightarrow 1 = \frac{2^{(2n-2)}}{3^{(2n-2)}}$$

$$\Rightarrow 3(2n-2) = 2(2n-2)$$

$$\Rightarrow 6n - 6 = 4n - 4$$

$$\Rightarrow 6n - 4n = 6 - 4$$

$$\Rightarrow 2n = 2$$

$$\Rightarrow n = 1$$

**Q8. If  $\frac{9^n \times 3^2 \times 3^n - (27)^n}{(3^3)^5 \times 2^3} = \frac{1}{27}$ , find the value of n**

Sol:

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

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

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

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

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

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

$$\Rightarrow \frac{3^{3n}(9-1)}{3^{15} \times 2^3} = \frac{1}{27}$$

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

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

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

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

On equating the coefficient

$$3n - 15 = -3$$

$$3n = -3 + 15$$

$$3n = 12$$

$$n = 4$$