

EXPONENTS AND POWERS

Class-7 CBSE Math Worksheets with Solutions

Practice Question & worksheet for chapter 4



Example: Simplify

(i) $3^4 \times 3^2 \times 3^{-3}$

(ii) $2^4 \times 4^2 \times 8^{-3}$

(iii) $(-2)^4 \times (-4)^2 \times 2^{-2} \times 4^2$

(iv) $3^6 \times 6^2 \times 2^{-4}$

Solution:

(i) $3^4 \times 3^2 \times 3^{-3} = 3^{(4+2-3)} = 3^3 = 27$

(ii) $2^4 \times 4^2 \times 8^{-3} = 2^4 \times (2^2)^2 \times (2^3)^{-3} = 2^4 \times 2^4 \times 2^{-9} = 2^{(4+4-9)} = 2^{-1} = \frac{1}{2}$

(iii) $(-2)^4 \times (-4)^2 \times 2^{-2} \times 4^2 = (-2)^4 \times (-2 \times 2)^2 \times 2^{-2} \times (2^2)^2$
 $= (-2)^4 \times (-2)^2 \times 2^2 \times 2^{-2} \times 2^4 = (-2)^{4+2} \times 2^{2-2+4} = (-2)^6 \times 2^4 = 2^6 \times 2^4 = 2^{10} = 1024$

(iv) $3^6 \times 6^2 \times 2^{-4} = 3^6 \times (3 \times 2)^2 \times 2^{-4} = 3^6 \times 3^2 \times 2^2 \times 2^{-4} = 3^8 \times 2^{-2} = \frac{3^8}{2^2}$

Example: Evaluate

(i) $\frac{3^{-3} \times 5^{-2} \times 3^6}{25 \times 3^2 \times 5^{-5}}$ (ii) $\frac{(2^3)^2 \times (-5)^2}{(5^2)^2 \times 16}$ (iii) $\frac{l^4 \times m^3 \times n^{-2} \times z^6}{n^3 \times l^{-1} \times z^0 \times m^{-2}}$

Solution:

(i) $\frac{3^{-3} \times 5^{-2} \times 3^6}{25 \times 3^2 \times 5^{-5}} = \frac{3^{-3} \times 5^{-2} \times 3^6}{5^2 \times 3^2 \times 5^{-5}} = 3^{(-3+6-2)} \times 5^{(-2-2+5)} = 3 \times 5 = 15$

(ii) $\frac{(2^3)^2 \times (-5)^2}{(5^2)^2 \times 16} = \frac{2^{3 \times 2} \times 5^2}{5^{2 \times 2} \times 2^4} = \frac{2^6 \times 5^2}{5^4 \times 2^4} = 2^{6-4} \times 5^{2-4} = 2^2 \times 5^{-2} = \frac{2^2}{5^2} = \frac{4}{25}$

(iii) $\frac{l^4 \times m^3 \times n^{-2} \times z^6}{n^3 \times l^{-1} \times z^0 \times m^{-2}} = \frac{m^{3+2} \times z^{6-0}}{n^{3+2} \times l^{-1+4}} = \frac{m^5 \times z^6}{n^5 \times l^3}$

Example: Find the values of

(i) $(27)^{-1/3}$

(ii) $8^{2/3}$

(iii) $\left(\frac{27}{125}\right)^{-2/3}$

Solution:

(i) $(27)^{-1/3} = (3^3)^{-1/3} = 3^{3 \times (-1/3)} = 3^{-1} = \frac{1}{3}$

(ii) $8^{2/3} = (2^3)^{2/3} = 2^{3 \times 2/3} = 2^2 = 4$



$$(iii) \left(\frac{27}{125}\right)^{-2/3} = \left[\left(\frac{3}{5}\right)^3\right]^{-2/3} = \left(\frac{3}{5}\right)^{3 \times (-2/3)} = \left(\frac{3}{5}\right)^{-2} = \left(\frac{5}{3}\right)^2 = \frac{25}{9}$$

Example: Simplify: $\left(\frac{x^a}{x^b}\right)^{a+b} \times \left(\frac{x^b}{x^c}\right)^{b+c} \times \left(\frac{x^c}{x^a}\right)^{c+a}$

Solution:

$$\begin{aligned} & \left(\frac{x^a}{x^b}\right)^{a+b} \times \left(\frac{x^b}{x^c}\right)^{b+c} \times \left(\frac{x^c}{x^a}\right)^{c+a} \\ &= (x^{a-b})^{a+b} \times (x^{b-c})^{b+c} \times (x^{c-a})^{c+a} \\ &= x^{(a-b)(a+b)} \times x^{(b-c)(b+c)} \times x^{(c-a)(c+a)} \\ &= x^{a^2-b^2} \times x^{b^2-c^2} \times x^{c^2-a^2} \\ &= x^{a^2-b^2+b^2-c^2+c^2-a^2} = x^0 = 1 \end{aligned}$$

Example: Find the value of n

$$\begin{aligned} (i) \quad & 5^{-5} \times 5^{2n-1} = 5^{13} \div 5^7 \\ (ii) \quad & \left(\frac{-3}{7}\right)^3 \times \left(\frac{-3}{7}\right)^5 = \left(\frac{-3}{7}\right)^{3n-4} \\ (iii) \quad & \frac{x^{2n-3} \times (x^2)^{n-1}}{(x^4)^{-3}} = x^3 \div (x^4)^{-3} \end{aligned}$$

Solution:

$$\begin{aligned} (i) \quad & 5^{-5} \times 5^{2n-1} = 5^{13} \div 5^7 \\ \Rightarrow & 5^{-5+2n-1} = 5^{13-7} \\ \Rightarrow & 5^{2n-6} = 5^6 \\ \Rightarrow & 2n-6=6 \\ \Rightarrow & 2n=12 \\ \Rightarrow & n=6 \\ (ii) \quad & \left(\frac{-3}{7}\right)^3 \times \left(\frac{-3}{7}\right)^5 = \left(\frac{-3}{7}\right)^{3n-4} \\ \Rightarrow & \left(\frac{-3}{7}\right)^{3+5} = \left(\frac{-3}{7}\right)^{3n-4} \\ \Rightarrow & \left(\frac{-3}{7}\right)^8 = \left(\frac{-3}{7}\right)^{3n-4} \\ \Rightarrow & 8=3n-4 \\ \Rightarrow & 3n=12 \\ \Rightarrow & n=4 \end{aligned}$$

$$(iii) \frac{x^{2n-3} \times (x^2)^{n-1}}{(x^4)^{-3}} = x^3 \div (x^4)^{-3}$$

$$\Rightarrow \frac{x^{2n-3} \times x^{2n-2}}{x^{-12}} = x^3 \div x^{-12}$$

$$\Rightarrow x^{2n-3+2n-2+12} = x^{3+12}$$

$$\Rightarrow x^{4n+7} = x^{15}$$

$$\Rightarrow 4n + 7 = 15$$

$$\Rightarrow 4n = 8$$

$$\Rightarrow n = 2$$



Entrance

