

Exercise 10.1 (Revised) - Chapter 12 - Exponents & Powers - Ncert Solutions class 8 - Maths

Updated On 11-02-2025 By Lithanya

Chapter 10: Exponents & Powers - NCERT Solutions for Class 8 Maths

Ex 10.1 Question 1.

Evaluate:

(i) 3^{-2}

(ii) $(-4)^{-2}$

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

Answer.

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

$$\left[\because a^{-m} = \frac{1}{a^m} \right]$$

$$= \frac{1}{9}$$

(ii) $(-4)^{-2} = \frac{1}{(-4)^2}$

$$\left[\because a^{-m} = \frac{1}{a^m} \right]$$

$$= \frac{1}{16}$$

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

$$\left[\because a^{-m} = \frac{1}{a^m} \right]$$

$$= (2)^5 = 32$$

Ex 10.1 Question 2.

Simplify and express the result in power notation with positive exponent:

(i) $(-4)^5 \div (-4)^8$

(ii) $\left(\frac{1}{2^3}\right)^2$

(iii) $(-3)^4 \times \left(\frac{5}{3}\right)^4$

(iv) $(3^{-7} \div 3^{-10}) \times 3^{-5}$

(v) $2^{-3} \times (-7)^{-3}$

Answer.

(i) $(-4)^5 \div (-4)^8 = (-4)^{5-8} \left[\because a^m \div a^n = a^{m-n} \right]$

$$= (-4)^{-3} = \frac{1}{(-4)^3} \left[\because a^{-m} = \frac{1}{a^m} \right]$$

(ii) $\left(\frac{1}{2^3}\right)^2 = \frac{1^2}{(2^3)^2}$



$$\begin{aligned} & \left[\cdot \cdot \left(\frac{a}{b} \right)^m = \frac{a^m}{a^n} \right] \\ & = \frac{1}{2^{3 \times 2}} = \frac{1}{2^6} \left[\cdot \cdot (a^m)^n = a^{m \times n} \right] \\ \text{(iii)} \quad & (-3)^4 \times \left(\frac{5}{3} \right)^4 = (-3)^4 \times \frac{5^4}{3^4} \left[\cdot \cdot \left(\frac{a}{b} \right)^m = \frac{a^m}{a^n} \right] \\ & = \{ (-1)^4 \times 3^4 \} \times \frac{5^4}{3^4} \end{aligned}$$

$$\begin{aligned} & [\cdot \cdot (ab)^m = a^m b^m] \\ & = 3^{4-4} \times 5^4 [\cdot \cdot a^m \div a^n = a^{m-n}] \\ & = 3^0 \times 5^4 = 5^4 [\cdot \cdot a^0 = 1] \\ \text{(iv)} \quad & (3^{-7} \div 3^{-10}) \times 3^{-5} = 3^{-7-(-10)} \times 3^{-5} \quad [\cdot \cdot a^m \div a^n = a^{m-n}] \\ & = 3^{-7+10} \times 3^{-5} = 3^3 \times 3^{-5} = 3^{3+(-5)} [\cdot \cdot a^m \times a^n = a^{m+n}] \\ & = 3^{-2} = \frac{1}{3^2} \left[\cdot \cdot a^{-m} = \frac{1}{a^m} \right] \\ \text{(v)} \quad & 2^{-3} \times (-7)^{-3} = \frac{1}{2^3} \times \frac{1}{(-7)^3} \left[\cdot \cdot a^{-m} = \frac{1}{a^m} \right] \\ & = \frac{1}{\{2 \times (-7)\}^3} = \frac{1}{(-14)^3} [\cdot \cdot (ab)^m = a^m b^m] \end{aligned}$$

Ex 10.1 Question 3.

Find the value of:

$$\begin{aligned} \text{(i)} \quad & (3^0 + 4^{-1}) \times 2^2 \\ \text{(ii)} \quad & (2^{-1} \times 4^{-1}) \div 2^{-2} \\ \text{(iii)} \quad & \left(\frac{1}{2} \right)^{-2} + \left(\frac{1}{3} \right)^{-2} + \left(\frac{1}{4} \right)^{-2} \\ \text{(iv)} \quad & (3^{-1} + 4^{-1} + 5^{-1})^0 \\ \text{(v)} \quad & \left\{ \left(\frac{-2}{3} \right)^{-2} \right\}^2 \end{aligned}$$

Answer.

$$\begin{aligned} \text{(i)} \quad & (3^0 + 4^{-1}) \times 2^2 = \left(1 + \frac{1}{4} \right) \times 2^2 \left[\cdot \cdot a^{-m} = \frac{1}{a^m} \right] \\ & = \left(\frac{4+1}{4} \right) \times 2^2 = \frac{5}{4} \times 2^2 = \frac{5}{2^2} \times 2^2 = 5 \times 2^{2-2} \quad [\cdot \cdot a^m \div a^n = a^{m-n}] \\ & = 5 \times 2^0 = 5 \times 1 = 5 \quad [\cdot \cdot a^0 = 1] \\ \text{(ii)} \quad & (2^{-1} \times 4^{-1}) \div 2^{-2} = \left(\frac{1}{2^1} \times \frac{1}{4^1} \right) \div 2^{-2} \left[\cdot \cdot a^{-m} = \frac{1}{a^m} \right] \\ & = \left(\frac{1}{2} \times \frac{1}{2^2} \right) \div 2^{-2} = \frac{1}{2^3} \div 2^{-2} [\cdot \cdot a^m \times a^n = a^{m+n}] \\ & = 2^{-3} \div 2^{-2} = 2^{-3-(-2)} = 2^{-3+2} = 2^{-1} [\cdot \cdot a^m \div a^n = a^{m-n}] \\ & = \frac{1}{2} \left[\cdot \cdot a^{-m} = \frac{1}{a^m} \right] \\ \text{(iii)} \quad & \left(\frac{1}{2} \right)^{-2} + \left(\frac{1}{3} \right)^{-2} + \left(\frac{1}{4} \right)^{-2} \\ & = (2^{-1})^{-2} + (3^{-1})^{-2} + (4^{-1})^{-2} \\ & \left[\cdot \cdot a^{-m} = \frac{1}{a^m} \right] \\ & = 2^{-1 \times (-2)} + 3^{-1 \times (-2)} + 4^{-1 \times (-2)} [\cdot \cdot (a^m)^n = a^{m \times n}] \\ & = 2^2 + 3^2 + 4^2 = 4 + 9 + 16 = 29 \\ \text{(iv)} \quad & (3^{-1} + 4^{-1} + 5^{-1})^0 = \left(\frac{1}{3} + \frac{1}{4} + \frac{1}{5} \right)^0 \left[\cdot \cdot a^{-m} = \frac{1}{a^m} \right] \\ & = \left(\frac{20+15+12}{60} \right)^0 = \left(\frac{47}{60} \right)^0 = 1 \\ & [\cdot \cdot a^0 = 1] \\ \text{(v)} \quad & \left\{ \left(\frac{-2}{3} \right)^{-2} \right\}^2 = \left(\frac{-2}{3} \right)^{-2 \times 2} [\cdot \cdot (a^m)^n = a^{m \times n}] \\ & = \left(\frac{-2}{3} \right)^{-4} = \left(\frac{-3}{2} \right)^4 \left[\cdot \cdot a^{-m} = \frac{1}{a^m} \right] \\ & = \frac{81}{16} \end{aligned}$$

Ex 10.1 Question 4.

Evaluate:

$$\begin{aligned} \text{(i)} \quad & \frac{8^{-1} \times 5^3}{2^{-4}} \\ \text{(ii)} \quad & (5^{-1} \times 2^{-1}) \times 6^{-1} \end{aligned}$$

Answer.

$$\text{(i)} \quad \frac{8^{-1} \times 5^3}{2^{-4}} = \frac{(2^3)^{-1} \times 5^3}{2^{-4}} = \frac{2^{-3} \times 5^3}{2^{-4}} [\cdot \cdot (a^m)^n = a^{m \times n}] = 2^{-3-(-4)} \times 5^3 = 2^{-3+4} \times 5^3 \quad [\cdot \cdot a^m \div a^n = a^{m-n}]$$

$$= 2 \times 125 = 250$$

$$(ii) \left(5^{-1} \times 2^{-1}\right) \times 6^{-1} = \left(\frac{1}{5} \times \frac{1}{2}\right) \times \frac{1}{6} \left[\because a^{-m} = \frac{1}{a^m}\right]$$

$$= \frac{1}{10} \times \frac{1}{6} = \frac{1}{60}$$

Ex 10.1 Question 5.

Find the value of m for which $5^m \div 5^{-3} = 5^5$.

Answer.

$$5^m \div 5^{-3} = 5^5$$

$$\Rightarrow 5^{m-(-3)} = 5^5$$

$$[\because a^m \div a^n = a^{m-n}]$$

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

Comparing exponents both sides, we get

$$\Rightarrow m + 3 = 5$$

$$\Rightarrow m = 5 - 3$$

$$\Rightarrow m = 2$$

Ex 10.1 Question 6.

Evaluate:

$$(i) \left\{ \left(\frac{1}{3}\right)^{-1} - \left(\frac{1}{4}\right)^{-1} \right\}^{-1} \quad (ii) \left(\frac{5}{8}\right)^{-7} \times \left(\frac{8}{5}\right)^{-4}$$

Answer.

$$(i) \left\{ \left(\frac{1}{3}\right)^{-1} - \left(\frac{1}{4}\right)^{-1} \right\} = \left\{ \left(\frac{3}{1}\right)^1 - \left(\frac{4}{1}\right)^1 \right\} \left[\because a^{-m} = \frac{1}{a^m}\right]$$

$$= \{3 - 4\} = -1$$

$$(ii) \left(\frac{5}{8}\right)^{-7} \times \left(\frac{8}{5}\right)^{-4} = \frac{5^{-7}}{8^{-7}} \times \frac{8^{-4}}{5^{-4}} \left[\because \left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}\right]$$

$$= 5^{-7-(-4)} \times 8^{-4-(-7)} \quad [\because a^m \div a^n = a^{m-n}]$$

$$= 5^{-7+4} \times 8^{-4+7} = 5^{-3} \times 8^3 = \frac{8^3}{5^3} \left[\because a^{-m} = \frac{1}{a^m}\right]$$

$$= \frac{512}{125}$$

Ex 10.1 Question 7. Simplify:

$$(i) \frac{25 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}} \quad (t \neq 0)$$

$$(ii) \frac{3^{-5} \times 10^{-5} \times 125}{5^{-7} \times 6^{-5}}$$

Answer.

$$(i) \frac{25 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}}$$

$$= \frac{5^2 \times t^{-4}}{5^{-3} \times 5 \times 2 \times t^{-8}}$$

$$= \frac{5^{2-(-3)-1} \times t^{-4-(-8)}}{2}$$

$$[\because a^m \div a^n = a^{m-n}]$$

$$= \frac{5^{2+3-1} \times t^{-4+8}}{2} = \frac{5^4 \times t^4}{2} = \frac{625}{2} t^4$$

$$(ii) \frac{3^{-5} \times 10^{-5} \times 125}{5^{-7} \times 6^{-5}}$$

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

$$= \frac{3^{-5} \times 2^{-5} \times 5^{-5} \times 5^3}{5^{-7} \times 2^{-5} \times 3^{-5}}$$

$$[\because (ab)^m = a^m b^m]$$

$$= \frac{3^{-5} \times 2^{-5} \times 5^{-5+3}}{5^{-7} \times 2^{-5} \times 3^{-5}} = \frac{3^{-5} \times 2^{-5} \times 5^{-2}}{5^{-7} \times 2^{-5} \times 3^{-5}} [\because a^m \times a^n = a^{m+n}]$$

$$= 3^{-5-(-5)} \times 2^{-5-(-5)} \times 5^{-2-(-7)} [\because a^m \div a^n = a^{m-n}]$$

$$= 3^{-5+5} \times 2^{-5+5} \times 5^{-2+7} = 3^0 \times 2^0 \times 5^5$$

$$= 1 \times 1 \times 3125 [\because a^0 = 1]$$

$$= 3125$$

Exercise 10.2 (Revised) - Chapter 12 - Exponents & Powers - Ncert Solutions class 8 - Maths

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Chapter 10: Exponents & Powers - NCERT Solutions for Class 8 Maths

Ex 10.2 Question 1.

Express the following numbers in standard form:

(i) 0.00000000000085

(ii) 0.000000000000942

(iii) 6020000000000000

(iv) 0.00000000837

(v) 31860000000

Answer.

(i) 0.00000000000085

$$= 0.00000000000085 \times \frac{10^{12}}{10^{12}} = 8.5 \times 10^{-12}$$

(ii) 0.000000000000942

$$= 0.000000000000942 \times \frac{10^{12}}{10^{12}} = 9.42 \times 10^{-12}$$

(iii) 6020000000000000

$$= 6020000000000000 \times \frac{10^{15}}{10^{15}} = 6.02 \times 10^{15}$$

(iv) 0.00000000837

$$= 0.00000000837 \times \frac{10^9}{10^9} = 8.37 \times 10^{-9}$$

(v) 31860000000

$$= 31860000000 \times \frac{10^{10}}{10^{10}} = 3.186 \times 10^{10}$$

Ex 10.2 Question 2.

Express the following numbers in usual form:

(i) 3.02×10^{-6}

(ii) 4.5×10^4

(iii) 3×10^{-8}

(iv) 1.0001×10^9

(v) 5.8×10^{12}

(vi) 3.61492×10^6

Answer.

(i)

$$(ii) 4.5 \times 10^4 = 4.5 \times 10000 = 45000$$

$$(iii) 3 \times 10^{-8} = \frac{3}{10^8} = 0.00000003$$

$$(iv) 1.0001 \times 10^9 = 1000100000$$

$$(v) 5.8 \times 10^{12} = 5.8 \times 1000000000000$$



$$= 5800000000000$$

$$(vi) 3.61492 \times 10^6 = 3.61492 \times 1000000$$

$$= 3614920$$

Ex 10.2 Question 3.

Express the number appearing in the following statements in standard form:

(i) 1 micron is equal to $\frac{1}{1000000}$ m.

(ii) Charge of an electron is 0.000, 000, 000, 000, 000, 16 coulomb.

(iii) Size of a bacteria is 0.0000005 m.

(iv) Size of a plant cell is

0.00001275 m.

(v) Thickness of a thick paper is 0.07 mm.

Answer.

(i) 1 micron

$$= \frac{1}{1000000} = \frac{1}{10^6} = 1 \times 10^{-6} \text{ m}$$

(ii) Charge of an electron is

0.00000000000000000016 coulombs.

$$= 0.00000000000000000016 \times \frac{10^{19}}{10^{19}}$$

$$= 1.6 \times 10^{-19} \text{ coulomb}$$

(iii) Size of bacteria = 0.0000005

$$\frac{5}{10000000} = \frac{5}{10^7} = 5 \times 10^{-7} \text{ m}$$

(iv) Size of a plant cell is 0.00001275 m

$$= 0.00001275 \times \frac{10^5}{10^5} = 1.275 \times 10^{-5} \text{ m}$$

(v) Thickness of a thick paper = 0.07 mm

$$= \frac{7}{100} \text{ mm} = \frac{7}{10^2} = 7 \times 10^{-2} \text{ mm}$$

Ex 10.2 Question 4.

In a stack there are 5 books each of thickness 20 mm and 5 paper sheets each of thickness 0.016 mm. What is the total thickness of the stack?

Answer.

Thickness of one book = 20 mm

Thickness of 5 books = $20 \times 5 = 100$ mm

Thickness of one paper = 0.016 mm

Thickness of 5 papers = 0.016×5

= 0.08 mm

Total thickness of a stack = $100 + 0.08$

= 100.08 mm

$$= 100.08 \times \frac{10^2}{10^2}$$

$$= 1.0008 \times 10^2 \text{ mm}$$