

# NCERT SOLUTIONS

## CLASS-8 MATHS

### CHAPTER-12 EXERCISE-12.1

Q.1. (i)  $4^{-3}$

(ii)  $(-5)^{-5}$

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

**Solution:**

(i)  $4^{-2}$

$$(4)^{-2} = \frac{1}{4^2} = \frac{1}{16}$$

(ii)  $(-5)^{-2}$

$$(-5)^{-2} = \frac{1}{(-5)^2} = \frac{1}{25}$$

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

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

**Formula:**  $a^{-m} = \frac{1}{a^m}$

Q.2. (i)  $(-5)^4 \div (-5)^7$

(ii)  $(\frac{1}{4^3})^2$

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

(iv)  $(2^{-7} \div 2^{-10}) \times 2^{-5}$

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

**Solution:**

(i)  $(-5)^4 \div (-5)^7$

$$(-5)^4 \div (-5)^7 = (-5)^{4-7}$$

$$= (-5)^{-3}$$

$$= \frac{1}{(-5)^3}$$

(ii)  $(\frac{1}{4^3})^2$

$$(\frac{1}{4^3})^2 = \frac{1^2}{(4^3)^2}$$

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

$$= \frac{1}{4^6}$$

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

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$$\begin{aligned}
 (-4)^2 \times \left(\frac{5}{4}\right)^2 &= (-4)^2 \times \frac{5^2}{4^2} \\
 &= [(-1)^2 \times 4^2] \times \frac{5^2}{4^2} \\
 &= 4^{2-2} \times 5^2 = 4^0 \times 5^2 = 5^2
 \end{aligned}$$

$$(iv) (2^{-7} \div 2^{-10}) \times 2^{-5}$$

$$\begin{aligned}
 (2^{-7} \div 2^{-10}) \times 2^{-5} &= 2^{-7-(-10)} \times 2^{-5} \\
 &= 2^{-7+10} \times 2^{-5} \\
 &= 2^3 \times 2^{-5} = 2^{3-5} \\
 &= 2^{-2} = \frac{1}{2^2}
 \end{aligned}$$

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

$$\begin{aligned}
 3^{-3} \times (-7)^{-3} &= \frac{1}{3^3} \times \frac{1}{(-7)^3} \\
 &= \frac{1}{[3 \times (-7)]^3} = \frac{1}{(-21)^3}
 \end{aligned}$$

**Formulae:**

$$1. (a^m)^n = a^{m \times n}$$

$$2. \left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

$$3. (ab)^m = a^m b^m$$

$$4. a^m \div a^n = a^{m-n}$$

$$5. a^m \times a^n = a^{m+n}$$

pdfelement

**Q.3. Find the value of:**

$$(i) (3^0 + 4^{-1}) \times 2^2$$

$$(ii) (2^{-1} \times 4^{-1}) \div 2^{-2}$$

$$(iii) \left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2}$$

$$(iv) (3^{-1} + 4^{-1} + 5^{-1})^0$$

$$(v) \left[\left(\frac{-2}{3}\right)^{-2}\right]^2$$

**Solution:**

$$(i) (3^0 + 4^{-1}) \times 2^2$$

$$\begin{aligned}
 &(1 + \frac{1}{4}) \times 2^2 \\
 &= \left(\frac{4+1}{4}\right) \times 2^2 = \frac{5}{4} \times 2^2 \\
 &= 5 \times 2^{2-2} \\
 &= 5 \times 2^0 = 5 \times 1 = 5
 \end{aligned}$$

$$(ii)(2^{-1} \times 4^{-1}) \div 2^{-2}$$

$$\begin{aligned}(2^{-1} \times 4^{-1}) \div 2^{-2} &= \left(\frac{1}{2^1} \times \frac{1}{4^1}\right) \div 2^{-2} \\ &= \left(\frac{1}{2} \times \frac{1}{2^2}\right) \div 2^{-2} = \frac{1}{2^3} \div 2^{-2} \\ &= 2^{-3} \div 2^{-2} = 2^{-3-(-2)} = 2^{-3+2} = 2^{-1} \\ &= \frac{1}{2}\end{aligned}$$

$$(iii)\left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2}$$

$$\begin{aligned}\left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2} &= (2^{-1})^2 + (3^{-1})^2 + (4^{-1})^2 \\ &= 2^{-1 \times (-2)} + 3^{-1 \times (-2)} + 4^{-1 \times (-2)} \\ &= 2^2 + 3^2 + 4^2 = 4 + 9 + 16 = 29\end{aligned}$$

$$(iv)(3^{-1} + 4^{-1} + 5^{-1})^0$$

$$\begin{aligned}(3^{-1} + 4^{-1} + 5^{-1})^0 &= \left(\frac{1}{3} + \frac{1}{4} + \frac{1}{5}\right)^0 \\ &= \left(\frac{20+15+12}{60}\right)^0 = \left(\frac{47}{60}\right)^0 = 1\end{aligned}$$

$$(v)\left[\left(\frac{-2}{3}\right)^{-2}\right]^2$$

$$\begin{aligned}\left[\left(\frac{-2}{3}\right)^{-2}\right]^2 &= \left(\frac{-2}{3}\right)^{-2 \times 2} \\ &= \left(\frac{-2}{3}\right)^{-4} = \left(\frac{-3}{2}\right)^4 = \frac{81}{16}\end{aligned}$$

#### Q.4. Evaluate:

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

$$(ii)(5^{-1} \times 2^{-1}) \times 6^{-1}$$

#### Solution:

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

$$\begin{aligned}\frac{8^{-1} \times 5^3}{2^{-4}} &= \frac{(2^3)^{-1} \times 5^3}{2^{-4}} = \frac{2^{-3} \times 5^3}{2^{-4}} \\ &= 2^{-3-(-4)} \times 5^3 = 2^{-3+4} \times 5^3 \\ &= 2 \times 125 = 250\end{aligned}$$

$$(ii)(5^{-1} \times 2^{-1}) \times 6^{-1}$$

$$\begin{aligned}(5^{-1} \times 2^{-1}) \times 6^{-1} &= \left(\frac{1}{5} \times \frac{1}{2}\right) \times \frac{1}{6} \\ &= \frac{1}{10} \times \frac{1}{6} = \frac{1}{60}\end{aligned}$$

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

#### Solution:

$$\begin{aligned}
 5^m \div 5^{-3} &= 5^5 & 5^m \div 5^{-3} &= 5^5 \\
 \Rightarrow 5^{m-(-3)} &= 5^5 & \Rightarrow 5^{m-(-3)} &= 5^5 \\
 \Rightarrow 5^{m+3} &= 5^5 & \Rightarrow 5^{m+3} &= 5^5 \\
 & & \Rightarrow m+3 &= 5 \\
 & & \Rightarrow m &= 5-3 \\
 & & \Rightarrow m &= 2
 \end{aligned}$$

**Q.6. Evaluate:**

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

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

**Solution:**

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

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

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

$$\begin{aligned}
 \left(\frac{5}{8}\right)^{-7} \times \left(\frac{8}{5}\right)^{-4} &= \frac{5^{-7}}{8^{-7}} \times \frac{8^{-4}}{5^{-4}} \\
 &= 5^{-7(-4)} \times 8^{-4(-7)} \\
 &= 5^{-7+4} \times 8^{-4+7} = 5^{-3} \times 8^3 = \frac{8^3}{5^3} \\
 &= \frac{512}{125}
 \end{aligned}$$

**Q.7. Simplify:**

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

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

**Solution:**

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

$$\begin{aligned}
 \frac{25 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}} &= \frac{5^2 \times t^{-4}}{5^{-3} \times 5 \times 2 \times t^{-8}} \\
 &= \frac{5^{2-(-3)-1} \times t^{-4-(-8)}}{2} \\
 &= \frac{5^{2+3-1} \times t^{-4+8}}{2} = \frac{5^4 \times t^4}{2} \\
 &= \frac{625}{2} t^4
 \end{aligned}$$

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

$$\frac{3^{-5} \times 10^{-5} \times 125}{5^{-7} \times 6^{-5}} = \frac{3^{-5} \times (2 \times 5)^{-5} \times 5^3}{5^{-7} \times (2 \times 3)^{-5}}$$

$$\begin{aligned} &= \frac{3^{-5} \times 2^{-5} \times 5^{-5} \times 5^3}{5^{-7} \times 2^{-5} \times 3^{-5}} \\ &= \frac{3^{-5} \times 2^{-5} \times 5^{-5+3}}{5^{-7} \times 2^{-5} \times 3^{-5}} = \frac{3^{-5} \times 2^{-5} \times 5^{-2}}{5^{-7} \times 2^{-5} \times 3^{-5}} \\ &= 3^{-5-(-5)} \times 2^{-5-(-5)} \times 5^{-2-(-7)} \\ &= 3^{-5+5} \times 2^{-5+5} \times 5^{-2+7} = 3^0 \times 2^0 \times 5^5 = 1 \times 1 \times 3125 \\ &= 3125 \end{aligned}$$

