

RD SHARMA

Solutions

Class 8 Maths

Chapter 2

Ex 2, 1

Question 1. Express each of the following as a rational number of the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.:

(i) 2^{-3}

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

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

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

(v) $(\frac{2}{3})^{-2}$

Answer:

(i) $2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

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

(iii) $\frac{1}{3^{-2}} = 3^2 = 9$

(iv) $(\frac{1}{2})^{-5} = 2^5 = 32$

(v) $(\frac{2}{3})^{-2} = (\frac{3}{2})^2 = \frac{9}{4}$

Question 2. Find the values of the following:

(i) $3^{-1} + 4^{-1}$

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

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

(iv) $((\frac{1}{3})^{-1} - (\frac{1}{4})^{-1})^{-1}$

Answer:

(i) We know from the property of powers that for every natural number a, $a^{-1} = \frac{1}{a}$, Then:

$$\begin{aligned} 3^{-1} + 4^{-1} &= \frac{1}{3} + \frac{1}{4} \\ &= \frac{4+3}{12} \\ &= \frac{7}{12} \end{aligned}$$

(ii) We know from the property of powers that for every natural number a , $a^{-1} = \frac{1}{a}$.

Moreover, a^0 is 1 for every natural number a not equal to 0. Then,

$$\begin{aligned}(3^0 + 4^{-1}) \times 2^2 \\ &= (1 + \frac{1}{4}) \times 4 \\ &= \frac{5}{4} \times 4 \\ &= 5\end{aligned}$$

(iii) We know from the property of powers that for every natural number a , $a^{-1} = \frac{1}{a}$.

Moreover, a^0 is 1 for every natural number a not equal to 0. Then,

$$(3^{-1} + 4^{-1} + 5^{-1})^0 = 1 \quad \text{---> (Ignore the expression inside the bracket and use } a^0 = 1)$$

(iv) We know from the property of powers that for every natural number a , $a^{-1} = \frac{1}{a}$.

Then:

$$\begin{aligned}((\frac{1}{3})^{-1} - (\frac{1}{4})^{-1})^{-1} &= (3-4)^{-1} \\ &= (-1)^{-1} \\ &= -1\end{aligned}$$

Question 3. Find the value of each of the following:

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

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

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

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

Answer:

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

$$\begin{aligned}&= \frac{1}{\frac{1}{2}} + \frac{1}{\frac{1}{3}} + \frac{1}{\frac{1}{4}} \\ &= 2 + 3 + 4 = 12\end{aligned}$$

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

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

$$= 4 + 9 + 16 = 29$$

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

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

$$= \frac{1}{8} \times 4 = \frac{1}{2}$$

$$\text{(iv)} (5^{-1} \times 2^{-1}) \div 6^{-1}$$

$$= \left(\frac{1}{5} \times \frac{1}{2}\right) \div \frac{1}{6}$$

$$= \frac{1}{10} \times 6 = \frac{3}{5}$$

Question 4. Simplify:

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

$$\text{(ii)} (5^{-1} \div 6^{-1})^3$$

$$\text{(iii)} (2^{-1} + 3^{-1})^{-1}$$

$$\text{(iv)} (3^{-1} + 4^{-1})^{-1} \times 5^{-1}$$

Answer:

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

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

$$= \left(\frac{1}{12}\right)^2$$

$$= \left(\frac{1^2}{12^2}\right) = \left(\frac{1}{24}\right)$$

$$\text{(ii)} (5^{-1} \div 6^{-1})^3$$

$$= \left(\frac{1}{5} \div \frac{1}{6}\right)^3$$

$$= \left(\frac{1}{5} \times 6\right)^3$$

$$= \left(\frac{6}{5}\right)^3 = \frac{216}{125}$$

$$\text{(iii)} (2^{-1} + 3^{-1})^{-1}$$

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

$$= \left(\frac{5}{6}\right)^{-1}$$

$$= \left(\frac{1}{\frac{5}{6}}\right) = \frac{6}{5}$$

$$\text{(iv)} (3^{-1} + 4^{-1})^{-1} \times 5^{-1}$$

$$= \left(\frac{1}{3} \times \frac{1}{4}\right)^{-1} \times \frac{1}{5}$$

$$= \left(\frac{1}{12}\right)^{-1} \times \frac{1}{5} = \frac{12}{5}$$

Question 5. Simplify:

(i) $(3^2 + 2^2) \times \left(\frac{1}{2}\right)^3$

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

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

(iv) $(2^2 + 3^2 - 4^2) \div \left(\frac{3}{2}\right)^2$

Answer:

(i) $(3^2 + 2^2) \times \left(\frac{1}{2}\right)^3$

$$= (9 + 4) \times \frac{1}{8} = \frac{13}{8}$$

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

$$= (9 - 4) \times \frac{1}{\left(\frac{2}{3}\right)^3}$$

$$= 5 \times \frac{1}{\left(\frac{8}{27}\right)} = \frac{135}{8}$$

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

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

$$= (27 - 8) \div 64$$

$$= 19 \times \frac{1}{64} = \frac{19}{64}$$

(iv) $(2^2 + 3^2 - 4^2) \div \left(\frac{3}{2}\right)^2$

$$= (4 + 9 - 16) \div \left(\frac{9}{4}\right)$$

$$= -3 \times \frac{4}{9} = -\frac{4}{3}$$

Question 6. By what number should 5^{-1} be multiplied so that the product may be equal to -7^{-1} ?

Answer:

Using the property $a^{-1} = \frac{1}{a}$ for every natural number a, we have $5^{-1} = \frac{1}{5}$ and $(-7)^{-1} = -\frac{1}{7}$. We have to find a number x such that

$$\frac{1}{5} \times x = -\frac{1}{7}$$

Multiply both sides by 5, we get

$$x = -\frac{5}{7}$$

Hence, the required number is $\frac{-5}{7}$

Question 7. By what number should $(\frac{1}{2})^{-1}$ be multiplies so that the product may be equal to $(-\frac{4}{7})^{-1}$?

Answer:

Using the property $a^{-1} = \frac{1}{a}$ for every natural number a, we have $(\frac{1}{2})^{-1} = 2$ and $(-\frac{4}{7})^{-1} = \frac{-7}{4}$. We have to find the number x such that

$$2x = \frac{-7}{4}$$

Dividing both sides by 2, we get

$$x = \frac{-7}{8}$$

Hence, the required number is $\frac{-7}{8}$

Question 8. By what number should $(-15)^{-1}$ be multiplies so that the product may be equal to $(-5)^{-1}$

Answer:

Using the property $a^{-1} = \frac{1}{a}$ for every natural number a, we have $(-15)^{-1} = -\frac{1}{15}$ and $(-5)^{-1} = -\frac{1}{5}$. We have to find a number x such that

$$\frac{-\frac{1}{15}}{x} = \frac{-1}{5}$$

$$\text{Or } \frac{1}{15} \times \frac{1}{x} = \frac{-1}{5}$$

$$\text{Or } x = \frac{1}{3}$$

Hence, $(-15)^{-1}$ should be divided by $\frac{1}{3}$ to obtain $(-5)^{-1}$.