

Rational Numbers

Exercise 4E

Q1

Answer :

$$(i) \frac{3}{4} \times \frac{5}{7} = \frac{(3 \times 5)}{(4 \times 7)} = \frac{15}{28}$$

$$(ii) \frac{8^3}{8^1} \times \frac{-3 \cdot 2^4}{-3^1} = \frac{(3 \times 4)}{(1 \times 1)} = 12$$

$$(iii) \frac{7}{-5^1} \times \frac{2 \cdot 4^4}{1} = 7 \times 4 = 28$$

$$(iv) \frac{-2}{-3^1} \times \frac{6^3}{7} = \frac{(-2 \times 2)}{7} = \frac{-4}{7}$$

(v) We need a positive denominator.

$$\begin{aligned} \therefore \frac{10}{-3} \times \frac{-1}{-1} &= \frac{-10}{3} \\ &= \frac{-1 \cdot 2^4}{-5^1} \times \frac{-1 \cdot 1^2}{-3^1} \\ &= (-4) \times (-2) \\ &= 8 \end{aligned}$$

$$(vi) \frac{-2 \cdot 5^5}{-9^3} \times \frac{-3^1}{-1 \cdot 1^2} = \frac{5}{3} \times \frac{1}{2} = \frac{5}{6}$$

$$(vii) \frac{-7^1}{-1 \cdot 1^1} \times \frac{-4 \cdot 1^4}{-2 \cdot 1^3} = \frac{4}{3}$$

$$(viii) \frac{-3 \cdot 6^{12}}{-5^1} \times \frac{2 \cdot 1^4}{-3^1} = 12 \times 4 = 48$$

$$(ix) \frac{-1 \cdot 3^1}{-1 \cdot 5^2} \times \frac{-2 \cdot 5^5}{-2 \cdot 1^2} = \frac{-1}{3} \times \frac{-5}{2} = \frac{5}{6}$$

Q2

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Answer :

(i)

$$\begin{aligned} & \frac{3}{-2 \cdot 5} \times \frac{-4}{5} \\ &= \frac{3 \times 1}{5 \times 5} \\ &= \frac{3}{25} \end{aligned}$$

(ii)

$$\begin{aligned} & \frac{-7}{-3 \cdot 6} \times \frac{-5}{-1 \cdot 4} \\ &= \frac{-1 \times 1}{6 \times 2} \\ &= \frac{-1}{12} \end{aligned}$$

(iii)

$$\begin{aligned} & \frac{-5}{-1 \cdot 2} \times \frac{-9}{-2 \cdot 4} \\ &= \frac{1 \times (-1)}{-2 \times 4} \\ &= \frac{-1}{-8} = \frac{1}{8} \end{aligned}$$

(iv)

$$\begin{aligned} & \frac{-9}{-3} \times \frac{-1 \cdot 6^2}{-3} \\ &= (-3) \times (-2) \\ &= 6 \end{aligned}$$

(v)

$$\begin{aligned} & \frac{-32}{1} \times \frac{-7}{36} \\ &= \frac{-3 \cdot 2^5 \times (-7)}{1 \times 3 \cdot 6^2} \\ &= \frac{-8 \times (-7)}{9} \\ &= \frac{56}{9} \end{aligned}$$

(vi)

We need a positive denominator.

$$\therefore \frac{16}{-21} \times \frac{-1}{-1} = \frac{-16}{21}$$

$$\begin{aligned} \text{Now, } & \frac{-16}{-2 \cdot 3} \times \frac{-1 \cdot 4^2}{5} \\ &= \frac{(-16) \times (-2)}{3 \times 5} \\ &= \frac{32}{15} \end{aligned}$$

Q3

Answer :

(i)

$$\begin{aligned} & \frac{7}{-2 \cdot 4} \times (-4 \cdot 8^2) \\ &= 7 \times (-2) \\ &= -14 \end{aligned}$$

(ii)

$$\begin{aligned} & \frac{-19}{-3 \cdot 9} \times -1 \cdot 6^4 \\ &= \frac{-19}{9} \times 4 \\ &= \frac{-76}{9} \end{aligned}$$

(iii)

$$\begin{aligned} & \frac{-3}{-4} \times \frac{4}{-3} \\ &= -1 \end{aligned}$$

(iv)

$$\begin{aligned} & -13 \times \frac{17}{26} \\ &= \frac{-1 \times 13 \times 17}{2 \times 13} \\ &= \frac{-17}{2} \end{aligned}$$

(v)

$$\begin{aligned} & \frac{-13}{-5} \times (-1 \times 10^2) \\ &= 26 \end{aligned}$$

(vi)

$$\begin{aligned} & \frac{(-9^1)}{-1 \times 3} \times \frac{(-6 \times 4^4)}{-2 \times 3} \\ &= \frac{4}{3} \end{aligned}$$

Q4

Answer :

(i)

$$\begin{aligned} & \left(\frac{+3^1}{-8} \times \frac{+2^3}{+3^1} \right) + \left(\frac{-4^2}{-9} \times \frac{-3^1}{-2^1} \right) \\ &= \frac{3}{2} + \frac{2}{3} \end{aligned}$$

L. C. M. of 2 and 3 is 6.

$$\begin{aligned} &= \frac{9+4}{6} \\ &= \frac{13}{6} \end{aligned}$$

(ii)

$$\begin{aligned} & \left(\frac{16}{15} \times \frac{-25}{8} \right) + \left(\frac{-14}{27} \times \frac{6}{7} \right) \\ &= \left(\frac{+16^2}{+15^3} \times \frac{-25^5}{-8^1} \right) + \left(\frac{-14^2}{27} \times \frac{6}{7^1} \right) \\ &= \left[\frac{2}{3} \times \frac{(-5)}{1} \right] + \left[\frac{(-2)}{27} \times \frac{6}{1} \right] \\ &= \frac{(-10)}{3} + \frac{(-12)}{-27} \\ &= \frac{-10}{3} + \frac{-4}{9} \end{aligned}$$

L. C. M. of 3 and 9 is 9.

$$\begin{aligned} &= \frac{-30-4}{9} \\ &= \frac{-34}{9} \end{aligned}$$

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(iii)

$$\begin{aligned} & \left(\frac{6}{55} \times \frac{-22}{9} \right) - \left(\frac{26}{125} \times \frac{-10}{39} \right) \\ &= \left(\frac{-6^2}{5 \cdot 5} \times \frac{-2 \cdot 2^2}{3} \right) - \left(\frac{-2 \cdot 6^2}{1 \cdot 2 \cdot 5 \cdot 25} \times \frac{-1 \cdot 6^2}{3 \cdot 3} \right) \\ &= \left[\frac{(-4)}{15} - \frac{(-4)}{75} \right] \\ &= \frac{-4}{15} + \frac{4}{75} \end{aligned}$$

L. C. M. of 15 and 75 is 75.

$$\begin{aligned} &= \frac{-20+4}{75} \\ &= \frac{-16}{75} \end{aligned}$$

(iv)

$$\begin{aligned} & \left(\frac{-1 \cdot 2^4}{7 \cdot 1} \times \frac{-1 \cdot 4^2}{2 \cdot 7 \cdot 9} \right) - \left(\frac{-8^1}{4 \cdot 5 \cdot 5} \times \frac{9^1}{16 \cdot 2} \right) \\ &= \left[\frac{(-4)}{1} \times \frac{(-2)}{9} \right] - \left[\frac{-1}{5} \times \frac{1}{2} \right] \\ &= \frac{8}{9} + \frac{1}{10} \end{aligned}$$

L. C. M. of 9 and 10 is 90.

$$\begin{aligned} &= \frac{80+9}{90} \\ &= \frac{89}{90} \end{aligned}$$

Q5

Answer :

$$\text{Cost of 1 meter cloth} = \text{Rs } 40 \frac{1}{2}$$

$$\begin{aligned} \text{Cost of } 3 \frac{1}{2} \text{ meter cloth} &= \text{Rs } \left(40 \frac{1}{2} \times 3 \frac{1}{2} \right) \\ &= \text{Rs } \left(\frac{81}{2} \times \frac{7}{2} \right) \\ &= \text{Rs } \frac{567}{4} \\ &= \text{Rs } 141.75 \end{aligned}$$

Q6

Answer :

$$\text{Distance covered in 1 hour} = 46 \frac{2}{3} \text{ km}$$

$$\text{Distance covered in } 2 \frac{2}{5} \text{ hours} = \left(46 \frac{2}{3} \times 2 \frac{2}{5} \right)$$

$$\begin{aligned} &= \left(\frac{144 \cdot 28}{3} \times \frac{1 \cdot 2^4}{5} \right) \\ &= (28 \times 4) \\ &= 112 \text{ km} \end{aligned}$$

Hence, the required distance is 112 km.