



## Rational Numbers Ex 1.2 Q1

**Answer :**

*Commutativity of the addition of rational numbers means that if  $\frac{a}{b}$  and  $\frac{c}{d}$  are two rational numbers, then  $\frac{a}{b} + \frac{c}{d} = \frac{c}{d} + \frac{a}{b}$ .*

(i)

We have  $\frac{-11}{5}$  and  $\frac{4}{7}$ .

$$\begin{aligned}\therefore \frac{-11}{5} + \frac{4}{7} &= \frac{-11 \times 7}{5 \times 7} + \frac{4 \times 5}{7 \times 5} = \frac{-77}{35} + \frac{20}{35} = \frac{-77+20}{35} = \frac{-57}{35} \\ \frac{4}{7} + \frac{-11}{5} &= \frac{4 \times 5}{7 \times 5} + \frac{-11 \times 7}{5 \times 7} = \frac{20}{35} + \frac{-77}{35} = \frac{20-77}{35} = \frac{-57}{35} \\ \therefore \frac{-11}{5} + \frac{4}{7} &= \frac{4}{7} + \frac{-11}{5}\end{aligned}$$

Hence verified.

(ii)

We have  $\frac{4}{9}$  and  $\frac{-7}{12}$ .

$$\begin{aligned}\therefore \frac{4}{9} + \frac{-7}{12} &= \frac{4 \times 4}{9 \times 4} + \frac{-7 \times 3}{12 \times 3} = \frac{16}{36} + \frac{-21}{36} = \frac{16-21}{36} = \frac{-5}{36} \\ \frac{-7}{12} + \frac{4}{9} &= \frac{-7 \times 3}{12 \times 3} + \frac{4 \times 4}{9 \times 4} = \frac{-21}{36} + \frac{16}{36} = \frac{-21+16}{36} = \frac{-5}{36} \\ \therefore \frac{4}{9} + \frac{-7}{12} &= \frac{-7}{12} + \frac{4}{9}\end{aligned}$$

Hence verified.

(iii)

We have  $\frac{-3}{5}$  and  $\frac{-2}{-15}$  or  $\frac{-3}{5}$  and  $\frac{2}{15}$ .

$$\therefore \frac{-3}{5} + \frac{2}{15} = \frac{-9}{15} + \frac{2}{15} = \frac{-9+2}{15} = \frac{-7}{15}$$

$$\frac{2}{15} + \frac{-3}{5} = \frac{2}{15} + \frac{-9}{15} = \frac{2-9}{15} = \frac{-7}{15}$$

$$\therefore \frac{-3}{5} + \frac{-2}{-15} = \frac{-2}{-15} + \frac{-3}{5}$$

Hence verified.

(iv)

We have  $\frac{2}{-7}$  and  $\frac{12}{-35}$ .

$$\therefore \frac{-2}{7} + \frac{-12}{35} = \frac{-2 \times 5}{7 \times 5} + \frac{-12}{35} = \frac{-10-12}{35} = \frac{-22}{35}$$

$$\frac{12}{-35} + \frac{2}{-7} = \frac{-12}{35} + \frac{-2 \times 5}{7 \times 5} = \frac{-12-10}{35} = \frac{-22}{35}$$

$$\therefore \frac{2}{-7} + \frac{12}{-35} = \frac{12}{-35} + \frac{2}{-7}$$

Hence verified.

(v)

We have 4 and  $\frac{-3}{5}$ .

$$\therefore 4 + \frac{-3}{5} = \frac{4 \times 5}{1 \times 5} + \frac{-3}{5} = \frac{20-3}{5} = \frac{17}{5}$$

$$\frac{-3}{5} + 4 = \frac{-3}{5} + \frac{4 \times 5}{1 \times 5} = \frac{-3+20}{5} = \frac{17}{5}$$

$$\therefore 4 + \frac{-3}{5} = \frac{-3}{5} + 4$$

Hence verified.

(vi)

We have  $-4$  and  $\frac{4}{-7}$ .

$$\therefore \frac{-4}{1} + \frac{-4}{7} = \frac{-4 \times 7}{1 \times 7} + \frac{-4}{7} = \frac{-28-4}{7} = \frac{-32}{7}$$

$$\frac{-4}{7} + \frac{-4}{1} = \frac{-4}{7} + \frac{-4 \times 7}{1 \times 7} = \frac{-4-28}{7} = \frac{-32}{7}$$

$$\therefore -4 + \frac{4}{-7} = \frac{4}{-7} - 4$$

Hence verified.

Answer :

We have to verify that  $(x+y)+z = x+(y+z)$ .

(i)

$$x = \frac{1}{2}, y = \frac{2}{3}, z = \frac{-1}{5}$$

$$(x+y)+z = \left(\frac{1}{2} + \frac{2}{3}\right) + \frac{-1}{5} = \left(\frac{3}{6} + \frac{4}{6}\right) + \frac{-1}{5} = \frac{7}{6} + \frac{-1}{5} = \frac{35}{30} + \frac{-6}{30} = \frac{35-6}{30} = \frac{29}{30}$$

$$x+(y+z) = \frac{1}{2} + \left(\frac{2}{3} + \frac{-1}{5}\right) = \frac{1}{2} + \left(\frac{10}{15} + \frac{-3}{15}\right) = \frac{1}{2} + \frac{7}{15} = \frac{15}{30} + \frac{14}{30} = \frac{15+14}{30} = \frac{29}{30}$$

$$\therefore \left(\frac{1}{2} + \frac{2}{3}\right) + \frac{-1}{5} = \frac{1}{2} + \left(\frac{2}{3} + \frac{-1}{5}\right)$$

Hence verified.

(ii)

$$x = \frac{-2}{5}, y = \frac{4}{3}, z = \frac{-7}{10}$$

$$(x+y)+z = \left(\frac{-2}{5} + \frac{4}{3}\right) + \frac{-7}{10} = \left(\frac{-6}{15} + \frac{20}{15}\right) + \frac{-7}{10} = \frac{14}{15} + \frac{-7}{10} = \frac{28}{30} + \frac{-21}{30} = \frac{28-21}{30} = \frac{7}{30}$$

$$x+(y+z) = \frac{-2}{5} + \left(\frac{4}{3} + \frac{-7}{10}\right) = \frac{-2}{5} + \left(\frac{40}{30} + \frac{-21}{30}\right) = \frac{-2}{5} + \frac{19}{30} = \frac{-12}{30} + \frac{19}{30} = \frac{-12+19}{30} = \frac{7}{30}$$

$$\therefore \left(\frac{-2}{5} + \frac{4}{3}\right) + \frac{-7}{10} = \frac{-2}{5} + \left(\frac{4}{3} + \frac{-7}{10}\right)$$

Hence verified.

(iii)

$$x = \frac{-7}{11}, y = \frac{2}{-5}, z = \frac{-3}{22}$$

$$(x+y)+z = \left(\frac{-7}{11} + \frac{2}{-5}\right) + \frac{-3}{22} = \left(\frac{-35}{55} + \frac{-22}{55}\right) + \frac{-3}{22} = \frac{-57}{55} + \frac{-3}{22} = \frac{-114}{110} + \frac{-15}{110}$$

$$= \frac{-114-15}{110} = \frac{-129}{110}$$

$$x+(y+z) = \frac{-7}{11} + \left(\frac{2}{-5} + \frac{-3}{22}\right) = \frac{-7}{11} + \left(\frac{-44}{110} + \frac{-15}{110}\right) = \frac{-7}{11} + \frac{-59}{110} = \frac{-70}{110} + \frac{-59}{110} = \frac{-70-59}{110}$$

$$= \frac{-129}{110}$$

$$\therefore \left(\frac{-7}{11} + \frac{2}{-5}\right) + \frac{-3}{22} = \frac{-7}{11} + \left(\frac{2}{-5} + \frac{-3}{22}\right)$$

Hence verified.

(iv)

$$x = -2, y = \frac{3}{5}, z = \frac{-4}{3}$$

$$\text{so, } (x+y)+z = \left(-2 + \frac{3}{5}\right) + \frac{-4}{3} = \left(\frac{-10}{5} + \frac{3}{5}\right) + \frac{-4}{3} = \frac{-7}{5} + \frac{-4}{3} = \frac{-21}{15} + \frac{-20}{15} = \frac{-21-20}{15}$$

$$= \frac{-41}{15}$$

$$x+(y+z) = -2 + \left(\frac{3}{5} + \frac{-4}{3}\right) = \frac{-2}{1} + \left(\frac{9}{15} + \frac{-20}{15}\right) = \frac{-2}{1} + \frac{-11}{15} = \frac{-30}{15} + \frac{-11}{15} = \frac{-30-11}{15}$$

$$= \frac{-41}{15}$$

$$\therefore \left(-2 + \frac{3}{5}\right) + \frac{-4}{3} = -2 + \left(\frac{3}{5} + \frac{-4}{3}\right)$$

Hence verified.

\*\*\*\*\* END \*\*\*\*\*