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 $\frac{4}{7}$.

$\therefore\ \frac{-11}{5}+\frac{4}{7}=\frac{-11\times7}{5\times7}+\frac{4\times5}{7\times5}=\frac{-77}{35}+\frac{20}{35}=\frac{-77+20}{35}=\frac{-57}{35}$

$\frac{4}{7}+\frac{-11}{5}=\frac{4\times5}{7\times5}+\frac{-11\times7}{5\times7}=\frac{20}{35}+\frac{-77}{35}=\frac{20-77}{35}=\frac{-57}{35}$

$\therefore\ \frac{-11}{5}+\frac{4}{7}=\frac{4}{7}+\frac{-11}{5}$

Hence verified.

(ii)

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

$\therefore\ \frac{4}{9}+\frac{-7}{12}=\frac{4\times4}{9\times4}+\frac{-7\times3}{12\times3}=\frac{16}{36}+\frac{-21}{36}=\frac{16-21}{36}=\frac{-5}{36}$

$\frac{-7}{12}+\frac{4}{9}=\frac{-7\times3}{12\times3}+\frac{4\times4}{9\times4}=\frac{-21}{36}+\frac{16}{36}=\frac{-21+16}{36}=\frac{-5}{36}$

$\therefore\ \frac{4}{9}+\frac{-7}{12}=\frac{-7}{12}+\frac{4}{9}$

Hence verified.

$\left(\text{iii}\right)$

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.

$\left(\text{iv}\right)$

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

$\therefore \frac{-2}{7}+\frac{-12}{35}=\frac{-2\times5}{7\times5}+\frac{-12}{35}=\frac{-10-12}{35}=\frac{-22}{35}$

$\frac{12}{-35}+\frac{2}{-7}=\frac{-12}{35}+\frac{-2\times5}{7\times5}=\frac{-12-10}{35}=\frac{-22}{35}$

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

Hence verified.

$\left(\text{v}\right)$

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

$\therefore 4+\frac{-3}{5}=\frac{4\times5}{1\times5}+\frac{-3}{5}=\frac{20-3}{5}=\frac{17}{5}$

$\frac{-3}{5}+4=\frac{-3}{5}+\frac{4\times5}{1\times5}=\frac{-3+20}{5}=\frac{17}{5}$

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

Hence verified.

$\left(\text{vi}\right)$

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

$\therefore\ \frac{-4}{1}+\frac{-4}{7}=\frac{-4\times7}{1\times7}+\frac{-4}{7}=\frac{-28-4}{7}=\frac{-32}{7}$

$\frac{-4}{7}+\frac{-4}{1}=\frac{-4}{7}+\frac{-4\times7}{1\times7}=\frac{-4-28}{7}=\frac{-32}{7}$

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

Hence verified.

Rational Numbers Ex 1.2 Q2

Answer :

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

$\left(i\right)$

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

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

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

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

Hence verified.

$\left(ii\right)$

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

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

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

$= \frac{7}{30}$

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

Hence verified.

$\left(iii\right)$

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

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

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

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

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

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

Hence verified.

$\left(iv\right)$

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

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

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

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

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

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

Hence verified.

*********** END **********