LORD BUDDHA NATIONAL PUBLIC SCHOOL

Online class Part - 2

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Subject - Maths , class - VIII

Operation on Rational number →

Case 1: If $\frac{p}{q}$ and $\frac{r}{q}$ are any two rational numbers with the common denominator q then

$$\frac{p}{q} + \frac{r}{q} = \frac{p+r}{q}$$

Note.- For addition we should convert each rational number into a rational number with positive denominator.

for example $\frac{6}{13} + \frac{-2}{13}$

$$\frac{6+(-2)}{13} = \frac{6-2}{13} = \frac{4}{13}$$

Case-II: For rational numbers $\frac{p}{q}$ and $\frac{r}{s}$ with different denominators, we take the LCM of the denominator and express the given rational number with this L.CM as the common denominator.

Examples- $\frac{1}{8} + \frac{3}{4}$

Take the L.C.M of 8 and 4.
L.C.M of 8 and 4 be 8.

2	8, 4
2	4, 2
2	2, 1
	1, 1

$\therefore 2 \times 2 \times 2 = 8$

$\therefore \frac{3}{4} \times \frac{2}{2} = \frac{6}{8}$

$\therefore \frac{1}{8} + \frac{6}{8}$

$= \frac{1+6}{8} = \frac{7}{8}$

Properties of Addition of Rational number

1. Closure: $\frac{a}{b} + \frac{c}{d}$ is a rational number.

Ex- $\frac{3}{4} + \frac{5}{7}$

$\frac{21+20}{28} = \frac{41}{28}$ which is a rational number.

2- Commutative: $\frac{a}{b} + \frac{c}{d} = \frac{c}{d} + \frac{a}{b}$

i.e two rational number can be added in any order.

Ex. $\frac{1}{2}+\frac{3}{5}$

$= \frac{5+6}{10} = \frac{11}{10}$

$\cdot \frac{3}{5}+\frac{1}{2}$

$\frac{6+5}{10} = \frac{11}{10}$.

$\therefore \frac{1}{2}+\frac{3}{5} = \frac{3}{5}+\frac{1}{2}$.

3. Associative :- For any three rational numbers $\frac{a}{b}, \frac{c}{d}, \frac{e}{f}$ we have $\left(\frac{a}{b}+\frac{c}{d}\right)+\frac{e}{f} = \frac{a}{b}+\left(\frac{c}{d}+\frac{e}{f}\right)$

ie while adding three or more rational numbers. they can be grouped in any order.

Ex. Suppose we have find the sum of $\frac{1}{2}, -\frac{1}{3}, \frac{-3}{5}$ Then

$\left(\frac{1}{2}+\frac{-1}{3}\right)+\frac{-3}{5} = \frac{3-2}{6}+\left(\frac{-3}{5}\right)$

$= \frac{1}{6}+\frac{-3}{5}$

$$= \frac{1\times5+(-3)+6}{30}$$

$$= \frac{5-18}{30} = \frac{-13}{30}$$

IInd part $\frac{1}{2}+\left(\frac{-1}{3}+\frac{-3}{5}\right)$

$$\frac{1}{2}+\frac{-1\times5+(-3)\times3}{15}$$

$$\frac{1}{2}+\frac{-5-9}{15}$$

$$\frac{1}{2}+\frac{-14}{15}$$

$$= \frac{1\times15+(-14)\times2}{30}$$

$$= \frac{15-28}{30} = \frac{-13}{30}$$

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

4. Property of Zero :-

The sum of any rational number and 0, is the rational number itself, i.e if $\frac{a}{b}$ is any rational number

then $\frac{a}{b}+0 = 0+\frac{a}{b} = \frac{a}{b}$

Ex $\frac{7}{8}+0=\frac{7}{8}+\frac{0}{8}=\frac{7+0}{8}=\frac{7}{8}$

Note. 0 is called the additive identity or the identity element for the addition of rational number.

5. Negative of rational number:

If $\frac{a}{b}$ is a rational number then $-\frac{a}{b}$ is a rational number.

Such that $\frac{a}{b}+\left(-\frac{a}{b}\right)=\left(-\frac{a}{b}\right)+\frac{a}{b}=0$

$-\frac{a}{b}$ is called negative of $\frac{a}{b}$

It is also called the additive inverse of $\frac{a}{b}$.

Exercise.

Q:1 Add the following rational number.

[i] $\frac{3}{7}$ and $\frac{2}{7}$ [ii] $\frac{-11}{13}$ and $\frac{9}{13}$

[iii] $\frac{-1}{6}$ and $\frac{3}{10}$ [iv] $\frac{13}{14}$ and $\frac{9}{-7}$

[v] $3\frac{3}{4}$ and $4\frac{1}{3}$ [vi] $2\frac{5}{7}$ and $\frac{-3}{-14}$

Q:2 Simplify.

[i] $\frac{5}{6}+\frac{7}{18}+\frac{-11}{12}$ [ii] $\frac{7}{15}+\frac{-9}{25}+\frac{-3}{10}$

Q:3 verify the following

[i] $\frac{3}{4}+\frac{-2}{5}=\frac{-2}{5}+\frac{3}{4}$

[ii] $\frac{-3}{4}+\frac{7}{-8}=\frac{7}{-8}+\frac{-3}{4}$

Q:4 Verify that.

[i] $\left(\frac{-5}{8}+\frac{9}{8}\right)+\frac{13}{8}=\frac{-5}{8}+\left(\frac{9}{8}+\frac{13}{8}\right)$

[ii] $-20+\left(\frac{3}{-5}+\frac{-7}{-10}\right)=\left(-20+\frac{3}{-5}\right)+\frac{-7}{-10}$