

## EXERCISE 1(A)

### Question 1.

Add, each pair of rational numbers, given below, and show that their addition (sum) is also a rational number.

**Solution:-**

(i)  $\frac{-5}{8}$  and  $\frac{3}{8}$

**Solution:**

$$\frac{-5}{8} \text{ and } \frac{3}{8}$$

Adding addition sign in between,

$$= \frac{-5}{8} + \frac{3}{8} \quad (\because \text{Denominators are same, LCM}=8)$$

$$= \frac{-5}{8} + \frac{3}{8} = \frac{-5+3}{8}$$

$$= \frac{-2}{8} = \frac{-1}{4} \quad (\text{Cancelling numerator and denominator by 2})$$

Which is a rational number.

(ii)  $\frac{-8}{13}$  and  $\frac{-4}{13}$

**Solution:**

$$\frac{-8}{13} \text{ and } \frac{-4}{13}$$

Adding addition sign in between

$$= \frac{-8}{13} + \left(\frac{-4}{13}\right) \quad (\because \text{Denominators are same, LCM}=13)$$

$$\frac{-8}{13} + \left(\frac{-4}{13}\right) = \frac{-8-4}{13} = \frac{-12}{13}$$

Which is a rational number.

(iii)  $\frac{6}{11}$  and  $\frac{-9}{11}$

**Solution:**

$$\frac{6}{11} \text{ and } \frac{-9}{11}$$

Adding addition sign in between

$$= \frac{6}{11} + \left(\frac{-9}{11}\right) = \frac{6}{11} + \left(\frac{-9}{11}\right) \quad (\because \text{Denominators are same, } \therefore \text{LCM}=11)$$

$$= \frac{6-9}{11} = \frac{-3}{11}$$

Which is a rational number.

(iv)  $\frac{5}{-26}$  and  $\frac{8}{39}$

**Solution:**

$$\frac{5}{-26} \text{ and } \frac{8}{39}$$

Adding addition sign in between

$$= \frac{5}{-26} + \frac{8}{39}$$

Taking L.C.M.

$$\therefore \text{LCM of 26 and 39} = 2 \times 3 \times 13 = 78$$

$$\frac{5}{-26} + \frac{8}{39} = \frac{-5 \times 3}{26 \times 3} + \frac{8 \times 2}{39 \times 2}$$

$$= \frac{-15 + 16}{78}$$

$$= \frac{1}{78}$$

Which is a rational number.

(v)  $\frac{5}{-6}$  and  $\frac{2}{3}$

**Solution:**

$$\frac{5}{-6} \text{ and } \frac{2}{3}$$

Adding addition sign in between

$$= \frac{-5}{6} + \frac{2}{3}$$

Taking L.C.M.

$$2 \ 6,3$$

$$3 \ 3,3$$

$$1,1$$

$$\therefore \text{LCM of 6, 3} = 2 \times 3 = 6$$

$$\frac{-5}{6} + \frac{2}{3} = \frac{-5 \times 1}{6 \times 1} + \frac{2 \times 2}{3 \times 2} \quad (\because \text{LCM of 6 and 3} = 6)$$

$$= \frac{-5 + 4}{6} = \frac{-1}{6}$$

Which is a rational number.

(vi)  $-2$  and  $\frac{2}{5}$

**Solution:**

$$-2 \text{ and } \frac{2}{5}$$



Adding addition sign in between

$$\begin{aligned} &= \frac{-2}{1} + \frac{2}{5} (\because \text{LCM of } 1 \text{ and } 5 = 5) \\ &= \frac{-2 \times 5}{1 \times 5} + \frac{2 \times 1}{5 \times 1} \\ &= \frac{-10+2}{5} = \frac{-8}{5} \end{aligned}$$

Which is a rational number.

(vii)  $\frac{9}{-4}$  and  $\frac{-3}{8}$

**Solution:**

$$\frac{9}{-4} \text{ and } \frac{-3}{8}$$

Adding addition sign in between

$$= \frac{-9}{4} + \left( \frac{-3}{8} \right)$$

Taking L.C.M.

2 4,8

2 2,4

2 2,2

1,1

$\therefore$  LCM of 4 and 8 =  $2 \times 2 \times 2 = 8$

$$\begin{aligned} \frac{-9}{4} + \left( \frac{-3}{8} \right) &= \frac{-9 \times 2}{4 \times 2} - \frac{3 \times 1}{8 \times 1} \\ &= \frac{-18-3}{8} = \frac{-21}{8} \end{aligned}$$

Which is a rational number.

(viii)  $\frac{7}{-18}$  and  $\frac{8}{27}$

**Solution:**

$$\frac{7}{-18} \text{ and } \frac{8}{27}$$

Adding addition sign in between

$$\frac{7}{-18} + \frac{8}{27}$$

2 18,27

3 9,27

3 3,9

3 1,3

1,1

∴ LCM of 18 and 27 =  $2 \times 3 \times 3 \times 3 = 54$

$$= \frac{-21+16}{54} = \frac{-5}{54} \text{ Which is a rational number.}$$

**Question 2. Evaluate:**

(i)  $\frac{5}{9} + \frac{-7}{6}$

**Solution:**

$$\frac{5}{9} + \frac{-7}{6} \text{ Taking L.C.M.}$$

2 9,6

3 9,3

3 3,1

1,1

∴ LCM of 9 and 6 =  $2 \times 3 \times 3 = 18$

$$\frac{5}{9} + \frac{-7}{6}$$

$$= \frac{5 \times 2}{9 \times 2} - \frac{7 \times 3}{6 \times 3}$$

(∴ LCM of 9 and 6 = 18)

$$= \frac{10-21}{18} = \frac{-11}{18}$$

(ii)  $4 + \frac{3}{-5}$

**Solution:**

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

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

$$= \frac{4}{1} - \frac{3}{5}$$

Taking L.C.M.

LCM of 1 and 5 = 5

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

$$= \frac{20-3}{5} = \frac{17}{5} = 3\frac{2}{5} \text{ (Displaying the answer in mixed fraction)}$$

(iii)  $\frac{1}{-15} + \frac{5}{-12}$

**Solution:**

$$\frac{1}{-15} + \frac{5}{-12}$$

$$= \frac{-1}{15} + \left( \frac{-5}{12} \right)$$

$$= \frac{-1}{15} - \frac{5}{12}$$

Taking L.C.M.

2 15,2

2 15,6

3 15,3

5 5,1

1,1

∴ LCM of 15 and 12 =  $2 \times 2 \times 3 \times 5 = 60$

$$= \frac{-1 \times 4}{15 \times 4} - \frac{5 \times 5}{12 \times 5}$$

LCM of 15 and 12 = 60

$$\frac{1}{-15} + \frac{5}{-12} = \frac{-4-25}{60} = \frac{-29}{60}$$

(iv)  $\frac{5}{9} + \frac{3}{-4}$

**Solution:**

$$\frac{5}{9} + \frac{3}{-4}$$
$$= \frac{5}{9} - \frac{3}{4} \text{ (Manipulating the signs)}$$

LCM of 9 and 4 =  $2 \times 2 \times 3 \times 3 = 36$

$$\frac{5}{9} + \frac{3}{-4} = \frac{5 \times 4}{9 \times 4} - \frac{3 \times 9}{4 \times 9}$$

$$= \frac{20-27}{36} = \frac{-7}{36}$$

$$= \frac{-7}{36}$$

(v)  $\frac{-8}{9} + \frac{-5}{12}$

**Solution:**

$$\frac{-8}{9} + \frac{-5}{12} \text{ Taking L.C.M.}$$

2 9,12

2 9,6

3 9,3

3 3,1

1,1

∴ LCM of 9, 12 =  $2 \times 2 \times 3 \times 3 = 36$

$$\frac{-8}{9} + \frac{-5}{12} = \frac{-8 \times 4}{9 \times 4} - \frac{5 \times 3}{12 \times 3}$$

$$= \frac{-32-15}{36}$$

$$= \frac{-47}{36}$$

(vi)  $0 + \frac{-2}{7}$

**Solution:**

$$0 + \frac{-2}{7} \text{ LCM of 0 and 7}=7$$

By cross multiplying

$$0 + \frac{-2}{7} = \frac{0 \times 7}{1 \times 7} - \frac{2 \times 1}{7 \times 1}$$

$$= \frac{0-2}{7} = \frac{-2}{7}$$

(vii)  $\frac{5}{-11} + 0$

**Solution:**

$$\frac{5}{-11} + 0$$

LCM of 0 and 11=11

By cross multiplying

$$\frac{5}{-11} + 0 = \frac{-5 \times 1}{11 \times 1} + \frac{0 \times 11}{1 \times 11}$$

$$= \frac{-5+0}{11} = \frac{-5}{11}$$

(viii)  $2 + \frac{-3}{5}$

**Solution:**

$$= \frac{2}{1} - \frac{3}{5} \text{ LCM of 1 and 5}=5$$

$$= \frac{2 \times 5}{1 \times 5} - \frac{3 \times 1}{5 \times 1}$$

$$= \frac{10-3}{5} = \frac{7}{5} = 1\frac{2}{5}$$

(ix)  $\frac{4}{-9} + 1$

**Solution:**

$$\frac{4}{-9} + 1$$

LCM of 9 and 1=9

$$\frac{-4}{9} + \frac{1}{1} = \frac{-4 \times 1}{9 \times 1} + \frac{1 \times 9}{1 \times 9}$$

$$= \frac{-4+9}{9} = \frac{5}{9}$$

**Myclass24**  
Your Class. Your Pace.

**Question 3. Evaluate:**

(i)  $\frac{3}{7} + \frac{-4}{9} + \frac{-11}{7} + \frac{7}{9}$

**Solution:**

$$\begin{aligned} &= \left(\frac{3}{7} + \frac{-11}{7}\right) + \left(\frac{-4}{9} + \frac{7}{9}\right) \\ &= \frac{3-11}{7} + \frac{-4+7}{9} \\ &= \frac{-8}{7} + \frac{3}{9} \\ &= \frac{-8}{7} + \frac{1}{3} \end{aligned}$$

Taking LCM of 7 and 3

3 7,3

7 7,7

1,1

∴ LCM of 3 and 7 =  $3 \times 7 = 21$

$$\begin{aligned} \frac{-8}{7} + \frac{1}{3} &= \frac{-8 \times 3}{7 \times 3} + \frac{1 \times 7}{3 \times 7} \\ &= \frac{-24+7}{21} = \frac{-17}{21} \end{aligned}$$

(ii)  $\frac{2}{3} + \frac{-4}{5} + \frac{1}{3} + \frac{2}{5}$

**Solution:**

$$\begin{aligned} &= \left(\frac{2}{3} + \frac{1}{3}\right) + \left(\frac{-4}{5} + \frac{2}{5}\right) \\ &= \frac{2+1}{3} + \frac{-4+2}{5} \\ &= \frac{3}{3} + \left(\frac{-2}{5}\right) \end{aligned}$$

Taking LCM,

3 3,5

5 1,5

1,1

∴ LCM of 3 and 5 =  $3 \times 5 = 15$

$$\begin{aligned} \frac{3}{3} + \left(\frac{-2}{5}\right) &= \frac{3 \times 5}{3 \times 5} + \frac{-2 \times 3}{5 \times 3} \\ &= \frac{15-6}{15} = \frac{9}{15} = \frac{3}{5} \end{aligned}$$

**Myclass24**  
Your Class. Your Pace.

$$(iii) \frac{4}{7} + 0 + \frac{-8}{9} + \frac{-13}{7} + \frac{17}{9}$$

**Solution:**

$$\begin{aligned} &= \frac{4}{7} + \frac{-8}{9} + \frac{-13}{7} + \frac{17}{9} \\ &= \left[ \frac{4}{7} + \left( \frac{-13}{7} \right) \right] + \left( \frac{-8}{9} + \frac{17}{9} \right) \\ &= \left[ \frac{4}{7} - \frac{13}{7} \right] + \left[ \frac{-8}{9} + \frac{17}{9} \right] \\ &= \frac{-9}{7} + \frac{9}{9} = \frac{-9}{7} + 1 \\ &= \frac{-9 \times 1}{7 \times 1} + \frac{1 \times 7}{1 \times 7} (\because \text{LCM of } 1 \text{ and } 7 = 7) \\ &= \frac{-9}{7} + \frac{7}{7} = \frac{-2}{7} \end{aligned}$$

$$(iv) \frac{3}{8} + \frac{-5}{12} + \frac{3}{7} + \frac{3}{12} + \frac{-5}{8} + \frac{-2}{7}$$

**Solution:**

$$\begin{aligned} &= \left( \frac{3}{8} - \frac{5}{8} \right) + \left( \frac{-5}{12} + \frac{3}{12} \right) + \left( \frac{3}{7} - \frac{2}{7} \right) \\ &= \frac{-2}{8} - \frac{2}{12} + \frac{1}{7} \\ &= \frac{-1}{4} - \frac{1}{6} + \frac{1}{7} \end{aligned}$$

2 4,6,7

2 2,3,7

3 1,3,7

7 1,1,7

1,1,1

$\therefore$  LCM of 4, 6 and 7 =  $2 \times 2 \times 3 \times 7 = 84$

$$\begin{aligned} \frac{-1}{4} - \frac{1}{6} + \frac{1}{7} &= \frac{-1 \times 21}{4 \times 21} - \frac{1 \times 14}{6 \times 14} + \frac{1 \times 12}{7 \times 12} \\ &= \frac{-21 - 14 + 12}{84} \\ &= \frac{-35 + 12}{84} = \frac{-23}{84} \end{aligned}$$

**Question 4.**

For each pair of rational numbers, verify commutative property of addition of rational numbers:

$$(i) \frac{-8}{7} \text{ and } \frac{5}{14}$$

**Solution:**

To prove:  $\frac{-8}{7} + \frac{5}{14} = \frac{5}{14} + \frac{-8}{7}$

LHS =  $\frac{-8}{7} + \frac{5}{14}$

Taking LCM of 7 and 14

2 7,14

7 7,7

1,1

∴ LCM of 2 and 7 = 14

$$\frac{-8}{7} + \frac{5}{14} = \frac{-8 \times 2}{7 \times 2} + \frac{5 \times 1}{14 \times 1}$$

$$= \frac{-16+5}{14} = \frac{-11}{14}$$

RHS =  $\frac{5}{14} + \frac{-8}{7}$

$$= \frac{5 \times 1}{14 \times 1} + \left( \frac{-8 \times 2}{7 \times 2} \right) (\because \text{LCM of 2 and 7} = 14)$$

$$= \frac{5-16}{14} = \frac{-11}{14} \therefore \text{RHS} = \text{LHS}$$

i.e.  $\frac{-8}{7} + \frac{5}{14} = \frac{5}{14} + \frac{-8}{7}$

Hence, the commutative property for the addition of rational numbers is verified.

(ii)  $\frac{5}{9}$  and  $\frac{5}{-12}$

**Solution:**

To prove:  $\frac{5}{9} + \frac{5}{-12} = \frac{5}{-12} + \frac{5}{9}$

LHS =  $\frac{5}{9} + \frac{5}{-12}$  LCM of 9 and 12 =  $2 \times 2 \times 3 \times 3 = 36$

$$\text{LHS} = \frac{5 \times 4}{9 \times 4} - \frac{5 \times 3}{12 \times 3}$$

$$= \frac{20-15}{36} = \frac{5}{36}$$

RHS =  $\frac{5}{-12} + \frac{5}{9}$

$$= \frac{5 \times 3}{-12 \times 3} + \frac{5 \times 4}{9 \times 4} (\because \text{LCM of 9 and 12} = 36)$$

$$= \frac{-15+20}{36} = \frac{5}{36} \therefore \text{RHS} = \text{LHS}$$

i.e.  $\frac{5}{9} + \frac{5}{-12} = \frac{5}{-12} + \frac{5}{9}$

Hence, the commutative property for the addition of rational numbers is verified.

(iii)  $\frac{-4}{5}$  and  $\frac{-13}{-15}$

**Solution:**

To prove:

$$\frac{-4}{5} + \frac{-13}{-15} = \frac{-13}{-15} + \left(\frac{-4}{5}\right)$$

$$\text{LHS} = \frac{-4}{5} + \frac{13}{15}$$

Taking LCM

5, 15

3, 1, 3

1, 1

∴ LCM of 5 and 15 = 5 × 3 = 15

$$\text{LHS} = \frac{-4 \times 3}{5 \times 3} + \frac{13 \times 1}{15 \times 1}$$

$$= \frac{-12 + 13}{15} = \frac{1}{15}$$

$$\text{RHS} = \frac{13}{15} + \frac{-4}{5}$$

$$= \frac{13 \times 1}{15 \times 1} + \frac{-4 \times 3}{5 \times 3} \quad (\because \text{LCM of 5 and 15} = 15)$$

$$= \frac{13 - 12}{15} = \frac{1}{15} \quad \therefore \text{RHS} = \text{LHS}$$

$$\text{i.e. } \frac{-4}{5} + \frac{-13}{-15} = \frac{-13}{-15} + \frac{-4}{5}$$

Hence, the commutative property for the addition of rational numbers is verified.

(iv)  $\frac{2}{-5}$  and  $\frac{11}{-15}$

**Solution:**

$$\text{To prove: } \frac{2}{-5} + \frac{11}{-15} = \frac{11}{-15} + \frac{2}{-5}$$

$$\text{LHS} = \frac{2}{-5} + \frac{11}{-15}$$

Taking LCM

3, 5, 15

5, 5, 5

1, 1

∴ LCM of 5 and 15 = 15

$$\text{LHS} = \frac{-2 \times 3}{5 \times 3} + \frac{11 \times 1}{15 \times 1}$$

$$= \frac{-6 - 11}{15} = \frac{-17}{15}$$

$$\begin{aligned}\text{RHS} &= \frac{11}{-15} + \frac{2}{-5} \\ &= \frac{-11 \times 1}{15 \times 1} - \frac{2 \times 3}{5 \times 3} \quad (\because \text{LCM of 5 and 15} = 15) \\ &= \frac{-11-6}{15} = \frac{-17}{15} \therefore \text{RHS} = \text{LHS}\end{aligned}$$

$$\text{i.e. } \frac{2}{-5} + \frac{11}{-15} = \frac{11}{-15} + \frac{2}{-5}$$

Hence, the commutative property for the addition of rational numbers is verified.

(v) 3 and  $\frac{-2}{7}$

**Solution:**

$$\text{To prove: } \frac{3}{1} + \frac{-2}{7} = \frac{-2}{7} + \frac{3}{1}$$

$$\begin{aligned}\text{LHS} &= \frac{3}{1} + \frac{-2}{7} \\ &= \frac{3 \times 7}{1 \times 7} - \frac{2 \times 1}{7 \times 1} \quad (\because \text{LCM of 1 and 7} = 7) \\ &= \frac{21-2}{7} = \frac{19}{7}\end{aligned}$$

$$\begin{aligned}\text{RHS} &= \frac{-2}{7} + \frac{3}{1} \\ &= \frac{-2 \times 1}{7 \times 1} + \frac{3 \times 7}{1 \times 7} \quad (\because \text{LCM of 1 and 7} = 7) \\ &= \frac{-2+21}{7} = \frac{19}{7} \therefore \text{RHS} = \text{LHS}\end{aligned}$$

$$\text{i.e. } \frac{3}{1} + \frac{-2}{7} = \frac{-2}{7} + \frac{3}{1}$$

Hence, the commutative property for the addition of rational numbers is verified.

vi)  $-2$  and  $\frac{3}{-5}$

**Solution:**

$$\text{To prove: } \frac{-2}{1} + \frac{-3}{5} = \frac{-3}{5} + \frac{-2}{1}$$

$$\begin{aligned}\text{LHS} &= \frac{-2}{1} + \frac{-3}{5} \\ &= \frac{-2 \times 5}{1 \times 5} + \frac{-3 \times 1}{5 \times 1} \quad (\because \text{LCM of 1 and 5} = 5) \\ &= \frac{-10-3}{5} = \frac{-13}{5}\end{aligned}$$

$$\text{RHS} = \frac{-3}{5} + \frac{-2}{1}$$

$$= \frac{-3 \times 1}{5 \times 1} + \frac{-2 \times 5}{1 \times 5} \quad (\because \text{LCM of 1 and 5} = 5)$$

$\therefore \text{RHS} = \text{LHS}$

$$\text{i.e. } -\frac{2}{1} + \frac{-3}{5} = \frac{-3}{5} + \frac{-2}{1}$$

Hence, the commutative property for the addition of rational numbers is verified.

**Question 5.**

For each set of rational numbers, given below, verify the associative property of addition of rational numbers:

(i)  $\frac{1}{2}$ ,  $\frac{2}{3}$  and  $-\frac{1}{6}$

**Solution:**

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

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

2 3,6

3 3,3

1,1

$\therefore$  LCM of 3 and 6=6

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

$$= \frac{1}{2} + \left(\frac{4}{6} - \frac{1}{6}\right)$$

$$= \frac{1}{2} + \left(\frac{4-1}{6}\right)$$

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

$$= \frac{1 \times 3}{2 \times 3} + \frac{3 \times 1}{6 \times 1} \quad (\because \text{LCM of 2 and 6} = 6)$$

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

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

2 2,3

3 1,3

1,1

$\therefore$  LCM of 2 and 3=6

$$\begin{aligned} \text{RHS} &= \left( \frac{1 \times 3}{2 \times 3} + \frac{2 \times 2}{3 \times 2} \right) + \frac{-1}{6} \\ &= \frac{3+4}{6} + \frac{-1}{6} \\ &= \frac{7-1}{6} = \frac{6}{6} = 1 \end{aligned}$$

∴ RHS = LHS

$$\text{i.e. } \frac{1}{2} + \left( \frac{2}{3} + \frac{-1}{6} \right) = \left( \frac{1}{2} + \frac{2}{3} \right) + \frac{-1}{6}$$

Hence, the associative property for the addition of rational numbers is verified.

(ii)  $\frac{-2}{5}$ ,  $\frac{4}{15}$  and  $\frac{-7}{10}$

**Solution:**

$$\text{To prove: } \frac{-2}{5} + \left( \frac{4}{15} + \frac{-7}{10} \right) = \left( \frac{-2}{5} + \frac{4}{15} \right) + \frac{-7}{10}$$

$$\text{LHS} = \frac{-2}{5} + \left( \frac{4}{15} + \frac{-7}{10} \right)$$

Taking LCM

2 15,10

3 15,5

5 5,5

1,1

$$\therefore \text{LCM of 15 and 10} = 2 \times 3 \times 5 = 30$$

$$\text{LHS} = \frac{-2}{5} + \left( \frac{4 \times 2}{15 \times 2} + \frac{-7 \times 3}{10 \times 3} \right)$$

$$= \frac{-2}{5} + \left( \frac{8-21}{30} \right)$$

$$= \frac{-2}{5} - \frac{13}{30} = \frac{-2 \times 6}{5 \times 6} - \frac{13 \times 1}{30 \times 1} \quad (\because \text{LCM of 5 and 30} = 30)$$

$$= \frac{-12-13}{30} = \frac{-25}{30} = \frac{-5}{6}$$

$$\text{RHS} = \left( \frac{-2}{5} + \frac{4}{15} \right) + \frac{-7}{10}$$

Taking LCM

3 5,15

5 5,5

1,1



∴ LCM of 5 and 15 = 3 × 5 = 15

$$\begin{aligned} \text{RHS} &= \left( \frac{-2 \times 3}{5 \times 3} + \frac{4 \times 1}{15 \times 1} \right) + \frac{-7}{10} \\ &= \frac{-6+4}{15} + \frac{-7}{10} \\ &= \frac{-2}{15} + \frac{-7}{10} \\ &= \frac{-2 \times 2}{15 \times 2} - \frac{7 \times 3}{10 \times 3} \quad (\because \text{LCM of 15 and 10} = 30) \\ &= \frac{-4}{30} - \frac{21}{30} = \frac{-25}{30} = \frac{-5}{6} \therefore \text{RHS} = \text{LHS} \end{aligned}$$

$$\text{i.e. } \frac{-2}{5} + \left( \frac{4}{15} + \frac{-7}{10} \right) = \left( \frac{-2}{5} + \frac{4}{15} \right) + \frac{-7}{10}$$

Hence, the associative property for the addition of rational numbers is verified.

(iii)  $\frac{-7}{9}$ ,  $\frac{2}{-3}$  and  $\frac{-5}{18}$

**Solution:**

$$\text{To prove: } \frac{-7}{9} + \left( \frac{2}{-3} + \frac{-5}{18} \right) = \left( \frac{-7}{9} + \frac{2}{-3} \right) + \frac{-5}{18}$$

$$\text{LHS} = \frac{-7}{9} + \left( \frac{2}{-3} + \frac{-5}{18} \right)$$

Taking LCM

2 3, 18

3 3, 9

5 3, 3

1, 1

∴ LCM of 3 and 18 = 2 × 3 × 3 = 18

$$\begin{aligned} \text{LHS} &= \frac{-7}{9} + \left( \frac{-2 \times 6}{3 \times 6} + \frac{-5 \times 1}{18 \times 1} \right) \\ &= \frac{-7}{9} + \left( \frac{-12-5}{18} \right) \\ &= \frac{-7}{9} + \frac{-17}{18} \\ &= \frac{-7 \times 2}{9 \times 2} - \frac{17 \times 1}{18 \times 1} \quad (\because \text{LCM of 9 and 18} = 18) \\ \text{RHS} &= \left( \frac{-7}{9} + \frac{2}{-3} \right) + \frac{-5}{18} \end{aligned}$$

Taking LCM

**Myclass24**  
Your Class. Your Pace.

3 3,9

3 3,3

1,1

∴ LCM of 3 and 9 = 3

$$\text{RHS} = \left( \frac{-7 \times 1}{9 \times 1} + \frac{-2 \times 3}{3 \times 3} \right) + \frac{-5}{18}$$

$$= \frac{-7-6}{9} + \frac{-5}{18}$$

$$= \frac{-13}{9} + \frac{-5}{18}$$

$$= \frac{-13 \times 2}{9 \times 2} + \frac{-5 \times 1}{18 \times 1} \quad (\because \text{LCM of 9 and 18} = 18)$$

$$= \frac{-26-5}{18} = \frac{-31}{18} \quad \therefore \text{RHS} = \text{LHS}$$

$$\text{i.e. } \frac{-7}{9} + \left( \frac{2}{-3} + \frac{-5}{18} \right) = \left( \frac{-7}{9} + \frac{2}{-3} \right) + \frac{-5}{18}$$

Hence, the associative property for the addition of rational numbers is verified.

(iv)  $-1, \frac{5}{6}$  and  $\frac{-2}{3}$

**Solution:**

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

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

Taking LCM

2 3,6

3 3,3

1,1

∴ LCM of 6 and 3 = 6

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

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

$$= \frac{-1 \times 6}{1 \times 6} + \frac{1 \times 1}{6 \times 1} \quad (\because \text{LCM of 1 and 6} = 6)$$

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

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

$$\begin{aligned} &= \left( \frac{-1 \times 6}{1 \times 6} + \frac{5 \times 1}{6 \times 1} \right) + \frac{-2}{3} \quad (\because \text{LCM of 1 and 6} = 6) \\ &= \left( \frac{-6+5}{6} \right) + \frac{-2}{3} = -\frac{1}{6} + \frac{-2}{3} \\ &= \frac{-1 \times 1}{6 \times 1} + \frac{-2 \times 2}{3 \times 2} \quad (\because \text{LCM of 6 and 3} = 6) \\ &= \frac{-1-4}{6} = \frac{-5}{6} \quad \therefore \text{RHS} = \text{LHS} \\ \text{i.e. } &\frac{-1}{1} + \left( \frac{5}{6} + \frac{-2}{3} \right) = \left( \frac{-1}{1} + \frac{5}{6} \right) + \frac{-2}{3} \end{aligned}$$

Hence, the associative property for the addition of rational numbers is verified.

**Question 6.**

**Write the additive inverse (negative) of:**

(i)  $\frac{-3}{8}$

(ii)  $\frac{4}{-9}$

(iii)  $\frac{-7}{5}$

(iv)  $\frac{-4}{-13}$

(v) 0

(vi) -2

(vii) 1

(viii)  $-\frac{1}{3}$

(ix)  $\frac{-3}{1}$

**Solution:**

(i) The additive inverse of  $\frac{-3}{8} = \frac{3}{8}$

(ii) The additive inverse of  $\frac{4}{-9} = \frac{4}{9}$

(iii) The additive inverse of  $\frac{-7}{5} = \frac{7}{5}$

(iv) The additive inverse of  $\frac{-4}{-13}$  or  $\left( \frac{4}{13} \right) = -\frac{4}{13}$

(v) The additive inverse of 0=0

(vi) The additive inverse of  $-2=2$

(vii) The additive inverse of  $1=-1$

(viii) The additive inverse of  $-\frac{1}{3} = \frac{1}{3}$

(ix) The additive inverse of  $\frac{-3}{1} = 3$

**Question 7**

**Fill in the blanks:**

(i) Additive inverse of  $\frac{-5}{-12} =$  \_\_\_\_\_.

(ii)  $\frac{-5}{-12} +$  its additive inverse = \_\_\_\_\_.

(iii) If  $\frac{a}{b}$  is additive inverse of  $\frac{-c}{d}$  then  $\frac{-c}{d}$  is additive inverse of \_\_\_\_\_.

**Solution:**

(i) Additive inverse of  $\frac{-5}{-12} = -\frac{5}{12}$

(ii)  $\frac{-5}{-12} +$  its additive inverse =  $\frac{-5}{-12} + (-\frac{5}{12}) = 0$

(iii)  $\frac{a}{b}$  is additive inverse of  $\frac{-c}{d}$  then  $\frac{-c}{d}$  is additive inverse of  $\frac{a}{b}$

**Question 8.**

**State, true or false:**

(i)  $\frac{7}{9} = \frac{7+5}{9+5}$

**Solution:** False

(ii)  $\frac{7}{9} = \frac{7-5}{9-5}$

**Solution:** False

(iii)  $\frac{7}{9} = \frac{7 \times 5}{9 \times 5}$

**Solution:** True

(iv)  $\frac{7}{9} = \frac{7+5}{9+5}$

**Solution:** True

(v)  $\frac{-5}{-12}$  is a negative rational number

**Solution:** False

(vi)  $\frac{-13}{25}$  smaller than  $\frac{-25}{13}$

**Solution:** False