

EXERCISE 4C

1. Add the following rational numbers:

(i) $\frac{12}{7}$ and $\frac{3}{7}$

(ii) $\frac{-2}{5}$ and $\frac{1}{5}$

(iii) $\frac{3}{-8}$ and $\frac{1}{8}$

(iv) $\frac{-5}{11}$ and $\frac{7}{-11}$

(v) $\frac{9}{-13}$ and $\frac{-11}{-13}$

(vi) $\frac{-2}{9}$ and $\frac{-5}{9}$

(vii) $\frac{-17}{9}$ and $\frac{-11}{9}$

(viii) $\frac{-3}{7}$ and $\frac{5}{-7}$

2. Add the following rational numbers:

(i) $\frac{-2}{5}$ and $\frac{3}{4}$

(ii) $\frac{-5}{9}$ and $\frac{2}{3}$

(iii) -4 and $\frac{1}{2}$

(iv) $\frac{-7}{27}$ and $\frac{5}{18}$

(v) $\frac{-5}{36}$ and $\frac{-7}{12}$

(vi) $\frac{1}{-9}$ and $\frac{4}{-27}$

(vii) $\frac{-9}{24}$ and $\frac{-1}{18}$

(viii) $\frac{27}{-4}$ and $\frac{-15}{8}$

3. Evaluate:

(i) $\frac{-3}{5} + \frac{7}{5} + \frac{-1}{5}$

(ii) $\frac{-12}{7} + \frac{3}{7} + \frac{-2}{7}$

(iii) $\frac{11}{-12} + \frac{3}{-8} + \frac{1}{4}$

(iv) $\frac{-16}{9} + \frac{-5}{12} + \frac{7}{18}$

(v) $-3 + \frac{1}{8} + \frac{-2}{5}$

(vi) $\frac{-13}{8} + \frac{5}{16} + \frac{-1}{4}$

4. Simplify:

(i) $\frac{-8}{15} + \frac{2}{-3}$

(ii) $\frac{-7}{10} + \frac{13}{-15} + \frac{27}{20}$

(iii) $-1 + \frac{7}{-9} + \frac{11}{12}$

(iv) $\frac{-11}{39} + \frac{5}{26} + 2$

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

(vi) $\frac{-9}{11} + \frac{2}{3} + \frac{-3}{4}$

5. Express each of the following rational numbers as the sum of an integer and a rational number:

(i) $\frac{12}{5}$

(ii) $\frac{-11}{7}$

(iii) $\frac{-25}{9}$

(iv) $\frac{-103}{20}$

Q1

Answer :

(i)

$$\frac{12}{7} + \frac{3}{7} = \frac{12+3}{7} = \frac{15}{7}$$

(ii)

$$\frac{-2}{5} + \frac{1}{5} = \frac{-2+1}{5} = \frac{-1}{5}$$

(iii)

$$\frac{3}{-8} \times \frac{-1}{-1} = \frac{-3}{8}$$

$$\frac{-3}{8} + \frac{1}{8} = \frac{-3+1}{8} = \frac{-2}{8}$$

(iv)

$$\frac{7}{-11} \times \frac{-1}{-1} = \frac{-7}{11}$$

$$\frac{-5}{11} + \frac{-7}{11} = \frac{-5+(-7)}{11} = \frac{-5-7}{11} = \frac{-12}{11}$$

(v)

$$\frac{-11}{-13} \times \frac{-1}{-1} = \frac{11}{13}$$

$$= \frac{-9}{13} + \frac{11}{13} = \frac{-9+11}{13} = \frac{2}{13}$$

(vi)

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

(vii)

$$\frac{(-17)}{9} + \frac{(-11)}{9} = \frac{-17-11}{9} = \frac{-28}{9}$$

(viii)

$$\frac{5}{-7} \times \frac{-1}{-1} = \frac{-5}{7}$$

$$\frac{-3}{7} + \frac{(-5)}{7} = \frac{-3-5}{7} = \frac{-8}{7}$$

Q2

Answer :

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

The denominators of the given rational numbers are 5 and 4.

L.C.M. of 5 and 4 is 20.

$$\frac{-2}{5} = \frac{(-2) \times 4}{5 \times 4} = \frac{-8}{20}$$

$$\frac{3}{4} = \frac{3 \times 5}{4 \times 5} = \frac{15}{20}$$

$$\text{Now, } \frac{(-8)}{20} + \frac{15}{20} = \frac{-8+15}{20} = \frac{7}{20}$$

$$(ii) \frac{-5}{9} + \frac{2}{3}$$

The denominators of the given rational numbers are 9 and 3.

$$\begin{array}{r|l} 3 & 9,3 \\ \hline 3 & 3,1 \\ \hline & 1,1 \end{array}$$

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

$$\frac{-5}{9} = \frac{(-5) \times 1}{9 \times 1} = \frac{-5}{9}$$

$$\frac{2}{3} = \frac{2 \times 3}{3 \times 3} = \frac{6}{9}$$

$$\text{Now, } \frac{(-5)}{9} + \frac{6}{9}$$

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

$$= \frac{1}{9}$$

$$(iii) -4 + \frac{1}{2}$$

The denominators of the given rational numbers are 1 and 2.

L.C.M. of 1 and 2 is 2.

$$\frac{-4}{1} = \frac{(-4) \times 2}{1 \times 2} = \frac{-8}{2}$$

$$\frac{1}{2} = \frac{1 \times 1}{2 \times 1} = \frac{1}{2}$$

$$\text{Now, } \frac{(-8)}{2} + \frac{1}{2}$$

$$= \frac{-8+1}{2}$$

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

$$(iv) \frac{-7}{27} + \frac{5}{18}$$

The denominators of the given rational numbers are 27 and 18.

$$\begin{array}{r|l} 3 & 27, 18 \\ \hline 3 & 9, 6 \\ \hline 3 & 3, 2 \\ \hline 2 & 1, 2 \\ \hline & 1, 1 \end{array}$$

L.C.M. of 27 and 18 is 54.

$$\frac{-7}{27} = \frac{(-7) \times 2}{27 \times 2} = \frac{-14}{54}$$

$$\frac{5}{18} = \frac{5 \times 3}{18 \times 3} = \frac{15}{54}$$

$$\text{Now, } \frac{(-14)}{54} + \frac{15}{54} = \frac{-14+15}{54}$$

$$= \frac{1}{54}$$

$$(v) \frac{-5}{36} + \left(\frac{-7}{12} \right)$$

$$\begin{array}{r|l} 3 & 36, 12 \\ \hline 2 & 12, 4 \\ \hline 2 & 6, 2 \\ \hline 3 & 3, 1 \\ \hline & 1, 1 \end{array}$$

The denominators of the given rational numbers are 36 and 12.

L.C.M. of 36 and 12 is 36.

$$\frac{-5}{36} = \frac{(-5) \times 1}{36 \times 1} = \frac{-5}{36}$$

$$\frac{-7}{12} = \frac{-7 \times 3}{12 \times 3} = \frac{-21}{36}$$

$$\text{Now, } \frac{(-5)}{36} + \frac{(-21)}{36} = \frac{-5-21}{36}$$

$$\frac{-26}{36} = \frac{-13}{18} \quad \left(26 \text{ and } 36 \text{ are divided by } 2 \right)$$

(vi)

$$\frac{1}{-9} + \left(\frac{4}{-27} \right)$$

We need a positive denominator.

$$\frac{1}{-9} \times \frac{-1}{-1} = \frac{-1}{9} \quad \text{and} \quad \frac{4}{-27} \times \frac{-1}{-1} = \frac{-4}{27}$$

The denominators of the given rational numbers are 9 and 27

$$\begin{array}{r|l} 3 & 9, 27 \\ \hline 3 & 3, 9 \\ \hline 3 & 1, 3 \\ \hline & 1, 1 \end{array}$$

L.C.M. of 9 and 27 is 27

(vii)

$$\frac{-9}{24} + \left(\frac{-1}{18}\right)$$

The denominators of the given numbers are 24 and 18

$$\begin{array}{r|l} 3 & 24, 18 \\ \hline 2 & 8, 6 \\ \hline 2 & 4, 3 \\ \hline 2 & 2, 3 \\ \hline 3 & 1, 3 \\ \hline & 1, 1 \end{array}$$

L. C. M. of 24 and 18 is 72.

$$\therefore \frac{-9}{24} = \frac{-9 \times 3}{24 \times 3} = \frac{-27}{72}$$

$$\frac{-1}{18} = \frac{-1 \times 4}{18 \times 4} = \frac{-4}{72}$$

$$\text{Now, } \frac{-27}{72} + \left(\frac{-4}{72}\right)$$

$$= \frac{-27 + (-4)}{72}$$

$$= \frac{-27-4}{72}$$

$$= \frac{-31}{72}$$

$$\text{(viii)} \frac{27}{-4} + \left(\frac{-15}{8}\right)$$

We need a positive denominator.

$$\frac{27}{-4} \times \frac{-1}{-1} = \frac{-27}{4}$$

The denominators of the given rational numbers are 4 and 8.

$$\begin{array}{r|l} 2 & 4, 8 \\ \hline 2 & 2, 4 \\ \hline 2 & 1, 2 \\ \hline & 1, 1 \end{array}$$

L.C.M. of 4 and 8 is 8.

$$\frac{-27}{4} = \frac{-27 \times 2}{4 \times 2} = \frac{-54}{8}$$

$$\frac{(-15)}{8} = \frac{(-15) \times 1}{8 \times 1} = \frac{-15}{8}$$

$$\text{Now, } \frac{-54}{8} + \frac{(-15)}{8}$$

$$= \frac{-54-15}{8}$$

$$= \frac{-69}{8}$$

Answer :

(i)

$$\frac{-3}{5} + \frac{7}{5} + \frac{-1}{5}$$

L.C.M. of the given rational number is 5.

$$\begin{aligned} & \frac{(-3)}{5} + \frac{7}{5} + \frac{(-1)}{5} \\ &= \frac{-3+7-1}{5} \\ &= \frac{-4+7}{5} \\ &= \frac{3}{5} \end{aligned}$$

(ii)

$$\begin{aligned} & \frac{-12}{7} + \frac{3}{7} + \frac{-2}{7} \\ &= \frac{(-12)}{7} + \frac{3}{7} + \frac{(-2)}{7} \\ &= \frac{-12+3-2}{7} \\ &= \frac{-14+3}{7} \\ &= \frac{-11}{7} \end{aligned}$$

$$(iii) \quad \frac{11}{-12} + \frac{3}{-8} + \frac{1}{4}$$

We need a positive denominator.

$$\frac{11}{-12} \times \frac{-1}{-1} = \frac{-11}{12} \text{ and } \frac{3}{-8} \times \frac{-1}{-1} = \frac{-3}{8}$$

L.C.M. of the denominators 12, 8 and 4 is 24.

$$\therefore \frac{-11 \times 2}{12 \times 2} = \frac{-22}{24}$$

$$\frac{-3 \times 3}{8 \times 3} = \frac{-9}{24}$$

$$\frac{1 \times 6}{4 \times 6} = \frac{6}{24}$$

$$\begin{aligned} \text{Now, } & \frac{(-22)}{24} + \frac{(-9)}{24} + \frac{6}{24} \\ &= \frac{-22-9+6}{24} \\ &= \frac{-31+6}{24} \\ &= \frac{-25}{24} \end{aligned}$$

$$(iv) \quad \frac{-16}{9} + \frac{-5}{12} + \frac{7}{18}$$

L.C.M. of the denominators 9, 12 and 18 is 36.

$$\frac{-16 \times 4}{9 \times 4} = \frac{-64}{36}$$

$$\frac{-5 \times 3}{12 \times 3} = \frac{-15}{36}$$

$$\frac{7 \times 2}{18 \times 2} = \frac{14}{36}$$

$$\begin{aligned} \text{Now, } & \frac{(-64)}{36} + \frac{(-15)}{36} + \frac{14}{36} \\ &= \frac{-64-15+14}{36} \end{aligned}$$

$$\begin{array}{r|l} 2 & 12, 8, 4 \\ \hline 2 & 6, 4, 2 \\ \hline 2 & 3, 2, 1 \\ \hline 3 & 3, 1, 1 \\ \hline & 1, 1, 1 \end{array}$$

$$\begin{array}{r|l} 3 & 9, 12, 18 \\ \hline 3 & 3, 4, 6 \\ \hline 2 & 1, 4, 2 \\ \hline 2 & 1, 2, 1 \\ \hline & 1, 1, 1 \end{array}$$

$$(v) -3 + \frac{1}{8} = \frac{-2}{5}$$

L.C.M. of the denominators 1, 8 and 5 is 40.

$$\frac{-3 \times 40}{1 \times 40} = \frac{-120}{40}$$

$$\frac{1 \times 5}{8 \times 5} = \frac{5}{40}$$

$$\frac{-2 \times 8}{5 \times 8} = \frac{-16}{40}$$

$$\begin{aligned} \text{Now, } & \frac{(-120)}{40} + \frac{5}{40} + \frac{(-16)}{40} \\ &= \frac{-120 + 5 - 16}{40} \\ &= \frac{-130 + 5}{40} = \frac{-125}{40} \end{aligned}$$

$$\begin{array}{r|l} 2 & 8, 16, 4 \\ \hline 2 & 4, 8, 2 \\ \hline 2 & 2, 4, 1 \\ \hline 2 & 1, 2, 1 \\ \hline & 1, 1, 1 \end{array}$$

$$(vi) \frac{-13}{8} + \frac{5}{16} + \frac{-1}{4}$$

L.C.M. of the denominator 8, 16 and 4 is 16.

$$\frac{-13 \times 2}{8 \times 2} = \frac{-26}{16}$$

$$\frac{5 \times 1}{16 \times 1} = \frac{5}{16}$$

$$\frac{-1 \times 4}{4 \times 4} = \frac{-4}{16}$$

$$\begin{aligned} \text{Now, } & \frac{(-26)}{16} + \frac{5}{16} + \frac{(-4)}{16} \\ &= \frac{-26 + 5 - 4}{16} \end{aligned}$$

$$\text{Now, } \frac{-30 + 5}{16} = \frac{-25}{16}$$

Q4.

Answer :

(i)

$$\frac{-8}{15} + \frac{2}{-3}$$

We need a positive denominator.

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

Now, L.C.M. of 15 and 3 is 15.

$$\frac{-8}{15} = \frac{-8 \times 1}{15 \times 1} = \frac{-8}{15}$$

$$\frac{-2}{3} = \frac{-2 \times 5}{3 \times 5} = \frac{-10}{15}$$

$$\begin{aligned} \text{Now, } & \frac{-8}{15} + \frac{-10}{15} \\ &= \frac{-8 - 10}{15} \\ &= \frac{-18}{15} \\ &= \frac{-6}{5} \end{aligned}$$

$$\begin{array}{r|l} 3 & 15, 3 \\ \hline 5 & 5, 1 \\ \hline & 1, 1 \end{array}$$

(ii)

$$\frac{-7}{10} + \frac{13}{-15} + \frac{27}{20}$$

We need a positive denominator.

$$\frac{13}{-15} \times \frac{-1}{-1} = \frac{-13}{15}$$

Now, L.C.M. of 10, 15 and 20 is 60.

$$\therefore \frac{-7}{10} = \frac{-7 \times 6}{10 \times 6} = \frac{-42}{60}$$

$$\frac{-13}{15} = \frac{-13 \times 4}{15 \times 4} = \frac{-52}{60}$$

$$\frac{27}{20} = \frac{27 \times 3}{20 \times 3} = \frac{81}{60}$$

5	10,15,20
2	2,3,4
2	1,3,2
3	1,3,1
	1,1,1

$$\text{Now, } \frac{-42}{60} + \frac{-52}{60} + \frac{81}{60}$$

$$= \frac{(-42) + (-52) + (81)}{60}$$

$$= \frac{-94 + 81}{60}$$

$$= \frac{-13}{60}$$

(iii)

$$-1 + \frac{7}{-9} + \frac{11}{12}$$

We need a positive denominator.

$$\frac{7}{-9} \times \frac{-1}{-1} = \frac{-7}{9}$$

Now, L.C.M. of 1, 9 and 12 is 36.

$$\frac{-1}{1} = \frac{-1 \times 36}{1 \times 36} = \frac{-36}{36}$$

$$\frac{-7}{9} = \frac{-7 \times 4}{9 \times 4} = \frac{-28}{36}$$

$$\frac{11}{12} = \frac{11 \times 3}{12 \times 3} = \frac{33}{36}$$

3	9,12
3	3,4
2	1,4
2	1,2
	1,1

$$\frac{-36}{36} + \frac{-28}{36} + \frac{33}{36}$$

$$= \frac{-36 - 28 + 33}{36}$$

$$= \frac{-64 + 33}{36}$$

$$= \frac{-31}{36}$$

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

(iv)

$$\frac{-11}{39} + \frac{5}{26} + \frac{2}{1}$$

L.C.M. of 39, 26 and 1 is 78.

(iv)

$$\frac{-11}{39} + \frac{5}{26} + \frac{2}{1}$$

L.C.M. of 39, 26 and 1 is 78.

$$\frac{-11}{39} = \frac{-11 \times 2}{39 \times 2} = \frac{-22}{78}$$

$$\frac{5}{26} = \frac{5 \times 3}{26 \times 3} = \frac{15}{78}$$

$$\frac{2}{1} = \frac{2 \times 78}{1 \times 78} = \frac{156}{78}$$

$$\text{Now, } \frac{-22}{78} + \frac{15}{78} + \frac{156}{78}$$

$$= \frac{-22+171}{78}$$

$$= \frac{149}{78}$$

(v)

$$2 + \frac{-1}{2} + \frac{-3}{4}$$

L.C.M. of 2 and 4 is 4.

$$2 = \frac{2 \times 4}{1 \times 4} = \frac{8}{4}$$

$$\frac{-1}{2} = \frac{-1 \times 2}{2 \times 2} = \frac{-2}{4}$$

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

$$\frac{8}{4} + \frac{(-2)}{4} + \frac{(-3)}{4}$$

$$= \frac{8-2-3}{4}$$

$$= \frac{3}{4}$$

$$(vi) \frac{-9}{11} + \frac{2}{3} + \frac{-3}{4}$$

L.C.M. of 11, 3 and 4 is 132.

$$\frac{-9}{11} = \frac{-9 \times 12}{11 \times 12} = \frac{-108}{132}$$

$$\frac{2}{3} = \frac{2 \times 44}{3 \times 44} = \frac{88}{132}$$

$$\frac{-3}{4} = \frac{-3 \times 33}{4 \times 33} = \frac{-99}{132}$$

$$\frac{-108}{132} + \frac{88}{132} + \frac{(-99)}{132}$$

$$= \frac{-108+88-99}{132}$$

$$= \frac{-207+88}{132} = \frac{-119}{132}$$

13	39,26
3	3,2
2	1,2
	1,1

2	2,4
2	1,2
	1,1

2	11,3,4
2	11,3,2
11	11,3,1
3	1,3,1
	1,1,1

Q5.

Answer :

$$(i) \frac{12}{5} = 2 \frac{2}{5} = 2 + \frac{2}{5}$$

$$(ii) \frac{-11}{7} = \left(-\frac{11}{7}\right) = \left(-1 \frac{4}{7}\right) = -1 + \left(\frac{-4}{7}\right)$$

$$(iii) \frac{-25}{9} = \left(-\frac{25}{9}\right) = -\left(2 \frac{7}{9}\right) = -2 + \left(\frac{-7}{9}\right)$$

$$(iv) \frac{-103}{20} = -\left(\frac{103}{20}\right) = -\left(5 \frac{3}{20}\right) = -5 + \left(\frac{-3}{20}\right)$$