Rational Numbers

EXERCISE 2 (A)

Question 1.
Write down a rational number whose numerator is the largest number of two digits and denominator is the smallest number of four digits.

Solution:
Largest two digit = 99
Smallest, number of four digit = 1000 Now numerator = 99 and denominator = 1000
∴ Rational number = $\frac{99}{1000}$

Question 2.
Write the numerator of each of the following rational numbers:

(*i*) $\frac{-125}{127}$ (*ii*) $\frac{37}{-137}$

(*iii*) $\frac{-85}{93}$ (*iv*) 2

(*v*) 0

Solution:

(*i*) $\frac{-125}{127}$

Numerator = –125

(*ii*) $\frac{37}{-137}$

Numerator = 37

(*iii*) $\frac{-85}{93}$

Numerator = –85

(*iv*) $2 = \frac{2}{1}$

Numerator = 2

(*v*) $0 = \frac{0}{1}$

Numerator = 0

Question 3.

Write the denominator of each of the following rational numbers:

(*i*) $\frac{7}{-15}$ (*ii*) $\frac{-18}{29}$

(*iii*) $\frac{-3}{4}$ (*iv*) -7

(*v*) 0

Solution:

(*i*) $\frac{7}{-15}$

Denominator = -15

(*ii*) $\frac{-18}{29}$

Denominator = 29

(*iii*) $\frac{-3}{4}$

Denominator = 4

(*iv*) $-7 = \frac{-7}{1}$

Denominator = 1

(*v*) $0 = \frac{0}{1}$

Denominator = 1

Question 4.

Write down a rational number numerator (-5) x (-4) and denominator (28 – 27) x (8 – 5).

Solution:

Numerator = (–5) × (–4) = 20

Denominator = (28 – 27) × (8 – 5)

= (1) × (3) = 3

$\therefore$ Rational number = $\frac{20}{5} = \frac{4}{1} = 4$

Question 5.

(*i*) $\frac{-15}{1}$ in integer form is ..... .

(*ii*) $\frac{23}{-1}$ in integer form is ..... .

(*iii*) If 18 = $\frac{18}{a}$ then a = ...

(*iv*) If –57 = $\frac{57}{a}$ then a = ...

Solution:

(*i*) $\frac{-15}{1}$ in integer form is = **–15**

(*ii*) $\frac{23}{-1}$ in integer form is = **–23**

(*iii*) If 18 = $\frac{18}{a}$ then $a = \frac{\mathbf{18}}{\mathbf{18}} = \mathbf{1}$

(*iv*) If –57 = $\frac{57}{a}$ then $a = \frac{\mathbf{57}}{\mathbf{-57}} = \mathbf{-1}$

Question 6.

Separate positive and negative rational numbers from the following :

$$\frac{-3}{5}, \frac{3}{-5}, \frac{-3}{-5}, \frac{3}{5}, 0, \frac{-13}{-3}, \frac{15}{-8}, \frac{-15}{8}$$

Solution:

Positive rational numbers are $\frac{-3}{-5} = \frac{3}{5}$

(as both or negative)

$\frac{-13}{-3} = \frac{13}{3}$ (as both are negative)

Negative rational numbers $= \frac{-3}{5}, \frac{3}{-5}, \frac{15}{-8}$

and $\frac{-15}{8}$

0 is neither positive nor negative integer.

Question 7.

Find three rational numbers equivalent to

(*i*) $\frac{3}{5}$ (*ii*) $\frac{4}{-7}$

(*iii*) $\frac{-5}{9}$ (*iv*) $\frac{8}{-15}$

Solution:

(*i*) $\frac{3}{5} = \frac{3\times2}{5\times2} = \frac{6}{10}$, $\frac{3\times3}{5\times3} = \frac{9}{15}$ and

$\frac{3\times4}{5\times4} = \frac{12}{20}$

Hence, $\frac{6}{10}$, $\frac{9}{15}$ and $\frac{12}{20}$ are rational numbers equivalent to the given rational number $\frac{3}{5}$.

(*ii*) $\frac{4}{-7} = \frac{4\times2}{-7\times2} = \frac{8}{-14}$, $\frac{4\times3}{-7\times3} = \frac{12}{-21}$

and $\frac{4\times4}{-7\times4} = \frac{16}{-28}$

Hence $\frac{8}{-14}$, $\frac{12}{-21}$ and $\frac{16}{-28}$ are rational numbers equivalent to given rational number $\frac{4}{-7}$.

(*iii*) $\frac{-5}{9} = \frac{-5\times2}{9\times2} = \frac{-10}{18}$, $\frac{-5\times3}{9\times3} = \frac{-15}{27}$ and

$\frac{-5\times4}{9\times4} = \frac{-20}{36}$

Hence, $\frac{-10}{18}$, $\frac{-15}{27}$ and $\frac{-20}{36}$ are rational numbers equivalent to given rational number $\frac{-5}{9}$.

(*iv*) $\frac{8}{-15} = \frac{8\times 2}{-15\times 2} = \frac{16}{-30}$,

$\frac{8\times 3}{-15\times 3} = \frac{24}{-45}$ and $\frac{8\times 4}{-15\times 4} = \frac{32}{-60}$

Hence, $\frac{16}{-30}$, $\frac{24}{-45}$ and $\frac{32}{-60}$ are rational numbers equivalent to given rational number $\frac{8}{-15}$.

Question 8.

Which of the following are not rational numbers :

(*i*) –3 (*ii*) 0

(*iii*) $\frac{0}{4}$ (*iv*) $\frac{8}{0}$

(*v*) $\frac{0}{0}$

Solution:

(*i*) $-3 = \frac{-3}{1}$ is a rational number.

(*ii*) $0 = \frac{0}{1}$ is a rational number.

(*iii*) $\frac{0}{4}$ is a rational number.

(*iv*) $\frac{8}{0}$ is not a rational number.

(*v*) $\frac{0}{0}$ is not a rational number as numerator and denominator both are zero.

Question 9.

Express each of the following integers as a rational number with denominator 7 :

(i) 5

(ii) -8

(iii) 0

(iv) -16

(v) 7

Solution:

$$(i)\ 5 = \frac{5 \times 7}{7} = \frac{35}{7}$$

$$(ii)\ -8 = \frac{-8 \times 7}{7} = \frac{-56}{7}$$

$$(iii)\ 0 = \frac{0 \times 7}{7} = \frac{0}{7}$$

$$(iv)\ -16 = \frac{-16 \times 7}{7} = \frac{-112}{7}$$

$$(v)\ 7 = \frac{7 \times 7}{7} = \frac{49}{7}$$

Question 10.

Express $\frac{3}{5}$ as a rational number with denominator:

Solution:

(*i*) 20

$$\frac{3}{5} = \frac{3 \times 4}{5 \times 4} = \frac{12}{20}$$

(*ii*) –20

$$\frac{3}{5} = \frac{3 \times -4}{5 \times -4} = \frac{-12}{-20}$$

(*iii*) 45

$$\frac{3}{5} = \frac{3 \times 9}{5 \times 9} = \frac{27}{45}$$

(*iv*) 25

$$\frac{3}{5} = \frac{3 \times 5}{5 \times 5} = \frac{15}{25}$$

(*v*) –35

$$\frac{3}{5} = \frac{3 \times -7}{5 \times -7} = \frac{-12}{-35}$$

Question 11.

Express $\frac{4}{7}$ as a rational number with numerator :

Solution:

(*i*) 12

$$\frac{4}{7} = \frac{4 \times 3}{7 \times 3} = \frac{12}{21}$$

(*ii*) –12

$$\frac{4}{7} = \frac{4 \times -3}{7 \times -3} = \frac{-12}{-21}$$

(*iii*) –16

$$\frac{4}{7} = \frac{4 \times -4}{7 \times -4} = \frac{-16}{-28}$$

(*iv*) –20

$$\frac{4}{7} = \frac{4 \times -5}{7 \times -5} = \frac{-20}{-35}$$

(*v*) 20

$$\frac{4}{7} = \frac{4 \times 5}{7 \times 5} = \frac{20}{35}$$

Question 12.

Find x, such that:

(*i*) $\frac{-2}{3} = \frac{6}{x}$ (*ii*) $\frac{7}{-4} = \frac{x}{8}$

(*iii*) $\frac{3}{7} = \frac{x}{-35}$ (*iv*) $\frac{-48}{x} = 6$

(*v*) $\frac{36}{x} = 3$ (*vi*) $\frac{-27}{x} = 9$

Solution:

(*i*) $\frac{-2}{3} = \frac{6}{x}$

$-2x = 6 \times 3$

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

$\therefore \frac{-2}{3} = \frac{6}{-9} = -\frac{6}{9}$

OR

$\frac{-2}{3} = \frac{6}{x}$

$\Rightarrow \frac{-2 \times 3}{-3 \times 3} = \frac{6}{x}$

$\Rightarrow \frac{6}{-9} = \frac{6}{x}$

$\Rightarrow x = -9$

(*ii*) $\frac{7}{-4} = \frac{x}{8}$

$= -4x = 7 \times 8$

$x = \frac{7 \times 8}{-4} = -7 \times 2$

$x = -14$

OR

$\Rightarrow \frac{-7 \times 2}{4 \times 2} = \frac{x}{8}$

$\Rightarrow \frac{-14}{8} = \frac{x}{8}$

$x = -14$

(*iii*) $\frac{3}{7} = \frac{x}{-35}$

$\Rightarrow \frac{3 \times -5}{7 \times -5} = \frac{x}{-35}$

$\Rightarrow \frac{-15}{-35} = \frac{x}{-35}$

$\Rightarrow x = -15$

(*iv*) $\dfrac{-48}{x} = 6$

$\Rightarrow \dfrac{-48}{x} = \dfrac{6}{1}$

$\Rightarrow \dfrac{-48}{x} = \dfrac{6 \times -8}{1 \times -8}$

$\Rightarrow \dfrac{-48}{x} = \dfrac{-48}{-8}$

$\Rightarrow x = -8$

(*v*) $\dfrac{36}{x} = 3$

$\Rightarrow \dfrac{36}{x} = \dfrac{3}{1}$

$\Rightarrow \dfrac{36}{x} = \dfrac{3 \times 12}{1 \times 12}$

$\Rightarrow \dfrac{36}{x} = \dfrac{36}{12}$

$\Rightarrow x = 12$

(*vi*) $\dfrac{-27}{x} = 9$

$\Rightarrow \dfrac{-27}{x} = \dfrac{9}{1}$

$\Rightarrow \dfrac{-27}{x} = \dfrac{9 \times (-3)}{1 \times (-3)}$

$\Rightarrow \dfrac{-27}{x} = \dfrac{-27}{-3}$

$\Rightarrow x = -3$

Question 13.

Express each of the following rational numbers to the lowest terms :

(*i*) $\frac{12}{15}$ (*ii*) $\frac{-120}{144}$

(*iii*) $\frac{-48}{-72}$ (*iv*) $\frac{14}{-56}$

Solution:

(*i*) $\frac{12}{15}$

```
12)15(1
   12
    3)12(4
      12
      ×
```

(Dividing by 3, H.C.F. of 12 and 15)

$$\Rightarrow \frac{12 \div 3}{15 \div 3} = \frac{4}{5}$$

(*ii*) $\dfrac{-120}{144}$

```
120)144(1
    120
    ---
     24)120(5
        120
        ---
          ×
```

(Dividing by 24, H.C.F. of –120 and 144)

$$\Rightarrow \frac{-120 \div 24}{144 \div 24} = \frac{-5}{6}$$

(*iii*) $\dfrac{-48}{-72}$

```
48)72(1
   48
   ---
   24)48(2
      48
      ---
       ×
```

(Dividing by 24, H.C.F. of –48 and –72)

$$\Rightarrow \frac{-48 \div 24}{-72 \div 24} = \frac{-2}{-3} = \frac{2}{3}$$

(*iv*) $\dfrac{14}{-56}$

```
14)56(4
   56
   ---
    ×
```

(Dividing by 14, H.C.F. of 14 and –56)

$$\Rightarrow \frac{14 \div 14}{-56 \div 14} = \frac{1}{-4} \text{ or } \frac{-1}{4}$$

Question 14.

Express each of the following rational numbers in the standard form.

(*i*) $\frac{-7}{-8}$ (*ii*) $\frac{5}{-12}$

(*iii*) $\frac{-7}{-20}$ (*iv*) $\frac{4}{-9}$

Solution:

We know that, a rational number is said to be in standard form, if its denominator is positive in lowest term.

(*i*) $\frac{-7}{-8} = \frac{7}{8}$

(*ii*) $\frac{5}{-12} = \frac{-5}{12}$

(*iii*) $\frac{-7}{-20} = \frac{7}{20}$

(*iv*) $\frac{4}{-9} = \frac{-4}{9}$

EXERCISE 2 (B)

Question 1.

Mark the following pairs of rational numbers on the separate number lines :

(*i*) $\frac{3}{4}$ and $-\frac{1}{4}$

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

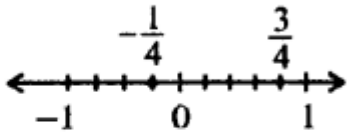
(*iii*) $\frac{5}{6}$ and $-\frac{2}{3}$

(*iv*) $\frac{2}{5}$ and $-\frac{4}{5}$

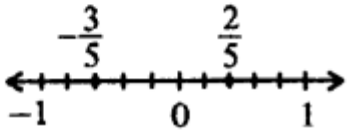
(*v*) $\frac{1}{4}$ and $-\frac{5}{4}$

Solution:

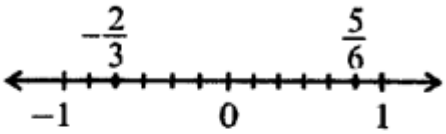
(*i*) $\frac{3}{4}$ and $-\frac{1}{4}$



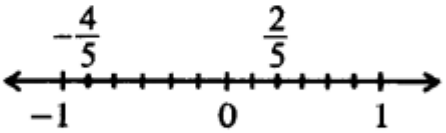
(*ii*) $\frac{2}{5}$ and $\frac{-3}{5}$



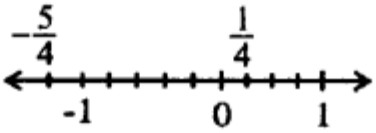
(*iii*) $\frac{5}{6}$ and $-\frac{2}{3}$



(*iv*) $\frac{2}{5}$ and $-\frac{4}{5}$



(*v*) $\frac{1}{4}$ and $-\frac{5}{4}$



Question 2.

Compare:

(*i*) $\frac{3}{5}$ and $\frac{5}{7}$

(*ii*) $\frac{-7}{2}$ and $\frac{5}{2}$

(*iii*) -3 and $2\frac{3}{4}$

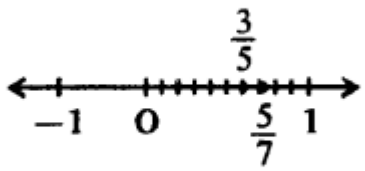
(*iv*) $-1\frac{1}{2}$ and 0

(*iv*) 0 and $\frac{3}{4}$

(*vi*) 3 and -1

Solution:

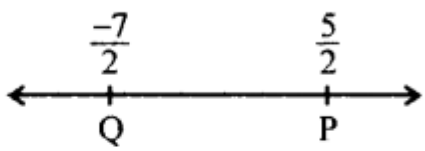
(*i*) $\frac{3}{5}$ and $\frac{5}{7}$



Since, $\frac{5}{7}$ is on the right side of the number line.

$\therefore \frac{5}{7} > \frac{3}{5}$

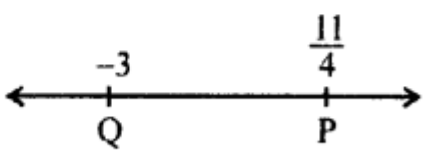
(*ii*) $\frac{-7}{2}$ and $\frac{5}{2}$



Since, P is on the right of Q.

$\Rightarrow \frac{5}{2} > \frac{-7}{2}$

(*iii*) –3 and $2\frac{3}{4}$ or $\frac{11}{4}$



Since, P is on the right of Q.

$\Rightarrow \frac{11}{4} > -3$ or $2\frac{3}{4} > -3$

(*iv*) $-1\frac{1}{2}$ and 0 or $\frac{-3}{2}$ and 0

Since, P is on the right of Q

$\Rightarrow 0 > \frac{-3}{2}$

(*iv*) 0 and $\frac{3}{4}$

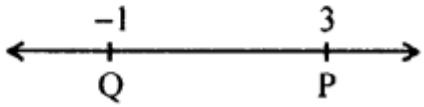
Since, P is on the right of Q

$\Rightarrow \frac{3}{4} > 0$

(*vi*) 3 and -1

Since, P is on the right of Q

$\Rightarrow 3 > -1$



Question 3.

Compare:

(*i*) $-\frac{1}{4}$ and 0 (*ii*) $\frac{1}{4}$ and 0

(*iii*) $-\frac{3}{8}$ and $\frac{2}{5}$ (*iv*) $\frac{-5}{8}$ and $\frac{7}{-12}$

(*v*) $\frac{5}{-9}$ and $\frac{-5}{-9}$ (*vi*) $\frac{-7}{8}$ and $\frac{5}{-6}$

(*vii*) $\frac{2}{7}$ and $\frac{-3}{-8}$ (*viii*) $\frac{-5}{8}$ and $\frac{7}{-12}$

Solution:

(*i*) $-\frac{1}{4}$ and 0

Since, $-\frac{1}{4}$ is a negative rational number and always less than 0.

$\therefore\ -\frac{1}{4} < 0$

(*ii*) $\frac{1}{4}$ and 0

Since, $\frac{1}{4}$ is a positive rational number and always greater than 0.

$\therefore\ \frac{1}{4} > 0$

(*iii*) $-\frac{3}{8}$ and $\frac{2}{5}$

-3×5 and 2×8

$$\left(\because \frac{a}{b} \text{ and } \frac{c}{d} \Rightarrow a \times d \text{ and } b \times c\right)$$

$-15 < 16$ $\quad (\because a \times d < b \times c)$

$\therefore \; -\frac{3}{8} < \frac{2}{5}$

(*iv*) $\frac{-5}{8}$ and $\frac{7}{-12}$

-5×-12 and 7×8

$$\left(\because \frac{a}{b} \text{ and } \frac{c}{d} \Rightarrow a \times d \text{ and } b \times c\right)$$

$60 > 56$ $\quad (\because a \times d > b \times c)$

$\therefore \; \frac{-5}{8} > \frac{7}{-12}$

(*v*) $\frac{5}{-9}$ and $\frac{-5}{-9}$

5×-9 and -5×-9

$$\left(\because \frac{a}{b} \text{ and } \frac{c}{d} \Rightarrow a \times d \text{ and } b \times c\right)$$

$-45 < 45$ $\quad (\because a \times d < b \times c)$

$\therefore \; \frac{5}{-9} < \frac{-5}{-9}$

(*vi*) $\frac{-7}{8}$ and $\frac{5}{-6}$

-7×-6 and 5×8

$$\left(\because \frac{a}{b} \text{ and } \frac{c}{d} \Rightarrow a \times d \text{ and } b \times c\right)$$

$42 > 40$ $\quad (\because a \times d > b \times c)$

$\therefore \frac{-7}{8} > \frac{5}{-6}$

(*vii*) $\frac{2}{7}$ and $\frac{-3}{-8}$

2×8 and 7×-3

$$\left(\because \frac{a}{b} \text{ and } \frac{c}{d} \Rightarrow a \times d \text{ and } b \times c\right)$$

$16 > -21$ $\quad (\because a \times d > b \times c)$

$\therefore \frac{2}{7} > \frac{-3}{-8}$

(*viii*) $\frac{-5}{8}$ and $\frac{7}{-12}$

-5×-12 and 7×8

$60 > 56$

$\therefore \frac{-5}{8} > \frac{7}{-12}$

Question 4.

Arrange the given rational numbers in ascending order :

(*i*) $\frac{7}{10}, \frac{-11}{-30}$ and $\frac{5}{-15}$

(*ii*) $\frac{4}{-9}, \frac{-5}{12}$ and $\frac{2}{-3}$

Solution:

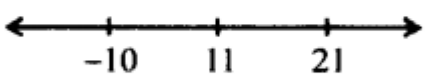
(*i*) $\frac{7}{10}, \frac{-11}{-30}$ and $\frac{5}{-15}$

$= \frac{7}{10}, \frac{11}{30}$ and $\frac{-5}{15}$

$= \frac{7\times3}{10\times3}, \frac{11}{30}$ and $\frac{-5\times2}{15\times2}$

($\because$ LCM of 10, 30 and 15 = 30)

$= \frac{21}{30}, \frac{11}{30}, \frac{-10}{30}$



Since, $-10 < 11 < 21$

$\therefore \frac{-10}{30} < \frac{11}{30} < \frac{21}{30}$

$\Rightarrow \frac{5}{-15} < \frac{-11}{-30} < \frac{7}{10}$

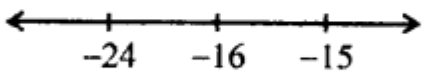
(*ii*) $\frac{4}{-9}, \frac{-5}{12}$ and $\frac{2}{-3}$

$$= \frac{-4}{9}, \frac{-5}{12} \text{ and } \frac{-2}{3}$$

$$= \frac{-4 \times 4}{9 \times 4}, \frac{-5 \times 3}{12 \times 3} \text{ and } \frac{-2 \times 12}{3 \times 12}$$

($\because$ LCM of 9, 12 and 3 = 36)

$$= \frac{-16}{36}, \frac{-15}{36} \text{ and } \frac{-24}{36}$$



Since, $-24 < -16 < -15$

$$\therefore \frac{-24}{36} < \frac{-16}{36} < \frac{-15}{36}$$

$$\Rightarrow \frac{2}{-3} < \frac{4}{-9} < \frac{-5}{12}$$

Question 5.

Arrange the given rational numbers in descending order:

(*i*) $\frac{5}{8}, \frac{13}{-16}$ and $\frac{-7}{12}$

(*ii*) $\frac{3}{-10}, \frac{-13}{30}$ and $\frac{8}{-20}$

Solution:

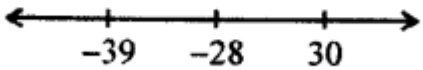
(*i*) $\frac{5}{8}, \frac{13}{-16}$ and $\frac{-7}{12}$

$= \frac{5}{8}, \frac{-13}{16}$ and $\frac{-7}{12}$

$= \frac{5\times6}{8\times6}, \frac{-13\times3}{16\times3}$ and $\frac{-7\times4}{12\times4}$

($\because$ LCM of 8, 16 and 12 = 48)

$= \frac{30}{48}, \frac{-39}{48}$ and $\frac{-28}{48}$



Since, $30 > -28 > -39$

$\therefore \frac{30}{48} > \frac{-28}{48} > \frac{-39}{48}$

$\Rightarrow \frac{5}{8} > \frac{-7}{12} > \frac{-13}{16}$

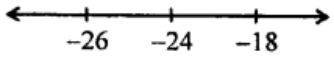
(*ii*) $\frac{3}{-10}, \frac{-13}{30}$ and $\frac{8}{-20}$

$= \frac{-3}{10}, \frac{-13}{30}$ and $\frac{-8}{20}$

$= \frac{-3\times6}{10\times6}, \frac{-13\times2}{30\times2}$ and $\frac{-8\times3}{20\times3}$

($\because$ LCM of 10, 20 and 30 = 60)

$= \frac{-18}{60}, \frac{-26}{60}$ and $\frac{-24}{60}$



Since, $-18 > -24 > -26$

$\therefore \frac{-18}{60} > \frac{-24}{60} > \frac{-26}{60}$

$\Rightarrow \frac{-3}{10} > \frac{-8}{20} > \frac{-13}{30}$

Question 6.

Fill in the blanks :

(*i*) $\frac{5}{8}$ and $\frac{3}{10}$ are on the ..... side of zero.

(*ii*) $-\frac{5}{8}$ and $\frac{3}{10}$ are on the ..... sides of zero.

(*iii*) $-\frac{5}{8}$ and $-\frac{3}{10}$ are on the ..... side of zero.

(*iv*) $\frac{5}{8}$ and $-\frac{3}{10}$ are on the ..... sides of zero.

Solution:

(*i*) $\frac{5}{8}$ and $\frac{3}{10}$ are on the **right** side of zero.

(*ii*) $-\frac{5}{8}$ and $\frac{3}{10}$ are on the **opposite** sides of zero.

(*iii*) $-\frac{5}{8}$ and $-\frac{3}{10}$ are on the **same/left** side of zero.

(*iv*) $\frac{5}{8}$ and $-\frac{3}{10}$ are on the **opposite** sides of zero.

EXERCISE 2 (C)

Question 1.

Add:

(*i*) $\frac{7}{5}$ and $\frac{2}{5}$ (*ii*) $\frac{-4}{9}$ and $\frac{2}{9}$

(*iii*) $\frac{5}{-12}$ and $\frac{1}{12}$ (*iv*) $\frac{4}{-15}$ and $\frac{-7}{-15}$

(*v*) $\frac{-7}{25}$ and $\frac{9}{-25}$ (*vi*) $\frac{-7}{26}$ and $\frac{7}{-26}$

Solution:

(*i*) $\frac{7}{5}$ and $\frac{2}{5} = \frac{7}{5} + \frac{2}{5}$

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

(*ii*) $\frac{-4}{9}$ and $\frac{2}{9} = \frac{-4}{9} + \frac{2}{9}$

$= \frac{-4+2}{9} = \frac{-2}{9}$

(*iii*) $\frac{5}{-12}$ and $\frac{1}{12} = \frac{-5}{12} + \frac{1}{12}$

$= \frac{-5+1}{12} = \frac{-4}{12} = -\frac{4}{12}$

(*iv*) $\frac{4}{-15}$ and $\frac{-7}{-15} = \frac{-4}{15} + \frac{7}{15}$

$= \frac{-4+7}{15} = \frac{3}{15}$

(v) $\frac{-7}{25}$ and $\frac{9}{-25} = \frac{-7}{25} + \frac{-9}{25}$

$= \frac{(-7)+(-9)}{25} = \frac{-16}{25}$

(vi) $\frac{-7}{26}$ and $\frac{7}{-26} = \frac{-7}{26} + \frac{-7}{26}$

$= \frac{(-7)+(-7)}{26} = \frac{-14}{26}$

Question 2.

Add:

(i) $\frac{-2}{5}$ and $\frac{3}{7}$ (ii) $\frac{-5}{6}$ and $\frac{4}{9}$

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

(v) $\frac{-7}{24}$ and $\frac{-5}{48}$ (vi) $\frac{1}{-18}$ and $\frac{5}{-27}$

(vii) $\frac{-9}{25}$ and $\frac{1}{-75}$ (viii) $\frac{13}{-16}$ and $\frac{-11}{24}$

(ix) $\frac{-9}{-16}$ and $\frac{-11}{8}$

Solution:

(*i*) $\frac{-2}{5}$ and $\frac{3}{7}$

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

($\because$ L.C.M. of 5 and 7 = 35)

$$= \frac{-14}{35} + \frac{15}{35}$$

$$= \frac{-14+15}{35} = \frac{1}{35}$$

(*ii*) $\frac{-5}{6}$ and $\frac{4}{9} = \frac{-5}{6} + \frac{4}{9}$

$$= \frac{-5\times 6}{6\times 6} + \frac{4\times 4}{9\times 4}$$

($\because$ L.C.M. of 6 and 9 = 36)

$$= \frac{-30}{36} + \frac{16}{36}$$

$$= \frac{-30+16}{36} = \frac{-14}{36}$$

(*iii*) -3 and $\frac{2}{3} = \frac{-3}{1} + \frac{2}{3}$

$$= \frac{-3\times3}{1\times3} + \frac{2\times1}{3\times1}$$

($\because$ L.C.M. of 1 and 3 = 3)

$$= \frac{-9}{3} + \frac{2}{3}$$

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

(*iv*) $\frac{-5}{9}$ and $\frac{7}{18} = \frac{-5}{9} + \frac{7}{18}$

$$= \frac{-5\times2}{9\times2} + \frac{7\times1}{18\times1}$$

($\because$ L.C.M. of 9 and 18 = 18)

$$= \frac{-10}{18} + \frac{7}{18} = \frac{-10+7}{18} = \frac{-3}{18}$$

(*v*) $\frac{-7}{24}$ and $\frac{-5}{48}$

$$= \frac{-7\times2}{24\times2} + \frac{-5\times1}{48\times1}$$

($\because$ L.C.M. of 24 and 48 = 48)

$$= \frac{-14}{48} + \frac{-5}{48}$$

$$= \frac{(-14)+(-5)}{48} = \frac{-14-5}{48} = \frac{-19}{48}$$

(*vi*) $\frac{1}{-18}$ and $\frac{5}{-27} = \frac{-1}{18} + \frac{-5}{27}$

$$= \frac{-1\times 3}{18\times 3} + \frac{-5\times 2}{27\times 2}$$

($\because$ L.C.M. of 18 and 27 = 54)

$$= \frac{-3}{54} + \frac{-10}{54}$$

$$= \frac{(-3)+(-10)}{54} = \frac{-3-10}{54} = \frac{-13}{54}$$

(*vii*) $\frac{-9}{25}$ and $\frac{1}{-75} = \frac{-9}{25} + \frac{-1}{75}$

$$= \frac{-9\times 3}{25\times 3} + \frac{-1\times 1}{75\times 1}$$

($\because$ L.C.M. of 25 and 75 = 75)

$$= \frac{-27}{75} + \frac{-1}{75}$$

$$= \frac{(-27)+(-1)}{75} = \frac{-27-1}{75} = \frac{-28}{75}$$

(*viii*) $\frac{13}{-16}$ and $\frac{-11}{24} = \frac{-13}{16} + \frac{-11}{24}$

$$= \frac{-13\times 3}{16\times 3} + \frac{-11\times 2}{24\times 2}$$

($\because$ L.C.M. of 16 and 24 = 48)

$$= \frac{-39}{48} + \frac{-22}{48}$$

$$= \frac{(-39)+(-22)}{48} = \frac{-39-22}{48} = \frac{-61}{48}$$

(*ix*) $\frac{-9}{-16}$ and $\frac{-11}{8} = \frac{9}{16} + \frac{-11}{8}$

$$= \frac{9\times1}{16\times1} + \frac{-11\times2}{8\times2}$$

(∵ L.C.M. of 16 and 8 = 16)

$$= \frac{9}{16} + \frac{-22}{16}$$

$$= \frac{9+(-22)}{16} = \frac{9-22}{16} = \frac{-13}{16}$$

Question 3.

Evaluate:

(*i*) $\frac{-2}{5} + \frac{3}{5} + \frac{-1}{5}$

(*ii*) $\frac{-8}{9} + \frac{4}{9} + \frac{-2}{9}$

(*iii*) $\frac{5}{-24} + \frac{-1}{8} + \frac{3}{16}$

(*iv*) $\frac{-7}{6} + \frac{4}{-15} + \frac{-4}{-30}$

(*v*) $-2 + \frac{2}{5} + \frac{-2}{15}$

(*vi*) $\frac{-11}{12} + \frac{5}{16} + \frac{-3}{8}$

Solution:

(*i*) $\frac{-2}{5} + \frac{3}{5} + \frac{-1}{5}$

$= \frac{-2+3-1}{5} = \frac{0}{5} = 0$

(*ii*) $\frac{-8}{9} + \frac{4}{9} + \frac{-2}{9}$

$= \frac{-8+4-2}{9} = \frac{-10+4}{9} = \frac{-6}{9}$

(*iii*) $\frac{5}{-24} + \frac{-1}{8} + \frac{3}{16}$

$= \frac{-5\times 2}{24\times 2} + \frac{-1\times 6}{8\times 6} + \frac{3\times 3}{16\times 3}$

($\because$ L.C.M. of 8, 16, 24 = 48)

$= \frac{-10}{48} + \frac{-6}{48} + \frac{9}{48}$

$= \frac{-10-6+9}{48} = \frac{-16+9}{48} = \frac{-7}{48}$

(*iv*) $\frac{-7}{6} + \frac{4}{-15} + \frac{-4}{-30}$

$= \frac{-7}{6} + \frac{-4}{15} + \frac{4}{30}$

$= \frac{-7\times5}{6\times5} + \frac{-4\times2}{15\times2} + \frac{4\times1}{30\times1}$

($\because$ L.C.M. of 6, 15 and 30 = 30)

$= \frac{-35}{30} + \frac{-8}{30} + \frac{4}{30}$

$= \frac{-35-8+4}{30} = \frac{-43+4}{30} = \frac{-39}{30}$

(*v*) $-2 + \frac{2}{5} + \frac{-2}{15}$

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

$= \frac{-2\times15}{1\times15} + \frac{2\times3}{5\times3} + \frac{-2\times1}{15\times1}$

($\because$ L.C.M. of 1, 5 and 15 = 15)

$= \frac{-30}{15} + \frac{6}{15} + \frac{-2}{15}$

$= \frac{-30+6-2}{15} = \frac{-32+6}{15} = \frac{-26}{15}$

(vi) $\frac{-11}{12} + \frac{5}{16} + \frac{-3}{8}$

$$= \frac{-11 \times 4}{12 \times 4} + \frac{5 \times 3}{16 \times 3} + \frac{-3 \times 6}{8 \times 6}$$

($\because$ L.C.M. of 8, 12 and 16 = 48)

$$= \frac{-44}{48} + \frac{15}{48} + \frac{-18}{48}$$

$$= \frac{-44 + 15 - 18}{48} = \frac{-62 + 15}{48} = \frac{-47}{48}$$

Question 4.

Evaluate:

(i) $-\frac{11}{18} + \frac{-3}{9} + \frac{2}{-3}$

(ii) $\frac{-9}{4} + \frac{13}{3} + \frac{25}{6}$

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

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

(v) $5 + \frac{-3}{4} + \frac{-5}{8}$

Solution:

(*i*) $-\frac{11}{18} + \frac{-3}{9} + \frac{2}{-3}$

$= \frac{-11}{18} + \frac{-3}{9} + \frac{-2}{3}$

$= \frac{-11\times1}{18\times1} + \frac{-3\times2}{9\times2} + \frac{-2\times6}{3\times6}$

($\because$ L.C.M. of 3, 9 and 18 = 18)

$= \frac{-11}{18} + \frac{-6}{18} + \frac{-12}{18}$

$= \frac{-11-6-12}{18} = \frac{-29}{18}$

(*ii*) $\frac{-9}{4} + \frac{13}{3} + \frac{25}{6}$

$= \frac{-9\times6}{4\times6} + \frac{13\times8}{3\times8} + \frac{25\times4}{6\times4}$

($\because$ L.C.M. of 4, 3 and 6 = 24)

$= \frac{-54}{24} + \frac{104}{24} + \frac{100}{24}$

$= \frac{-54+104+100}{24} = \frac{150}{24} = \frac{25}{6}$

(*iii*) $-5 + \frac{5}{-8} + \frac{-5}{-12}$

$$= \frac{-5}{1} + \frac{-5}{8} + \frac{5}{12}$$

$$= \frac{-5 \times 24}{1 \times 24} + \frac{-5 \times 3}{8 \times 3} + \frac{5 \times 2}{12 \times 2}$$

($\because$ L.C.M. of 1, 8 and 12 = 24)

$$= \frac{-120}{24} + \frac{-15}{24} + \frac{10}{24}$$

$$= \frac{-120 - 15 + 10}{24} = \frac{-125}{24}$$

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

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

$$= \frac{-2 \times 2}{3 \times 2} + \frac{5 \times 3}{2 \times 3} + \frac{2 \times 6}{1 \times 6}$$

($\because$ L.C.M. of 3, 2 and 1 = 6)

$$= \frac{-4}{6} + \frac{15}{6} + \frac{12}{6}$$

$$= \frac{-4 + 15 + 12}{6} = \frac{23}{6}$$

(v) $5 + \frac{-3}{4} + \frac{-5}{8}$

$$= \frac{5}{1} + \frac{-3}{4} + \frac{-5}{8}$$

$$= \frac{5 \times 8}{1 \times 8} + \frac{-3 \times 2}{4 \times 2} + \frac{-5 \times 1}{8 \times 1}$$

($\because$ L.C.M. of 1, 4 and 8 = 8)

$$= \frac{40}{8} + \frac{-6}{8} + \frac{-5}{8}$$

$$= \frac{40 - 6 - 5}{8} = \frac{40 - 11}{8} = \frac{29}{8}$$

Question 5.

Subtract :

(i) $\frac{2}{9}$ from $\frac{5}{9}$ (ii) $\frac{-6}{11}$ from $\frac{-3}{-11}$

(iii) $\frac{-2}{15}$ from $\frac{-8}{15}$ (iv) $\frac{11}{18}$ from $\frac{-5}{18}$

(v) $\frac{-4}{11}$ from -2

Solution:

(*i*) $\frac{2}{9}$ from $\frac{5}{9}$

$$= \frac{5}{9} - \frac{2}{9} = \frac{5-2}{9} = \frac{3}{9} = \frac{1}{3}$$

(*ii*) $\frac{-6}{11}$ from $\frac{-3}{-11}$

$$= \frac{3}{11} - \left(-\frac{6}{11}\right)$$

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

(*iii*) $\frac{-2}{15}$ from $\frac{-8}{15}$

$$= \frac{-8}{15} - \left(\frac{-2}{15}\right)$$

$$= \frac{-8}{15} + \frac{2}{15} = \frac{-8+2}{15} = \frac{-6}{15} = \frac{-2}{5}$$

(*iv*) $\frac{11}{18}$ from $\frac{-5}{18}$

$$= \frac{-5}{18} - \frac{11}{18} = \frac{-5-11}{18} = \frac{-16}{18} = \frac{-8}{9}$$

(*v*) $\frac{-4}{11}$ from -2

$$= \frac{-2}{1} - \left(\frac{-4}{11}\right) = \frac{-2\times 11}{1\times 11} + \frac{4\times 1}{11\times 1}$$

$$= \frac{-22}{11} + \frac{4}{11} = \frac{-22+4}{11} = \frac{-18}{11}$$

Question 6.

Subtract :

(*i*) $-\frac{3}{10}$ from $\frac{1}{5}$ (*ii*) $\frac{-6}{25}$ from $\frac{-8}{5}$

(*iii*) $\frac{-7}{4}$ from -2 (*iv*) $\frac{-16}{21}$ from 1

(*v*) $\frac{-8}{15}$ from 0 (*vi*) 0 from $\frac{-3}{8}$

(*vii*) -2 from $\frac{-3}{10}$ (*viii*) $\frac{5}{8}$ from $\frac{-5}{16}$

(*ix*) 4 from $-\frac{3}{13}$

Solution:

(*i*) $-\frac{3}{10}$ from $\frac{1}{5}$

$$= \frac{1}{5} - \left(-\frac{3}{10}\right)$$

$$= \frac{1\times 2}{5\times 2} + \frac{3}{10}$$

$$= \frac{2}{10} + \frac{3}{10} = \frac{2+3}{10} = \frac{5}{10}$$

(*ii*) $\frac{-6}{25}$ from $\frac{-8}{5}$

$$= \frac{-8}{5} - \left(\frac{-6}{25}\right)$$

$$= \frac{-8\times 5}{5\times 5} + \frac{6}{25} = \frac{-40}{25} + \frac{6}{25}$$

$$= \frac{-40+6}{25} = \frac{-34}{25}$$

(*iii*) $\frac{-7}{4}$ from -2

$$= \frac{-2}{1} - \left(\frac{-7}{4}\right)$$

$$= \frac{-2 \times 4}{1 \times 4} + \frac{7}{4} = \frac{-8}{4} + \frac{7}{4}$$

$$= \frac{-8+7}{4} = \frac{-1}{4}$$

(*iv*) $\frac{-16}{21}$ from 1

$$= \frac{1}{1} - \left(\frac{-16}{21}\right)$$

$$= \frac{1}{1} + \frac{16}{21} = \frac{1 \times 21 + 16}{21}$$

$$= \frac{21+16}{21} = \frac{37}{21}$$

(*v*) $\frac{-8}{15}$ from 0

$$= 0 - \left(\frac{-8}{15}\right)$$

$$= 0 + \frac{8}{15} = \frac{8}{15}$$

(*vi*) 0 from $\frac{-3}{8}$

$$= \frac{-3}{8} - 0 = \frac{-3}{8}$$

(*vii*) –2 from $\frac{-3}{10}$

$$= \frac{-3}{10} - \left(\frac{-2}{1}\right)$$

$$= \frac{-3}{10} + \frac{2}{1} = \frac{-3+2\times10}{10} = \frac{17}{10}$$

(*viii*) $\frac{5}{8}$ from $\frac{-5}{16}$

$$= \frac{-5}{16} - \left(\frac{5}{8}\right)$$

$$= \frac{-5}{16} - \frac{5\times2}{8\times2} = \frac{-5}{16} - \frac{10}{16}$$

$$= \frac{-5-10}{16} = \frac{-15}{16}$$

(*ix*) 4 from $-\frac{3}{13}$

$$= -\frac{3}{13} - \frac{4}{1} = \frac{-3-4\times13}{13}$$

$$= \frac{-3-52}{13} = \frac{-55}{13}$$

Question 7.

The sum of two rational numbers is $\frac{11}{24}$. If one of them is $\frac{3}{8}$, find the other.

Solution:

$\because$ Sum of two rational number $= \frac{11}{24}$

and one of them $= \frac{3}{8}$

$\therefore$ The other rational number $= \frac{11}{24} - \frac{3}{8}$

$= \frac{11}{24} - \frac{3 \times 3}{8 \times 3} = \frac{11}{24} - \frac{9}{24}$

$= \frac{11-9}{24} = \frac{2}{24}$

Question 8.

The sum of two rational numbers is $\frac{-7}{11}$. If one of them is $\frac{13}{24}$, find the other.

Solution:

$\because$ Sum of two rational number $= \frac{-7}{12}$

One of them $= \frac{13}{24}$

$\therefore$ Other rational number $= \frac{-7}{12} - \frac{13}{24}$

$= \frac{-7 \times 2}{12 \times 2} - \frac{13}{24}$

$= \frac{-14}{24} - \frac{13}{24}$

$= \frac{-14-13}{24} = \frac{-27}{24}$

Question 9.

The sum of two rational numbers is -4. If one of them is $-\frac{13}{12}$, find the other.

Solution:

$\because$ Sum of two rational number = –4

and one of them = $-\frac{13}{12}$

$\therefore$ Other rational number = $-4-\left(-\frac{13}{12}\right)$

$= -4+\frac{13}{12}$

$= \frac{-4\times 12+13}{12} = \frac{-48+13}{12} = \frac{-35}{12}$

Question 10.

What should be added to $-\frac{3}{6}$ to get $-\frac{11}{24}$?

Solution:

Let the required rational number be x

Other number = $-\frac{3}{16}$

Sum of two number = $\frac{11}{24}$

According to question,

$$-\frac{3}{16} + x = \frac{11}{24}$$

$$\Rightarrow x = \frac{11}{24} + \frac{3}{16}$$

$$x = \frac{11 \times 2}{24 \times 2} + \frac{3 \times 3}{16 \times 3}$$

($\because$ L.C.M. of 16 and 24 = 48)

$$x = \frac{22}{48} + \frac{9}{48}$$

$$x = \frac{22 + 9}{48} = \frac{31}{48}$$

Question 11.

What should be added to $\frac{-3}{5}$ to get 2?

Solution:

Let the required rational number be x

Other number = $\frac{-3}{5}$

Sum of two number = 2

According to question,

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

$$\Rightarrow x = 2 + \frac{3}{5}$$

$$= \frac{2 \times 5 + 3}{5} = \frac{10 + 3}{5} = \frac{13}{5}$$

Question 12.

What should be subtracted from $\frac{-4}{5}$ to get 1?

Solution:

Let the required rational number = x

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

Difference of two number = 1

According to question,

$$\therefore \frac{-4}{5} - x = 1$$

$$\Rightarrow \frac{-4}{5} - 1 = x$$

$$\Rightarrow x = \frac{-4 - 1 \times 5}{5} = \frac{-4 - 5}{5} = \frac{-9}{5}$$

Question 13.

The sum of two numbers is $-\frac{6}{5}$. If one of them is -2, find the other.

Solution:

$\because$ Sum of two rational number $= -\frac{6}{5}$

and one of them $= -2$

$\therefore$ Other rational number $= -\frac{6}{5} - \left(-\frac{2}{1}\right)$

$$= \frac{-6+2\times5}{5} = \frac{-6+10}{5} = \frac{4}{5}$$

Question 14.

What should be added to $\frac{-7}{12}$ to get $\frac{3}{8}$?

Solution:

Let the required rational number be $= x$

Other number $= \frac{-7}{12}$

Sum of two numbers $= \frac{3}{8}$

$$\therefore \frac{-7}{12} + x = \frac{3}{8}$$

$$\Rightarrow x = \frac{3}{8} - \frac{-7}{12}$$

$$= \frac{3\times3}{8\times3} + \frac{7\times2}{12\times2}$$

($\because$ L.C.M. of 8 and 12 = 24)

$$= \frac{9}{24} + \frac{14}{24}$$

$$= \frac{9+14}{24} = \frac{23}{24}$$

Question 15.

What should be subtracted from $\frac{5}{9}$ to get $\frac{9}{5}$?

Solution:

Let the first number be x

Other number $= \frac{5}{9}$

Difference of two number $= \frac{9}{5}$

According to question,

$$\therefore \frac{5}{9} - x = \frac{9}{5}$$

$$x = \frac{5}{9} - \frac{9}{5}$$

$$x = \frac{5 \times 5}{9 \times 5} - \frac{9 \times 9}{5 \times 9}$$

($\because$ L.C.M. of 9 and 5 = 45)

$$x = \frac{25}{45} - \frac{81}{45}$$

$$x = \frac{25 - 81}{45} = -\frac{56}{45}$$

EXERCISE 2 (D)

Question 1.

Evaluate:

(i) $\frac{5}{4} \times \frac{3}{7}$ (ii) $\frac{2}{3} \times -\frac{6}{7}$

(iii) $\left(\frac{-12}{5}\right) \times \left(\frac{10}{-3}\right)$ (iv) $\frac{-45}{39} \times \frac{-13}{15}$

(v) $3\frac{1}{8} \times \left(-2\frac{2}{5}\right)$ (vi) $2\frac{14}{25} \times \left(\frac{-5}{16}\right)$

(vii) $\left(\frac{-8}{9}\right) \times \left(\frac{-3}{16}\right)$ (viii) $\left(\frac{5}{-27}\right) \times \left(\frac{-9}{20}\right)$

Solution:

(i) $\frac{5}{4} \times \frac{3}{7} = \frac{5 \times 3}{4 \times 7} = \frac{15}{28}$

(ii) $\frac{2}{3} \times -\frac{6}{7} = \frac{2 \times -6}{3 \times 7} = \frac{2 \times -2}{7} = \frac{-4}{7}$

(iii) $\left(\frac{-12}{5}\right) \times \left(\frac{10}{-3}\right)$

$= \frac{(-12) \times 10}{5 \times (-3)} = 4 \times 2 = 8$

(iv) $\frac{-45}{39} \times \frac{-13}{15}$

$= \frac{(-45) \times (-13)}{39 \times 15} = \frac{(-3) \times (-1)}{3 \times 1}$

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

(v) $3\frac{1}{8} \times \left(-2\frac{2}{5}\right)$

$= \frac{3 \times 8 + 1}{8} \times \left(-\frac{2 \times 5 + 2}{5}\right)$

$= \frac{25}{8} \times \left(-\frac{12}{5}\right) = \frac{25 \times (-12)}{8 \times 5}$

$= \frac{5 \times (-3)}{2 \times 1} = \frac{-15}{2}$

(vi) $2\frac{14}{25} \times \left(\frac{-5}{16}\right)$

$$= \frac{2\times 25+14}{25} \times \left(\frac{-5}{16}\right)$$

$$= \frac{64}{25} \times \left(\frac{-5}{16}\right)$$

$$= \frac{64\times(-5)}{25\times 16} = \frac{4\times(-1)}{5\times 1} = -\frac{4}{5}$$

(vii) $\left(\frac{-8}{9}\right) \times \left(\frac{-3}{16}\right)$

$$= \frac{(-8)\times(-3)}{9\times 16} = \frac{(-1)\times(-1)}{3\times 2} = \frac{1}{6}$$

(viii) $\left(\frac{5}{-27}\right) \times \left(\frac{-9}{20}\right)$

$$= \frac{5\times(-9)}{(-27)\times 20} = \frac{1\times 1}{3\times 4} = \frac{1}{12}$$

Question 2.

Multiply:

(i) $\frac{3}{25}$ and $\frac{4}{5}$ (ii) $1\frac{1}{8}$ and $10\frac{2}{3}$

(iii) $6\frac{2}{3}$ and $\frac{-3}{8}$ (iv) $\frac{-13}{15}$ and $\frac{-25}{26}$

(v) $1\frac{1}{6}$ and 18 (vi) $2\frac{1}{14}$ and -7

(vii) $5\frac{1}{8}$ and -16 (viii) 35 and $\frac{-18}{25}$

(ix) $6\frac{2}{3}$ and $-\frac{3}{8}$ (x) $3\frac{3}{5}$ and -10

(xi) $\frac{27}{28}$ and -14 (xii) -24 and $\frac{5}{16}$

Solution:

(*i*) $\frac{3}{25}$ and $\frac{4}{5}$

$$= \frac{3}{25} \times \frac{4}{5} = \frac{3 \times 4}{25 \times 5} = \frac{12}{125}$$

(*ii*) $1\frac{1}{8}$ and $10\frac{2}{3}$

$$= \frac{9}{8} \times \frac{32}{3} = \frac{9 \times 32}{8 \times 3} = 3 \times 4 = 12$$

(*iii*) $6\frac{2}{3}$ and $\frac{-3}{8}$

$$= \frac{20}{3} \times \frac{(-3)}{8} = \frac{20 \times (-3)}{3 \times 8}$$

$$= \frac{5 \times (-1)}{1 \times 2} = \frac{-5}{2}$$

(*iv*) $\frac{-13}{15}$ and $\frac{-25}{26}$

$$= \frac{-13 \times -25}{15 \times 26} = \frac{-1 \times -5}{3 \times 2} = \frac{5}{6}$$

(*v*) $1\frac{1}{6}$ and 18

$$= \frac{7}{6} \times 18 = 7 \times 3 = 21$$

(*vi*) $2\frac{1}{14}$ and -7

$$= \frac{2 \times 14 + 1}{14} \times (-7) = \frac{29}{14} \times (-7)$$

$$= \frac{29 \times (-1)}{2} = \frac{-29}{2}$$

(*vii*) $5\frac{1}{8}$ and -16

$$= \frac{41}{8} \times (-16) = 41 \times -2 = -82$$

(*viii*) 35 and $\frac{-18}{25}$

$$= 35 \times \frac{-18}{25} = \frac{35 \times (-18)}{25} = \frac{7 \times (-18)}{5}$$

$$= \frac{-126}{5} = -25\frac{1}{5}$$

(*ix*) $6\frac{2}{3}$ and $-\frac{3}{8}$

$$= \frac{20}{3} \times \frac{-3}{8} = \frac{20 \times (-3)}{3 \times 8}$$

$$= \frac{5 \times (-1)}{1 \times 2} = \frac{-5}{2} = -2\frac{1}{2}$$

(*x*) $3\frac{3}{5}$ and -10

$$= \frac{3 \times 5 + 3}{5} \times (-10)$$

$$= \frac{18}{5} \times (-10) = 18 \times (-2) = -36$$

(*xi*) $\frac{27}{28}$ and -14

$$= \frac{27}{28} \text{ and } (-14)$$

$$= \frac{27 \times (-1)}{2} = \frac{-27}{2} = -13\frac{1}{2}$$

(*xii*) -24 and $\frac{5}{16}$

$$= \frac{-24 \times 5}{16} = \frac{-3 \times 5}{2}$$

$$= \frac{-15}{2} = -7\frac{1}{2}$$

Question 3.

Evaluate:

(i) $\left(-6\times\frac{5}{18}\right)-\left(-4\frac{2}{9}\right)$

(ii) $\left(\frac{7}{8}\times\frac{8}{7}\right)+\left(\frac{-5}{9}\right)\times\left(\frac{6}{-25}\right)$

(iii) $\left(\frac{11}{-9}\times\frac{21}{44}\right)+\left(\frac{-5}{9}\right)\times\left(\frac{63}{-100}\right)$

(iv) $\left(\frac{-5}{9}\times\frac{6}{-25}\right)+\left(\frac{24}{21}\times\frac{7}{8}\right)$

(v) $\left(\frac{-35}{39}\times\frac{-13}{7}\right)-\left(\frac{7}{90}\times\frac{-18}{14}\right)$

(vi) $\left(\frac{-4}{5}\times\frac{3}{2}\right)+\left(\frac{9}{-5}\times\frac{10}{3}\right)-\left(\frac{-3}{2}\times\frac{-1}{4}\right)$

Solution:

(*i*) $\left(-6\times\frac{5}{18}\right)-\left(-4\frac{2}{9}\right)$

$=\left(-1\times\frac{5}{3}\right)-\left(\frac{-(4\times9+2)}{9}\right)$

3	3, 9
3	1, 3
	1, 1

L.C.M. = 9

$=\frac{-5}{3}-\left(\frac{-38}{9}\right)$

$=\frac{-5}{3}+\frac{38}{9}=\frac{-5\times3}{3\times3}+\frac{38\times1}{9\times1}$

$=\frac{-15+38}{9}\Rightarrow\frac{23}{9}=2\frac{5}{9}$

(*ii*) $\left(\frac{7}{8}\times\frac{8}{7}\right)+\left(\frac{-5}{9}\right)\times\left(\frac{6}{-25}\right)$

$=\left(\frac{7}{8}\times\frac{8}{7}\right)+\left(\frac{-5}{9}\times\frac{6}{(-25)}\right)$

$=\frac{1}{1}+\frac{1\times2}{3\times5}=\frac{1}{1}+\frac{2}{15}$

$=\frac{15+2}{15}=\frac{17}{15}=1\frac{2}{15}$

(*iii*) $\left(\frac{11}{-9}\times\frac{21}{44}\right)+\left(\frac{-5}{9}\right)\times\left(\frac{63}{-100}\right)$

$$=\left(\frac{11}{-9}\times\frac{21}{44}\right)+\left(\frac{5}{9}\times\frac{63}{100}\right)$$

$$=-\frac{1\times7}{3\times4}+\frac{1\times7}{1\times20}=-\frac{7}{12}+\frac{7}{20}$$

$$=-\frac{7\times5}{12\times5}+\frac{7\times3}{20\times3}$$

($\because$ L.C.M. of 12 and 20 = 60)

$$=-\frac{35}{60}+\frac{21}{60}=\frac{-35+21}{60}=\frac{-14}{60}$$

(*iv*) $\left(\frac{-5}{9}\times\frac{6}{-25}\right)+\left(\frac{24}{21}\times\frac{7}{8}\right)$

$$\left(\frac{5}{9}\times\frac{6}{25}\right)+\left(\frac{24}{21}\times\frac{7}{8}\right)$$

$$=\frac{2}{3\times5}+1=\frac{2}{15}+1$$

$$=\frac{2+15}{15}=\frac{17}{15}=1\frac{2}{15}$$

(*v*) $\left(\frac{-35}{39}\times\frac{-13}{7}\right)-\left(\frac{7}{90}\times\frac{-18}{14}\right)$

$$=\left(\frac{-35}{39}\times\frac{(-13)}{7}\right)-\left(\frac{7}{90}\times\frac{-18}{14}\right)$$

$$=\frac{(-5)\times(-1)}{3\times1}-\left(\frac{1\times(-1)}{5\times2}\right)$$

$$=\frac{5}{3}-\left(\frac{-1}{10}\right)$$

$$=\frac{5\times10}{3\times10}+\frac{1}{10\times3}$$

$$=\frac{50+3}{30}=\frac{53}{30}=1\frac{23}{30}$$

(vi) $\left(\frac{-4}{5}\times\frac{3}{2}\right)+\left(\frac{9}{-5}\times\frac{10}{3}\right)-\left(\frac{-3}{2}\times\frac{-1}{4}\right)$

$$=\left(\frac{-2\times3}{5\times1}\right)+\left(\frac{3\times2}{-1\times1}\right)-\left(\frac{-3\times(-1)}{2\times4}\right)$$

$$=\left(\frac{-6}{5}\right)+\left(\frac{-6}{1}\right)-\left(\frac{3}{8}\right)$$

$$=\frac{-6\times8}{5\times8}-\frac{6\times40}{1\times40}-\frac{3\times5}{8\times5}$$

$$=\frac{-48-240-15}{40}$$

$$=\frac{-288-15}{40}=\frac{303}{40}=5\frac{3}{40}$$

Question 4.

Find the cost of $3\frac{1}{2}$ m cloth, if one metre cloth costs ₹$325\frac{1}{2}$.

Solution:

Cost of 1 metre cloth = ₹$325\frac{1}{2}$

$$=\frac{2\times325+1}{2}=\frac{650+1}{2}=₹\frac{651}{2}$$

Now cost of $3\frac{1}{2}$ m $\left(\frac{2\times3+1}{2}=\frac{7}{2}\right)$m

$$=\frac{651}{2}\times\frac{7}{2}=\frac{651\times7}{2\times2}$$

$$=\frac{4557}{4}=₹1139\frac{1}{4}$$

Question 5.

A bus is moving with a speed of 65 $\frac{1}{2}$ km per hour. How much distance will it cover in 1 $\frac{1}{3}$ hours.

Solution:

$$\text{Speed of bus per hour} = 65\frac{1}{2}$$

$$= \frac{2\times 65+1}{2} = \frac{130+1}{2} = \frac{131}{2}\text{ km}$$

$$\text{Time taken} = 1\frac{1}{3}\text{ hour} = \frac{4}{3}\text{ hour}$$

$$= \frac{131}{2}\times\frac{4}{3} \Rightarrow \frac{131}{1}\times\frac{2}{3}$$

$$\text{Distance covered} = \text{Speed} \times \text{Time}$$

$$= \frac{131}{2}\times\frac{4}{3}$$

$$= \frac{131\times 2}{1\times 3} = \frac{262}{3} = 87\frac{1}{3}\text{ km}$$

Question 6.

Divide:

(*i*) $\frac{15}{28}$ by $\frac{3}{4}$ (*ii*) $\frac{-20}{9}$ by $\frac{-5}{9}$

(*iii*) $\frac{16}{-5}$ by $\frac{-8}{7}$ (*iv*) -7 by $\frac{-14}{5}$

(*v*) -14 by $\frac{7}{-2}$ (*vi*) $\frac{-22}{9}$ by $\frac{11}{18}$

(*vii*) 35 by $\frac{-7}{9}$ (*viii*) $\frac{21}{44}$ by $-\frac{11}{9}$

Solution:

(*i*) $\frac{15}{28}$ by $\frac{3}{4}$

$= \frac{15}{28} \div \frac{3}{4} \Rightarrow \frac{15}{28} \times \frac{4}{3}$

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

(*ii*) $\frac{-20}{9}$ by $\frac{-5}{9} = \frac{-20}{9} \div \frac{-5}{9}$

$\Rightarrow \frac{-20}{9} \times \frac{9}{-5} = \frac{-4}{-1} = \frac{4}{1} = 4$

(*iii*) $\frac{16}{-5}$ by $\frac{-8}{7}$

$= \frac{16}{-5} \div \frac{-8}{7} \Rightarrow \frac{16}{-5} \times \frac{7}{-8}$

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

$= \frac{2 \times 7}{-5 \times (-1)} = \frac{14}{5} = 2\frac{4}{5}$

(*iv*) -7 by $\frac{-14}{5}$

$= -7 \div \frac{-14}{5} \Rightarrow -7 \times \frac{5}{-14} \Rightarrow 1 \times \frac{5}{2}$

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

(*v*) -14 by $\frac{7}{-2}$

$$= -14 \div \frac{7}{-2} \Rightarrow -14 \times \frac{-2}{7}$$

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

(*vi*) $\frac{-22}{9}$ by $\frac{11}{18}$

$$= \frac{-22}{9} \div \frac{11}{18} \Rightarrow \frac{-22}{9} \times \frac{18}{11}$$

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

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

(*vii*) 35 by $\frac{-7}{9}$

$$= 35 \div \frac{-7}{9} \Rightarrow 35 \times \frac{9}{-7}$$

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

$$= \frac{5 \times 9}{-1} = \frac{45}{-1} = -45$$

(*viii*) $\frac{21}{44}$ by $-\frac{11}{9}$

$$= \frac{21}{44} \div \left(-\frac{11}{9}\right) \Rightarrow \frac{21}{44} \times -\frac{9}{11}$$

$$= \frac{21 \times (-9)}{44 \times 11} = -\frac{189}{484}$$

Question 7.

Evaluate:

$$(i)\ 3\frac{5}{12} + 1\frac{2}{3} \qquad (ii)\ 3\frac{5}{12} - 1\frac{2}{3}$$

$$(iii)\ \left(3\frac{5}{12}+1\frac{2}{3}\right) \div \left(3\frac{5}{12}-1\frac{2}{3}\right)$$

Solution:

$$(i)\ 3\frac{5}{12} + 1\frac{2}{3}$$

$$= \frac{12\times3+5}{12} + \frac{3\times1+2}{3}$$

$$= \frac{41}{12} + \frac{5}{3} \qquad (\because \text{L.C.M. of } 12, 3 = 12)$$

$$= \frac{41\times1}{12\times1} + \frac{5\times4}{3\times4} = \frac{41}{12} + \frac{20}{12}$$

$$= \frac{41+20}{12} = \frac{61}{12} = 5\frac{1}{12}$$

$$(ii)\ 3\frac{5}{12} - 1\frac{2}{3}$$

$$= \frac{12\times3+5}{12} - \frac{3\times1+2}{3}$$

$$= \frac{41}{12} - \frac{5}{3} \qquad (\because \text{L.C.M. of } 12, 3 = 12)$$

$$= \frac{41\times1}{12\times1} - \frac{5\times4}{3\times4}$$

$$= \frac{41-20}{12} = \frac{21}{12} = \frac{7}{4} = 1\frac{3}{4}$$

(iii) $\left(3\frac{5}{12}+1\frac{2}{3}\right) \div \left(3\frac{5}{12}-1\frac{2}{3}\right)$

$$= \left(\frac{12\times3+5}{12}+\frac{3\times1+2}{3}\right) \div \left(\frac{12\times3+5}{12}-\frac{3\times1+2}{3}\right)$$

$$\left(\frac{41}{12}+\frac{5}{3}\right) \div \left(\frac{41}{12}-\frac{5}{3}\right)$$

($\because$ L.C.M. of 12, 3 = 12)

$$= \left(\frac{41+20}{12}\right) \div \left(\frac{41-20}{12}\right)$$

$$= \frac{61}{12} \div \frac{21}{12} \Rightarrow \frac{61}{12} \times \frac{12}{21}$$

$$= \frac{61}{21} = 2\frac{19}{21}$$

Question 8.

The product of two numbers is 14. If one of the numbers is $\frac{-8}{7}$, find the other.

Solution:

$\because$ Product of two numbers = 14

and one of these two numbers = $\frac{-8}{7}$

The other number = $14 \div \frac{-8}{7}$

$$= 14 \times -\frac{7}{8} = -\frac{98}{8} = \frac{-49}{4}$$

Question 9.

The cost of 11 pens is ₹3 $\frac{2}{3}$. Find the cost of one pen.

Solution:

The cost of 11 pens = ₹$3\frac{2}{3}$

$= \frac{3 \times 3 + 2}{3} =$ ₹$\frac{11}{3}$

The cost of one pen = $\frac{11}{3} \div 11$

$= \frac{11}{3} \times \frac{1}{11} =$ ₹$\frac{1}{3}$

Question 10.

If 6 identical articles can be bought for ₹2 $\frac{6}{17}$. Find the cost of each article.

Solution:

Cost of 6 articles = ₹$2\frac{6}{17}$

$= \frac{2 \times 17 + 6}{17} =$ ₹$\frac{40}{17}$

Cost of each article = $\frac{40}{17} \div 6$

$= \frac{40}{17} \times \frac{1}{6} =$ ₹$\frac{20}{51}$

Question 11.

By what number should $\frac{-3}{8}$ be multiplied so that the product is $\frac{-9}{16}$?

Solution:

Number = $\frac{-3}{8} \div \left(\frac{-9}{16}\right)$

$= \frac{-3}{8} \times \frac{16}{-9} = \frac{2}{3} = 1\frac{1}{2}$

Question 12.

By what number should $\frac{-5}{7}$ be divided so -15 that the result is $\frac{-15}{28}$?

Solution:

$$\text{Number} = \frac{-15}{28} \div \frac{-5}{7}$$

$$= \frac{-15}{28} \times \frac{-7}{5} = \frac{3}{4}$$

Question 13.

Evaluate :

$$\left(\frac{32}{15}+\frac{8}{5}\right) \div \left(\frac{32}{15}-\frac{8}{5}\right).$$

Solution:

$$\left(\frac{32}{15}+\frac{8}{5}\right) \div \left(\frac{32}{15}-\frac{8}{5}\right)$$

$$\left(\frac{32\times1}{15\times1}+\frac{8\times3}{5\times3}\right) \div \left(\frac{32\times1}{15\times1}-\frac{8\times1}{5\times1}\right)$$

$$(\because \text{L.C.M. of } 15, 5 = 15)$$

$$= \left(\frac{32+24}{15}\right) \div \left(\frac{32-24}{15}\right)$$

$$= \frac{56}{15} \div \frac{8}{15} \Rightarrow \frac{56}{15} \times \frac{15}{8} = 7$$

Question 14.

Seven equal piece are made out of a rope 5 of 21 $\frac{5}{7}$ m. Find the length of each piece.

Solution:

Length of 7 pieces of rope $= 21\frac{5}{7}$ m

$$= \frac{21 \times 7 + 5}{7} = \frac{152}{7}$$

Length of each piece $= \frac{152}{7} \div 7$

$$= \frac{152}{7} \times \frac{1}{7} = \frac{152}{49} = 3\frac{5}{49} \text{ m}$$

EXERCISE 2 (E)

Question 1.

Evaluate:

(i) $\frac{-2}{3} + \frac{3}{4}$ (ii) $\frac{7}{-27} + \frac{11}{18}$

(iii) $\frac{-3}{8} + \frac{-5}{12}$ (iv) $\frac{9}{-16} + \frac{-5}{-12}$

(v) $\frac{-5}{9} + \frac{-7}{12} + \frac{11}{18}$ (vi) $\frac{7}{-26} + \frac{16}{39}$

(vii) $-\frac{2}{3} - \left(\frac{-5}{7}\right)$ (viii) $-\frac{5}{7} - \left(-\frac{3}{8}\right)$

(ix) $\frac{7}{26} + 2 + \frac{-11}{13}$ (x) $-1 + \frac{2}{-3} + \frac{5}{6}$

Solution:

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

3	3, 4
4	1, 4
	1, 1

L.C.M. of 3 and 4 = 3 × 4 = 12

$$\Rightarrow \frac{-2\times 4}{3\times 4} + \frac{3\times 3}{4\times 3}$$

(∵ L.C.M. of 3 and 4 = 12)

$$\Rightarrow \frac{-8+9}{12} = \frac{1}{12}$$

(*ii*) $\frac{7}{-27} + \frac{11}{18}$

2	27, 18
3	27, 9
3	9, 3
3	3, 1
	1, 1

L.C.M. of 27 and 18 = 2 × 3 × 3 × 3 = 54

$$\Rightarrow \frac{7\times 2}{-27\times 2} + \frac{11\times 3}{18\times 3}$$

(∵ L.C.M. of –27 and 18 = 54)

$$\Rightarrow \frac{-14+33}{54} = \frac{19}{54}$$

(*iii*) $\frac{-3}{8} + \frac{-5}{12}$

2	8, 12
2	4, 6
2	2, 3
3	1, 3
	1, 1

L.C.M. of 8 and 12 = 2 × 2 × 2 × 3 = 24

$$\Rightarrow \frac{-3\times 3}{8\times 3} + \frac{(-5\times 2)}{12\times 2}$$

(∵ L.C.M. of 8, 12 = 24)

$$\Rightarrow \frac{-9-10}{24} = \frac{-19}{24}$$

(*iv*) $\frac{9}{-16} + \frac{-5}{-12}$ or $\frac{-5}{-12} = \frac{5}{12}$

2	16, 12
2	8, 6
2	4, 3
2	2, 3
3	1, 3
	1, 1

L.C.M. of 16 and 12 = 2 × 2 × 2 × 2 × 3 = 48

$$\Rightarrow \frac{9\times 3}{-16\times 3} + \frac{5\times 4}{12\times 4}$$

(∵ L.C.M. of 16 and 12 = 48)

$$\Rightarrow \frac{-27+20}{48} = \frac{-7}{48}$$

(*v*) $\frac{-5}{9} + \frac{-7}{12} + \frac{11}{18}$

2	9, 12, 18
2	9, 6, 9
3	9, 3, 9
3	3, 1, 3
	1, 1, 1

L.C.M. of 9, 12 and 18 = 2 × 2 × 3 × 3 = 36

$$\Rightarrow \frac{-5\times 4}{9\times 4} - \frac{7\times 3}{12\times 3} + \frac{11\times 2}{18\times 2}$$

(∵ L.C.M. of 9, 12 and 18 = 36)

$$\Rightarrow \frac{-20-21+22}{36}$$

$$\Rightarrow \frac{-41+22}{36} = \frac{-19}{36}$$

(*vi*) $\frac{7}{-26} + \frac{16}{39}$

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

L.C.M. of 26 and 39 = 2 × 3 × 13 = 78

$$\Rightarrow \frac{-7\times 3}{26\times 3} + \frac{16\times 2}{39\times 2}$$

(L.C.M. of –26 and 39 = 78)

$$\Rightarrow \frac{-21+32}{78} = \frac{11}{78}$$

(*vii*) $-\frac{2}{3} - \left(\frac{-5}{7}\right)$

$\Rightarrow -\frac{2}{3} + \frac{5}{7}$

$$\begin{array}{c|c} 3 & 3, 7 \\ \hline 7 & 1, 7 \\ \hline & 1, 1 \end{array}$$

L.C.M. of 3 and 7 = 3 × 7 = 21

$\Rightarrow \frac{-2\times 7}{3\times 7} + \frac{5\times 3}{7\times 3}$

($\because$ L.C.M. of 3 and 7 = 21)

$\Rightarrow \frac{-14+15}{21} = \frac{1}{21}$

(*viii*) $-\frac{5}{7}-\left(-\frac{3}{8}\right)$

$\Rightarrow -\frac{5}{7}+\frac{3}{8}$

2	7, 8
2	7, 4
2	7, 2
7	7, 1
	1

L.C.M. of 7 and 8 = 2 × 2 × 2 × 7 = 56

$\Rightarrow \frac{-5\times 8}{7\times 8}+\frac{3\times 7}{8\times 7}$

(∵ LCM of 7 and 8 = 56)

$\Rightarrow \frac{-40+21}{56}=\frac{-19}{56}$

(*ix*) $\frac{7}{26}+2+\frac{-11}{13}$

$\Rightarrow \frac{7}{26}+\frac{2}{1}+\frac{-11}{13}$

2	26, 13
13	13, 13
	1, 1

L.C.M. of 26 and 13 = 2 × 13 = 26

$\Rightarrow \frac{7\times 1}{26\times 1}+\frac{2\times 26}{1\times 26}-\frac{11\times 2}{13\times 2}$

(∵ L.C.M. of 26, 13 = 26)

$\Rightarrow \frac{7+52-22}{26}$

$$\Rightarrow \frac{59-22}{26} = \frac{37}{26}$$

(x) $-1 + \frac{2}{-3} + \frac{5}{6}$

2	3, 6
3	3, 3
	1, 1

L.C.M. of 3 and 6 = 2 × 3 = 6

$$\Rightarrow \frac{-1\times 6}{1\times 6} - \frac{2\times 2}{3\times 2} + \frac{5\times 1}{6\times 1}$$

($\because$ L.C.M. of 3 and 6 = 6)

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

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

Question 2.

The sum of two rational numbers is $\frac{-3}{8}$. If one of them is $\frac{3}{16}$, find the other,

Solution:

$$\text{Sum of two numbers} = \frac{-3}{8}$$

$$\text{One number} = \frac{3}{16}$$

$$\therefore \text{ Second number} = \frac{-3}{8} - \frac{3}{16}$$

2	8, 16
2	4, 8
2	2, 4
2	1, 2
	1, 1

L.C.M. of 8 and 16 = 2 × 2 × 2 × 2 = 16

$$= \frac{-3 \times 2}{8 \times 2} - \frac{3 \times 1}{16 \times 1}$$

(∵ L.C.M. of 8 and 16 = 16)

$$= \frac{-6-3}{16} = \frac{-9}{16}$$

$$\therefore \text{ Second number} = \frac{-9}{16}$$

Question 3.

The sum of two rational numbers is -5. If one of them is $\frac{-52}{25}$, find the other.

Solution:

Sum of two numbers = –5

$$\text{One number} = \frac{-52}{25}$$

$$\text{Second number} = -5 - \left(\frac{-52}{25}\right)$$

$$= \frac{-5 \times 25}{1 \times 25} + \frac{52 \times 1}{25 \times 1}$$

$$= \frac{-125 + 52}{25} = \frac{-77}{25}$$

$$\therefore \text{ Second number} = \frac{-77}{25}$$

Question 4.

What rational number should be added to $-\frac{3}{16}$ to get $\frac{11}{24}$

Solution:

$$\text{Sum of two number} = \frac{11}{24}$$

$$\text{One number} = -\frac{3}{16}$$

$$\therefore \text{ The required number} = \frac{11}{24} - \left(\frac{-3}{16}\right)$$

$$\Rightarrow \frac{11}{24} + \frac{3}{16}$$

2	24, 16
2	12, 8
2	6, 4
2	3, 2
3	3, 1
	1

L.C.M. of 16 and 24 = 2 × 2 × 2 × 2 × 3

= 48

(∵ L.C.M. of 24, 16 = 48)

$$= \frac{11\times 2}{24\times 2} + \frac{3\times 3}{16\times 3}$$

$$= \frac{22+9}{48} = \frac{31}{48}$$

Question 5.

What rational number should be added to $-\frac{3}{5}$ to get 2?

Solution:

$$\text{The required number} = 2 - \left(\frac{-3}{5}\right)$$

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

$$= \frac{2\times5}{1\times5} + \frac{3\times1}{5\times1}$$

$$= \frac{10+3}{5} = \frac{13}{5} = 2\frac{3}{5}$$

Question 6.

What rational number should be subtracted from $-\frac{5}{12}$ to get $\frac{5}{24}$

Solution:

$$\text{The required number} = \frac{-5}{12} - \frac{5}{24}$$

2	12, 24
2	6, 12
2	3, 6
3	3, 3
	1, 1

$$\text{L.C.M. of 12 and 24} = 2 \times 2 \times 2 \times 3 \times 3$$
$$= 72$$

$$\Rightarrow \frac{-5\times6}{12\times6} - \frac{5\times3}{24\times3}$$

$$(\because \text{L.C.M. of 12, 24} = 72)$$

$$\Rightarrow \frac{-30-15}{72} = \frac{-45}{72} \text{ or } \frac{-5}{8}$$

Question 7.

What rational number should be subtracted from $\frac{5}{8}$ to get $\frac{8}{5}$?

Solution:

$$\text{The required number} = \frac{5}{8} - \frac{8}{5}$$

2	8, 5
2	4, 5
2	2, 5
5	1, 5
	1, 1

$$\Rightarrow \frac{5\times5}{8\times5} - \frac{8\times8}{5\times8} \qquad \text{(L.C.M. of 8, 5 = 40)}$$

$$\Rightarrow \frac{25-64}{40} = \frac{-39}{40}$$

Question 8.

Evaluate:

(i) $\left(\frac{7}{8}\times\frac{24}{21}\right) + \left(\frac{-5}{9}\times\frac{6}{-25}\right)$

(ii) $\left(\frac{8}{15}\times\frac{-25}{16}\right) + \left(\frac{-18}{35}\times\frac{5}{6}\right)$

(iii) $\left(\frac{18}{33}\times\frac{-22}{27}\right) - \left(\frac{13}{25}\times\frac{-75}{26}\right)$

(iv) $\left(\frac{-13}{7}\times\frac{-35}{39}\right) - \left(\frac{-7}{45}\times\frac{9}{14}\right)$

Solution:

(*i*) $\left(\frac{7}{8}\times\frac{24}{21}\right)+\left(\frac{-5}{9}\times\frac{6}{-25}\right)$

$$\Rightarrow \frac{7\times 24}{8\times 21}+\frac{-5\times 6}{9\times(-25)}$$

$$\Rightarrow \frac{1\times 3}{1\times 3}+\frac{1\times 2}{3\times 5}$$

$$\Rightarrow \frac{3}{3}+\frac{2}{15}$$

3	3, 15
5	1, 5
	1, 1

(∵ L.C.M. of 3 and 15 = 15)

$$\Rightarrow \frac{3\times 5}{3\times 5}+\frac{2\times 1}{15\times 1}$$

$$\Rightarrow \frac{15+2}{15}=\frac{17}{15}=1\frac{2}{15}$$

(*ii*) $\left(\frac{8}{15}\times\frac{-25}{16}\right)+\left(\frac{-18}{35}\times\frac{5}{6}\right)$

$$\Rightarrow \frac{8\times(-25)}{15\times 16}+\frac{-18\times 5}{35\times 6}$$

$$\Rightarrow \frac{1\times(-5)}{3\times 2}+\left(\frac{-3\times 1}{7\times 1}\right)$$

$$\Rightarrow \frac{-5}{6}-\frac{3}{7}$$

2	6, 7
3	3, 7
7	1, 7
	1, 1

L.C.M. of 6 and 7 = 2 × 3 × 7 = 42

(∵ L.C.M. of 6 and 7 = 42)

$$\Rightarrow \frac{-5\times 7}{6\times 7}-\frac{3\times 6}{7\times 6}$$

$$\Rightarrow \frac{-35-18}{42}=\frac{-53}{42}$$

(*iii*) $\left(\frac{18}{33}\times\frac{-22}{27}\right)-\left(\frac{13}{25}\times\frac{-75}{26}\right)$

$$\Rightarrow \frac{18\times(-22)}{33\times 27}-\frac{13\times(-75)}{25\times 26}$$

$$\Rightarrow \frac{2\times(-2)}{3\times 3}-\frac{1\times(-3)}{1\times 2}$$

$$\Rightarrow \frac{-4}{9}-\left(\frac{-3}{2}\right)$$

$$\Rightarrow \frac{-4}{9}+\frac{3}{2}$$

2	9, 2
3	9, 1
3	3, 1
	1, 1

L.C.M. of 9 and 2 = 2 × 3 × 3 = 18

$$\Rightarrow \frac{-4\times 2}{9\times 2}+\frac{3\times 9}{2\times 9} \quad (\because \text{L.C.M. of 9 and 2} = 18)$$

$$\Rightarrow \frac{-8+27}{18}=\frac{19}{18}=1\frac{1}{18}$$

(*iv*) $\left(\frac{-13}{7}\times\frac{-35}{39}\right)-\left(\frac{-7}{45}\times\frac{9}{14}\right)$

$$\Rightarrow \frac{-13\times(-35)}{7\times 39}+\frac{7\times 9}{45\times 14}$$

$$\Rightarrow \frac{-1\times(-5)}{1\times 3}+\frac{1\times 1}{5\times 2}$$

$$\Rightarrow \frac{5}{3}+\frac{1}{10}$$

2	3, 10
3	3, 5
5	1, 5
	1, 1

L.C.M. of 3 and 10 = 2 × 3 × 5 = 10

$$\Rightarrow \frac{5\times10}{3\times10} + \frac{1\times3}{10\times3}$$

(∵ L.C.M. of 3 and 10 = 30)

$$\Rightarrow \frac{50+3}{30} = \frac{53}{30} = 1\frac{23}{30}$$

Question 9.

The product of two rational numbers is 24. If one of them is $-\frac{36}{11}$, find the other.

Solution:

Product of two numbers = 24

$$\text{One number} = \frac{-36}{11}$$

$$\therefore \text{ Second number} = 24 \div \left(\frac{-36}{11}\right)$$

$$= 24 \times \left(\frac{-11}{36}\right)$$

$$= 2 \times \frac{(-11)}{3} = \frac{-22}{3}$$

Question 10.

By what rational number should we multiply $\frac{20}{-9}$,so that the product may be $\frac{-5}{9}$?

Solution:

$$\text{Required number} = \frac{-5}{9} \div \left(\frac{20}{-9}\right)$$

$$\Rightarrow \frac{-5}{9} \times \left(\frac{-9}{20}\right) = \frac{1}{4}$$

$$\therefore \text{ Required number} = \frac{1}{4}$$