

Exercise 1A**Question 1:**

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

- (i) 20
- (ii) -30
- (iii) 35
- (iv) -40

ANSWER:

If $\frac{a}{b}$ is a fraction and m is a non-zero integer, then $\frac{a}{b} = \frac{a \times m}{b \times m}$.

Now,

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

$$(ii) \frac{-3}{5} = \frac{-3 \times -6}{5 \times -6} = \frac{18}{-30}$$

$$(iii) \frac{-3}{5} = \frac{-3 \times 7}{5 \times 7} = \frac{-21}{35}$$

$$(iv) \frac{-3}{5} = \frac{-3 \times -8}{5 \times -8} = \frac{24}{-40}$$

Question 2:

Express $\frac{-42}{98}$ as a rational number with denominator 7.

ANSWER:

If $\frac{a}{b}$ is a rational number and m is a common divisor of a and b , then $\frac{a}{b} = \frac{a \div m}{b \div m}$.

$$\therefore \frac{-42}{98} = \frac{-42 \div 14}{98 \div 14} = \frac{-3}{7}$$

Question 3:

Express $\frac{-48}{60}$ as a rational number with denominator 5.

ANSWER:

If $\frac{a}{b}$ is a rational integer and m is a common divisor of a and b , then $\frac{a}{b} = \frac{a \div m}{b \div m}$.

$$\therefore \frac{-48}{60} = \frac{-48 \div 12}{60 \div 12} = \frac{-4}{5}$$

Question 4:

Express each of the following rational numbers in standard form:

(i) $\frac{-12}{30}$

(ii) $\frac{-14}{49}$

(iii) $\frac{24}{-64}$

(iv) $\frac{-36}{-63}$

ANSWER:

A rational number $\frac{a}{b}$ is said to be in the standard form if a and b have no common divisor other than unity and $b > 0$.

Thus,

(i) The greatest common divisor of 12 and 30 is 6.

$$\therefore \frac{-12}{30} = \frac{-12 \div 6}{30 \div 6} = \frac{-2}{5} \text{ (In the standard form)}$$

(ii) The greatest common divisor of 14 and 49 is 7.

$$\therefore \frac{-14}{49} = \frac{-14 \div 7}{49 \div 7} = \frac{-2}{7} \text{ (In the standard form)}$$

$$(iii) \frac{24}{-64} = \frac{24 \times (-1)}{-64 \times -1} = \frac{-24}{64}$$

The greatest common divisor of 24 and 64 is 8.

$$\therefore \frac{-24}{64} = \frac{-24 \div 8}{64 \div 8} = \frac{-3}{8} \text{ (In the standard form)}$$

$$(iv) \frac{-36}{-63} = \frac{-36 \times (-1)}{-63 \times -1} = \frac{36}{63}$$

The greatest common divisor of 36 and 63 is 9.

$$\therefore \frac{36}{63} = \frac{36 \div 9}{63 \div 9} = \frac{4}{7} \text{ (In the standard form)}$$

Question 5:

Which of the two rational numbers is greater in the given pair?

(i) $\frac{3}{8}$ or 0

(ii) $\frac{-2}{9}$ or 0

(iii) $\frac{-3}{4}$ or $\frac{1}{4}$

(iv) $\frac{-5}{7}$ or $\frac{-4}{7}$

(v) $\frac{2}{3}$ or $\frac{3}{4}$

(vi) $\frac{-1}{2}$ or -1

ANSWER:

We know:

(i) Every positive rational number is greater than 0.

(ii) Every negative rational number is less than 0.

Thus, we have:

(i) $\frac{3}{8}$ is a positive rational number.

$$\therefore \frac{3}{8} > 0$$

(ii) $\frac{-2}{9}$ is a negative rational number.

$$\therefore \frac{-2}{9} < 0$$

(iii) $\frac{-3}{4}$ is a negative rational number.

$$\therefore \frac{-3}{4} < 0$$

Also,

$\frac{1}{4}$ is a positive rational number.

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

Combining the two inequalities, we get:

$$\frac{-3}{4} < \frac{1}{4}$$

(iv) Both $\frac{-5}{7}$ and $\frac{-4}{7}$ have the same denominator, that is, 7.

So, we can directly compare the numerators.

$$\therefore \frac{-5}{7} < \frac{-4}{7}$$

(v) The two rational numbers are $\frac{2}{3}$ and $\frac{3}{4}$.

The LCM of the denominators 3 and 4 is 12.

Now,

$$\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$

Also,

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

Further

$$\frac{8}{12} < \frac{9}{12}$$

$$\therefore \frac{2}{3} < \frac{3}{4}$$

(vi) The two rational numbers are $\frac{-1}{2}$ and -1 .

We can write $-1 = \frac{-1}{1}$.

The LCM of the denominators 2 and 1 is 2.

Now,

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

Also,

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

$$\therefore \frac{-2}{2} < \frac{-1}{2}$$

$$\therefore -1 < \frac{-1}{2}$$

Question 6:

Which of the two rational numbers is greater in the given pair?

(i) $\frac{-4}{3}$ or $\frac{-8}{7}$

(ii) $\frac{7}{-9}$ or $\frac{-5}{8}$

(iii) $\frac{-1}{3}$ or $\frac{4}{-5}$

(iv) $\frac{9}{-13}$ or $\frac{7}{-12}$

(v) $\frac{4}{-5}$ or $\frac{-7}{10}$

(vi) $\frac{-12}{5}$ or -3

ANSWER:

1. The two rational numbers are $\frac{-4}{3}$ and $\frac{-8}{7}$.

The LCM of the denominators 3 and 7 is 21.

Now,

$$\frac{-4}{3} = \frac{-4 \times 7}{3 \times 7} = \frac{-28}{21}$$

Also,

$$\frac{-8}{7} = \frac{-8 \times 3}{7 \times 3} = \frac{-24}{21}$$

Further,

$$\frac{-28}{21} < \frac{-24}{21}$$

$$\therefore \frac{-4}{3} < \frac{-8}{7}$$

2. The two rational numbers are $\frac{7}{-9}$ and $\frac{-5}{8}$.

The first fraction can be expressed as $\frac{7}{-9} = \frac{7 \times -1}{-9 \times -1} = \frac{-7}{9}$.

The LCM of the denominators 9 and 8 is 72.

Now,

$$\frac{-7}{9} = \frac{-7 \times 8}{9 \times 8} = \frac{-56}{72}$$

Also,

$$\frac{-5}{8} = \frac{-5 \times 9}{8 \times 9} = \frac{-45}{72}$$

Further,

$$\frac{-56}{72} < \frac{-45}{72}$$

$$\therefore \frac{7}{-9} < \frac{-5}{8}$$

3. The two rational numbers are $\frac{-1}{3}$ and $\frac{4}{-5}$.

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

The LCM of the denominators 3 and 5 is 15.

Now,

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

Also,

$$\frac{-4}{5} = \frac{-4 \times 3}{5 \times 3} = \frac{-12}{15}$$

Further,

$$\frac{-12}{15} < \frac{-5}{15}$$

$$\therefore \frac{4}{-5} < \frac{-1}{3}$$



4. The two rational numbers are $\frac{9}{-13}$ and $\frac{7}{-12}$.

$$\text{Now, } \frac{9}{-13} = \frac{9 \times -1}{-13 \times -1} = \frac{-9}{13} \text{ and } \frac{7}{-12} = \frac{7 \times -1}{-12 \times -1} = \frac{-7}{12}$$

The LCM of the denominators 13 and 12 is 156.

Now,

$$\frac{-9}{13} = \frac{-9 \times 12}{13 \times 12} = \frac{-108}{156}$$

Also,

$$\frac{-7}{12} = \frac{-7 \times 13}{12 \times 13} = \frac{-91}{156}$$

Further,

$$\frac{-108}{156} < \frac{-91}{156}$$

$$\therefore \frac{9}{-13} < \frac{7}{-12}$$

5. The two rational numbers are $\frac{4}{-5}$ and $\frac{-7}{10}$.

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

The LCM of the denominators 5 and 10 is 10.

Now,

$$\frac{-4}{5} = \frac{-4 \times 2}{5 \times 2} = \frac{-8}{10}$$

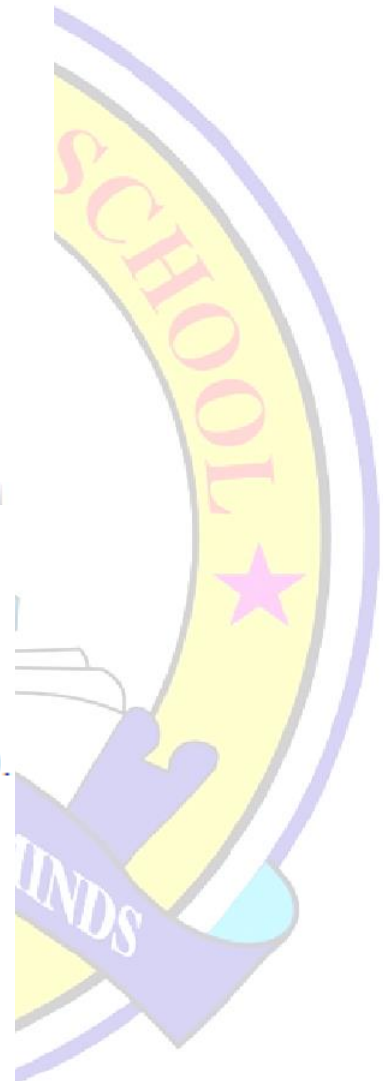
Also,

$$\frac{-7}{10} = \frac{-7 \times 1}{10 \times 1} = \frac{-7}{10}$$

Further,

$$\frac{-8}{10} < \frac{-7}{10}$$

$$\therefore \frac{-4}{5} < \frac{-7}{10}, \text{ or, } \frac{4}{-5} < \frac{-7}{10}$$



6. The two rational numbers are $\frac{-12}{5}$ and -3 .

-3 can be written as $\frac{-3}{1}$.

The LCM of the denominators is 5.

Now,

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

Because $\frac{-15}{5} < \frac{-12}{5}$, we can conclude that $-3 < \frac{-12}{5}$.

Question 7:

Fill in the blanks with the correct symbol out of $>$, $=$ and $<$:

(i) $\frac{-3}{7} \dots \frac{6}{-13}$

(ii) $\frac{5}{-13} \dots \frac{-35}{91}$

(iii) $-2 \dots \frac{-13}{5}$

(iv) $\frac{-2}{3} \dots \frac{5}{-8}$

(v) $0 \dots \frac{-3}{-5}$

(vi) $\frac{-8}{9} \dots \frac{-9}{10}$

ANSWER:

(i) We will write each of the given numbers with positive denominators.

$$\text{One number} = \frac{-3}{7}$$

$$\text{Other number} = \frac{6}{-13} = \frac{6 \times (-1)}{-13 \times (-1)} = \frac{-6}{13}$$

LCM of 7 and 13 = 91

$$\therefore \frac{-3}{7} = \frac{-3 \times 13}{7 \times 13} = \frac{-39}{91}$$

And,

$$\frac{-6}{13} = \frac{-6 \times 7}{13 \times 7} = \frac{-42}{91} \quad \frac{-6}{13} = \frac{-6 \times 7}{13 \times 7} = \frac{-42}{91} \quad \frac{-6}{13} = \frac{-6 \times 7}{13 \times 7} = \frac{-42}{91}$$

Clearly,

$$-39 > -41$$

$$\therefore \frac{-39}{91} > \frac{-42}{91}$$

Thus,

$$\frac{-3}{7} > \frac{6}{-13}$$

(ii) We will write each of the given numbers with positive denominators.

$$\text{One number} = \frac{5}{-13} = \frac{5 \times (-1)}{-13 \times (-1)} = \frac{-5}{13}$$

$$\text{Other number} = \frac{-35}{91}$$

LCM of 13 and 91 = 91

$$\therefore \frac{-5}{13} = \frac{-5 \times 7}{13 \times 7} = \frac{-35}{91} \text{ and } \frac{-35}{91}$$

Clearly,

$$-35 = -35$$

$$\therefore \frac{-35}{91} = \frac{-35}{91}$$

Thus,

$$\frac{-5}{13} = \frac{-35}{91}$$

(iii) We will write each of the given numbers with positive denominators.

One number = -2

We can write -2 as $\frac{-2}{1}$.

Other number = $\frac{-13}{5}$

LCM of 1 and 5 = 5

$$\therefore \frac{-2}{1} = \frac{-2 \times 5}{1 \times 5} = \frac{-10}{5} \text{ and } \frac{-13}{5} = \frac{-13 \times 1}{5 \times 1} = \frac{-13}{5}$$

Clearly,

$$-10 > -13$$

$$\therefore \frac{-10}{5} > \frac{-13}{5}$$

Thus,

$$\frac{-2}{1} > \frac{-13}{5}$$

$$-2 > \frac{-13}{5}$$

(iv) We will write each of the given numbers with positive denominators.

One number = $\frac{-2}{3}$

Other number = $\frac{5}{-8} = \frac{5 \times (-1)}{-8 \times (-1)} = \frac{-5}{8}$

LCM of 3 and 8 = 24

$$\therefore \frac{-2}{3} = \frac{-2 \times 8}{3 \times 8} = \frac{-16}{24} \text{ and } \frac{-5}{8} = \frac{-5 \times 3}{8 \times 3} = \frac{-15}{24}$$

Clearly,

$$-16 < -15$$

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

Thus,

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

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

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

$\frac{3}{5}$ is a positive number.

Because every positive rational number is greater than 0, $\frac{3}{5} > 0 \Rightarrow 0 < \frac{3}{5}$.

(vi) We will write each of the given numbers with positive denominators.

$$\text{One number} = \frac{-8}{9}$$

$$\text{Other number} = \frac{-9}{10}$$

$$\text{LCM of 9 and 10} = 90$$

$$\therefore \frac{-8}{9} = \frac{-8 \times 10}{9 \times 10} = \frac{-80}{90} \text{ and } \frac{-9}{10} = \frac{-9 \times 9}{10 \times 9} = \frac{-81}{90}$$

Clearly,

$$-81 < -80$$

$$\therefore \frac{-81}{90} < \frac{-80}{90}$$

Thus,

$$\frac{-9}{10} < \frac{-8}{9}$$

Question 8:

Arrange the following rational numbers in ascending order:

(i) $\frac{4}{-9}, \frac{-5}{12}, \frac{7}{-18}, \frac{-2}{3}$

(ii) $\frac{-3}{4}, \frac{5}{-12}, \frac{-7}{16}, \frac{9}{-24}$

(iii) $\frac{3}{-5}, \frac{-7}{10}, \frac{-11}{15}, \frac{-13}{20}$

(iv) $\frac{-4}{7}, \frac{-9}{14}, \frac{13}{-28}, \frac{-23}{42}$

ANSWER:

(i) We will write each of the given numbers with positive denominators.

We have:

$$\frac{4}{-9} = \frac{4 \times (-1)}{-9 \times (-1)} = \frac{-4}{9} \text{ and } \frac{7}{-18} = \frac{7 \times (-1)}{-18 \times (-1)} = \frac{-7}{18}$$

Thus, the given numbers are $\frac{-4}{9}, \frac{-5}{12}, \frac{-7}{18}$ and $\frac{-2}{3}$.

LCM of 9, 12, 18 and 3 is 36.

Now,

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

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

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

$$\frac{-2}{3} = \frac{-2 \times 12}{3 \times 12} = \frac{-24}{36}$$

Clearly,

$$\frac{-24}{36} < \frac{-16}{36} < \frac{-15}{36} < \frac{-14}{36}$$

$$\therefore \frac{-2}{3} < \frac{-4}{9} < \frac{-5}{12} < \frac{-7}{18}$$

That is

$$\frac{-2}{3} < \frac{-4}{9} < \frac{-5}{12} < \frac{-7}{18}$$

(ii) We will write each of the given numbers with positive denominators.

We have:

$$\frac{5}{-12} = \frac{5 \times (-1)}{-12 \times (-1)} = \frac{-5}{12} \text{ and } \frac{9}{-24} = \frac{9 \times (-1)}{-24 \times (-1)} = \frac{-9}{24}$$

Thus, the given numbers are $\frac{-3}{4}$, $\frac{-5}{12}$, $\frac{-7}{16}$ and $\frac{-9}{24}$.

LCM of 4, 12, 16 and 24 is 48.

Now,

$$\frac{-3}{4} = \frac{-3 \times 12}{4 \times 12} = \frac{-36}{48}$$

$$\frac{-5}{12} = \frac{-5 \times 4}{12 \times 4} = \frac{-20}{48}$$

$$\frac{-7}{16} = \frac{-7 \times 3}{16 \times 3} = \frac{-21}{48}$$

$$\frac{-9}{24} = \frac{-9 \times 2}{24 \times 2} = \frac{-18}{48}$$

Clearly,

$$\frac{-36}{48} < \frac{-21}{48} < \frac{-20}{48} < \frac{-18}{48}$$

$$\therefore \frac{-3}{4} < \frac{-7}{16} < \frac{-5}{12} < \frac{-9}{24}$$

That is

$$\frac{-3}{4} < \frac{-7}{16} < \frac{5}{-12} < \frac{9}{-24}$$

(iii) We will write each of the given numbers with positive denominators.

We have:

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

Thus, the given numbers are $\frac{-3}{5}$, $\frac{-7}{10}$, $\frac{-11}{15}$ and $\frac{-13}{20}$.

LCM of 5, 10, 15 and 20 is 60.

Now,

$$\frac{-3}{5} = \frac{-3 \times 12}{5 \times 12} = \frac{-36}{60}$$

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

$$\frac{-11}{15} = \frac{-11 \times 4}{15 \times 4} = \frac{-44}{60}$$

$$\frac{-13}{20} = \frac{-13 \times 3}{20 \times 3} = \frac{-39}{60}$$

Clearly,

$$\frac{-44}{60} < \frac{-42}{60} < \frac{-39}{60} < \frac{-36}{60}$$

$$\therefore \frac{-11}{15} < \frac{-7}{10} < \frac{-13}{20} < \frac{-3}{5}$$

That is

$$\frac{-11}{15} < \frac{-7}{10} < \frac{-13}{20} < \frac{3}{-5}$$

(iv) We will write each of the given numbers with positive denominators.

We have:

$$\frac{13}{-28} = \frac{13 \times (-1)}{-28 \times (-1)} = \frac{-13}{28}$$

Thus, the given numbers are $\frac{-4}{7}$, $\frac{-9}{14}$, $\frac{-13}{28}$ and $\frac{-23}{42}$.

LCM of 7, 14, 28 and 42 is 84.

Now,

$$\frac{-4}{7} = \frac{-4 \times 12}{7 \times 12} = \frac{-48}{84}$$

$$\frac{-9}{14} = \frac{-9 \times 6}{14 \times 6} = \frac{-54}{84}$$

$$\frac{-13}{28} = \frac{-13 \times 3}{28 \times 3} = \frac{-39}{84}$$

$$\frac{-23}{42} = \frac{-23 \times 2}{42 \times 2} = \frac{-46}{84}$$

Clearly,

$$\frac{-54}{84} < \frac{-48}{84} < \frac{-46}{84} < \frac{-39}{84}$$

$$\therefore \frac{-9}{14} < \frac{-4}{7} < \frac{-23}{42} < \frac{-13}{28}$$

That is

$$\frac{-9}{14} < \frac{-4}{7} < \frac{-23}{42} < \frac{-13}{28}$$

Question 9:

Arrange the following rational numbers in descending order:

(i) -2 , $\frac{-13}{6}$, $\frac{8}{-3}$, $\frac{1}{3}$

(ii) $\frac{-3}{10}$, $\frac{7}{-15}$, $\frac{-11}{20}$, $\frac{14}{-30}$

(iii) $\frac{-5}{6}$, $\frac{-7}{12}$, $\frac{-13}{18}$, $\frac{23}{-24}$

(iv) $\frac{-10}{11}$, $\frac{-19}{22}$, $\frac{-23}{33}$, $\frac{-39}{44}$

ANSWER:

(i) We will first write each of the given numbers with positive denominators. We have:

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

Thus, the given numbers are -2 , $\frac{-13}{6}$, $\frac{-8}{3}$ and $\frac{1}{3}$

LCM of 1, 6, 3 and 3 is 6

Now,

$$\frac{-2}{1} = \frac{-2 \times 6}{1 \times 6} = \frac{-12}{6}$$

$$\frac{-13}{6} = \frac{-13 \times 1}{6 \times 1} = \frac{-13}{6}$$

$$\frac{-8}{3} = \frac{-8 \times 2}{3 \times 2} = \frac{-16}{6}$$

and

$$\frac{1}{3} = \frac{1 \times 2}{3 \times 2} = \frac{2}{6}$$

Clearly, Thus,

$$\frac{2}{6} > \frac{-12}{6} > \frac{-13}{6} > \frac{-16}{6}$$

$$\therefore \frac{1}{3} > -2 > \frac{-13}{6} > \frac{-8}{3} \text{ i.e. } \frac{1}{3} > -2 > \frac{-13}{6} > \frac{-8}{3}$$

(ii) We will first write each of the given numbers with positive denominators. We have:

$$\frac{7}{-15} = \frac{7 \times (-1)}{-15 \times (-1)} = \frac{-7}{15} \text{ and } \frac{17}{-30} = \frac{17 \times (-1)}{-30 \times (-1)} = \frac{-17}{30}$$

Thus, the given numbers are $\frac{-3}{10}$, $\frac{-7}{15}$, $\frac{-11}{20}$ and $\frac{-17}{30}$

LCM of 10, 15, 20 and 30 is 60

Now,

$$\frac{-3}{10} = \frac{-3 \times 6}{10 \times 6} = \frac{-18}{60}$$

$$\frac{-7}{15} = \frac{-7 \times 4}{15 \times 4} = \frac{-28}{60}$$

$$\frac{-11}{20} = \frac{-11 \times 3}{20 \times 3} = \frac{-33}{60}$$

and

$$\frac{-17}{30} = \frac{-17 \times 2}{30 \times 2} = \frac{-34}{60}$$

Clearly,

$$\frac{-18}{60} > \frac{-28}{60} > \frac{-33}{60} > \frac{-34}{60}$$

$$\therefore \frac{-3}{10} > \frac{-7}{15} > \frac{-11}{20} > \frac{-17}{30} \text{ i.e. } \frac{-3}{10} > \frac{-7}{15} > \frac{-11}{20} > \frac{-17}{30}$$

(iii) We will first write each of the given numbers with positive denominators. We have:

$$\frac{23}{-24} = \frac{23 \times (-1)}{-24 \times (-1)} = \frac{-23}{24}$$

Thus, the given numbers are $\frac{-5}{6}$, $\frac{-7}{12}$, $\frac{-13}{18}$ and $\frac{-23}{24}$

LCM of 6, 12, 18 and 24 is 72

Now,

$$\frac{-5}{6} = \frac{-5 \times 12}{6 \times 12} = \frac{-60}{72}$$

$$\frac{-7}{12} = \frac{-7 \times 6}{12 \times 6} = \frac{-42}{72}$$

$$\frac{-13}{18} = \frac{-13 \times 4}{18 \times 4} = \frac{-52}{72}$$

and

$$\frac{-23}{24} = \frac{-23 \times 3}{24 \times 3} = \frac{-69}{72}$$

Clearly,

$$\frac{-42}{72} > \frac{-52}{72} > \frac{-60}{72} > \frac{-69}{72}$$

$$\therefore \frac{-7}{12} > \frac{-13}{18} > \frac{-5}{6} > \frac{-23}{24} \text{ i.e. } \frac{-7}{12} > \frac{-13}{18} > \frac{-5}{6} > \frac{-23}{24}$$

(iv) The given numbers are $\frac{-10}{11}$, $\frac{-19}{22}$, $\frac{-23}{33}$ and $\frac{-39}{44}$

LCM of 11, 22, 33 and 44 is 132

Now,

$$\frac{-10}{11} = \frac{-10 \times 12}{11 \times 12} = \frac{-120}{132}$$

$$\frac{-19}{22} = \frac{-19 \times 6}{22 \times 6} = \frac{-114}{132}$$

$$\frac{-23}{33} = \frac{-23 \times 4}{33 \times 4} = \frac{-92}{132}$$

and

$$\frac{-39}{44} = \frac{-39 \times 3}{44 \times 3} = \frac{-117}{132}$$

Clearly,

$$\frac{-92}{132} > \frac{-114}{132} > \frac{-117}{132} > \frac{-120}{132}$$

$$\therefore \frac{-23}{33} > \frac{-19}{22} > \frac{-39}{44} > \frac{-10}{11}$$

Question 10:

Which of the following statements are true and which are false?

- (i) Every whole number is a rational number.
- (ii) Every integer is a rational number.
- (iii) 0 is a whole number but it is not a rational number.

ANSWER:

- (i) True, as the set of whole numbers is a subset of the set of rational numbers
- (ii) True, as the set of integers is a subset of the set of rational numbers.
- (iii) False, as 0 is a whole number and set of whole number is a sub set of rational numbers
 $\therefore$ 0 is also a rational number. Ans.

Exercise 1B

Question 1.

Represent each of the following numbers on the number line :

(i) $\frac{1}{3}$ (ii) $\frac{2}{7}$ (iii) $1\frac{3}{4}$

(iv) $2\frac{2}{5}$ (v) $3\frac{1}{2}$ (vi) $5\frac{5}{7}$

(vii) $4\frac{2}{3}$ (viii) 8

Solution:

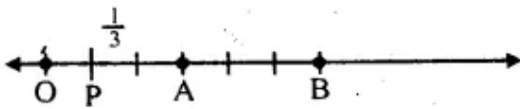
(i) $\frac{1}{3}$

Draw a line and take a point O on it.

Let it represent 0.

From O, set off unit OA, AB to right side of O, representing integers 1, 2 respectively.

Now, divide OA into 3 equal parts and take one part OR Which is $\frac{1}{3}$ as shown below on the line.

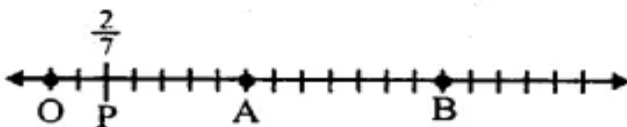


(ii) $\frac{2}{7}$

Draw a line and take a point O on it.
Let it represent 0.

From O, set off units OA, AB to right side of O. Now divide OA into 7 equal parts and take two parts. Let OP = 2 parts.

Then OP = $\frac{2}{7}$ as shown on the number line given below :



(iii) $1\frac{3}{4}$

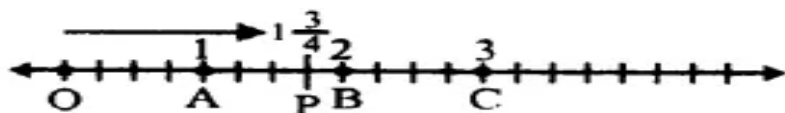
Draw a line and take a point O on it.
Let it represent 0.

From O, set off units OA. Units OA, AB, BC to the right side of O.

Now divide AB into 4 equal parts and take 3 equal parts such that $AP = \frac{3}{4}$

then $OP = 1 + \frac{3}{4} = 1\frac{3}{4}$

as shown on the number line given below.



(iv) $2\frac{2}{5}$

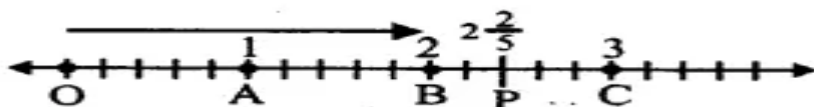
Draw a line and take a point O on it. Let it represent 0.

From O, set off units OA, AB, BC, CD to right side of O.

Now, divide BC into 5 equal parts and

take 2 equal parts. Then $BP = \frac{2}{5}$

$\therefore OP = OB + BP = 2 + \frac{2}{5} = 2\frac{2}{5}$ as shown on the number line as given below:



(v) $3\frac{1}{2}$

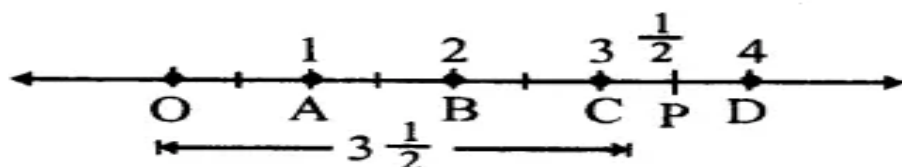
Draw a line and take a point O on it. Let it represent 0.

From O, set off units OA, AB, BC, CD to the right side of O.

Now, divide CD into two equal parts and

take one part. then $CP = \frac{1}{2}$

$\therefore OP = OC + CP = 3 + \frac{1}{2} = 3\frac{1}{2}$ as shown on the number line as given below:



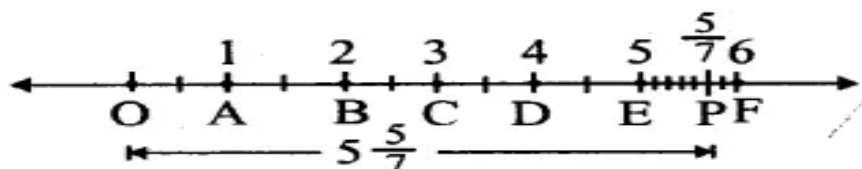
(vi) $5\frac{5}{7}$

Draw a line and take a point O on it. Let it represent 0.

From O, set off units OA, AB, BC, CD, DE, EF to the right side of O.

Now divide EF into seven equal parts and take EP = 5 equal parts

Then $OP = OE + EP = 5 + \frac{5}{7} = 5\frac{5}{7}$ as shown on the line given below :



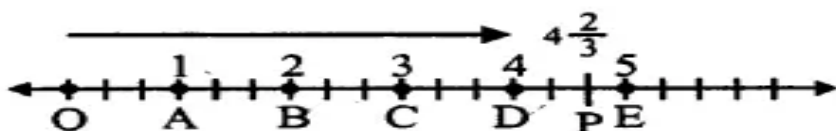
(vii) $4\frac{2}{3}$

Draw a line and take a point O on it. Let O represents 0.

From O, set off units OA, AB, BC, CD, DE, EF on the right side of O. Divide EF into 3 equal parts and take two parts

then $EP = \frac{2}{3}$

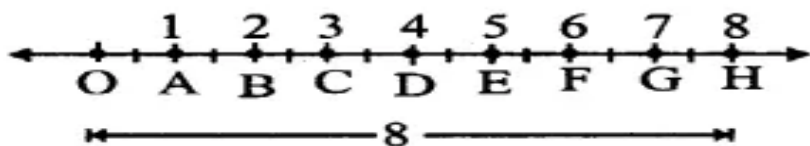
$\therefore OP = OE + EP = 4 + \frac{2}{3} = 4\frac{2}{3}$ as shown on the number line given below :



(viii) 8

Draw a line and take a point O on it. Let O represents 0. From O, set off units OA, AB, BC, CD, DE, EF, FG and GH on the right side of O.

Then $OH = 8$



Question 2.

Represent each of the following numbers on the number line.

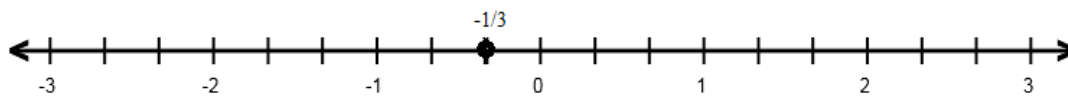
(i) $-\frac{1}{3}$ (ii) $-\frac{3}{4}$ (iii) $-1\frac{2}{3}$

(iv) $-3\frac{1}{7}$ (v) $-4\frac{3}{5}$ (vi) $-2\frac{5}{6}$

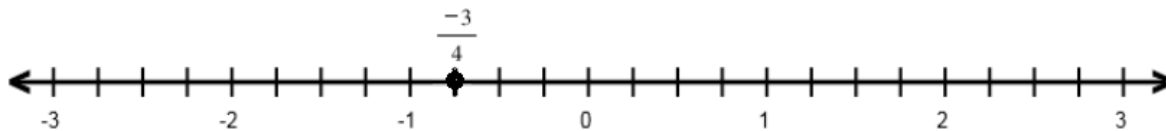
(vii) -3 (viii) $-2\frac{7}{8}$

ANSWER:

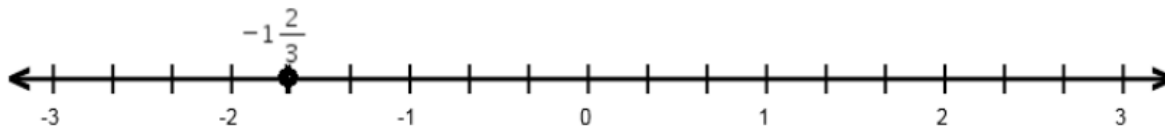
(i)



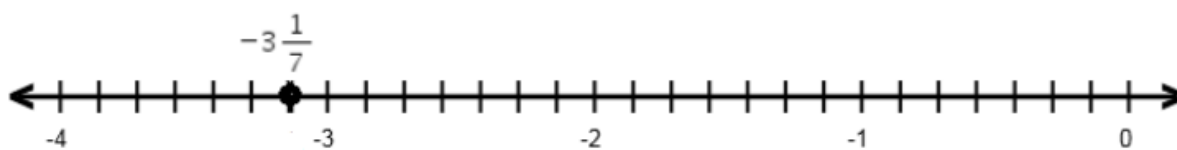
(ii)



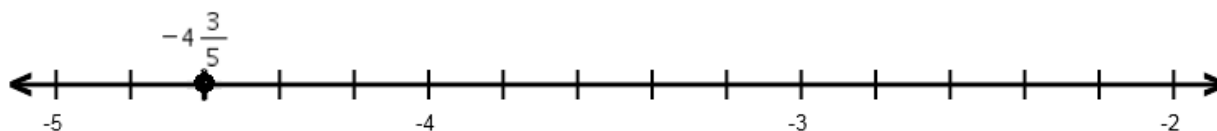
(iii)



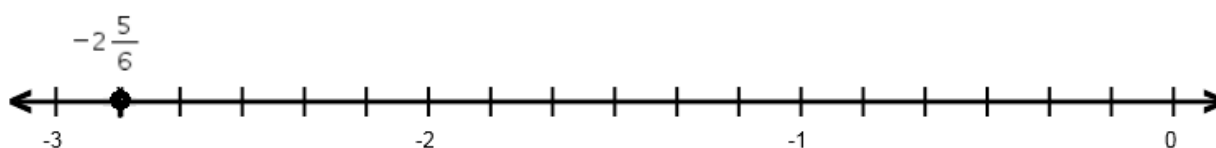
(iv)



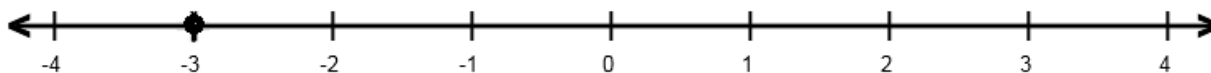
(v)



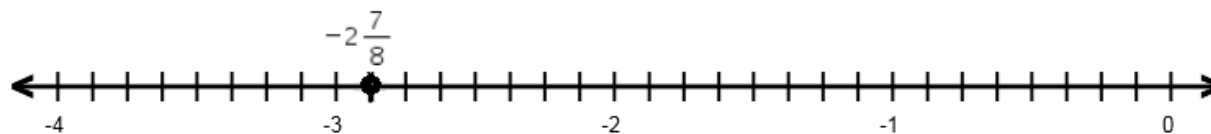
(vi)



(vii)



(viii)



Question 3.

Which of the following statements are true and which are false?

(i) $\frac{-3}{5}$ lies to the left of 0 on the number line.

(ii) $\frac{-12}{7}$ lies to the right of 0 on the number line.

(iii) The rational numbers $\frac{1}{3}$ and $\frac{-5}{2}$ are on opposite sides of 0 on the number line.

(iv) The rational number $\frac{-18}{-13}$ lies to the left of 0 on the number line.

ANSWER:

(i) True

A negative number always lies to the left of 0 on the number line.

(ii) False

A negative number always lies to the left of 0 on the number line.

(iii) True

Negative and positive numbers always lie on the opposite sides of 0 on the number line.

(iv) False

The negative sign cancels off and the number becomes $\frac{18}{13}$; it lies to the right of 0 on the number line.

Exercise 1C

Question 1:

Add the following rational numbers:

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

(ii) $\frac{-6}{11}$ and $\frac{-4}{11}$

(iii) $\frac{-11}{8}$ and $\frac{5}{8}$

(iv) $\frac{-7}{3}$ and $\frac{1}{3}$

(v) $\frac{5}{6}$ and $\frac{-1}{6}$

(vi) $\frac{-17}{15}$ and $\frac{-1}{15}$

ANSWER:

1. $\frac{-2}{5} + \frac{4}{5} = \frac{-2+4}{5} = \frac{2}{5}$

2. $\frac{-6}{11} + \frac{-4}{11} = \frac{-6+(-4)}{11} = \frac{-6-4}{11} = \frac{-10}{11}$

3. $\frac{-11}{8} + \frac{5}{8} = \frac{-11+5}{8} = \frac{-6}{8} = \frac{-3 \times 2}{4 \times 2} = \frac{-3}{4}$

4. $\frac{-7}{3} + \frac{1}{3} = \frac{-7+1}{3} = \frac{-6}{3} = \frac{-3 \times 2}{3} = -2$

5. $\frac{5}{6} + \frac{-1}{6} = \frac{5+(-1)}{6} = \frac{4}{6} = \frac{2 \times 2}{3 \times 2} = \frac{2}{3}$

6. $\frac{-17}{15} + \frac{-1}{15} = \frac{-17+(-1)}{15} = \frac{-17-1}{15} = \frac{-18}{15} = \frac{-6 \times 3}{5 \times 3} = \frac{-6}{5}$

Question 2:

Add the following rational numbers:

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

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

(iii) $\frac{-8}{9}$ and $\frac{11}{6}$

(iv) $\frac{-5}{16}$ and $\frac{7}{24}$

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

(vi) $\frac{1}{-12}$ and $\frac{2}{-15}$

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

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

(ix) 0 and $\frac{-2}{5}$

ANSWER:

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

LCM of 4 and 5 is 20.

Now,

$$\frac{3}{4} = \frac{3 \times 5}{4 \times 5} = \frac{15}{20} \text{ and } \frac{-3}{5} = \frac{-3 \times 4}{5 \times 4} = \frac{-12}{20}$$

$$\therefore \frac{3}{4} + \frac{-3}{5} = \frac{15}{20} + \frac{-12}{20} = \frac{15+(-12)}{20} = \frac{15-12}{20} = \frac{3}{20}$$

2. The denominators of the given rational numbers are 8 and 12.

LCM of 8 and 12 is 24.

Now,

$$\frac{5}{8} = \frac{5 \times 3}{8 \times 3} = \frac{15}{24} \text{ and } \frac{-7}{12} = \frac{-7 \times 2}{12 \times 2} = \frac{-14}{24}$$

$$\therefore \frac{5}{8} + \frac{-7}{12} = \frac{15}{24} + \frac{-14}{24} = \frac{15+(-14)}{24} = \frac{15-14}{24} = \frac{1}{24}$$

3. The denominators of the given rational numbers are 9 and 6.

LCM of 9 and 6 is 18.

Now,

$$\frac{-8}{9} = \frac{-8 \times 2}{9 \times 2} = \frac{-16}{18} \text{ and } \frac{11}{6} = \frac{11 \times 3}{6 \times 3} = \frac{33}{18}$$

$$\therefore \frac{-8}{9} + \frac{11}{6} = \frac{-16}{18} + \frac{33}{18} = \frac{-16+33}{18} = \frac{-16+33}{18} = \frac{17}{18}$$

4. The denominators of the given rational numbers are 16 and 24.

LCM of 16 and 24 is 48.

Now,

$$\frac{-5}{16} = \frac{-5 \times 3}{16 \times 3} = \frac{-15}{48} \text{ and } \frac{7}{24} = \frac{7 \times 2}{24 \times 2} = \frac{14}{48}$$

$$\therefore \frac{-5}{16} + \frac{7}{24} = \frac{-15}{48} + \frac{14}{48} = \frac{-15+14}{48} = \frac{-1}{48}$$

5. We will first write each of the given numbers with positive denominators.

$$\frac{7}{-18} = \frac{7 \times (-1)}{-18 \times (-1)} = \frac{-7}{18}$$

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

LCM of 18 and 27 is 54.

Now,

$$\frac{-7}{18} = \frac{-7 \times 3}{18 \times 3} = \frac{-21}{54} \text{ and } \frac{8}{27} = \frac{8 \times 2}{27 \times 2} = \frac{16}{54}$$

$$\therefore \frac{7}{-18} + \frac{8}{27} = \frac{-21}{54} + \frac{16}{54} = \frac{-21+16}{54} = \frac{-5}{54}$$

6. We will first write each of the given numbers with positive denominators.

$$\frac{1}{-12} = \frac{1 \times (-1)}{-12 \times (-1)} = \frac{-1}{12} \text{ and } \frac{2}{-15} = \frac{2 \times (-1)}{-15 \times (-1)} = \frac{-2}{15}$$

The denominators of the given rational numbers are 12 and 15.

LCM of 12 and 15 is 60.

Now,

$$\frac{-1}{12} = \frac{-1 \times 5}{12 \times 5} = \frac{-5}{60} \text{ and } \frac{-2}{15} = \frac{-2 \times 4}{15 \times 4} = \frac{-8}{60}$$

$$\therefore \frac{1}{-12} + \frac{2}{-15} = \frac{-5}{60} + \frac{-8}{60} = \frac{-5+(-8)}{60} = \frac{-5-8}{60} = \frac{-13}{60}$$

7. We can write -1 as $\frac{-1}{1}$.

The denominators of the given rational numbers are 1 and 4.

LCM of 1 and 4 is 4.

Now,

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

$$\therefore -1 + \frac{3}{4} = \frac{-4}{4} + \frac{3}{4} = \frac{-4+3}{4} = \frac{-1}{4}$$

8. We can write 2 as $\frac{2}{1}$.

The denominators of the given rational numbers are 1 and 4.

LCM of 1 and 4 is 4.

Now,

$$\frac{2}{1} = \frac{2 \times 4}{1 \times 4} = \frac{8}{4} \text{ and } \frac{-5}{4} = \frac{-5 \times 1}{4 \times 1} = \frac{-5}{4}$$

$$\therefore 2 + \frac{(-5)}{4} = \frac{8}{4} + \frac{(-5)}{4} = \frac{8 + (-5)}{4} = \frac{8-5}{4} = \frac{3}{4}$$

9. We can write 0 as $\frac{0}{1}$.

The denominators of the given rational numbers are 1 and 5.

LCM of 1 and 5 is 5, that is, (1×5) .

Now,

$$\frac{0}{1} = \frac{0 \times 5}{1 \times 5} = \frac{0}{5} = 0 \text{ and } \frac{-2}{5} = \frac{-2 \times 1}{5 \times 1} = \frac{-2}{5}$$

$$\therefore 0 + \frac{(-2)}{5} = \frac{0}{5} + \frac{(-2)}{5} = \frac{0 + (-2)}{5} = \frac{0-2}{5} = \frac{-2}{5}$$

Question 3:

Verify the following:

$$(i) \frac{-12}{5} + \frac{2}{7} = \frac{2}{7} + \frac{-12}{5}$$

$$(ii) \frac{-5}{8} + \frac{-9}{13} = \frac{-9}{13} + \frac{-5}{8}$$

$$(iii) 3 + \frac{-7}{12} = \frac{-7}{12} + 3$$

$$(iv) \frac{2}{-7} + \frac{12}{-35} = \frac{12}{-35} + \frac{2}{-7}$$

ANSWER:

$$1. \text{ LHS} = \frac{-12}{5} + \frac{2}{7}$$

LCM of 5 and 7 is 35.

$$\frac{-12 \times 7}{5 \times 7} + \frac{2 \times 5}{7 \times 5} = \frac{-84}{35} + \frac{10}{35} = \frac{-84+10}{35} = \frac{-74}{35}$$

$$\text{RHS} = \frac{2}{7} + \frac{-12}{5}$$

LCM of 5 and 7 is 35.

$$\frac{2 \times 5}{7 \times 5} + \frac{-12 \times 7}{5 \times 7} = \frac{10}{35} + \frac{-84}{35} = \frac{10-84}{35} = \frac{-74}{35}$$

$$\therefore \frac{-12}{5} + \frac{2}{7} = \frac{2}{7} + \frac{-12}{5}$$

$$2. \text{ LHS} = \frac{-5}{8} + \frac{-9}{13}$$

LCM of 8 and 13 is 104.

$$\frac{-5 \times 13}{8 \times 13} + \frac{-9 \times 8}{13 \times 8} = \frac{-65}{104} + \frac{-72}{104} = \frac{-65+(-72)}{104} = \frac{-65-72}{104} = \frac{-137}{104}$$

$$\text{RHS} = \frac{-9}{13} + \frac{-5}{8}$$

LCM of 13 and 8 is 104.

$$\frac{-9 \times 8}{13 \times 8} + \frac{-5 \times 13}{8 \times 13} = \frac{-72}{104} + \frac{-65}{104} = \frac{-72-65}{104} = \frac{-137}{104}$$

$$\therefore \frac{-5}{8} + \frac{-9}{13} = \frac{-9}{13} + \frac{-5}{8}$$

$$3. \text{ LHS} = \frac{3}{1} + \frac{-7}{12}$$

LCM of 1 and 12 is 12.

$$\frac{3 \times 12}{1 \times 12} + \frac{-7 \times 1}{12 \times 1} = \frac{36}{12} + \frac{-7}{12} = \frac{36+(-7)}{12} = \frac{36-7}{12} = \frac{29}{12}$$

$$\text{RHS} = \frac{-7}{12} + \frac{3}{1}$$

LCM of 12 and 1 is 12.

$$\frac{-7 \times 1}{12 \times 1} + \frac{3 \times 12}{1 \times 12} = \frac{-7}{12} + \frac{36}{12} = \frac{-7+36}{12} = \frac{29}{12}$$

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

$$4. \text{ LHS} = \frac{2}{-7} + \frac{12}{-35}$$

We will write the given numbers with positive denominators.

$$\frac{2}{-7} = \frac{2 \times (-1)}{-7 \times (-1)} = \frac{-2}{7} \text{ and } \frac{12}{-35} = \frac{12 \times (-1)}{-35 \times (-1)} = \frac{-12}{35}$$

LCM of 7 and 35 is 35.

$$\frac{-2 \times 5}{7 \times 5} + \frac{-12 \times 1}{35 \times 1} = \frac{-10}{35} + \frac{-12}{35} = \frac{-10+(-12)}{35} = \frac{-10-12}{35} = \frac{-22}{35}$$

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

We will write the given numbers with positive denominators.

$$\frac{12}{-35} = \frac{12 \times (-1)}{-35 \times (-1)} = \frac{-12}{35} \text{ and } \frac{2}{-7} = \frac{2 \times (-1)}{-7 \times (-1)} = \frac{-2}{7}$$

LCM of 35 and 7 is 35.

$$\frac{-2 \times 5}{7 \times 5} + \frac{-12 \times 1}{35 \times 1} = \frac{-10}{35} + \frac{-12}{35} = \frac{-10 + (-12)}{35} = \frac{-10 - 12}{35} = \frac{-22}{35}$$

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

Question 4:

Verify the following:

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

$$(ii) \left(\frac{-7}{11} + \frac{2}{-5} \right) + \frac{-13}{22} = \frac{-7}{11} + \left(\frac{2}{-5} + \frac{-13}{22} \right)$$

$$(iii) -1 + \left(\frac{-2}{3} + \frac{-3}{4} \right) = \left(-1 + \frac{-2}{3} \right) + \frac{-3}{4}$$

ANSWER:

1.

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

$$\left\{ \left(\frac{15-8}{20} \right) + \frac{-7}{10} \right\} = \left(\frac{7}{20} + \frac{-7}{10} \right) = \left(\frac{7}{20} + \frac{-14}{20} \right) = \left(\frac{7+(-14)}{20} \right) = \frac{-7}{20}$$

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

$$\left\{ \frac{3}{4} + \left(\frac{-4}{10} + \frac{-7}{10} \right) \right\} = \left\{ \frac{3}{4} + \left(\frac{-4-7}{10} \right) \right\} = \left\{ \frac{3}{4} + \left(\frac{-11}{10} \right) \right\} = \left(\frac{3}{4} + \frac{-11}{10} \right) = \left(\frac{15}{20} + \frac{-22}{20} \right) = \left(\frac{15-22}{20} \right) = \frac{-7}{20}$$

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

$$(ii) \text{ L.H.S.} = \left(\frac{-7}{11} + \frac{2}{-5} \right) + \frac{-13}{22}$$

$$= \left(\frac{-7}{11} + \frac{-2}{5} \right) + \frac{-13}{22}$$

$$= \frac{-35 + (-22)}{55} + \frac{-13}{22}$$

$$= \frac{-35 - 22}{55} + \frac{-13}{22}$$

$$= \frac{-57}{55} + \frac{-13}{22}$$

$$= \frac{-114 - 65}{110} = \frac{-179}{110}$$

$$\text{R.H.S.} = \frac{-7}{11} + \left(\frac{2}{-5} + \frac{-13}{22} \right)$$

$$= \frac{-7}{11} + \left(\frac{-2}{5} + \frac{-13}{22} \right)$$

$$= \frac{-7}{11} + \frac{-44 + (-65)}{110}$$

$$= \frac{-7}{11} + \frac{-44 - 65}{110} = \frac{-7}{11} + \frac{(-109)}{110}$$

$$= \frac{-70 + (-109)}{110}$$

$$= \frac{-70 - 109}{110} = \frac{-179}{110}$$

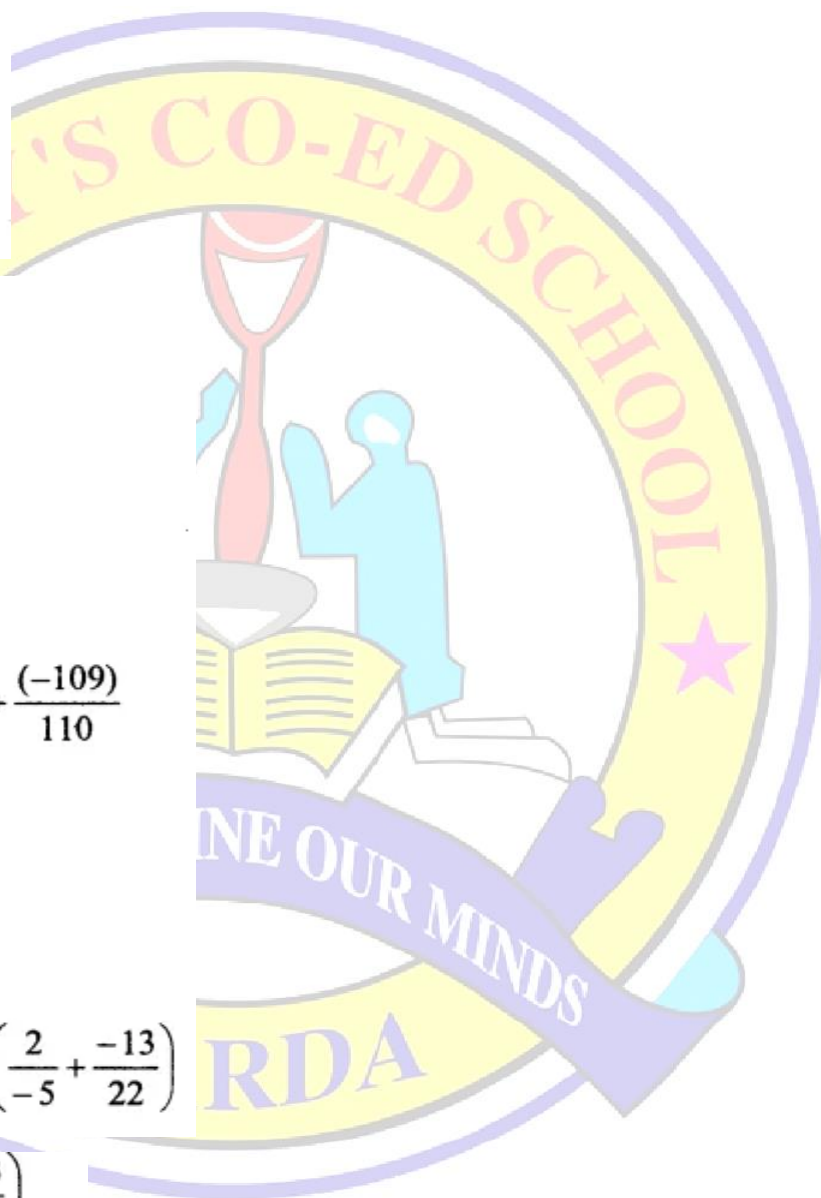
$$\therefore \left(\frac{-7}{11} + \frac{2}{-5} \right) + \frac{-13}{22} = \frac{-7}{11} + \left(\frac{2}{-5} + \frac{-13}{22} \right)$$

$$(iii) \text{ L.H.S.} = -1 + \left(\frac{-2}{3} + \frac{-3}{4} \right)$$

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

$$= \frac{-1}{1} + \frac{-17}{12}$$

$$= \frac{-12 - 17}{12} = \frac{-29}{12}$$



$$\begin{aligned}
 \text{R.H.S.} &= \left(-1 + \frac{-2}{3}\right) + \frac{-3}{4} \\
 &= \frac{-3 + (-2)}{3} + \frac{-3}{4} \\
 &= \frac{-3-2}{3} + \frac{-3}{4} = \frac{-5}{3} + \frac{-3}{4} \\
 &= \frac{-20 + (-9)}{12} = \frac{-20-9}{12} = \frac{-29}{12}
 \end{aligned}$$

$$\therefore -1 + \left(\frac{-2}{3} + \frac{-3}{4}\right) = \left(-1 + \frac{-2}{3}\right) + \frac{-3}{4}$$

Question 5:

Fill in the blanks.

(i) $\left(\frac{-3}{17}\right) + \left(\frac{-12}{5}\right) = \left(\frac{-12}{5}\right) + (\dots\dots)$

(ii) $-9 + \frac{-21}{8} = (\dots\dots) + (-9)$

(iii) $\left(\frac{-8}{13} + \frac{3}{7}\right) + \left(\frac{-13}{4}\right) = (\dots\dots) + \left[\frac{3}{7} + \left(\frac{-13}{4}\right)\right]$

(iv) $-12 + \left(\frac{7}{12} + \frac{-9}{11}\right) = \left(-12 + \frac{7}{12}\right) + (\dots\dots)$

(v) $\frac{19}{-5} + \left(\frac{-3}{11} + \frac{-7}{8}\right) = \left\{\frac{19}{-5} + (\dots\dots)\right\} + \frac{-7}{8}$

(vi) $\frac{-16}{7} + \dots\dots = \dots\dots + \frac{-16}{7} = \frac{-16}{7}$

ANSWER:

(i) Addition is commutative, that is, $a + b = b + a$.

Hence, the required solution is $\left(\frac{-3}{17}\right) + \left(\frac{-12}{5}\right) = \left(\frac{-12}{5}\right) + \left(\frac{-3}{17}\right)$.

(ii) Addition is commutative, that is, $a + b = b + a$.

Hence, the required solution is $-9 + \frac{-21}{8} = \frac{-21}{8} + -9$.

(iii) Addition is associative, that is, $(a + b) + c = a + (b + c)$.

Hence, the required solution is $\left(\frac{-8}{13} + \frac{3}{7}\right) + \left(\frac{-13}{4}\right) = \left(\frac{-8}{13}\right) + \left[\frac{3}{7} + \left(\frac{-13}{4}\right)\right]$.

(iv) Addition is associative, that is, $(a + b) + c = a + (b + c)$.

Hence, the required solution is $-12 + \left(\frac{7}{12} + \frac{-9}{11}\right) = \left(-12 + \frac{7}{12}\right) + \frac{-9}{11}$.

(v) Addition is associative, that is, $(a + b) + c = a + (b + c)$.

Hence, the required solution is $\frac{19}{-5} + \left(\frac{-3}{11} + \frac{-7}{8}\right) = \left\{\frac{19}{-5} + \left(\frac{-3}{11}\right)\right\} + \frac{-7}{8}$.

(vi) 0 is the additive identity, that is, $0 + a = a$.

Hence, the required solution is $\frac{-16}{7} + 0 = 0 + \frac{-16}{7} = \frac{-16}{7}$.

Question 6:

Find the additive inverse of each of the following:

- (i) $\frac{1}{3}$
- (ii) $\frac{23}{9}$
- (iii) -18
- (iv) $\frac{-17}{8}$
- (v) $\frac{15}{-4}$
- (vi) $\frac{-16}{-5}$
- (vii) $\frac{-3}{11}$
- (viii) 0
- (ix) $\frac{19}{-6}$
- (x) $\frac{-8}{-7}$

ANSWER:

The additive inverse of $\frac{a}{b}$ is $\frac{-a}{b}$. Therefore, $\frac{a}{b} + \left(\frac{-a}{b}\right) = 0$

(i) Additive inverse of $\frac{1}{3}$ is $\frac{-1}{3}$.

(ii) Additive inverse of $\frac{23}{9}$ is $\frac{-23}{9}$.

(iii) Additive inverse of -18 is 18 .

(iv) Additive inverse of $\frac{-17}{8}$ is $\frac{17}{8}$.

(v) In the standard form, we write $\frac{15}{-4}$ as $\frac{-15}{4}$.

Hence, its additive inverse is $\frac{15}{4}$.

(vi) We can write:

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

Hence, its additive inverse is $\frac{-16}{5}$.

(vii) Additive inverse of $\frac{-3}{11}$ is $\frac{3}{11}$.

(viii) Additive inverse of 0 is 0.

(ix) In the standard form, we write $\frac{19}{-6}$ as $\frac{-19}{6}$.

Hence, its additive inverse is $\frac{19}{6}$.

(x) We can write:

$$\frac{-8}{-7} = \frac{-8 \times (-1)}{-7 \times (-1)} = \frac{8}{7}$$

Hence, its additive inverse is $\frac{-8}{7}$.

Question 7:

Subtract:

(i) $\frac{3}{4}$ from $\frac{1}{3}$

(ii) $\frac{-5}{6}$ from $\frac{1}{3}$

(iii) $\frac{-8}{9}$ from $\frac{-3}{5}$

(iv) $\frac{-9}{7}$ from -1

(v) $\frac{-18}{11}$ from 1

(vi) $\frac{-13}{9}$ from 0

(vii) $\frac{-32}{13}$ from $\frac{-6}{5}$

(viii) -7 from $\frac{-4}{7}$

ANSWER:

$$(i) \left(\frac{1}{3} - \frac{3}{4} \right) = \frac{1}{3} + (\text{Additive inverse of } \frac{3}{4})$$

$$= \left(\frac{1}{3} + \frac{-3}{4} \right) = \left(\frac{4}{12} + \frac{-9}{12} \right) = \left(\frac{4-9}{12} \right) = \frac{-5}{12}$$

$$(ii) \left(\frac{1}{3} - \frac{-5}{6} \right) = \frac{1}{3} + (\text{Additive inverse of } \frac{-5}{6})$$

$$= \left(\frac{1}{3} + \frac{5}{6} \right) \text{ (Because the additive inverse of } \frac{-5}{6} \text{ is } \frac{5}{6} \text{)}$$

$$= \left(\frac{2}{6} + \frac{5}{6} \right) = \left(\frac{2+5}{6} \right) = \frac{7}{6}$$

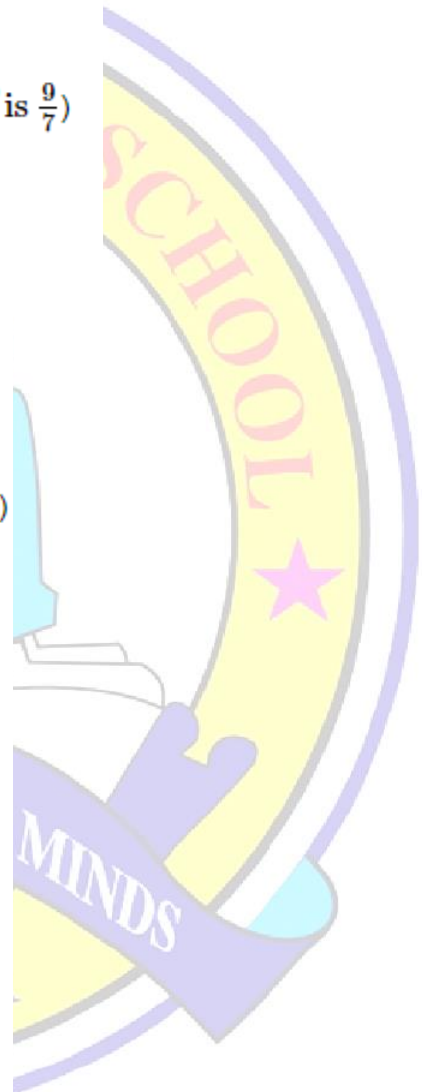
$$\begin{aligned}
 \text{(iii)} \quad \left(\frac{-3}{5} - \frac{-8}{9} \right) &= \frac{-3}{5} + \left(\text{Additive inverse of } \frac{-8}{9} \right) \\
 &= \left(\frac{-3}{5} + \frac{8}{9} \right) \text{ (Because the additive inverse of } \frac{-8}{9} \text{ is } \frac{8}{9} \text{)} \\
 &= \left(\frac{-27}{45} + \frac{40}{45} \right) = \left(\frac{-27+40}{45} \right) = \frac{13}{45}
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv)} \quad \left(-1 - \frac{-9}{7} \right) &= -1 + \left(\text{Additive inverse of } \frac{-9}{7} \right) \\
 &= \left(\frac{-1}{1} + \frac{9}{7} \right) \text{ (Because the additive inverse of } \frac{-9}{7} \text{ is } \frac{9}{7} \text{)} \\
 &= \left(\frac{-7}{7} + \frac{9}{7} \right) = \left(\frac{-7+9}{7} \right) = \frac{2}{7}
 \end{aligned}$$

$$\begin{aligned}
 \text{(v)} \quad \left(1 - \frac{-18}{11} \right) &= 1 + \left(\text{Additive inverse of } \frac{-18}{11} \right) \\
 &= \left(\frac{1}{1} + \frac{18}{11} \right) \text{ (Because the additive inverse of } \frac{-18}{11} \text{ is } \frac{18}{11} \text{)} \\
 &= \left(\frac{11}{11} + \frac{18}{11} \right) = \left(\frac{11+18}{11} \right) = \frac{29}{11}
 \end{aligned}$$

$$\begin{aligned}
 \text{(vi)} \quad \left(0 - \frac{-13}{9} \right) &= 0 + \left(\text{Additive inverse of } \frac{-13}{9} \right) \\
 &= \left(0 + \frac{13}{9} \right) \text{ (Because the additive inverse of } \frac{-13}{9} \text{ is } \frac{13}{9} \text{)} \\
 &= \frac{13}{9}
 \end{aligned}$$

$$\begin{aligned}
 \text{(vii)} \quad \left(\frac{-6}{5} - \frac{-32}{13} \right) &= \frac{-6}{5} + \left(\text{Additive inverse of } \frac{-32}{13} \right) \\
 &= \left(\frac{-6}{5} + \frac{32}{13} \right) \text{ (Because the additive inverse of } \frac{-32}{13} \text{ is } \frac{32}{13} \text{)} \\
 &= \left(\frac{-78}{65} + \frac{160}{65} \right) = \left(\frac{-78+160}{65} \right) = \frac{82}{65}
 \end{aligned}$$



$$(viii) \left(\frac{-4}{7} - \frac{-7}{1} \right) = \frac{-4}{7} + \left(\text{Additive inverse of } \frac{-7}{1} \right)$$

$$= \left(\frac{-4}{7} + \frac{7}{1} \right) \text{ (Because the additive inverse of } \frac{-7}{1} \text{ is } \frac{7}{1} \text{)}$$

$$= \left(\frac{-4}{7} + \frac{49}{7} \right) = \left(\frac{-4+49}{7} \right) = \frac{45}{7}$$

Question 8:

Using the rearrangement property find the sum:

$$(i) \frac{4}{3} + \frac{3}{5} + \frac{-2}{3} + \frac{-11}{5}$$

$$(ii) \frac{-8}{3} + \frac{-1}{4} + \frac{-11}{6} + \frac{3}{8}$$

$$(iii) \frac{-13}{20} + \frac{11}{14} + \frac{-5}{7} + \frac{7}{10}$$

$$(iv) \frac{-6}{7} + \frac{-5}{6} + \frac{-4}{9} + \frac{-15}{7}$$

ANSWER:

(i)

$$\left(\frac{4}{3} + \frac{-2}{3} \right) + \left(\frac{3}{5} + \frac{-11}{5} \right)$$

$$= \left(\frac{4-2}{3} \right) + \left(\frac{3-11}{5} \right)$$

$$= \left(\frac{2}{3} + \frac{-8}{5} \right) = \left(\frac{10}{15} + \frac{-24}{15} \right) = \left(\frac{10-24}{15} \right) = \frac{-14}{15}$$

$$(ii) \frac{-8}{3} + \frac{-1}{4} + \frac{-11}{6} + \frac{3}{8}$$

$$= \left(\frac{-8}{3} + \frac{-11}{6} \right) + \left(\frac{-1}{4} + \frac{3}{8} \right)$$

$$= \frac{-16+(-11)}{6} + \frac{-2+3}{8}$$

$$= \frac{-16-11}{6} + \frac{1}{8} = \frac{-27}{6} + \frac{1}{8}$$

$$= \frac{-108+3}{24} = \frac{-105}{24}$$

$$= \frac{-105 \div 3}{24 \div 3} = \frac{-35}{8} \text{ Ans.}$$

$$\begin{aligned}
 \text{(iii)} \quad & \frac{-13}{20} + \frac{11}{14} + \frac{-5}{7} + \frac{7}{10} \\
 &= \left(\frac{-13}{20} + \frac{7}{10} \right) + \left(\frac{11}{14} + \frac{-5}{7} \right) \\
 &= \frac{-13+14}{20} + \frac{11+(-10)}{14} \\
 &= \frac{1}{20} + \frac{1}{14} \\
 &= \frac{7+10}{140} = \frac{17}{140} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv)} \quad & \frac{-6}{7} + \frac{-5}{6} + \frac{-4}{9} + \frac{-15}{7} \\
 &= \left(\frac{-6}{7} + \frac{-15}{7} \right) + \left(\frac{-5}{6} + \frac{-4}{9} \right) \\
 &= \frac{-6-15}{7} + \frac{-15+(-8)}{18} \\
 &= \frac{-21}{7} + \frac{-23}{18} \\
 &= \frac{-378+(-161)}{126} \\
 &= \frac{-378-161}{126} = \frac{-539}{126} \\
 &= \frac{-539 \div 7}{126 \div 7} = \frac{-77}{18} \text{ Ans.}
 \end{aligned}$$



Question 9:

The sum of two rational numbers is -2 . If one of the numbers is $\frac{-14}{5}$, find the other.

ANSWER:

$$\text{Let the other number be } x. \text{ Now, } \Rightarrow x + \frac{-14}{5} = -2 \Rightarrow x - \frac{14}{5} = -2 \Rightarrow x = -2 + \frac{14}{5} \Rightarrow x = \frac{(-2) \times 5 + 14}{5} \Rightarrow x = \frac{-10+14}{5} \Rightarrow x = \frac{4}{5}$$

Question 10:

The sum of two rational numbers is $\frac{-1}{2}$. If one of the numbers is $\frac{5}{6}$, find the other.

ANSWER:

Let the other number be x . Now, $x + \frac{5}{6} = \frac{-1}{2} \Rightarrow x = -\frac{1}{2} - \frac{5}{6} \Rightarrow x = \frac{-3-5}{6} \Rightarrow x = \frac{-8}{6} \Rightarrow x = \frac{-4}{3}$

Question 11:

What number should be added to $\frac{-5}{8}$ so as to get $\frac{-3}{2}$?

ANSWER:

Let the required number be x .

Now,

$$\frac{-5}{8} + x = \frac{-3}{2}$$

$$\Rightarrow \frac{-5}{8} + x + \frac{5}{8} = \frac{-3}{2} + \frac{5}{8} \quad (\text{Adding } \frac{5}{8} \text{ to both the sides})$$

$$\Rightarrow x = \left(\frac{-3}{2} + \frac{5}{8} \right) \Rightarrow x = \left(\frac{-12}{8} + \frac{5}{8} \right) \Rightarrow x = \left(\frac{-12+5}{8} \right) \Rightarrow x = \frac{-7}{8}$$

Hence, the required number is $\frac{-7}{8}$.

Question 12:

What number should be added to -1 so as to get $\frac{5}{7}$?

ANSWER:

Let the required number be x .

Now,

$$-1 + x = \frac{5}{7}$$

$$\Rightarrow -1 + x + 1 = \frac{5}{7} + 1 \quad (\text{Adding } 1 \text{ to both the sides})$$

$$\Rightarrow x = \left(\frac{5+7}{7} \right) \Rightarrow x = \frac{12}{7}$$

Hence, the required number is $\frac{12}{7}$.

Question 13:

What number should be subtracted from $\frac{-2}{3}$ to get $\frac{-1}{6}$?

ANSWER:

Let the required number be x .

Now,

$$\begin{aligned}\frac{-2}{3} - x &= \frac{-1}{6} \\ \Rightarrow \frac{-2}{3} - x + x &= \frac{-1}{6} + x \quad (\text{Adding } x \text{ to both the sides}) \\ \Rightarrow \frac{-2}{3} &= \frac{-1}{6} + x \\ \Rightarrow \frac{-2}{3} + \frac{1}{6} &= \frac{-1}{6} + x + \frac{1}{6} \quad (\text{Adding } \frac{1}{6} \text{ to both the sides}) \\ \Rightarrow \left(\frac{-4}{6} + \frac{1}{6} \right) &= x \\ \Rightarrow \left(\frac{-4+1}{6} \right) &= x \\ \Rightarrow \frac{-3}{6} = x &\Rightarrow \frac{-1 \times 3}{2 \times 3} = x \Rightarrow \frac{-1}{2} = x\end{aligned}$$

Hence, the required number is $\frac{-1}{2}$.

Question 14:

- (i) Which rational number is its own additive inverse?
- (ii) Is the difference of two rational numbers a rational number?
- (iii) Is addition commutative on rational numbers?
- (iv) Is addition associative on rational numbers?
- (v) Is subtraction commutative on rational numbers?
- (vi) Is subtraction associative on rational numbers?
- (vii) What is the negative of a negative rational number?

Solution:

- (i) 0 is the rational number.
- (ii) Yes, difference of two rational number is also a rational.
- (iii) Yes, addition is commutative.
- (iv) Yes, addition associative.
- (v) No, subtraction is not commutative.
- (vi) No, subtraction is not associative.
- (vii) The number it self.

Negative of a negative rational number is a positive rational number.

Exercise 1D

Question 1.

Find each of the following products:

(i) $\frac{3}{5} \times \frac{-7}{8}$

(ii) $\frac{-9}{2} \times \frac{5}{4}$

(iii) $\frac{-6}{11} \times \frac{-5}{3}$

(iv) $\frac{-2}{3} \times \frac{6}{7}$

(v) $\frac{-12}{5} \times \frac{10}{-3}$

(vi) $\frac{25}{-9} \times \frac{3}{-10}$

(vii) $\frac{5}{+18} \times \frac{-9}{20}$

(viii) $\frac{-13}{15} \times \frac{-25}{26}$

(ix) $\frac{16}{-21} \times \frac{14}{5}$

(x) $\frac{-7}{6} \times 24$

(xi) $\frac{7}{24} \times (-48)$

(xii) $\frac{-13}{5} \times (-10)$

Solution:

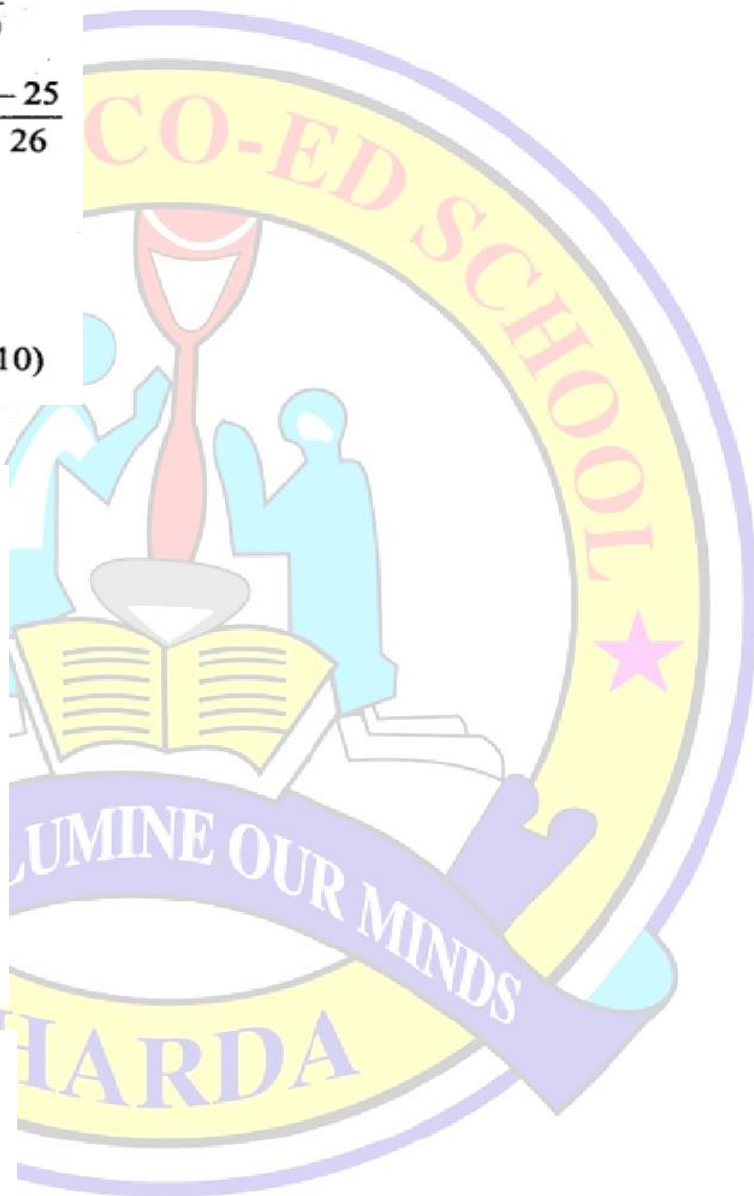
(i) $\frac{3}{5} \times \frac{-7}{8} = \frac{3 \times (-7)}{5 \times 8} = \frac{-21}{40}$

(ii) $\frac{-9}{2} \times \frac{5}{4} = \frac{-9 \times 5}{2 \times 4} = \frac{-45}{8}$

(iii) $\frac{-6}{11} \times \frac{-5}{3} = \frac{-6 \times (-5)}{11 \times 3} = \frac{30}{33}$
 $= \frac{30 \div 3}{33 \div 3} = \frac{10}{11}$

(iv) $\frac{-2}{3} \times \frac{6}{7} = \frac{-2 \times 6}{3 \times 7} = \frac{-12}{21}$
 $= \frac{-12 \div 3}{21 \div 3} = \frac{-4}{7}$

(v) $\frac{-12}{5} \times \frac{10}{-3}$
 $= \frac{-12 \times 10}{5 \times (-3)} = \frac{-120}{-15} = \frac{-120 \div 15}{-15 \div 15}$
 $= \frac{-8}{-1} = \frac{8}{1} = 8$



$$(vi) \frac{25}{-9} \times \frac{3}{-10}$$

$$= \frac{25 \times 3}{(-9) \times (-10)} = \frac{75}{90} = \frac{75 \div 15}{90 \div 15} = \frac{5}{6}$$

$$(vii) \frac{5}{-18} \times \frac{-9}{20}$$

$$= \frac{5 \times (-9)}{-18 \times 20} = \frac{-45}{-360} = \frac{-45 \div 45}{-360 \div 45}$$

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

$$(viii) \frac{-13}{15} \times \frac{-25}{26} = \frac{-13 \times (-25)}{15 \times 26} = \frac{325}{390}$$

$$= \frac{325 \div 65}{390 \div 65} = \frac{5}{6}$$

$$(ix) \frac{16}{-21} \times \frac{14}{5} = \frac{16 \times 14}{-21 \times 5} = \frac{224}{-105}$$

$$= \frac{224 \div 7}{-105 \div 7} = \frac{32}{-15} = \frac{-32}{15}$$

$$(x) \frac{-7}{6} \times 24 = \frac{-7 \times 24}{6} = -7 \times 4 = -28$$

$$(xi) \frac{7}{24} \times (-48) = \frac{7 \times (-48)}{24}$$

$$= 7 \times (-2) = -14$$

$$(xii) \frac{-13}{5} \times (-10) = \frac{-13 \times (-10)}{5}$$

$$= -13 \times (-2) = 26 \text{ Ans.}$$

Question 2.

Verify each of the following :

$$(i) \frac{3}{7} \times \frac{-5}{9} = \frac{-5}{9} \times \frac{3}{7}$$

$$(ii) \frac{-8}{7} \times \frac{13}{9} = \frac{13}{9} \times \frac{-8}{7}$$

$$(iii) \frac{-12}{5} \times \frac{7}{-36} = \frac{7}{-36} \times \frac{-12}{5}$$

$$(iv) -8 \times \frac{-13}{12} = \frac{-13}{12} \times (-8)$$

Solution:

$$(i) \text{ L.H.S.} = \frac{3}{7} \times \frac{-5}{9}$$

$$= \frac{3 \times (-5)}{7 \times 9} = \frac{-15}{63}$$

$$\text{R.H.S.} = \frac{-5}{9} \times \frac{3}{7} = \frac{-5 \times 3}{9 \times 7} = \frac{-15}{63}$$

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

$$(ii) \text{ L.H.S.} = \frac{-8}{7} \times \frac{13}{9} = \frac{-8 \times 13}{7 \times 9} = \frac{-104}{63}$$

$$\text{R.H.S.} = \frac{13}{9} \times \frac{-8}{7} = \frac{13 \times (-8)}{9 \times 7} = \frac{-104}{63}$$

$$\therefore \frac{-8}{7} \times \frac{13}{9} = \frac{13}{9} \times \frac{-8}{7}$$

$$(iii) \text{ L.H.S.} = \frac{-12}{5} \times \frac{7}{-36} = \frac{-12 \times 7}{5 \times (-36)}$$

$$= \frac{-84}{-180} = \frac{84}{180} = \frac{84 \div 12}{180 \div 12} = \frac{7}{15}$$

$$\text{R.H.S.} = \frac{7}{-36} \times \frac{-12}{5} = \frac{7 \times (-12)}{-36 \times 5} = \frac{-84}{-180}$$

$$= \frac{84}{180} = \frac{84 \div 12}{180 \div 12} = \frac{7}{15}$$

$$\therefore \frac{-12}{5} \times \frac{7}{-36} = \frac{7}{-36} \times \frac{-12}{5}$$

$$(iv) \text{ L.H.S.} = -8 \times \frac{-13}{12} = \frac{-8 \times (-13)}{12}$$

$$= \frac{104}{12} = \frac{104 \div 4}{12 \div 4} = \frac{26}{3}$$

$$\text{R.H.S.} = \frac{-13}{12} \times -8 = \frac{-13 \times (-8)}{12} = \frac{104}{12}$$

$$= \frac{104 \div 4}{12 \div 4} = \frac{26}{3}$$

$$\therefore -8 \times \frac{-13}{12} = \frac{-13}{12} \times -8 \quad \text{Ans.}$$



Question 3.

Verify each of the following :

$$(i) \left(\frac{5}{7} \times \frac{12}{13} \right) \times \frac{7}{18} = \frac{5}{7} \times \left(\frac{12}{13} \times \frac{7}{18} \right)$$

$$(ii) \frac{-13}{24} \times \left(\frac{-12}{5} \times \frac{35}{36} \right) = \left(\frac{-13}{24} \times \frac{-12}{5} \right) \times \frac{35}{36}$$

$$(iii) \left(\frac{-9}{5} \times \frac{-10}{3} \right) \times \frac{21}{-4} = \frac{-9}{5} \times \left(\frac{-10}{3} \times \frac{21}{-4} \right)$$

Solution:

$$\begin{aligned} (i) \text{ L.H.S.} &= \left(\frac{5}{7} \times \frac{12}{13} \right) \times \frac{7}{18} \\ &= \frac{5 \times 12}{7 \times 13} \times \frac{7}{18} \\ &= \frac{60}{91} \times \frac{7}{18} = \frac{420}{1638} = \frac{420 \div 21}{1638 \div 21} = \frac{20}{78} \end{aligned}$$

$$\begin{aligned} \text{R.H.S.} &= \frac{5}{7} \times \left(\frac{12}{13} \times \frac{7}{18} \right) \\ &= \frac{5 \times 84}{7 \times 234} = \frac{420}{1638} = \frac{420 \div 21}{1638 \div 21} = \frac{20}{78} \end{aligned}$$

$$\therefore \left(\frac{5}{7} \times \frac{12}{13} \right) \times \frac{7}{18} = \frac{5}{7} \times \left(\frac{12}{13} \times \frac{7}{18} \right)$$

$$\begin{aligned} (ii) \text{ L.H.S.} &= \frac{-13}{24} \times \left(\frac{-12}{5} \times \frac{35}{36} \right) \\ &= \frac{-13}{24} \times \frac{-12 \times 35}{5 \times 36} = \frac{-13}{24} \times \frac{-420}{180} \\ &= \frac{-13 \times (-420)}{24 \times 180} = \frac{5460}{4320} \\ &= \frac{5460 \div 60}{4320 \div 60} = \frac{91}{72} \end{aligned}$$

$$\text{R.H.S.} = \left(\frac{-13}{24} \times \frac{-12}{5} \right) \times \frac{35}{36}$$

$$= \frac{-13 \times (-12)}{24 \times 5} \times \frac{35}{36}$$

$$= \frac{156 \times 35}{120 \times 36} = \frac{5460}{4320}$$

$$= \frac{5460 \div 60}{4320 \div 60} = \frac{91}{72}$$

$$\therefore \frac{-13}{24} \times \left(\frac{-12}{5} \times \frac{35}{36} \right) = \left(\frac{-13}{24} \times \frac{-12}{5} \right) \times \frac{35}{36}$$

$$\text{(iii) L.H.S.} = \left(\frac{-9}{5} \times \frac{-10}{3} \right) \times \frac{21}{-4}$$

$$= \frac{-9 \times (-10)}{5 \times 3} \times \frac{21}{-4} = \frac{90}{15} \times \frac{21}{-4}$$

$$= \frac{90 \times 21}{15 \times (-4)} = \frac{1890}{-60}$$

$$= \frac{1890 \div 30}{-60 \div 30} = \frac{63}{-2} = \frac{-63}{2}$$

$$\text{R.H.S.} = \frac{-9}{5} \times \left(\frac{-10}{3} \times \frac{21}{-4} \right)$$

$$= \frac{-9}{5} \times \frac{-10 \times 21}{3 \times (-4)} = \frac{-9}{5} \times \frac{-210}{-12}$$

$$= \frac{-9 \times (-210)}{5 \times (-12)} = \frac{1890}{-60}$$

$$= \frac{1890 \div 30}{-60 \div 30} = \frac{63}{-2} = \frac{-63}{2}$$

$$\therefore \left(\frac{-9}{5} \times \frac{-10}{3} \right) \times \frac{21}{-4} = \frac{-9}{5} \times \left(\frac{-10}{3} \times \frac{21}{-4} \right)$$



Question 4:

Fill in the blanks:

$$(i) \frac{-23}{17} \times \frac{18}{35} = \frac{18}{35} \times (\dots\dots)$$

$$(ii) -38 \times \frac{-7}{19} = \frac{-7}{19} \times (\dots\dots)$$

$$(iii) \left(\frac{15}{7} \times \frac{-21}{10} \right) \times \frac{-5}{6} = (\dots\dots) \times \left(\frac{-21}{10} \times \frac{-5}{6} \right)$$

$$(iv) \frac{-12}{5} \times \left(\frac{4}{15} \times \frac{25}{-16} \right) = \left(\frac{-12}{5} \times \frac{4}{15} \right) \times (\dots\dots)$$

Solution:

$$(i) \frac{-23}{17} \times \frac{18}{35} = \frac{18}{35} \times \left(\frac{-23}{17} \right)$$

$$(ii) -38 \times \frac{-7}{19} = \frac{-7}{19} \times (-38)$$

$$(iii) \left(\frac{15}{7} \times \frac{-21}{10} \right) \times \frac{-5}{6} = \left(\frac{15}{7} \right) \times \left(\frac{-21}{10} \times \frac{-5}{6} \right)$$

$$(iv) \frac{-12}{5} \times \left(\frac{4}{15} \times \frac{25}{-16} \right) = \left(\frac{-12}{5} \times \frac{4}{15} \right) \times \frac{25}{-16}$$

Question 5.

Find the multiplicative inverse (i.e. reciprocal) of:

$$(i) \frac{13}{25} \quad (ii) \frac{-17}{12} \quad (iii) \frac{-7}{24}$$

$$(iv) 18 \quad (v) -16 \quad (vi) \frac{-3}{-5}$$

$$(vii) -1 \quad (viii) \frac{0}{2} \quad (ix) \frac{2}{-5} \quad (x) \frac{-1}{8}$$

Solution:

(i) Multiplicative inverse of

$$\frac{13}{25} = \frac{25}{13}$$

$$(ii) \text{ Multiplicative inverse of } \frac{-17}{12} = \frac{-12}{17}$$

$$(iii) \text{ Multiplicative inverse of } \frac{-7}{24} = \frac{24}{-7}$$

$$(iv) \text{ Multiplicative inverse of } 18 = \frac{1}{18}$$

(v) Multiplicative inverse of $-16 = \frac{-1}{16}$

(vi) Multiplicative inverse of $\frac{-3}{-5} = \frac{-5}{-3}$

(vii) Multiplicative inverse of $-1 = -1$

(viii) Multiplicative inverse of $\frac{0}{2} =$ does not exist.

(ix) Multiplicative inverse of $\frac{2}{-5} = \frac{-5}{2}$

(x) Multiplicative inverse of $\frac{-1}{8} = -8$

Question 6.

Find the value of:

(i) $\left(\frac{5}{8}\right)^{-1}$ (ii) $\left(\frac{-4}{9}\right)^{-1}$

(iii) $(-7)^{-1}$ (iv) $\left(\frac{1}{-3}\right)^{-1}$

Solution:

(i) $\left(\frac{5}{8}\right)^{-1} = \frac{8}{5}$ (ii) $\left(\frac{-4}{9}\right)^{-1}$
 $= \frac{-9}{4}$

(iii) $(-7)^{-1} = \frac{-1}{7}$ (iv) $\left(\frac{1}{-3}\right)^{-1} = (-3)$
 $= -3$ Ans.

Question 7.

Verify the following :

(i) $\frac{3}{7} \times \left(\frac{5}{6} + \frac{12}{13}\right) = \left(\frac{3}{7} \times \frac{5}{6}\right) + \left(\frac{3}{7} \times \frac{12}{13}\right)$

(ii) $\frac{-15}{4} \times \left(\frac{3}{7} + \frac{-12}{5}\right)$

$= \left(\frac{-15}{4} \times \frac{3}{7}\right) + \left(\frac{-15}{4} \times \frac{-12}{5}\right)$

(iii) $\left(\frac{-8}{3} + \frac{-13}{12}\right) \times \frac{5}{6} = \frac{-8}{3} \times \frac{5}{6} + \frac{-13}{12} \times \frac{5}{6}$

(iv) $\frac{-16}{7} \times \left(\frac{-8}{9} + \frac{-7}{6}\right)$

$= \left(\frac{-16}{7} \times \frac{-8}{9}\right) + \left(\frac{-16}{7} \times \frac{-7}{6}\right)$

Solution:

$$(i) \text{ L.H.S.} = \frac{3}{7} \times \left(\frac{5}{6} + \frac{12}{13} \right)$$

$$= \frac{3}{7} \times \left(\frac{65+72}{78} \right) = \frac{3}{7} \times \frac{137}{78} = \frac{411}{546}$$

$$\text{R.H.S.} = \left(\frac{3}{7} \times \frac{5}{6} \right) + \left(\frac{3}{7} \times \frac{12}{13} \right)$$

$$= \frac{3 \times 5}{7 \times 6} + \frac{3 \times 12}{7 \times 13} = \frac{15}{42} + \frac{36}{91}$$

$$= \frac{195+216}{546} = \frac{411}{546}$$

$$\therefore \text{ L.H.S.} = \text{R.H.S.}$$

$$(ii) \text{ L.H.S.} = \frac{-15}{4} \times \left(\frac{3}{7} + \frac{-12}{5} \right)$$

$$= \frac{-15}{4} \times \left(\frac{15-84}{35} \right)$$

$$= \frac{-15}{4} \times \frac{69}{35} = \frac{1035}{140}$$

$$\text{R.H.S.} = \left(\frac{-15}{4} \times \frac{3}{7} \right) + \left(\frac{-15}{4} \times \frac{-12}{5} \right)$$

$$= \frac{-15 \times 3}{4 \times 7} + \frac{-15 \times (-12)}{4 \times 5}$$

$$= \frac{-45}{28} + \frac{180}{20} = \frac{-225+1260}{140} = \frac{1035}{140}$$

$$\therefore \text{ L.H.S.} = \text{R.H.S.}$$

$$(iii) \text{ L.H.S.} = \left(\frac{-8}{3} + \frac{-13}{12} \right) \times \frac{5}{6}$$

$$= \frac{-32-13}{12} \times \frac{5}{6} = \frac{-45}{12} \times \frac{5}{6} = \frac{-225}{72}$$



$$\begin{aligned}
 \text{R.H.S.} &= \left(\frac{-8}{3} \times \frac{5}{6} \right) + \left(\frac{-13}{12} \times \frac{5}{6} \right) \\
 &= \frac{-8 \times 5}{3 \times 6} + \frac{-13 \times 5}{12 \times 6} = \frac{-40}{18} + \frac{-65}{72} \\
 &= \frac{-160 + (-65)}{72} = \frac{-160 - 65}{72} \\
 &= \frac{-225}{72}
 \end{aligned}$$

$$\therefore \text{L.H.S.} = \text{R.H.S.}$$

$$\begin{aligned}
 \text{(iv) L.H.S.} &= \frac{-16}{7} \times \left(\frac{-8}{9} + \frac{-7}{6} \right) \\
 &= \frac{-16}{7} \times \left(\frac{-16 + (-21)}{18} \right) = \frac{-16}{7} \times \frac{-37}{18} \\
 &= \frac{-16 \times -37}{7 \times 18} = \frac{592}{126}
 \end{aligned}$$

$$\begin{aligned}
 \text{R.H.S.} &= \left(\frac{-16}{7} \times \frac{-8}{9} \right) + \left(\frac{-16}{7} \times \frac{-7}{6} \right) \\
 &= \frac{-16 \times (-8)}{7 \times 9} + \frac{-16 \times (-7)}{7 \times 6} = \frac{128}{63} + \frac{112}{42} \\
 &= \frac{256 + 336}{126} = \frac{592}{126}
 \end{aligned}$$

$$\therefore \text{L.H.S.} = \text{R.H.S.}$$

Question 8.

Name the property of multiplication illustrated by each of the following statements :

$$\text{(i) } \frac{-15}{8} \times \frac{-12}{7} = \frac{-12}{7} \times \frac{-15}{8}$$

$$\text{(ii) } \left(\frac{-2}{3} \times \frac{7}{9} \right) \times \frac{-9}{5} = \frac{-2}{3} \times \left(\frac{7}{9} \times \frac{-9}{5} \right)$$

$$\text{(iii) } \frac{-3}{4} + \left(\frac{-5}{6} + \frac{7}{8} \right) = \left(\frac{-3}{4} \times \frac{-5}{6} \right) + \left(\frac{-3}{4} \times \frac{7}{8} \right)$$

$$\text{(iv) } \frac{-16}{9} \times 1 = 1 \times \frac{-16}{9} = \frac{-16}{9}$$

$$\text{(v) } \frac{-11}{15} \times \frac{15}{-11} = \frac{15}{-11} \times \frac{-11}{15} = 1$$

$$\text{(vi) } \frac{-7}{5} \times 0 = 0$$

ANSWER:

1. Commutative property
2. Associative property
3. Distributive property
4. Property of multiplicative identity
5. Property of multiplicative inverse
6. Multiplicative property of 0

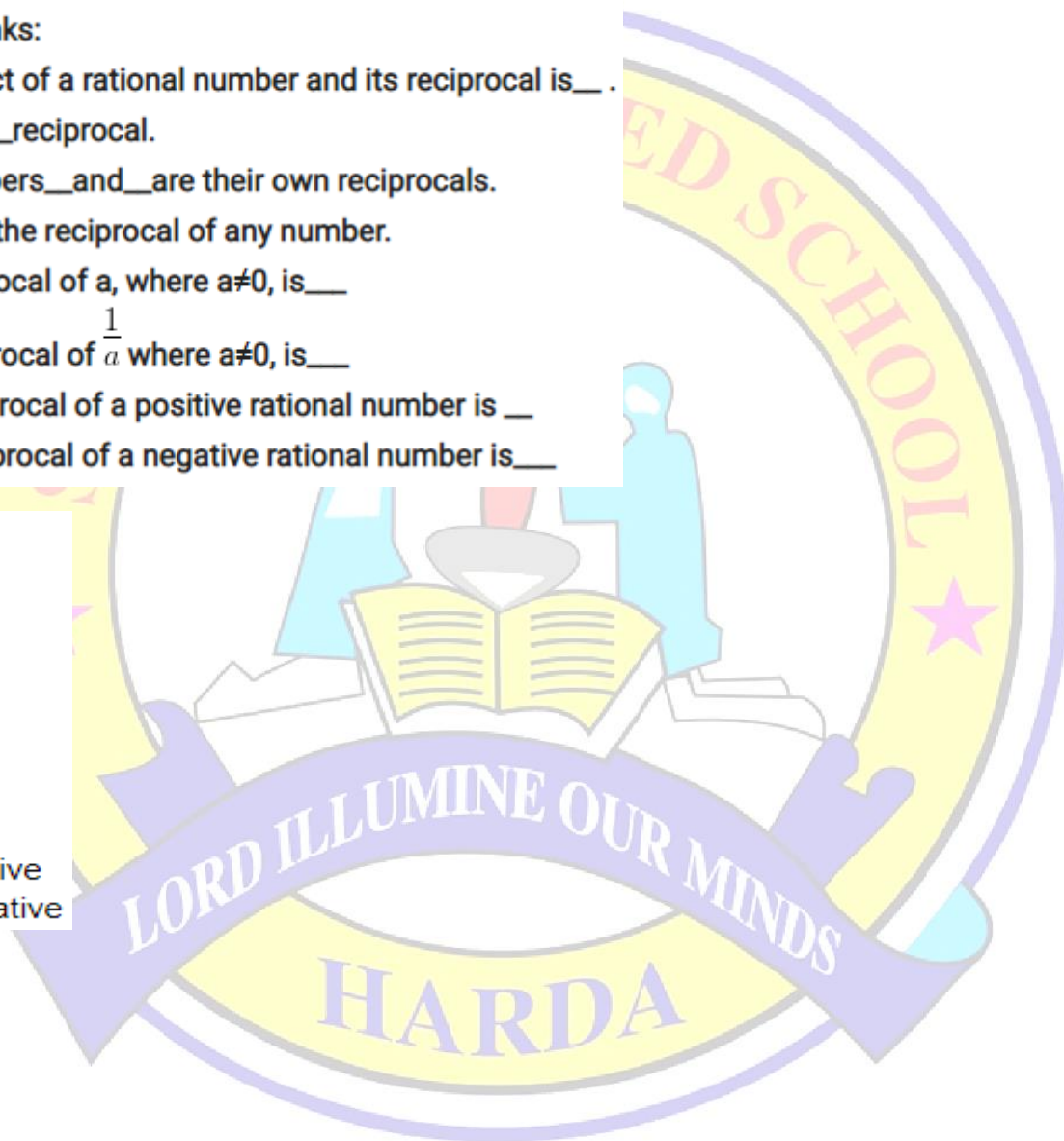
Question 9.

Fill in the blanks:

- (i) The product of a rational number and its reciprocal is__.
- (ii) Zero has __reciprocal.
- (iii) The numbers__and__are their own reciprocals.
- (iv) Zero is __the reciprocal of any number.
- (v) The reciprocal of a, where $a \neq 0$, is__
- (vi) The reciprocal of $\frac{1}{a}$ where $a \neq 0$, is__
- (vii) The reciprocal of a positive rational number is __
- (viii) The reciprocal of a negative rational number is__

ANSWER:

- (i) 1
- (ii) no
- (iii) 1; -1
- (iv) not
- (v) $\frac{1}{a}$
- (vi) a
- (vii) positive
- (viii) negative



Exercise 1E

Question 1.

Simplify

(i) $\frac{4}{9} \div \frac{-5}{12}$ (ii) $-8 \div \frac{-7}{16}$

(iii) $\frac{-12}{7} \div (-18)$ (iv) $\frac{-1}{10} \div \frac{-8}{5}$

(v) $\frac{-16}{35} \div \frac{-15}{14}$ (vi) $\frac{-65}{14} \div \frac{13}{7}$

Solution:

$$\begin{aligned} \text{(i)} \quad \frac{4}{9} \div \frac{-5}{12} &= \frac{4}{9} \times \frac{12}{-5} = \frac{4 \times 12}{9 \times (-5)} \\ &= \frac{48}{-45} = \frac{-48}{45} = \frac{-48 \div 3}{45 \div 3} = \frac{-16}{15} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad -8 \div \frac{-7}{16} &= -8 \times \frac{16}{-7} = \frac{-8 \times 16}{-7} \\ &= \frac{-128}{-7} = \frac{128}{7} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad \frac{-12}{7} \div (-18) &= \frac{-12}{7} \times \frac{1}{-18} \\ &= \frac{-12 \times 1}{7 \times (-18)} \\ &= \frac{-12}{-126} = \frac{12}{126} = \frac{12 \div 6}{126 \div 6} = \frac{2}{21} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad \frac{-1}{10} \div \frac{-8}{5} &= \frac{-1}{10} \times \frac{5}{-8} = \frac{-1 \times 5}{10 \times (-8)} \\ &= \frac{-5}{-80} = \frac{5}{80} = \frac{5 \div 5}{80 \div 5} = \frac{1}{16} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{(v)} \quad \frac{-16}{35} \div \frac{-15}{14} &= \frac{-16}{35} \times \frac{14}{-15} = \frac{-16 \times 14}{35 \times (-15)} \\ &= \frac{-224}{-525} = \frac{224}{525} = \frac{224 \div 7}{525 \div 7} = \frac{32}{75} \text{ Ans.} \end{aligned}$$

$$(vi) \frac{-65}{14} \div \frac{13}{7} = \frac{-65}{14} \times \frac{7}{13}$$

$$= \frac{-455}{182} = \frac{-455 \div 91}{182 \div 91} = \frac{-5}{2} \quad \text{Ans.}$$

Question 2.

Verify whether the given statement is true or false :

$$(i) \frac{13}{5} \div \frac{26}{10} = \frac{26}{10} \div \frac{13}{5}$$

$$(ii) -9 \div \frac{3}{4} = \frac{3}{4} \div (-9)$$

$$(iii) \frac{-8}{9} \div \frac{-4}{3} = \frac{-4}{3} \div \frac{-8}{9}$$

$$(iv) \frac{-7}{24} \div \frac{3}{-16} = \frac{3}{-16} \div \frac{-7}{24}$$

Solution:

$$(i) \text{ L.H.S.} = \frac{13}{5} \div \frac{26}{10}$$

$$= \frac{13}{5} \times \frac{10}{26} = \frac{13 \times 10}{5 \times 26} = \frac{130}{130} = 1$$

$$\text{R.H.S.} = \frac{26}{10} \div \frac{13}{5} = \frac{26}{10} \times \frac{5}{13} = \frac{26 \times 5}{10 \times 13}$$

$$= \frac{130}{130} = 1$$

Since, RHS = LHS

Therefore, True

$$(ii) \text{ L.H.S.} = -9 \div \frac{3}{4} = -9 \times \frac{4}{3} = \frac{-36}{3}$$

$$= -12$$

$$\text{R.H.S.} = \frac{3}{4} \div (-9) = \frac{3}{4} \times \frac{1}{-9} = \frac{3}{-36}$$

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

Since, RHS $\neq$ LHS

$\therefore$ It is false.

$$(iii) \text{ L.H.S.} = \frac{-8}{9} \div \frac{-4}{3} = \frac{-8}{9} \times \frac{3}{-4}$$

$$= \frac{-8 \times 3}{9 \times (-4)} = \frac{-24}{-36}$$

$$= \frac{24}{36} = \frac{24 \div 12}{36 \div 12} = \frac{2}{3}$$

$$\text{R.H.S.} = \frac{-4}{3} \div \frac{-8}{9} = \frac{-4}{3} \times \frac{9}{-8} = \frac{-36}{-24}$$

$$= \frac{36}{24} = \frac{36 \div 12}{24 \div 12} = \frac{3}{2}$$

Since, $\text{RHS} \neq \text{LHS}$

$\therefore$ It is false.

$$(iv) \text{ L.H.S.} = \frac{-7}{24} \div \frac{3}{-16} = \frac{-7}{24} \times \frac{-16}{3}$$

$$= \frac{-7 \times (-16)}{24 \times 3} = \frac{112}{72}$$

$$= \frac{112 \div 8}{72 \div 8} = \frac{14}{9}$$

$$\text{R.H.S.} = \frac{3}{-16} \div \frac{-7}{24} = \frac{3}{-16} \times \frac{24}{-7}$$

$$= \frac{3 \times 24}{-16 \times (-7)} = \frac{72}{-112} = \frac{72 \div 8}{-112 \div 8}$$

$$= \frac{9}{-14}$$

Since, $\text{RHS} \neq \text{LHS}$

$\therefore$ It is false.

Question 3.

Verify whether the given statement is true or false :

$$(i) \left(\frac{5}{9} \div \frac{1}{3} \right) \div \frac{5}{2} = \frac{5}{9} \div \left(\frac{1}{3} \div \frac{5}{2} \right)$$

$$(ii) \left((-16) \div \frac{6}{5} \right) \div \frac{-9}{10} = (-16) \div \left(\frac{6}{5} \div \frac{-9}{10} \right)$$

$$(iii) \left(\frac{-3}{5} \div \frac{-12}{35} \right) \div \frac{1}{14} = \frac{-3}{5} \div \left(\frac{-12}{35} \div \frac{1}{14} \right)$$

Solution:

$$\begin{aligned}\text{(i) L.H.S.} &= \left(\frac{5}{9} \div \frac{1}{3}\right) \div \frac{5}{2} \\&= \left(\frac{5}{9} \times \frac{3}{1}\right) \div \frac{5}{2} = \frac{15}{9} \div \frac{5}{2} \\&= \frac{15}{9} \times \frac{2}{5} = \frac{30}{45} = \frac{30 \div 15}{45 \div 15} = \frac{2}{3}\end{aligned}$$

$$\begin{aligned}\text{R.H.S.} &= \frac{5}{9} \div \left[\frac{1}{3} \div \frac{5}{2}\right] = \frac{5}{9} \div \left[\frac{1}{3} \times \frac{2}{5}\right] \\&= \frac{5}{9} \div \left[\frac{2}{15}\right] = \frac{5}{9} \times \frac{15}{2} = \frac{75}{18} \\&= \frac{75 \div 3}{18 \div 3} = \frac{25}{6}\end{aligned}$$

$\therefore \text{L.H.S.} \neq \text{R.H.S.}$

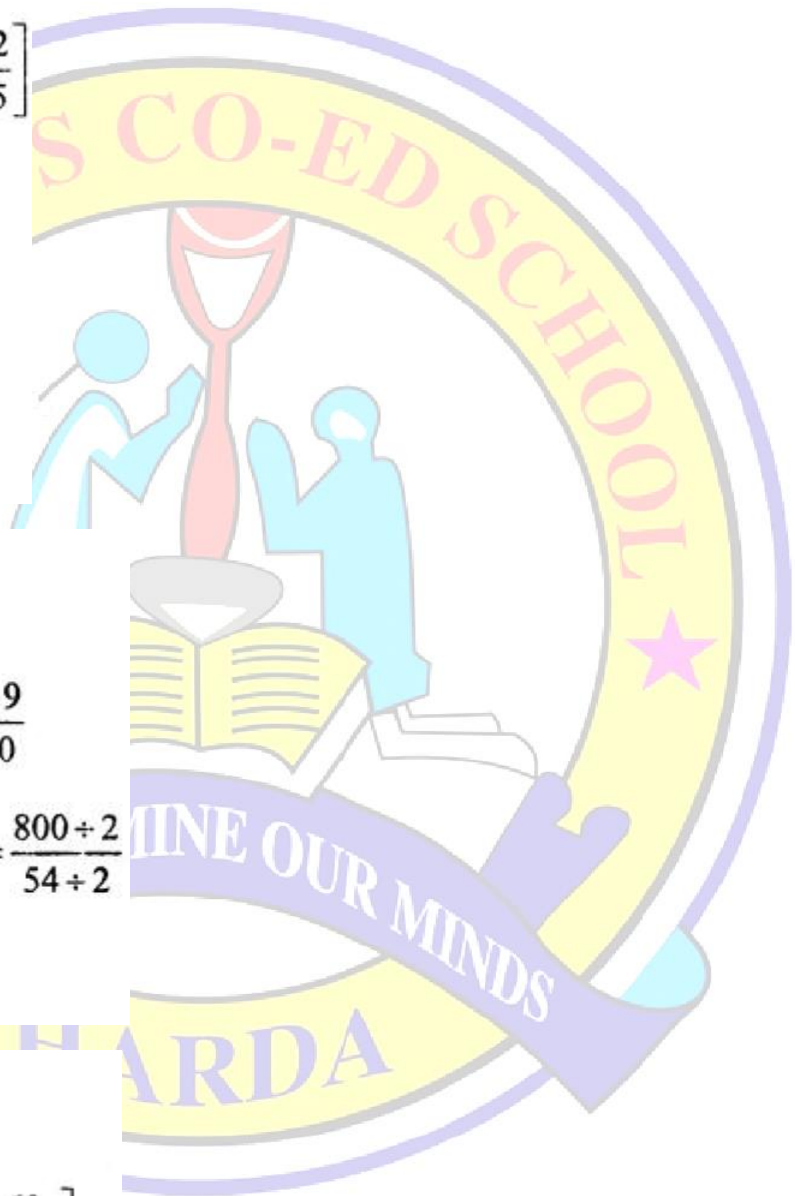
$\therefore$ It is false.

$$\begin{aligned}\text{(ii) L.H.S.} &= \left[(-16) \div \frac{6}{5}\right] \div \frac{-9}{10} \\&= \left[-16 \times \frac{5}{6}\right] \div \frac{-9}{10} = \frac{-80}{6} \div \frac{-9}{10} \\&= \frac{-80}{6} \times \frac{10}{-9} = \frac{-800}{-54} = \frac{800}{54} = \frac{800 \div 2}{54 \div 2} \\&= \frac{400}{27}\end{aligned}$$

$$\begin{aligned}\text{R.H.S.} &= (-16) \div \left[\frac{6}{5} \div \frac{-9}{10}\right] \\&= (-16) \div \left[\frac{6}{5} \times \frac{10}{-9}\right] = -16 \div \left[\frac{60}{-45}\right] \\&= -16 \times \frac{-45}{60} = \frac{720}{60} = \frac{720 \div 60}{60 \div 60} = \frac{12}{1} = 12\end{aligned}$$

$\therefore \text{L.H.S.} \neq \text{R.H.S.}$

$\therefore$ It is false.



$$(iii) \text{ L.H.S.} = \left[\frac{-3}{5} \div \frac{-12}{35} \right] \div \frac{1}{14}$$

$$= \left[\frac{-3}{5} \times \frac{35}{-12} \right] \div \frac{1}{14}$$

$$= \frac{-105}{-60} \div \frac{1}{14} = \frac{105}{60} \times \frac{14}{1}$$

$$= \frac{1470}{60} = \frac{1470 \div 30}{60 \div 30} = \frac{49}{2}$$

$$\text{R.H.S.} = \frac{-3}{5} \div \left[\frac{-12}{35} \div \frac{1}{14} \right]$$

$$= \frac{-3}{5} \div \left[\frac{-12}{35} \times \frac{14}{1} \right]$$

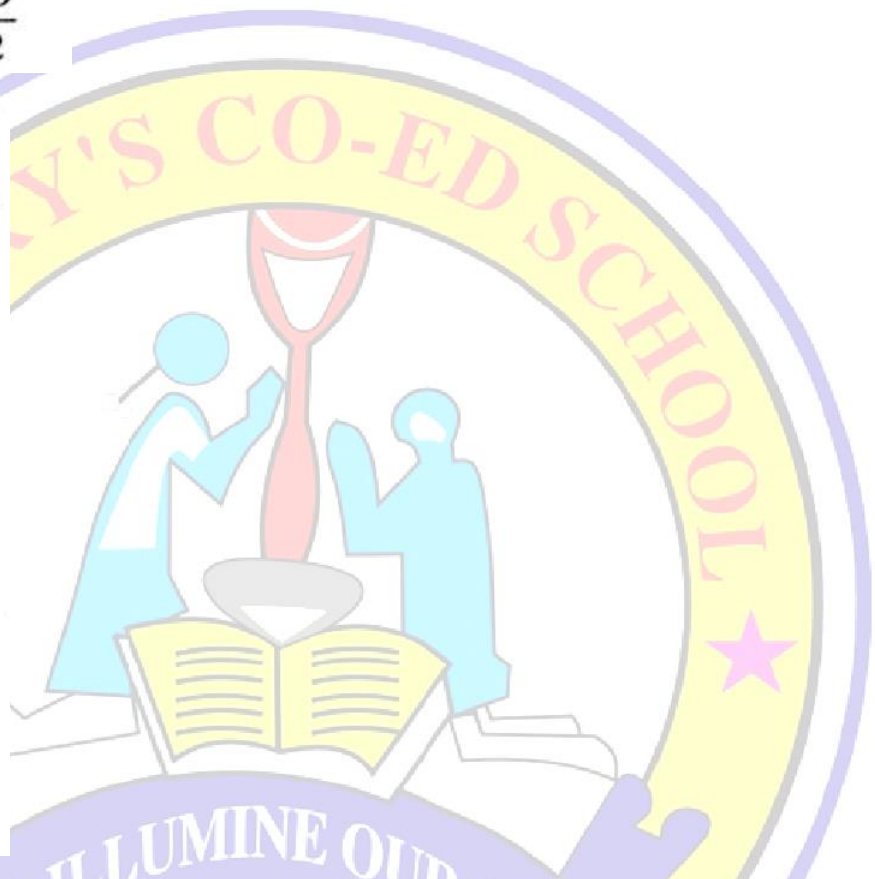
$$= \frac{-3}{5} \div \left[\frac{-168}{35} \right]$$

$$= \frac{-3}{5} \times \frac{35}{-168} = \frac{-105}{-840}$$

$$= \frac{105}{840} = \frac{105 \div 105}{840 \div 105} = \frac{1}{8}$$

$\therefore \text{ L.H.S.} \neq \text{ R.H.S.}$

$\therefore$ It is false. Ans.



Question 4.

The product of two rational numbers is -9. If one of the numbers is -12, find the other.

Solution:

Product of two numbers = -9

one number = -12

Let second number = x

$$\text{Then } -12 \times x = -9$$

$$\Rightarrow x = -9 \div -12$$

$$\Rightarrow x = -9 \times \frac{1}{-12} = \frac{9 \div 3}{12 \div 3} = \frac{3}{4}$$

$$\therefore \text{ Second number} = \frac{3}{4} \text{ Ans.}$$

Question 5.

The product of two rational numbers is $\frac{-16}{9}$. If one of the numbers is $\frac{-4}{3}$ find the other.

Solution:

Product of two rational numbers = $\frac{-16}{9}$

One number = $\frac{-4}{3}$

Let x be the second number,

$$\text{then } x + \frac{-4}{3} = \frac{-16}{3}$$

$$\begin{aligned} x &= \frac{-16}{9} \div \frac{-4}{3} = \frac{-16}{9} \times \frac{3}{-4} \\ &= \frac{-48}{-36} = \frac{48}{36} = \frac{48 \div 12}{36 \div 12} = \frac{4}{3} \end{aligned}$$

$$\therefore \text{Second number} = \frac{4}{3} \text{ Ans.}$$

Question 6.

By what rational number should we multiply $\frac{-15}{56}$ to get $\frac{-5}{7}$?

Solution:

Let x be multiplied

$$\text{then } x \times \frac{-15}{56} = \frac{-5}{7}$$

$$\Rightarrow x = \frac{-5}{7} \div \frac{-15}{56}$$

$$\begin{aligned} \Rightarrow x &= \frac{-5}{7} \times \frac{56}{-15} = \frac{-280}{-105} = \frac{280}{105} \\ &= \frac{280 \div 35}{105 \div 35} = \frac{8}{3} \end{aligned}$$

$$\therefore \text{Required rational number} = \frac{8}{3} \text{ Ans.}$$

Question 7.

By what rational number should $\frac{-8}{39}$ be multiplied to obtain $\frac{1}{26}$?

Solution:

Let x be multiplied

$$\text{then } \frac{-8}{39} \times x = \frac{1}{26} \Rightarrow x = \frac{1}{26} \div \frac{-8}{39}$$

$$\Rightarrow x = \frac{1}{26} \times \frac{39}{-8} = \frac{39}{-208}$$

$$= \frac{39 \div 13}{-208 \div 13} = \frac{3}{-16} = \frac{-3}{16} \text{ Ans.}$$

Question 8.

By what number should $\frac{-33}{8}$ be divided to get $\frac{-11}{2}$?

Solution:

Let required number = x

$$\text{Then } \frac{-33}{8} \div x = \frac{-11}{2}$$

$$\Rightarrow \frac{-33}{8} \times \frac{1}{x} = \frac{-11}{2}$$

$$\Rightarrow \frac{1}{x} = \frac{-11}{2} \div \frac{-33}{8}$$

$$\Rightarrow \frac{1}{x} = \frac{-11}{2} \times \frac{8}{-33} = \frac{-88}{-66} = \frac{88}{66}$$

$$\Rightarrow x = \frac{66}{88} = \frac{66 \div 22}{88 \div 22} = \frac{3}{4}$$

$$\therefore \text{ Required number} = \frac{3}{4} \text{ Ans.}$$

Question 9.

Divide the sum of $\frac{13}{5}$ and $\frac{-12}{7}$ by the product of $\frac{-31}{7}$ and $\frac{1}{-2}$.

Solution:

sum of $\frac{13}{5}$ and $\frac{-12}{7}$

$$= \frac{13}{5} + \frac{-12}{7}$$

$$= \frac{91 + (-60)}{35} = \frac{91 - 60}{35} = \frac{31}{35}$$

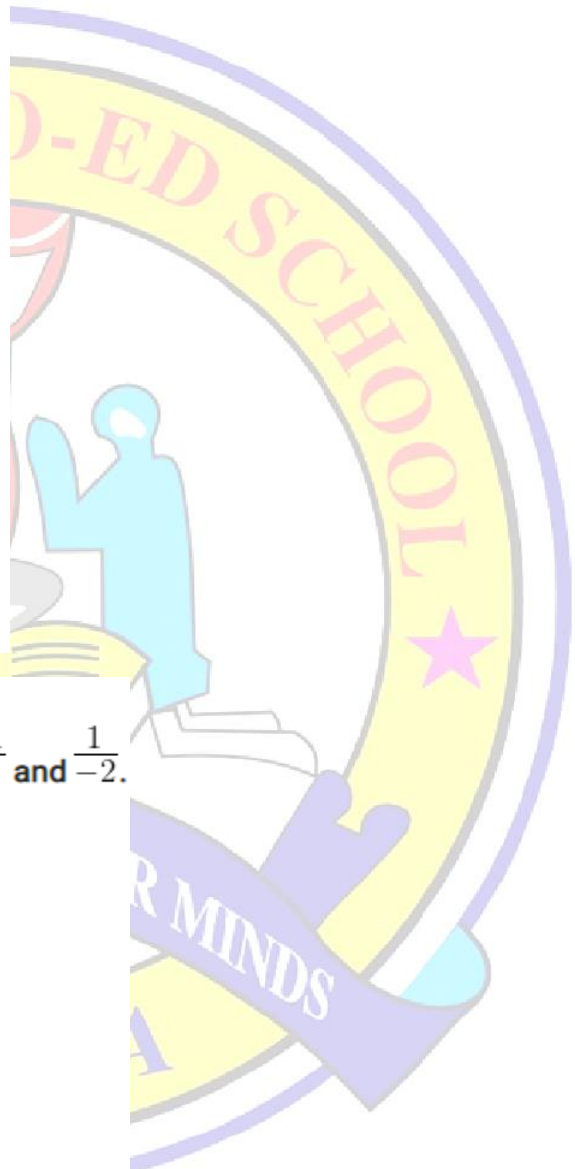
Now, product of $\frac{-31}{7}$ and $\frac{1}{-2}$

$$= \frac{-31}{7} \times \frac{1}{-2}$$

$$= \frac{-31}{-14} = \frac{31}{14}$$

$$\therefore \frac{31}{35} \div \frac{31}{14} = \frac{31}{35} \times \frac{14}{31} = \frac{14}{35}$$

$$= \frac{14 \div 7}{35 \div 7} = \frac{2}{5} \text{ Ans.}$$



Question 10.

Divide the sum of $\frac{65}{12}$ and $\frac{8}{3}$ by their difference.

Solution:

$$\begin{aligned}\text{Sum of } \frac{65}{12} \text{ and } \frac{8}{3} &= \frac{65}{12} + \frac{8}{3} \\ &= \frac{65+32}{12} = \frac{97}{12}\end{aligned}$$

$$\begin{aligned}\text{Difference of } \frac{65}{12} \text{ and } \frac{8}{3} &= \frac{65}{12} - \frac{8}{3} \\ &= \frac{65-32}{12} = \frac{33}{12}\end{aligned}$$

$$\therefore \frac{97}{12} \div \frac{33}{12} = \frac{97}{12} \times \frac{12}{33} = \frac{97}{33} \text{ Ans.}$$

Question 11.

Fill in the blanks

$$(i) \frac{9}{8} \div (\dots) = \frac{-3}{2}$$

$$(ii) (\dots) \div \left(\frac{-7}{5}\right) = \frac{10}{19}$$

$$(iii) (\dots) \div (-3) = \frac{-4}{15}$$

$$(iv) (-12) \div (\dots) = \frac{-6}{5}$$

Solution:

$$(i) \frac{9}{8} \div (\dots) = \frac{-3}{2}$$

Let required number = x , then

$$\frac{9}{8} \div x = \frac{-3}{2} \Rightarrow \frac{9}{8} \times \frac{1}{x} = \frac{-3}{2}$$

$$\Rightarrow \frac{1}{x} = \frac{-3}{2} \div \frac{9}{8} = \frac{-3}{2} \times \frac{8}{9} = \frac{-24}{18}$$

$$\Rightarrow x = \frac{18}{-24} = \frac{18 \div 6}{-24 \div 6} = \frac{3}{-4} = \frac{-3}{4}$$

$\therefore$ Required number = $-3/4$ Ans.

$$(ii) (\dots) \div \left(\frac{-7}{5}\right) = \frac{10}{9}$$

Let required number = x , then

$$x \div \frac{-7}{5} = \frac{10}{9}$$

$$\Rightarrow x = \frac{10}{9} \div \frac{-7}{5}$$

$$\Rightarrow x = \frac{10}{9} \times \frac{-5}{7} = \frac{-50}{63} = \frac{-50 \div 7}{63 \div 7} = \frac{-10}{9}$$

$$\therefore \text{Required number} = \frac{-10}{9} \text{ Ans.}$$

$$(iii) (\dots) \div (-3) = \frac{-4}{15}$$

Let required number = x , then

$$x \div (-3) = \frac{-4}{15}$$

$$\Rightarrow x = \frac{-4}{15} \div -3 = \frac{-4}{15} \times \frac{1}{3} = \frac{-4}{45} = \frac{-4 \div 1}{45 \div 1} = \frac{-4}{45}$$

$$\therefore \text{Required number} = \frac{-4}{45} \text{ Ans.}$$

$$(iv) (-12) \div (\dots) = \frac{-6}{5}$$

Let required number = x , then

$$(-12) \div x = \frac{-6}{5}$$

$$\Rightarrow \frac{-12}{1} \times \frac{1}{x} = \frac{-6}{5}$$

$$\Rightarrow \frac{1}{x} = \frac{-6}{5} \div \frac{-12}{1} = \frac{-6}{5} \times \frac{1}{-12} = \frac{-6}{-60} = \frac{1}{10}$$

$$\therefore x = \frac{10}{1} = 10$$

$$\therefore \text{Required number} = 10 \text{ Ans.}$$



Question 12.

- (i) Are rational numbers always closed -under division ?
- (ii) Are rational numbers always commutative under division ?
- (iii) Are rational numbers always associative under division ?
- (iv) Can we divide 1 by 0 ?

Solution:

- (i) No, not always closed under division.
- (ii) No, not always commutative.
- (iii) No, not always associative.
- (iv) No. It is not possible to divide any number by zero. Ans.



Exercise 1F

Question 1.

Find a rational number between $\frac{1}{4}$ and $\frac{1}{3}$.

Solution:

Rational number between $\frac{1}{4}$ and $\frac{1}{3}$

$$= \frac{1}{2} \left[\frac{1}{4} + \frac{1}{3} \right]$$

$$= \frac{1}{2} \left[\frac{3+4}{12} \right]$$

$$= \frac{1}{2} \times \frac{7}{12}$$

$$= \frac{7}{24}$$

Question 2.

Find a rational number between 2 and 3.

Solution:

Solution. Rational number between 2 and 3

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

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

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

Question 3.

Find a rational number between $\frac{-1}{3}$ and $\frac{1}{2}$

Solution:

Rational number between $\frac{-1}{3}$ and $\frac{1}{2}$

$$= \frac{1}{2} \left[\frac{-1}{3} + \frac{1}{2} \right]$$

$$= \frac{1}{2} \left[\frac{-2+3}{6} \right]$$

$$= \frac{1}{2} \times \frac{1}{6}$$

$$= \frac{1}{12}$$



Question 4.

Find two rational numbers between -3 and -2.

Solution:

First rational number between -3 and -2

$$= \frac{1}{2} [-3 + (-2)] = \frac{1}{2} (-3 - 2)$$

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

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

Second rational number between -3

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

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

$$= \frac{1}{2} \left[\frac{-6-5}{2} \right] = \frac{1}{2} \times \frac{-11}{2} = \frac{-11}{4}$$

Thus, the required numbers are $-\frac{5}{2}$ and $-\frac{11}{4}$.

Question 5.

Find three rational numbers between 4 and 5.

Solution:

First rational number between 4 and 5

$$= \frac{1}{2} [4 + 5] = \frac{1}{2} \times 9 = \frac{9}{2}$$

$$\therefore 4 < \frac{9}{2} < 5$$

Second rational number between 4 and $\frac{9}{2}$

$$= \frac{1}{2} \left[4 + \frac{9}{2} \right] = \frac{1}{2} \left[\frac{8+9}{2} \right] = \frac{1}{2} \times \frac{17}{2} = \frac{17}{4}$$

and third rational number between $\frac{9}{2}$ and 5

$$= \frac{1}{2} \left[\frac{9}{2} + 5 \right] = \frac{1}{2} \left[\frac{9+10}{2} \right] = \frac{1}{2} \times \frac{19}{2} = \frac{19}{4}$$

$$\therefore 4 < \frac{17}{4} < \frac{9}{2} < \frac{19}{4} < 5$$

$\therefore$ Required three rational numbers

$$\text{and } \frac{17}{4}, \frac{9}{2}, \frac{19}{4} \text{ Ans.}$$



Question 6.

Find three rational numbers between $\frac{2}{3}$ and $\frac{3}{4}$

Solution:

First rational numbers between $\frac{2}{3}$ and $\frac{3}{4}$

$$= \frac{1}{2} \left[\frac{2}{3} + \frac{3}{4} \right] = \frac{1}{2} \left[\frac{8+9}{12} \right] = \frac{1}{2} \times \frac{17}{12} = \frac{17}{24}$$

$$\therefore \frac{2}{3} < \frac{17}{24} < \frac{3}{4}$$

Second rational number between $\frac{2}{3}$

and $\frac{17}{24}$

$$= \frac{1}{2} \left[\frac{2}{3} + \frac{17}{24} \right] = \frac{1}{2} \left[\frac{16+17}{24} \right] = \frac{1}{2} \times \frac{33}{24} = \frac{33}{48}$$

Third rational number between $\frac{17}{24}$ and $\frac{3}{4}$

$$= \frac{1}{2} \left[\frac{17}{24} + \frac{3}{4} \right] = \frac{1}{2} \left[\frac{17+18}{24} \right] = \frac{1}{2} \times \frac{35}{24} = \frac{35}{48}$$

$$\therefore \frac{2}{3} < \frac{33}{48} < \frac{17}{24} < \frac{35}{48} < \frac{3}{4}$$

$\therefore$ Required rational numbers

$$= \frac{33}{48}, \frac{17}{24}, \frac{35}{48} \text{ Ans.}$$

Question 7.

Find 10 rational numbers between $\frac{-3}{4}$ and $\frac{5}{6}$

Solution:

$$\frac{-3}{4}, \frac{5}{6}$$

LCM of 4 and 6 = 12

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

$$\text{and } \frac{5}{6} = \frac{5 \times 2}{6 \times 2} = \frac{10}{12}$$

10 rational number can be between

$$\frac{-3}{4}, \frac{5}{6}$$

$$= \frac{-8}{12}, \frac{-7}{12}, \frac{-6}{12}, \frac{-5}{12}, \frac{-4}{12}, \frac{-3}{12},$$

$$\frac{-2}{12}, \frac{-1}{12}, 0 \text{ and } \frac{1}{12}$$

Question 8.

Find 12 rational numbers between -1 and 2.

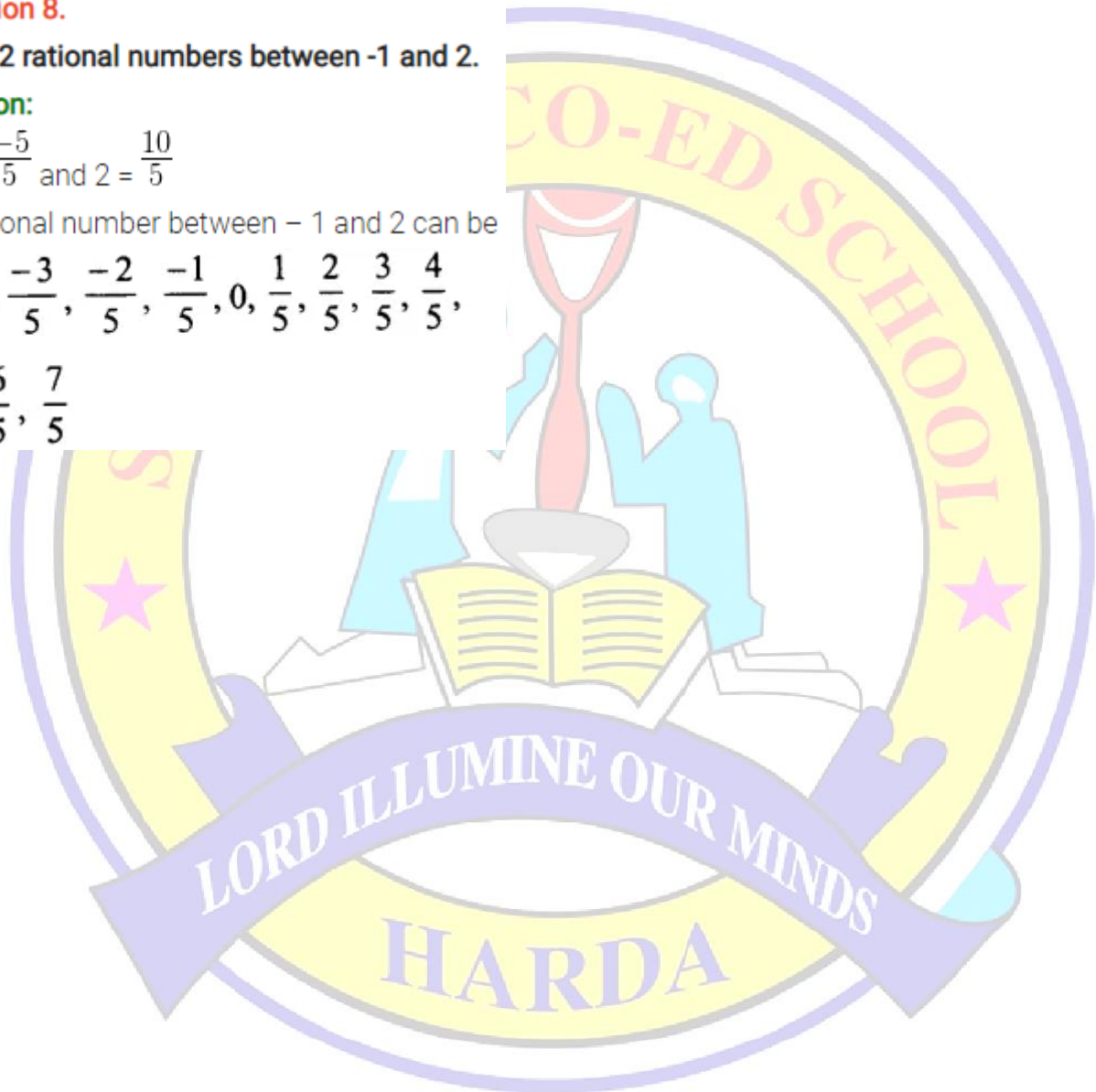
Solution:

$$-1 = \frac{-5}{5} \text{ and } 2 = \frac{10}{5}$$

12 rational number between -1 and 2 can be

$$\frac{-4}{5}, \frac{-3}{5}, \frac{-2}{5}, \frac{-1}{5}, 0, \frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5},$$

$$\frac{5}{5}, \frac{6}{5}, \frac{7}{5}$$



Exercise 1G

Question 1.

From a rope 11 m long, two pieces of lengths $2\frac{3}{5}$ m and $3\frac{3}{10}$ m are cut off. What is the length of the remaining rope?

Solution:

Total length of rope = 11 m.

Sum of lengths of two parts

$$\begin{aligned} &= \left(2\frac{3}{5} + 3\frac{3}{10} \right) \text{ m} \\ &= \left(\frac{13}{5} + \frac{33}{10} \right) \text{ m} = \frac{26+33}{10} = \frac{59}{10} \text{ m} \end{aligned}$$

$$\text{Length of remaining rope} = \left(11 - \frac{59}{10} \right) \text{ m}$$

$$= \frac{110-59}{10} = \frac{51}{10} \text{ m} = 5\frac{1}{10} \text{ m Ans.}$$

Question 2.

A drum full of rice weighs $40\frac{1}{6}$ kg. If the empty drum weighs $13\frac{3}{4}$ kg, find the weight of rice in the drum.

Solution:

Total weight of rice and drum

$$\begin{aligned} &= 40\frac{1}{6} \text{ kg} \\ &= 13\frac{3}{4} \end{aligned}$$

$$\text{Weight of empty drum} = 13\frac{3}{4} = \frac{55}{4} \text{ kg}$$

$$\therefore \text{Weight of rice} = \left(\frac{241}{6} - \frac{55}{4} \right) \text{ kg}$$

$$= \frac{482-165}{12} = \frac{317}{12} \text{ kg} = 26\frac{5}{12} \text{ kg Ans.}$$

Question 3.

A basket contains three types of fruits weighing $19\frac{1}{3}$ kg in all. If $8\frac{1}{9}$ kg of these be apples, $3\frac{1}{6}$ kg be oranges and the rest pears. What is the weight of pears in the basket ?

Solution:

Total weight of three types of fruits

$$\begin{aligned} &= 19\frac{1}{3} \text{ kg} \\ &= \frac{58}{3} \text{ kg} \end{aligned}$$

$$\text{Weight of apples} = 8\frac{1}{9} \text{ kg} = \frac{73}{9} \text{ kg}$$

$$\text{Weight of oranges} = 3\frac{1}{6} \text{ kg} = \frac{19}{6} \text{ kg}$$

∴ Weight of apples and oranges

$$= \frac{73}{9} + \frac{19}{6} = \frac{146+57}{18} = \frac{203}{18} \text{ kg}$$

$$\therefore \text{Weight of pears} = \frac{58}{3} - \frac{203}{18}$$

$$= \frac{348-203}{18} = \frac{145}{18} = 8\frac{1}{18} \text{ kg Ans.}$$

Question 4.

On one day a rickshaw puller earned Rs 160 Out of his earnings he spent Rs $26\frac{3}{5}$ on tea and snacks Rs $50\frac{1}{2}$ on food and Rs $16\frac{2}{5}$ on repairs of the rickshaw. How much did he save on that day?

Solution:

Total earnings = Rs 160

$$\text{Spent on tea and snacks} = ₹26\frac{3}{5}$$

$$= ₹\frac{133}{5}$$

$$\text{Spent on food} = ₹50\frac{1}{2} = ₹\frac{101}{2}$$

$$\text{Spent on repair of rickshaw} = ₹16\frac{2}{5}$$

$$= ₹\frac{82}{5}$$

$$\text{Total amount spent} = ₹\frac{133}{5} + \frac{101}{2} + \frac{82}{5}$$

$$= \frac{266+505+164}{10} = ₹\frac{935}{10}$$

$$\therefore \text{Savings} = ₹160 - \frac{935}{10}$$

$$= \frac{1600-935}{10} = \frac{665}{10}$$

$$= \frac{665 \div 5}{10 \div 5} = \frac{133}{2}$$

$$= ₹66\frac{1}{2} \text{ Ans.}$$

Question 5.

Find the cost of $3\frac{2}{5}$ metres of cloth at Rs $63\frac{3}{4}$ per metre.

Solution:

Cost of 1m cloth = Rs $63\frac{3}{4}$

$$\frac{4 \times 63 + 3}{4} = ₹ \frac{255}{4}$$

$$\therefore \text{Cost of } 3\frac{2}{5} \text{ metres} = ₹ \frac{255}{4} \times \frac{17}{5}$$

$$= ₹ \frac{255 \times 17}{4 \times 5} = \frac{51 \times 17}{4}$$

$$= ₹ \frac{867}{4} = ₹ 216\frac{3}{4} \text{ Ans.}$$

Question 6.

A car is moving at an average speed of $60\frac{2}{5}$ km/hr. How much distance will it cover in $6\frac{1}{4}$ hours?

Solution:

Distance covered in 1 hour

$$= 60\frac{2}{5}$$

$$= \frac{302}{5}$$

$$\therefore \text{Distance covered in } 6\frac{1}{4} = \frac{25}{4} \text{ hours}$$

$$= \frac{302}{5} \times \frac{25}{4} = \frac{151 \times 5}{2} \text{ km}$$

$$= \frac{755}{2} = 377\frac{1}{2} \text{ Ans.}$$

Question 7.

Find the area of a rectangular park which is $36\frac{3}{5}$ m long and $16\frac{2}{3}$ m broad.

Solution:

Length of rectangular park

$$= 36\frac{3}{5} \text{ m}$$

$$= \frac{183}{5}$$

$$\text{and breadth} = 16\frac{2}{3} = \frac{50}{3} \text{ m}$$

$$\therefore \text{Area} = \text{Length} \times \text{Breadth}$$

$$= \frac{183}{5} \times \frac{50}{3} = \frac{183 \times 50}{5 \times 3} \text{ km}^2$$

$$= \frac{9150}{15} \text{ km}^2 = 610 \text{ km}^2 \text{ Ans.}$$

Question 8.

Find the area of a square plot of land whose each side measures $8\frac{1}{2}$ metres.

Solution:

Side of a square plot = $8\frac{1}{2}$ m

$$= \frac{17}{2} \text{ m}$$

Area = (Side)² = Side x Side

$$= \frac{17}{2} \times \frac{17}{2} \text{ m}^2$$

$$= \frac{289}{4} \text{ m}^2$$

$$= 72\frac{1}{4} \text{ m}^2$$

Question 9.

One litre of petrol costs Rs $63\frac{3}{4}$. What is the cost of 34 litres of petrol?

Solution:

Cost of 1 litre petrol = Rs $63\frac{3}{4}$

$$= \text{Rs } \frac{255}{4}$$

Cost of 34 litres of petrol

$$= \frac{255}{4} \times 34$$

$$= \frac{255 \times 17}{2}$$

$$= \frac{4335}{2}$$

$$= \text{Rs } 2167\frac{1}{2}$$

Question 10.

An aeroplane covers 1020 km in an hour. How much distance will it cover in $4\frac{1}{6}$ hours?

Solution:

Distance covered in 1 hour = 1020 km.

Distance covered in $4\frac{1}{6}$ hours

$$= 1020 \times 4\frac{1}{6}$$

$$= 1020 \times \frac{25}{6} \text{ km}$$

$$= \frac{25500}{6}$$

$$= 4250 \text{ km. Ans.}$$

Question 11.

The cost of $3\frac{1}{2}$ metres of cloth is Rs $166\frac{1}{4}$. What is the cost of one metre of cloth?

Solution:

Cost of $3\frac{1}{2}$ metres cloth

$$= \text{Rs } 166\frac{1}{4}$$

$$\therefore \text{Cost of 1 metre} = ₹ 166\frac{1}{4} \div 3\frac{1}{2}$$

$$= ₹ \frac{665}{4} \div \frac{7}{2} = ₹ \frac{665}{4} \times \frac{2}{7}$$

$$= \frac{95 \times 1}{2} = ₹ 47\frac{1}{2} \text{ Ans.}$$

Question 12.

A cord of length $71\frac{1}{2}$ m has been cut into 26 pieces of equal length. What is the length of each piece?

Solution:

Total length of piece of chord

$$= 71\frac{1}{2}$$

No. of pieces = 26

$$\therefore \text{Length of each piece} = 71\frac{1}{2} \div 26 \text{ m}$$

$$= \frac{143}{2} \div 26$$

$$= \frac{143}{2} \times \frac{1}{26} \text{ m}$$

$$= \frac{143}{52} \text{ m} = \frac{143 \div 13}{52 \div 13} \text{ m}$$

$$= \frac{11}{4} \text{ m} = 2\frac{3}{4} \text{ m Ans.}$$

Question 13.

The area of a room is $65\frac{1}{4}$ m². If its breadth is $5\frac{7}{16}$ metres, what is its length?

Solution:

Area of a room = $65\frac{1}{4}$ m²

Breadth = $5\frac{7}{16}$ m

$$\therefore \text{Length} = \text{Area} \div \text{Breadth}$$

$$= \left(65\frac{1}{4} \div 5\frac{7}{16} \right) \text{ m}$$

$$= \frac{261}{4} \div \frac{87}{16} = \frac{261}{4} \times \frac{16}{87} \text{ m}$$

$$= \frac{4176}{348} = 12 \text{ m Ans.}$$

Question 14.

The product of two fractions is $9\frac{3}{5}$. If one of the fractions is $9\frac{3}{7}$, find the other.

Solution:

$$\begin{aligned}\text{Product of two fractions} &= 9\frac{3}{5} \\ &= \frac{48}{5}\end{aligned}$$

$$\text{One fraction} = 9\frac{3}{7} = \frac{66}{7}$$

$$\therefore \text{Second fraction} = \frac{48}{5} \div \frac{66}{7}$$

$$= \frac{48}{5} \times \frac{7}{66} = \frac{48 \times 7}{5 \times 66}$$

$$= \frac{336}{330} = \frac{336 \div 6}{330 \div 6}$$

$$= \frac{56}{55} = 1\frac{1}{55} \text{ Ans.}$$

Question 15.

In a school, $\frac{5}{8}$ of the students are boys. If there are 240 girls, find the number of boys in the school.

Solution:

Let total number of students = 1

and no. of boys = $\frac{5}{8}$

$$\therefore \text{No. of girls} = 1 - \frac{5}{8}$$

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

$$\therefore \text{If girls are } \frac{3}{8}, \text{ Then boys} = \frac{5}{8}$$

$$\text{and if girls are 1, Then boys} = \frac{5}{8} \div \frac{3}{8}$$

$$= \frac{5}{8} \times \frac{8}{3} = \frac{5}{3}$$

$$\text{and if girls are 240, Then boys} = \frac{5}{3} \times 240$$

$$= \frac{1200}{3} = 400 \text{ Ans.}$$

Question 16.

After reading $\frac{7}{9}$ of a book, 40 pages are left. How many pages are there in the book?

Solution:

Let no of pages = 1

Then no. of pages read = $\frac{7}{9}$

$$\text{and no. of pages left} = 1 - \frac{7}{9} = \frac{9-7}{9} = \frac{2}{9}$$

If $\frac{2}{9}$ pages are left then total number of

pages = 1

and 1 page is left then total number of

$$\text{pages} = 1 \div \frac{2}{9} = 1 \times \frac{9}{2}$$

and if 40 pages are left then total number

$$\text{of pages} = \frac{9}{2} \times 40 = \frac{360}{2} = 180 \text{ Ans.}$$

Question 17.

Rita had Rs 300. She spent $\frac{1}{3}$ of her money on notebooks and $\frac{1}{4}$ of the remainder on stationery items. How much money is left with her?

Solution:

Total amount, Rita has = Rs 300

Amount spent on notebooks = $\frac{1}{3}$ of 300

$$= ₹ \frac{300}{3} = ₹100$$

$$\text{Balance} = ₹300 - ₹100 = ₹200$$

Amount spent on stationery = $\frac{1}{4}$ of ₹200

$$= ₹200 \times \frac{1}{4} = \frac{200}{4}$$

$$= ₹50$$

$$\text{Amount left at the end} = ₹200 - ₹50$$

$$= ₹150 \text{ Ans.}$$

Question 18.

Amit earns Rs 32000 per month. He spends $\frac{1}{4}$ of his income on food; $\frac{3}{10}$ of the remainder on house rent and $\frac{5}{21}$ of the remainder on the education of children. How much money is still left with him?

Solution:

Total amount earned by Amit = Rs 32000

Amount spent on food = $\frac{1}{4}$ of Rs 32000

$$= \frac{1}{4} \times ₹32000 = ₹8000$$

$$\text{Balance} = ₹32000 - ₹8000 = ₹24000$$

Amount spent on house rent

$$= \frac{3}{10} \text{ of } ₹24000 = \frac{3}{10} \times ₹24000$$

$$= 3 \times ₹2400 = ₹7200$$

$$\text{Amount left} = ₹24000 - ₹7200 = ₹16800$$

Amount spent on education of children

$$= \frac{5}{21} \text{ of } ₹16800 = \frac{5}{21} \times ₹16800$$

$$= ₹5 \times 800 = ₹4000$$

$$\text{Amount left} = ₹16800 - ₹4000$$

$$= ₹12800 \text{ Ans.}$$

Question 19.

If $\frac{3}{5}$ of a number exceeds its $\frac{2}{7}$ by 44. Find the number.

Solution:

Let number = 1

Then difference between $\frac{3}{5}$ and $\frac{2}{7}$

$$= \frac{3}{5} - \frac{2}{7} = \frac{21-10}{35} = \frac{11}{35}$$

$$\therefore \frac{11}{35} \text{ of a number} = 44$$

$$\therefore \text{Number} = 44 \div \frac{11}{35} = 44 \times \frac{35}{11}$$

$$= \frac{1540}{11} = 140 \text{ Ans.}$$

Question 20.

At a cricket test match $\frac{2}{7}$ of the spectators were in a covered place while 15000 were in open. Find the total number of spectators.

Solution:

Let total number of spectators = 1

No. of spectators in covered place = $\frac{2}{7}$ of

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

$$\text{Balance} = 1 - \frac{2}{7}$$

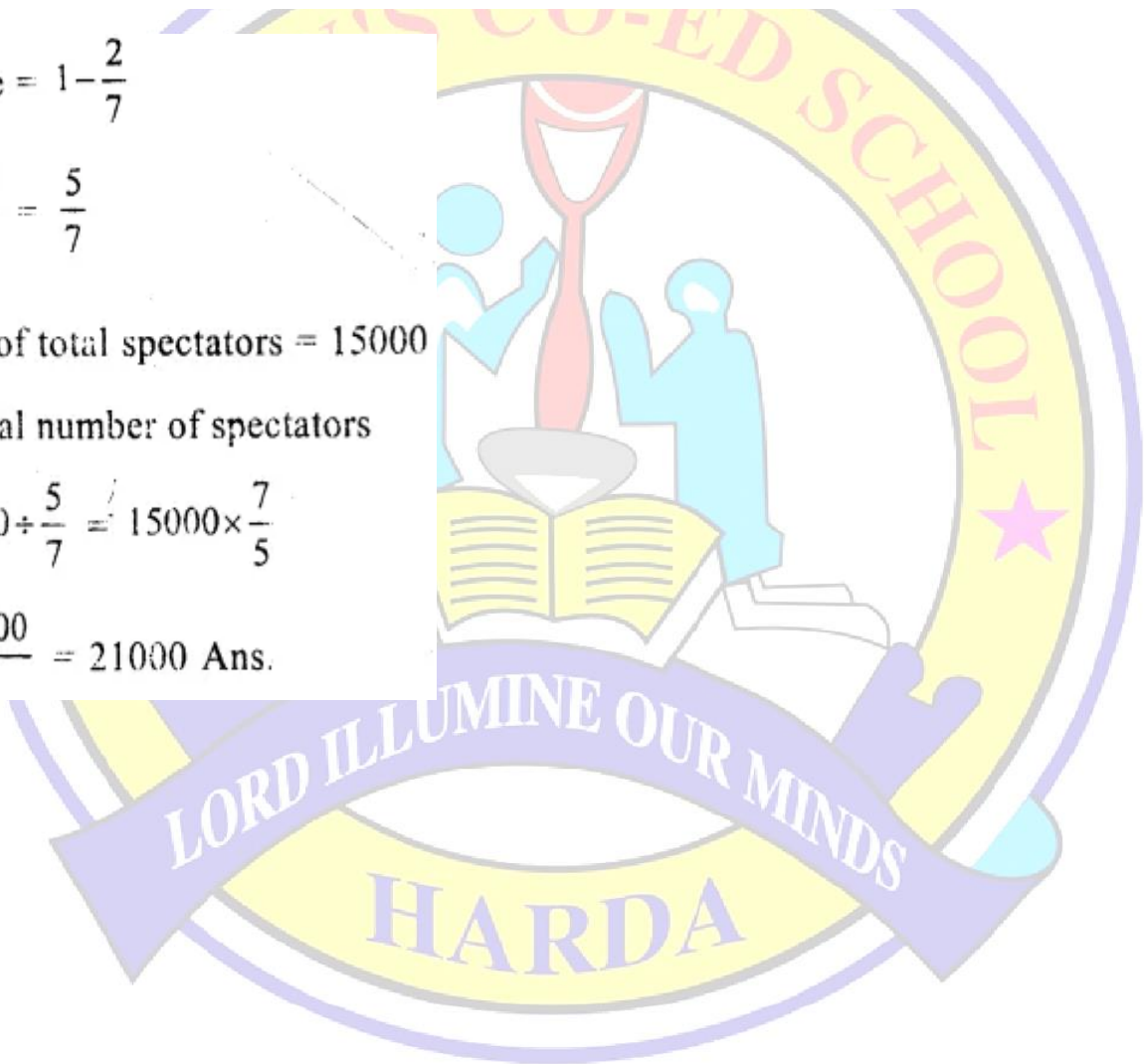
$$= \frac{7-2}{7} = \frac{5}{7}$$

$$\therefore \frac{5}{7} \text{ of total spectators} = 15000$$

$\therefore$ Total number of spectators

$$= 15000 \div \frac{5}{7} = 15000 \times \frac{7}{5}$$

$$= \frac{105000}{5} = 21000 \text{ Ans.}$$



Exercise 1H

Objective Questions :

Tick the correct answer in each of the following :

Question 1.

$$\left(\frac{-5}{16} + \frac{7}{12}\right) = ?$$

- (a) $\frac{-7}{48}$ (b) $\frac{1}{24}$ (c) $\frac{13}{48}$ (d) $\frac{1}{3}$

Solution:

Answer = (c)

$$\begin{aligned}\therefore \frac{-5}{16} + \frac{7}{12} \\ = \frac{-15+28}{48} = \frac{13}{48}\end{aligned}$$

Question 2.

$$\left(\frac{8}{-15} + \frac{4}{-3}\right) = ?$$

- (a) $\frac{28}{15}$ (b) $\frac{-28}{15}$
(c) $\frac{-4}{5}$ (d) $\frac{-4}{15}$

Solution:

$$\begin{aligned}\frac{8}{-15} + \frac{4}{-3} &= \frac{8+20}{-15} \\ &= \frac{28}{-15} = \frac{-28}{15}\end{aligned}$$

(b)

Question 3.

$$\left(\frac{7}{-26} + \frac{16}{39}\right) = ?$$

- (a) $\frac{11}{78}$ (b) $\frac{-11}{78}$
(c) $\frac{11}{39}$ (d) $\frac{-11}{39}$

Solution:

$$\begin{aligned}\frac{7}{-26} + \frac{16}{39} \\ = \frac{-21+32}{78} = \frac{11}{78}\end{aligned}$$

(a)

Question 4.

$$\left(3 + \frac{5}{-7}\right) = ?$$

(a) $\frac{-16}{7}$

(b) $\frac{16}{7}$

(c) $\frac{-26}{7}$

(d) $\frac{-8}{7}$

ANSWER:

(b) $\frac{16}{7}$

$$3 = \frac{3}{1} \text{ and } \frac{5}{-7} = \frac{-5}{7}$$

Now, we have:

$$\left(3 + \frac{5}{-7}\right) = \left(\frac{3}{1} + \frac{-5}{7}\right)$$

LCM of 1 and 7 is 7

$$\left(\frac{3}{1} + \frac{-5}{7}\right) = \frac{7 \times 3 + 1 \times (-5)}{7} = \frac{21 + (-5)}{7} = \frac{16}{7}$$

Question 5.

$$\left(\frac{31}{-4} + \frac{-5}{8}\right) = ?$$

(a) $\frac{67}{8}$

(b) $\frac{57}{8}$

(c) $\frac{-57}{8}$

(d) $\frac{-67}{8}$

Solution:

$$\begin{aligned} & \frac{31}{-4} + \frac{-5}{8} \\ &= \frac{-62 - 5}{8} = \frac{-67}{8} \end{aligned}$$

(d)

Question 6.

What should be added to $\frac{7}{12}$ to get $\frac{-4}{15}$?

(a) $\frac{17}{20}$

(b) $\frac{-17}{20}$

(c) $\frac{7}{20}$

(d) $\frac{-7}{20}$



Solution:

$$\begin{aligned} & \frac{-4}{15} - \frac{7}{12} \\ &= \frac{-16-35}{60} = \frac{-51}{60} \\ &= \frac{-51 \div 3}{60 \div 3} = \frac{-17}{20} \end{aligned} \quad (b)$$

Question 7.

$$\frac{2}{3} + \frac{-4}{5} + \frac{7}{15} + \frac{-11}{20} = ?$$

(a) $-\frac{1}{5}$ (b) $-\frac{4}{15}$ (c) $-\frac{13}{60}$ (d) $-\frac{7}{30}$

Solution:

Answer = (b)

LCM of 3, 5, 15 and 20 = 60

$$\begin{aligned} \therefore & \frac{2}{3} + \frac{-4}{5} + \frac{7}{15} + \frac{-11}{20} \\ &= \frac{40 + (-48) + 28 + (-33)}{60} \\ &= \frac{40 - 48 + 28 - 33}{60} = \frac{68 - 81}{60} = \frac{-13}{60} \end{aligned}$$

Question 8.

The sum of two numbers is $\frac{-4}{3}$. If one of the number is -5, what is the other.

(a) $\frac{-11}{3}$ (b) $\frac{11}{3}$
(c) $\frac{-19}{3}$ (d) $\frac{19}{3}$

Solution:

$$\text{Sum of two numbers} = \frac{-4}{3}$$

$$\text{One number} = -5$$

$$\text{Second number} = \frac{-4}{3} - (-5)$$

$$= \frac{-4}{3} + \frac{5}{1} = \frac{-4+15}{3} = \frac{11}{3} \quad (b)$$

Question 9.

What should be added to $\frac{-5}{7}$ to get $\frac{-2}{3}$?

- (a) $\frac{-29}{21}$ (b) $\frac{29}{21}$
(c) $\frac{1}{21}$ (d) $\frac{-1}{21}$

Solution:

$$\begin{aligned}\frac{-2}{3} - \left(\frac{-5}{7}\right) \\&= \frac{-2}{3} + \frac{5}{7} \\&= \frac{-14+15}{21} = \frac{1}{21} \quad (c)\end{aligned}$$

Question 10.

What should be subtracted from $\frac{-5}{3}$ to get $\frac{5}{6}$?

- (a) $\frac{5}{2}$ (b) $\frac{3}{2}$
(c) $\frac{5}{4}$ (d) $\frac{-5}{2}$

Solution:

Let x be subtracted

$$\begin{aligned}\frac{-5}{3} - x &= \frac{5}{6} \Rightarrow \frac{-5}{3} - \frac{5}{6} = x \\ \frac{-10-5}{6} &= \frac{-15}{6} = \frac{-15 \div 3}{6 \div 3} = \frac{-5}{2}\end{aligned}$$

Number to be subtracted = $\frac{-5}{2}$ (d)

Question 11.

$$\left(\frac{-3}{7}\right)^{-1} = ?$$

- (a) $\frac{7}{3}$ (b) $\frac{-7}{3}$
(c) $\frac{3}{7}$ (d) none of these

Solution:

$$\left(\frac{-3}{7}\right)^{-1} = \frac{-7}{3} \left(\because x^{-1} = \frac{1}{x}\right) \quad (b)$$



Question 12.

The product of two rational numbers is $\frac{-28}{81}$. If one of the numbers is $\frac{14}{27}$ then the other one is

- (a) $\frac{-2}{3}$ (b) $\frac{2}{3}$
 (c) $\frac{3}{2}$ (d) $\frac{-3}{2}$

Solution:

Product of two numbers = $\frac{-28}{81}$

One number = $\frac{14}{27}$

$$\begin{aligned}\therefore \text{Other number} &= \frac{-28}{81} \div \frac{14}{27} \\ &= \frac{-28}{81} \times \frac{27}{14} = \frac{-2}{3} \quad \text{(a)}\end{aligned}$$

Question 13.

The product of two numbers is $\frac{-16}{35}$. If one of the number is $\frac{-15}{14}$, the other is

- (a) $\frac{-2}{5}$ (b) $\frac{8}{15}$
 (c) $\frac{32}{75}$ (d) $\frac{-8}{3}$

Solution:

Answer = (c)

Let x be the required number, then

$$\begin{aligned}-\frac{15}{14} \times x &= \frac{-16}{35} \\ \Rightarrow x &= \frac{-16}{35} \div \frac{-15}{14} \\ \Rightarrow x &= \frac{-16}{35} \times \frac{14}{-15} = \frac{-224}{-525} = \frac{224}{525} \\ &= \frac{224 \div 7}{525 \div 7} = \frac{32}{75}\end{aligned}$$

Question 14.

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

- (a) $-\frac{7}{5}$ (b) $-\frac{13}{5}$ (c) $\frac{13}{5}$ (d) $\frac{7}{5}$

Solution:

Answer = (d)

Let x is to be subtracted then

$$\begin{aligned}\frac{-3}{5} - x &= -2 \Rightarrow x = -\frac{3}{5} + 2 \\ &= x = \frac{-3 + 10}{5} = \frac{7}{5}\end{aligned}$$

Question 15.

The sum of two rational numbers is -3. If one of them is $-\frac{10}{3}$ then the other one is

- (a) $-\frac{13}{3}$ (b) $-\frac{19}{3}$ (c) $\frac{1}{3}$ (d) $\frac{13}{3}$

Solution:

Answer = (c)

sum = -3, one number = $-\frac{10}{3}$

$$\therefore \text{Second number} = -3 - \left(-\frac{10}{3}\right)$$

$$= -3 + \frac{10}{3} = \frac{-9+10}{3} = \frac{1}{3}$$

Question 16.

Which of the following numbers is in standard form?

- (a) $\frac{-12}{26}$ (b) $\frac{-49}{71}$
(c) $\frac{-9}{16}$ (d) $\frac{28}{-105}$

Solution:

Answer = (c)

We know that a number is called in standard form if the numerator and denominator has no common divisor except 1.

$\frac{-9}{16}$ is in standard form.

Question 17.

$$\left(\frac{-9}{16} \times \frac{8}{15}\right) = ?$$

- (a) $\frac{-3}{10}$ (b) $\frac{-4}{15}$ (c) $\frac{-9}{25}$ (d) $\frac{-2}{5}$

Solution:

$$\begin{aligned} \frac{-9}{16} \times \frac{8}{15} &= \frac{-9 \times 8}{16 \times 15} = \frac{-72}{240} \\ &= \frac{-72 \div 24}{240 \div 24} = \frac{-3}{10} \end{aligned}$$

(a)

Question 18.

$$\left(\frac{-5}{9} \div \frac{2}{3}\right) = ?$$

- (a) $\frac{-5}{2}$ (b) $\frac{-5}{6}$
(c) $\frac{-10}{27}$ (d) $\frac{-6}{5}$

Solution:

Answer = (b)

$$-\frac{5}{9} \div \frac{2}{3} = \frac{-5}{9} \times \frac{3}{2} = \frac{-5 \times 3}{9 \times 2} = \frac{-15}{18}$$
$$= \frac{-15 \div 3}{18 \div 3} = \frac{-5}{6}$$

Question 19.

$$\frac{4}{9} \div ? = \frac{-8}{15}$$

- (a) $\frac{-32}{45}$ (b) $\frac{-8}{5}$
(c) $\frac{-9}{10}$ (d) $\frac{-5}{6}$

Solution:

Answer = (d)

Let x is required rational

$$\therefore \frac{4}{9} \div x = \frac{-8}{15} \Rightarrow \frac{4}{9} \times \frac{1}{x} = \frac{-8}{15}$$

$$\frac{1}{x} = \frac{-8}{15} \times \frac{9}{4} = \frac{-72}{60} = \frac{-72 \div 12}{60 \div 12} = \frac{-6}{5}$$

$$\therefore x = \frac{-5}{6}$$

Question 20.

Additive inverse of $\frac{-5}{9}$ is

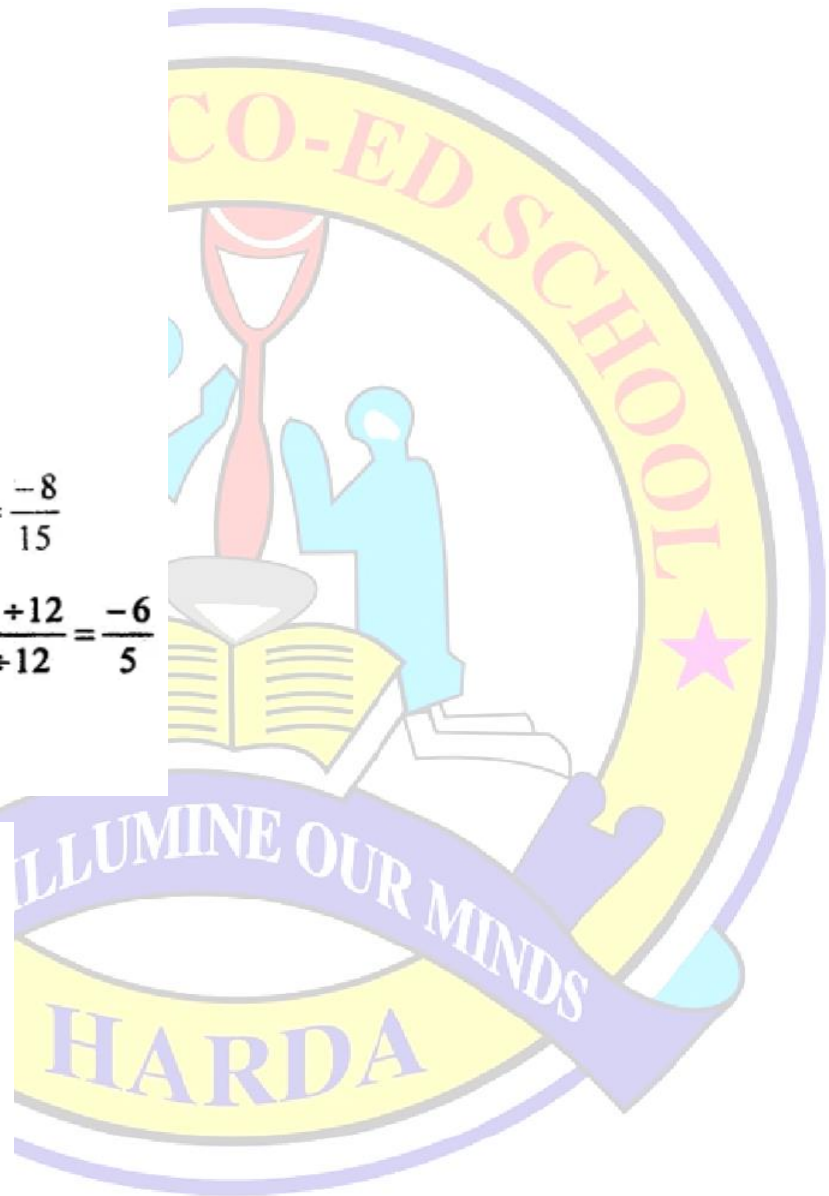
- (a) $\frac{-9}{5}$ (b) 0
(c) $\frac{5}{9}$ (d) $\frac{9}{5}$

Solution:

Additive inverse of $\frac{-5}{9}$ is $= -\left(\frac{-5}{9}\right)$

(c) $\frac{5}{9}$

Additive inverse of $\frac{-5}{9}$ is $\frac{5}{9}$.



Question 21.

Reciprocal of $\frac{-3}{4}$ is

- (a) $\frac{4}{3}$ (b) $\frac{3}{4}$
(c) $\frac{-4}{3}$ (d) 0

Solution:

Reciprocal of $\frac{-3}{4}$ is $\frac{-4}{3}$

(c) $\frac{-4}{3}$

Question 22.

A rational number between $\frac{-2}{3}$ and $\frac{1}{4}$ is

- (a) $\frac{5}{12}$ (b) $\frac{-5}{12}$
(c) $\frac{5}{24}$ (d) $\frac{-5}{24}$

Solution:

A rational number between $\frac{-2}{3}$ and $\frac{1}{4}$ is

$$\begin{aligned}\frac{1}{4} \text{ will be } &= \frac{1}{2} \left(\frac{-2}{3} + \frac{1}{4} \right) \\ &= \frac{1}{2} \left(\frac{-8+3}{12} \right) \\ &= \frac{1}{2} \times \frac{-5}{12} = \frac{-5}{24}\end{aligned}$$

(d)

Question 23.

The reciprocal of negative rational number

- (a) is a positive rational number.
(b) is a negative rational number
(c) can be either a positive or negative rational number
(d) does not exist

Solution:

Answer = (b)

The reciprocal of a negative rational number is also a negative rational number.