Chapter 3

Rational Numbers

Exercise 3.1

Question 1.

Which of the following are positive rational numbers?

$\frac{5}{8}, \frac{-3}{11}, \frac{0}{5}, 7, -4, \frac{-3}{-13}, \frac{-17}{-6}, \frac{9}{-20}$

Solution :

$\frac{5}{8}, \frac{0}{5}, 7, \frac{-3}{-13}$ *or* $\frac{3}{13}, \frac{-17}{-6}$ *or* $\frac{17}{6}$ are positive rational numbers.

Question 2.

Which of the following are negative rational numbers?

$\frac{-5}{7}, \frac{4}{-3}, \frac{-3}{-11} - 6, 9, 0, \frac{-28}{5}, \frac{31}{7}$

Solution :

$\frac{-5}{7}, \frac{4}{-3}, -6, \frac{-28}{5}$, are negative rational numbers.

Question 3.

Find four rational numbers equivalent to each of the following rational numbers:

(i) $\frac{3}{-7}$

(b) $\frac{-5}{-9}$

Solution :

(i) $\frac{3}{-7}$ first (multiply and divide by 2)

$\Longrightarrow \frac{3}{-7} \times \frac{2}{2} = \frac{6}{-14}$

Second (multiply and divide by 3)

$\Longrightarrow \frac{3}{-7} \times \frac{3}{3} = \frac{9}{-21}$

Third (Multiply and divide by 4)

$\Longrightarrow \frac{3}{-7} \times \frac{4}{4} = \frac{12}{-28}$

Fourth, (multiply and divide by 5)

$\Longrightarrow \frac{3}{-7} \times \frac{5}{5} = \frac{15}{-35}$

Hence for equivalent rational numbers are:

$\frac{6}{-14}, \frac{9}{-21}, \frac{12}{-28}, \frac{15}{-35}$

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

First equivalent rational number

$\frac{-5}{-9}$ (Multiply and divide by 2)

$\Longrightarrow \frac{-5}{-9} \times \frac{2}{2} = \frac{-10}{-18}$

Second, $\frac{-5}{-9}$ (Multiply and divide by 3)

$\Longrightarrow \frac{-5}{-9} \times \frac{3}{3} = \frac{-15}{-27} = \frac{15}{27} = \frac{5}{9}$

Third, $\frac{-5}{-9}$ (Multiply and divide by 4)

$\Longrightarrow \frac{-5}{-9} \times \frac{4}{4} = \frac{-20}{-36} = \frac{20}{36}$

Hence four equivalent rational numbers are:

$\frac{-10}{-18}, \frac{-15}{-27}, \frac{5}{9}, \frac{20}{36}$

Question 4.

Write each of the following rational numbers with positive denominators:

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

(ii) $\frac{17}{-33}$

(iii) $\frac{-15}{-38}$

Solution

(i) $\frac{4}{-9} = \frac{-4}{9}$

(ii) $\frac{17}{-33} = \frac{-17}{33}$

(iii) $\frac{-15}{-38} = \frac{15}{38}$

Question 5.

Write next four rational numbers in each of the following petterns:

(i) $\frac{-1}{4}, \frac{-2}{8}, \frac{-3}{12}, \frac{-4}{16}$, ...

(ii) $\frac{2}{-3}$, $\frac{-4}{6}, \frac{-6}{9}, \frac{-8}{12}$, ...

Solution :

Next four rational numbers in the same patterns.

(i) $\frac{-1}{4}$, $\frac{-2}{8}, \frac{-3}{12}, \frac{-4}{16}, \frac{-5}{20}$, $\frac{-6}{24}, \frac{-7}{28}, \frac{-8}{32}$

(ii) $\frac{2}{-3}$, $\frac{-4}{6}, \frac{-6}{9}, \frac{-8}{12}, \frac{-10}{15}$, $\frac{-12}{18}, \frac{-14}{21}, \frac{-16}{24}$,

Question 6.

Which of the following pairs of rational numbers are equeal?

(i) $\frac{-3}{-7}$ and $\frac{15}{35}$

(ii) $\frac{-6}{8}$ and $\frac{10}{-15}$

(iii) $\frac{6}{-10}$ and $\frac{-12}{20}$

Solution :

(i) $\frac{-3}{-7}$ and $\frac{15}{35} = \frac{15}{35} = \frac{3}{7}$

-3 × 35 = 15 × (-7)

= -105 = -105

(ii) $\frac{-6}{8}$ and $\frac{10}{-15}$

If -6 × (-15) = 10 × 8

90 = 80 which is not true?

$\frac{-6}{8} \neq \frac{10}{-15}$

(iii) $\frac{6}{-10} \neq \frac{-12}{20}$

120 = 120 which is true

$\frac{6}{-10} = \frac{-12}{20}$

Question 7.

Which of the following pairs represent the same rational number

(i) - $\frac{7}{21}, \frac{3}{9}$

(ii) $\frac{-16}{20}$, $\frac{20}{-25}$

(iii) $\frac{-3}{5}$, $\frac{-12}{20}$

(iv) $\frac{8}{-5}$, $\frac{-24}{15}$

Solution :

(i) - $\frac{7}{21}$, $\frac{3}{9}$

= - $\frac{7}{21}$, $\frac{-1}{3}$

= $\frac{3}{9}$, $\frac{1}{3}$

From (i) and (ii)

$\frac{-1}{3} \neq \frac{1}{3}$

$\frac{-7}{21}$ *and* $\frac{3}{9}$ are not same rational numbers.

(ii) $\frac{-3}{5}$, $\frac{-12}{20}$

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

$\frac{-3}{5} = \frac{-3}{5}$ ..... (ii)

$\frac{-3}{5}, \frac{-12}{20}$ are same rational numbers.

(iv) $\frac{8}{-5}, \frac{-24}{15}$

$\frac{8}{-5} = \frac{-8}{5}$ ..... (i)

$\frac{-24}{15} = \frac{-8}{5}$ ..... (ii)

From (i) and (ii) $\frac{8}{-5}, \frac{-24}{15}$ are some rational numbers.

Question 8

Fill in the blanks :

(i) $\frac{5}{4} = \frac{....}{16} = \frac{25}{.....} = \frac{-15}{...}$

(ii) $\frac{-3}{7} = \frac{....}{14} = \frac{6}{....} = \frac{-6}{.....}$

Solution :

(i) $\frac{5}{4} = \frac{....}{16} = \frac{25}{.....} = \frac{-15}{...}$

$= \frac{5}{4} = \frac{5\times4}{4\times4} = \frac{20}{16}$

$\frac{25}{...} = \frac{5\times5}{4\times5} = \frac{25}{20}$

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

(ii) $\frac{-3}{7} = \frac{....}{14} = \frac{6}{....} = \frac{-6}{....}$

$= \frac{-3}{7} = \frac{-3\times2}{7\times2} = \frac{-6}{14}$

$= \frac{-3\times(-3)}{7\times(-3)} = \frac{9}{-21}$

$= \frac{-3\times2}{7\times2} = \frac{-6}{14}$

$= \frac{-3}{7} = \frac{-6}{14} = \frac{9}{-21} \neq \frac{-6}{14}$

Question 9.

Reduce each of the following rational numbers in standard

(i) $\frac{-45}{30}$

(ii) $\frac{16}{-36}$

(iii) $\frac{-3}{-15}$

(iv) $\frac{68}{-119}$

Solution :

(i) $\frac{-45}{30} = \frac{-45\div3}{30\div3} = \frac{-3}{2}$ (H.C.F 45,30 .... 15)

(ii) $\frac{16}{-36} = \frac{16\div4}{-36\div4} = \frac{4}{-9}$ (H.C.F 16, 36 ..... 4)

(iii) $\frac{-3}{-15} = \frac{-3\div(-3)}{-15\div(-3)} = \frac{1}{5}$ (H.C.F 3,15.....3)

(iv) $\frac{68}{-119} = \frac{68\div17}{-119\div17} = \frac{4}{-7}$ (H.C.F 68,119..... 17)

Exercise 3.2

Question 1.

Draw a number line and represent the following rational number it:

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

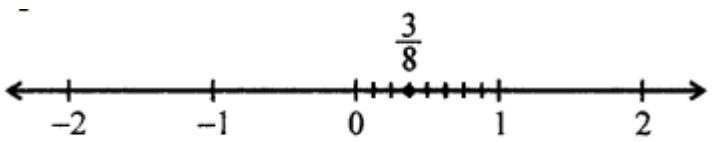
(ii) $\frac{-3}{4}$

(iii) $\frac{-7}{8}$

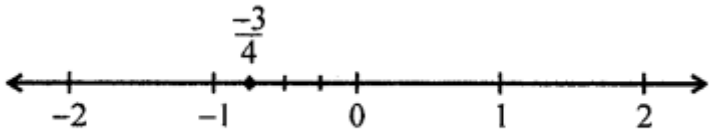
(iv) $\frac{-17}{8}$

Solution :

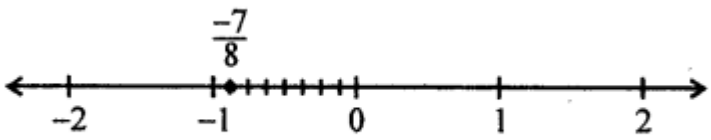
(i) $\frac{3}{8}$



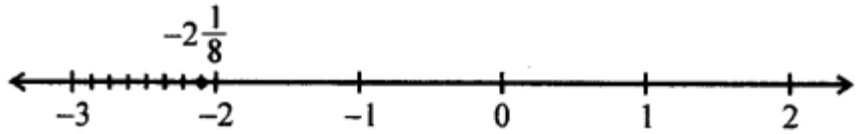
(ii) $\frac{-3}{4}$



(iii) $\frac{-7}{8}$

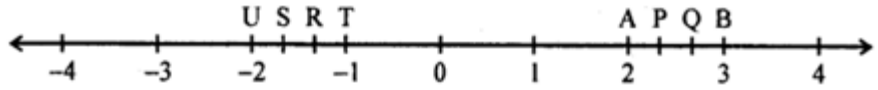


(iv) $\frac{-17}{8}$



Question 2.

The points P,Q,R,S,T,U,A and B on the number line are TR = RS=SU and AP = PQ = QB . name the rational number represented by P,Q,R, and S respectively.



Solution :

Points P,Q,R,S,T,U,A and B are on numbers line such that TR = RS = SU and AP = PQ = QB.

From the number line, we see that

TU = -1 then TR = RS = SU = $\frac{-1}{3}$

And AB = 1 , then

AP = PQ = QB = $\frac{1}{3}$

The point P represents = $2 + \frac{1}{3} = 2\frac{1}{3} = \frac{7}{3}$

Q represents = $2 + \frac{2}{3} = 2\frac{2}{3} = \frac{8}{3}$

R represents = $-1 - \frac{2}{3} = -\frac{5}{3}$

Question 3.

State whether the following statements are true or false:

(i) The rational number - $\frac{-13}{-5}$ lies to the right of zeroxin the number line.

(ii) The rational numbers $\frac{-5}{-7}$ and $\frac{7}{-9}$ lie on opposite sides of zero on the number line.

(iii) the rational numbers $\frac{-17}{6}$ and $\frac{8}{-15}$ lie on opposite sides of zero on the number line.

Solution :

On a number line,

(i) $\frac{-13}{-5} = \frac{13}{5}$ which lies to the right said of zero **(True)**

(ii) $\frac{-5}{-7} = \frac{5}{7}$ and $\frac{7}{-9} = \frac{-7}{9}$ lie on opposite sides of zero **(True).**

(iii) $\frac{-17}{6}$ and $\frac{8}{-15}$ $= \frac{-8}{15}$ lie on the same side of zero.

On opposite sides is false. **(False)**

Question 4.

Which on the two rational numbers is greater in each of the following pairs?

(i) $\frac{-4}{7}$, 0

(ii) $\frac{5}{-9}$, $\frac{3}{7}$

(iii) $\frac{-9}{-5}$, 0

(iv) $\frac{7}{-5}$,$\frac{-21}{-23}$

Solution :

(i) $\frac{-4}{7}$, 0

0 is greater than $\frac{-4}{7}$

(ii) $\frac{5}{-9}$, $\frac{3}{7}$

$\frac{3}{7}$ is greater than $\frac{5}{-9}$

(iii) $\frac{-9}{-5}$, 0

$\frac{9}{5}$ is greater than 0

(iv) $\frac{7}{-5}$, $\frac{-21}{-23} = \frac{21}{23}$

$\frac{21}{23}$ is greater than $\frac{7}{-5}$

Question 5.

Fill in the boxes with the correct symbol out or > ,< and =

(i) $\frac{-4}{5} \square \frac{-5}{7}$

(ii) $\frac{-8}{5} \square \frac{-7}{4}$

(iii) $\frac{-7}{8} \square \frac{42}{-48}$

(iv) $\frac{1}{-3} \square \frac{-1}{4}$

(v) $-\frac{3}{8} \square -\frac{2}{7}$

(vi) $\frac{-4}{3}$ $\square$ $-\frac{3}{2}$

Solution

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

LCM of 5,7 = 35

$\frac{-4}{5} = \frac{-4\times7}{5\times7} = \frac{-28}{35}$

$\frac{-5}{7} = \frac{-5\times5}{5\times7} = \frac{-25}{35}$

$\frac{-28}{35} < \frac{-25}{35}$

$= \frac{-4}{5}$ $\boxed{<}$ $\frac{-5}{7}$

(ii) $\frac{-8}{5}$ $\square$ $\frac{-7}{4}$

LCM of 5,4 = 20

$\frac{-8}{5} = \frac{-8\times4}{5\times4} = \frac{-32}{20}$

$\frac{-7}{4} = \frac{-7\times5}{5\times4} = \frac{-35}{20}$

$\frac{-32}{20} > \frac{-35}{20}$

$\frac{-8}{5}$ $\boxed{>}$ $\frac{-7}{4}$

(iii) $\frac{-7}{8}$ $\square$ $\frac{42}{-48}$

LCM of 8, 48 = 48

$\frac{-7}{8} = \frac{-7\times6}{8\times6} = \frac{-42}{48}$

$\frac{-42}{48} = \frac{42}{-48}$

$\frac{-7}{8} \boxed{\quad =} \frac{42}{-48}$

(iv) $\frac{1}{-3} \boxed{\quad} \frac{-1}{4}$

LCM of 3,4 = 12

$\frac{1}{-3} = \frac{1\times4}{-3\times4} = \frac{-4}{12}$

$\left[\frac{1}{3} = \frac{1\times(-1)}{-3\times(-1)} = \frac{-1}{3}\right]$

$\frac{1}{-3} = \frac{1\times3}{4\times3} = \frac{-3}{12}$

$\frac{-4}{12} < \frac{-3}{12}$

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

(v) $-\frac{3}{8} \boxed{\quad} -\frac{2}{7}$

LCM of 8,7 = 56

$\frac{3}{8} = -\frac{3\times7}{8\times7} = -\frac{21}{56}$

$\frac{2}{7} = -\frac{2\times8}{8\times7} = -\frac{16}{56}$

$= -\frac{21}{56} < -\frac{16}{56}$

$= -\frac{3}{8} \boxed{\quad <} -\frac{2}{7}$

(vi) $\frac{-4}{3}$ $\square$ $-\frac{3}{2}$

LCM of 8,7 = 56

$\frac{-4}{3} = \frac{-4\times2}{3\times2} = \frac{-8}{6}$

$-\frac{3}{2} = -\frac{3\times3}{2\times3} = -\frac{9}{6}$

$\frac{-8}{6} > -\frac{9}{6}$

$\frac{-4}{3}$ $\boxed{>}$ $-\frac{3}{2}$

Question 6.

Arrange the following rational numbers in ascending order:

(i) $\frac{-3}{7}, \frac{-3}{2}, \frac{-3}{4}$

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

Solution .

Arranging and ascending order:

(i) $\frac{-3}{7}, \frac{-3}{2}, \frac{-3}{4}$

Numerator are the same:

Greater denominator is less than the smaller denominator.

$\frac{-3}{2} < \frac{-3}{4} < \frac{-3}{7}$

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

LCM of 4, 12, 24, 16 = 48

$\frac{-3}{4} = \frac{-3\times12}{4\times12} = \frac{-36}{48}$

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

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

$\frac{-7}{16} = \frac{-7\times3}{16\times3} = \frac{-21}{48}$

Arranging in ascending order,

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

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

Question 7.

Arrange the following rational numbers in descending order:

(i) $\frac{-3}{10}, \frac{-11}{20}, \frac{-7}{15}, \frac{17}{-30}$

(ii) $\frac{-7}{10}, \frac{-11}{15}, \frac{2}{-5}, \frac{19}{-30}$

Solution :

(i) $\frac{-3}{10}, \frac{-11}{20}, \frac{-7}{15}, \frac{17}{-30}$

LCM of 10,20,15,30 = 6

$\frac{-3}{10} = \frac{-3\times6}{10\times6} = \frac{-18}{60}$

$\frac{-11}{20} = \frac{-11\times3}{20\times3} = \frac{-33}{60}$

$\frac{-7}{15} = \frac{-7\times4}{15\times4} = \frac{-28}{60}$

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

Arranging in ascending order,

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

$\frac{-3}{10} < \frac{-7}{15} < \frac{-11}{20} < \frac{-34}{60}$

(ii) $\frac{-7}{10}, \frac{-11}{15}, \frac{2}{-5}, \frac{19}{-30}$

Solution :

LCM of 10,15,5,30 = 30

$\frac{-7}{10} = \frac{-7\times3}{10\times3} = \frac{-21}{30}$

$\frac{-11}{15} = \frac{-11\times2}{15\times2} = \frac{-22}{30}$

$\frac{-2}{5} = \frac{2\times(-6)}{-5\times(-6)} = \frac{-12}{30}$

$\frac{-19}{30} = \frac{-19\times(-1)}{-30\times(-1)} = \frac{-19}{30}$

Arranging in ascending order,

$\frac{-12}{30} < \frac{-19}{30} < \frac{-21}{30} < \frac{-22}{30}$

$\frac{2}{-5} < \frac{19}{-30} < \frac{-7}{10} < \frac{-11}{15}$

Question 8.

Insert five rational numbers between:

(i) -3 and -2

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

Solution :

(i) 5 rational numbers between -3 and -2

$\frac{-3}{1}, \frac{-2}{1}$

We have to find 5 rational numbers between -3 and -2 multiplying by (5+1) = 6 to numerator and denominator

$\frac{-3}{1} = \frac{-3\times6}{1\times6} = \frac{-18}{6}$

And $\frac{-2}{1} = \frac{-2\times6}{1\times6} = \frac{-12}{6}$

Five rational numbers between -3 and -2 are

$\frac{-17}{6}, \frac{-16}{6}, \frac{-15}{6}, \frac{-14}{6}, \frac{-13}{6}$

$\frac{-17}{6}, \frac{-8}{3}, \frac{-5}{2}, \frac{-7}{3}, \frac{-13}{6}$

(ii) 5 rational numbers between $\frac{-2}{3}$ and $\frac{-1}{3}$

Multiply number and denominator by

5+1 = 6 therefore,

$\frac{-2}{3} = \frac{-2\times6}{3\times6} = \frac{-12}{18}$ and

$\frac{-1}{3} = \frac{-1\times6}{3\times6} = \frac{-6}{18}$

Five rational numbers will be

$\frac{-11}{18}, \frac{-10}{18}, \frac{-9}{18}, \frac{-8}{18}, \frac{-7}{18}$

$\frac{-11}{18}, \frac{-5}{18}, \frac{-1}{18}, \frac{-4}{18}, \frac{-7}{18}$

Question 9.

Insert five rational numbers between :

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

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

Solution :

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

LCM of 3,5 = 15

$\frac{-4}{5} = \frac{-4\times3}{5\times3} = \frac{-12}{15}$ and

$\frac{-2}{3} = \frac{-2\times5}{3\times5} = \frac{-10}{15}$

Between -10 and -12 there are is one rational

Multiplying numerator and denominator by

5+ 1 = 6

$\frac{-12}{15} = \frac{-12\times6}{15\times6} = \frac{-72}{90}$

$\frac{-10}{15} = \frac{-10\times6}{15\times6} = \frac{-60}{90}$

5 rational numbers between $\frac{-72}{90}$ and $\frac{-60}{90}$

$\frac{-71}{90}, \frac{-70}{90}, \frac{-69}{90}, \frac{-68}{90}, \frac{-67}{90}$

$\frac{-71}{90}, \frac{-7}{90}, \frac{-23}{90}, \frac{-34}{90}, \frac{-67}{90}$

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

LCM of 2,3 = 6

- $\frac{1}{2} = \frac{-1\times3}{2\times3} = \frac{-3}{6}$

$\frac{2}{3} = \frac{2\times2}{3\times2} = \frac{4}{6}$

Now 5 rational numbers between

- $\frac{1}{2}$ *and* $\frac{2}{3}$

$\frac{-2}{6}, \frac{-1}{6}, \frac{1}{6}, \frac{2}{6}, \frac{3}{6}$

Exercise 3.3

Question 1.

Add the following pairs of rational numbers:

(i) $\frac{3}{11}, \frac{-5}{11}$

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

(iii) $\frac{5}{-7}, \frac{-2}{7}$

(iv) $\frac{-2}{5}, \frac{3}{4}$

Solution :

(i) $\frac{3}{11}, \frac{-5}{11}$

$= \frac{3}{11} + \frac{-5}{11}$

$= \frac{3-5}{11}$

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

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

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

$= \frac{4}{9} + \frac{5\times(-1)}{-9\times(-1)}$

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

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

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

(iii) $\frac{5}{-7}, \frac{-2}{-7}$

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

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

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

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

$= \frac{-3}{7}$

(iv) $\frac{-2}{5}, \frac{3}{4}$

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

$= \frac{(-2\times4)+(3\times5)}{20}$

$= \frac{-8+15}{20}$

$= \frac{7}{20}$

Question 2.

Find the sum.

(i) $\frac{-27}{4}+\frac{15}{8}$

(ii) $\frac{-1}{18}+\frac{-3}{8}$

(iii) $-3\frac{1}{6}+2\frac{3}{8}$

(iv) $-2\frac{4}{5}+4\frac{3}{10}$

Solution .

(i) $\frac{-27}{4}+\frac{15}{8}$

$=\frac{27\times(-1)}{-4\times(-1)}+\frac{-15}{8}$

$=\frac{-27}{4}+\frac{15}{8}$

$=\frac{(-27\times2)+(-15)}{8}$

$=\frac{-54+(-15)}{8}$

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

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

(ii) $\frac{-1}{18}+\frac{-3}{8}$

$=\frac{(-1\times4)+(-3\times9)}{72}$ (LCM 18 , 8 = 72)

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

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

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

(iii) $-3\frac{1}{6} + 2\frac{3}{8}$

$= \frac{-19}{6} + \frac{19}{8}$

$= \frac{(-19\times4)+(19\times3)}{24}$ (LCM 6,8 = 24)

$= \frac{-76+54}{24}$

$= \frac{-19}{24}$

(iv) $-2\frac{4}{5} + 4\frac{3}{10}$

$= \frac{-14}{5} + \frac{43}{10}$

$= \frac{(-14\times2)+43}{10}$ (LCM 5,10 = 10)

$= \frac{-28+43}{10}$

$= \frac{15}{10}$

$= \frac{3}{2}$

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

Question 3.

(i) $\frac{-6}{13} from \frac{4}{13}$

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

(iii) $\frac{5}{9} from \frac{-2}{3}$

Solution .

(i) $\frac{-6}{13} from \frac{4}{13}$

$= \frac{4}{13} - \frac{-6}{13}$

$= \frac{4}{13} + \frac{-6}{13}$

$= \frac{4+6}{13}$

$= \frac{10}{13}$

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

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

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

$= \frac{-4+3}{6}$

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

(iii) $\frac{5}{9} from \frac{-2}{3}$

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

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

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

Question 4.

Find .

(i) $\frac{5}{63} - \left(\frac{-6}{21}\right)$

(ii) $\frac{-6}{13} - \left(\frac{-7}{15}\right)$

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

Solution :

(i) $\frac{5}{63} - \left(\frac{-6}{21}\right)$

$= \frac{5}{63} - \frac{6}{21}$

$= \frac{5+18}{63}$

$= \frac{23}{63}$ (LCM of 63,21 = 63)

(ii) $\frac{-6}{13} - \left(\frac{-7}{15}\right)$

$= \frac{-6}{13} + \frac{7}{15}$

$= \frac{-90+91}{195}$

$= \frac{1}{195}$ (LCM of 13,15 = 195)

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

$= \frac{25}{8} + \frac{11}{6}$

$= \frac{75+44}{24}$

$= \frac{119}{24}$

$= 4\frac{23}{24}$

Question 5.

The sum of two rational numbers is $\frac{2}{5}$ if one of them is $\frac{-4}{7}$ find the other.

Solution :

Sum of two rational numbers = $\frac{2}{5}$

One of them = $\frac{-4}{7}$

Other = $\frac{2}{5} - \frac{-4}{7}$

$= \frac{14+20}{35}$

$= \frac{34}{35}$

Question 6.

What rational number should added to $\frac{-5}{12}$ to get $\frac{-7}{8}$?

Solution :

Sum of two rational numbers = $\frac{-7}{8}$

One number = $\frac{-5}{12}$

Required number = $\frac{-7}{8} - \frac{-5}{12}$

= $\frac{-7}{8} + \frac{5}{12}$

= $\frac{-21+10}{24}$ (LCM of 8,12 = 24)

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

Question 7.

What rational number should be subtracted from $\frac{-2}{3}$ to get $\frac{-5}{6}$?

Solution :

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

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

= $\frac{1}{6}$

Question 8.

Find the product:

(i) $\frac{2}{3} \times \frac{-7}{8}$

(ii) $\frac{-6}{7} \times \frac{5}{7}$

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

(iv) $\frac{-5}{11} \times \frac{11}{-5}$

(v) $\frac{8}{35} \times \frac{21}{-32}$

(vi) $\frac{-105}{128} \times (1 - \frac{29}{35})$

Solution :

(i) $\frac{2}{3} \times \frac{-7}{8}$

$= \frac{1 \times (-7)}{3 \times 4}$

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

(ii) $\frac{-6}{7} \times \frac{5}{7}$

$= \frac{-6 \times 5}{7 \times 7}$

$= \frac{-30}{49}$

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

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

$= \frac{-2\times(-5)}{9\times1}$

$= \frac{10}{9}$

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

(iv) $\frac{-5}{11} \times \frac{11}{-5}$

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

$= 1$

(v) $\frac{8}{35} \times \frac{21}{-32}$

$= \frac{1\times3}{5\times(-4)}$

$= \frac{3}{-20}$

$= \frac{-3}{20}$

(vi) $\frac{-105}{128} \times (1 - \frac{29}{35})$

$= \frac{-105}{128} \times \frac{-64}{35}$

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

$= \frac{3}{2}$

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

Question 9.

Find the value of:

(i) $(-6) \div \frac{2}{5}$

(ii) $\frac{-1}{10} \div \frac{-8}{5}$

(iii) $\frac{-65}{14} \div \frac{13}{7}$

(iv) $(-6) \div 3\frac{3}{5}$

(v) $\frac{-48}{49} \div \frac{72}{-35}$

(vi) $3\frac{1}{7} \div \frac{-33}{34}$

Solution :

(i) $(-6) \div \frac{2}{5}$

$= (-6) \times \frac{5}{2}$

$= -3 \times 5$

$= -15$

(ii) $\frac{-1}{10} \div \frac{-8}{5}$

$= \frac{-1}{10} \times \frac{5}{-8}$

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

$= \frac{1}{16}$

(iii) $\frac{-65}{14} \div \frac{13}{7}$

$= \frac{-65}{14} \times \frac{-7}{13}$

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

$= \frac{5}{2}$

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

(iv) $(-6) \div 3\frac{3}{5}$

$= (-6) \div \frac{18}{5}$

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

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

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

(v) $\frac{-48}{49} \div \frac{72}{-35}$

$= \frac{-48}{49} \div \frac{-35}{72}$

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

$= \frac{10}{21}$

(vi) $3\frac{1}{7} \div \frac{-33}{34}$

$= \frac{22}{7} \div \frac{-33}{34}$

$= \frac{22}{7} \div \frac{-34}{33}$

$= \frac{2 \times 34}{7 \times 1 - 3}$

$= \frac{68}{-21}$

$= \frac{-68}{21}$

$= -3\frac{5}{21}$

Question 10.

The product of two rational numbers is $\frac{18}{35}$ if one of them is $\frac{-2}{5}$

Find the other.

Solution :

Product of two rational numbers = $\frac{18}{35}$

One of them = $\frac{-2}{5}$

Second number = $\frac{18}{35} \div \frac{-2}{5}$

$= \frac{18}{35} \times \frac{-2}{5}$

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

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

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

Question 11

Find the value of :

(i) $\left(\frac{13}{21} \div \frac{39}{42}\right) \times \left(\frac{-3}{5}\right)$

(ii) $\left(-5\frac{5}{21}\right) \div \left(\frac{7}{11} \times \frac{5}{12}\right)$

Solution .

$(i) = \left(\frac{13}{21} \div \frac{39}{42}\right) \times \left(\frac{-3}{5}\right)$

$= \left(\frac{13}{21} \times \frac{42}{39}\right) \times \left(\frac{-3}{5}\right)$

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

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

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

(ii) $\left(-5\frac{5}{21}\right) \div \left(\frac{7}{11} \times \frac{5}{12}\right)$

$= \left(\frac{-110}{21}\right) \div \left(\frac{7}{11} \times \frac{5}{12}\right)$

$= \frac{-110}{21} \div \frac{35}{132}$

$= \frac{-110}{21} \times \frac{132}{35}$

$= \frac{-22 \times 44}{7 \times 7}$

$= \frac{-968}{49}$

$= -19\frac{37}{49}$

Question 12

Find the reciprocal of the following .

(i) $\frac{3}{13} \div \frac{-4}{65}$

(ii) $\left(-5 \times \frac{12}{15}\right) - \left(-3 \times \frac{2}{9}\right)$

Solution :

(i) $\frac{3}{13} \div \frac{-4}{65}$

$= \frac{3}{13} \times \frac{65}{-4}$

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

$= \frac{15}{-4}$

Reciprocal of it = $\frac{15}{-4}$

Reciprocal of it = $\frac{15}{-4}$

(ii) $\left(-5 \times \frac{12}{15}\right) - \left(-3 \times \frac{2}{9}\right)$

= (-4) - $\frac{-2}{3}$

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

$= \frac{-12+2}{3}$

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

Reciprocal of it $= \frac{-3}{10}$

Rational Numbers objective type Question

Question 1.

Fill in the blanks:

(i) Two rational numbers are called equivalent if they have value.

(ii) The number $\frac{-4}{7}$ lies to the ..... of zero on the number

(iii) The rational number $\frac{-5}{-11}$ lies to the .... of zero on the line.

(iv) The rational number $\frac{84}{156}$ reduced to simplest form is....

(v) The standard form of the rational number $\frac{14}{-12}$ is .....

(vi) there are .... rational numbers between two different rational numbers.

(vii) Two rational numbers are equal if an only if $q \times r$ .....

(viii) The multiplicative inverse of $-3\frac{1}{5}$ is ....

(ix) $\frac{-3}{7} \div \frac{-7}{3}$ = ...

(x) If P and Q are positive integers, then pq is a ..... rational number and $\frac{p}{-q}$ is a ....

Solution :

(i) Two rational numbers are called equivalent if they have value.sam value.

(ii) The number $\frac{-4}{7}$ lies to the left of zero on the number line.

(iii) The rational number $\frac{-5}{-11}$ or $\frac{5}{11}$ lies to the right of zero on the numbers line.

(iv) The rational number $\frac{84}{156}$ reduced to simplest form is $\frac{-7}{13}$

(v) The standard form of the rational number $\frac{14}{-12}$ is $\frac{-7}{6}$

(vi) there are infinitely many rational numbers between two different rational numbers.

(vii) Two rational numbers pq and rs are equal if an only if q × r $p \times s$

(viii) The multiplicative inverse of -3$\frac{1}{5}$ is $\frac{-5}{16}$

(ix) $\frac{-3}{7} \div \frac{-7}{3}$ = ...

$= \frac{-3}{7} \times \frac{3}{-7} = \frac{-9}{49} \div \frac{9}{49}$

(x) If P and Q are positive integers, then pq is a positive . rational number and $\frac{p}{-q}$ is a negative rational number.

Question 2.

State whether the following statements are true (T) of false (F) .

(i) zero is the smallest rational number.

(ii) Every integer is a rational number.

(iii) Every rational number is an integer.

(iv) Every fraction is a rational number.

(v) Every rational number is a fraction.

(vi) The reciprocal of -1 is -1.

(vii) The quotient of two integers is always a rational number.

(viii) The value of a rational number remains the same if both its numerator and denominator are multiplied (or divided) by the same (nonzero) integer.

(ix) Between two distinct integers, we can always insert an integer.

(x) Between two distinct rational numbers, we can always insert a rational number.

(xi) There exists atheist one integer between two different rational numbers.

(xii) The reciprocal of $2\frac{6}{7}$ is $\frac{-7}{20}$.

(xiii) All terminating decimal numbers are rational numbers.

Solution

(i) Zero is the smallest rational number. **(False)**

Correct:

(There is no end of smallest rational numbers)

(ii) Every integer is a rational number. **(True)**

(iii) Every rational number is an integer. **(False)**

Correct:

Every rational number is not an integer.

(iv) Every fraction is a rational number. **(True)**

(v) Every rational number is a fraction. **(False)**

(vi) The reciprocal of -1 is -1. **(True)**

(vii) The quotient of two integers is always a rational number. **(False)**

(viii) The value of a rational number remains the same if both its numerator and denominator are multiplied (or divided) by the same (nonzero) integer. **(True)**

(ix) Between two distinct integers, we can always insert an integer. **(False)**

Correct:

Between two integers, we can insert rational numbers.

(x) Between two distinct rational numbers, we can always insert a rational number. **(True)**

(xi) There exists atheist one integer between two different rational numbers. **(False)**

Correct:

It is not necessary that one integer will exist between two different rational numbers.

(xii) The reciprocal of $2\frac{6}{7}$ is $\frac{-7}{20}$. **(False)**

Correct:

The reciprocal of 267 or $\frac{7}{20}$ is $\frac{7}{20}$ not $\frac{-7}{20}$

(xiii) All terminating decimal numbers are rational numbers. **(True)**

Multiple choice Question

Choose the correct answer from the given four options (3 to 14)

Question 3.

The rational number $\frac{110}{-132}$ when reduced to standard from is

(a) $\frac{10}{-12}$

(b) $\frac{5}{-6}$

(c) $\frac{-5}{6}$

(d) $\frac{110}{-132}$

Solution :

$\frac{110}{-132}$

$= \frac{110 \div (-22)}{-132 \div (-22)}$

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

Question 4.

The additive inverse of $\frac{-7}{12}$ is

(a) $\frac{12}{-7}$

(b) $\frac{-7}{12}$

(c) $\frac{-5}{12}$

(d) $\frac{7}{12}$

Solution :

Additive inverse of $\frac{-7}{12} = \frac{7}{12}$

Question 5.

The multiplicative inverse of $\frac{-4}{9}$ is

(a) $\frac{4}{9}$

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

(c) $\frac{9}{4}$

(d) none of these

Solution:

Multiplicative inverse of $\frac{-4}{9}$

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

$= \frac{9(-1)}{-4(-1)}$

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

Question 6.

The reciprocal of the rational number $-2\frac{3}{7}$ is

(a) $\frac{-17}{7}$

(b) $\frac{7}{17}$

(c) $\frac{-7}{17}$

(d) none of these

Solution:

Reciprocal of $-2\frac{3}{7}$ or $\frac{-17}{7} = \frac{-7}{17}$

Question 7.

The product of rational number $\frac{-2}{5}$ and its multiplicative inverse is

(a) 1

(b) 0

(c) $\frac{4}{25}$

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

Solution :

Product of rational number $\frac{-2}{5}$ and its multiplicative inverse is $\frac{-2}{5} \times \frac{-5}{2} = 1$

Question 8.

The product of rational number $\frac{-2}{3}$ and its additive inverse is

(a) 1

(b) $\frac{-2}{3}$

(c) $\frac{4}{9}$

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

Solution :

Additive inverse of $\frac{2}{3} is \frac{2}{3} = \frac{-4}{9}$

Question 9.

The sum of rational number $\frac{-1}{3}$ and its reciprocal is

(a) 0

(b) 1

(c) $\frac{-10}{3}$

(d) $\frac{-3}{10}$

Solution :

Reciprocal of $\frac{-1}{3}$ is $\frac{-3}{1}$

Sum of rational number and its reciprocal

$\frac{-1}{3} + \left(\frac{-3}{1}\right) = \frac{-1-9}{3} = \frac{-10}{3}$

Question 10 .

$\frac{-3}{1}$ - $\frac{-2}{15}$ is equal to

(a) $\frac{-11}{5}$

(b) $\frac{-1}{15}$

(c) $\frac{-7}{15}$

(d) $\frac{7}{15}$

Solution:

$\frac{-3}{5} - \frac{-2}{15} = \frac{-3}{5} + \frac{2}{15} = \frac{-9+2}{15} = \frac{-7}{15}$

Question 11.

$\left(-5\frac{1}{3}\right) \times \left(-1\frac{7}{8}\right)$ is equal to

(a) 10

(b) -10

(c) $5\frac{7}{24}$

(d) $-5\frac{7}{24}$

Solution :

$\left(-5\frac{1}{3}\right) \times \left(-1\frac{7}{8}\right) = \frac{16}{3} \times \frac{15}{8} = 10$

Question 12.

$\left(-2\frac{1}{3}\right) \div 2\frac{11}{12}$ is equal to

(a) $-\frac{4}{5}$

(b) $\frac{4}{5}$

(c) $\frac{4}{11}$

(d) $-\frac{4}{11}$

Solution:

$\left(-2-\right) \div 2\frac{11}{12} = \frac{-7}{3} \div \frac{35}{12} = \frac{-7}{3} \div \frac{12}{35} = \frac{-7}{3} \div \frac{-4}{5}$

Question 13.

In the standard form of a rational number, the denominator is always

(a) 0

(b) a negative integer

(c) 1

(d) a positive integer

Solution :

In a standard form of a rational number, the denominator is always a positive integer. (d)

Question 14.

The sum of two rational numbers is -1. If one of them is $\frac{-5}{7}$, then the other is

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

(b) $\frac{-2}{7}$

(c) $\frac{12}{7}$

(d) $\frac{-12}{7}$

Solution

The sum of two rational number is -1 one of them = $\frac{-5}{7}$

The other will be = -1-$\left(\frac{-5}{7}\right) = -1 + \frac{5}{7} = \frac{-7+5}{7} = \frac{-2}{7}$

Value Based Questions

Question 1.

Rohit donated $\frac{1}{5}$ of his monthly income to an NGO working for the education of old women, $\frac{1}{4}$ of his salary spent on food, $\frac{1}{3}$ on rent and $\frac{1}{15}$

On other expenses, if he is left with 9000, find his monthly income. What values are being promoted?

Solution:

Let salary = 1

Then donation to NGO = $\frac{1}{5} of 1 = \frac{1}{5}$

Spent on food = $\frac{1}{4}$ of 1 = $\frac{1}{4}$

On rent = $\frac{1}{3}$ of 1 = $\frac{1}{3}$

And other expenses = $\frac{1}{15}$

Remaining income = 1 - $\left[\frac{1}{5}+\frac{1}{4}+\frac{1}{3}+\frac{1}{15}\right]$

$= \frac{60-(12+15+20+4)}{60}$

$= \frac{60-51}{60}$

$= \frac{9}{60}$

; $\frac{9}{60}$ of total income = 9000

Total income = $\frac{9000\times60}{9}$ = 60000

His donation to NGO who is working for the education of the old women is remarkable.

Higher order thinking skills (HOTS)

Question 1.

From a rope 15 m long, $4\frac{1}{3}$ m is cut off and 35 of the remaining is cut off again. Find the length of the remaining part of the rope.

Solution:

Length of a rope = 15m

Length of piece cut off = $4\frac{1}{3} = \frac{13}{3}$m

Remaining length of rope = 15 - $\frac{13}{3}$

$= \frac{45-13}{3} = \frac{32}{3}$m

Remaining length of rope = $\frac{32}{3} - \frac{32}{5}$

$= \frac{160-96}{15}$

$= \frac{64}{15}$

$= 4\frac{4}{15}$

Question 2.

Perimeter of a rectangle is 2m less than 25 of the perimeter of a square, if the perimeter of the square is 40m, find the length and breadth of the rectangle given that the breadth is 13 of the length.

Solution:

Perimeter of a square = 40m

Perimeter of rectangle = 25 of 40 -2 = 14m

Perimeter of rectangle = 2 (length + Breadth)

Length + Breadth = $\frac{perimeter}{2} = \frac{14}{2} = 7m$

If length is 1, then breadth = $\frac{1}{3}$

L+ b = 1 + $\frac{1}{3} = \frac{4}{3}$

Now divide 7m in the ratio of 1:$\frac{1}{3}$ = 3:1

Length = $\frac{7}{3+1} \times 1$

$= \frac{7}{4} \times 1$

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

Rational numbers check your progress

Question 1.

Write five rational numbers equivalent to $\frac{5}{-11}$

Solution :

Five rational numbers equivalent to $\frac{5}{-11}$ will be

$\frac{10}{-22}, \frac{15}{-33}, \frac{20}{-44}, \frac{25}{-55}, \frac{30}{-66}$

Question 2.

Express $\frac{9}{-15}$ as a rational number with:

(i) denominator 5

(ii) numerator -12

(iii) denominator 30

Solution:

$\frac{9}{-15}$

(i) Denominator 5, then $\frac{9\div(-3)}{-15\div(-3)} = \frac{-3}{5}$

(ii) Numerator -12 then $\frac{-3\times4}{5\times4} = \frac{-12}{20}$

(iii) Denominator 30, then $\frac{-3\times6}{5\times6} = \frac{-18}{30}$

Question 3.

Write each of the following numbers in standard from:

(i) $\frac{78}{-91}$

(ii) $\frac{-216}{162}$

(iii) $\frac{-195}{-520}$

Solution :

(i) $\frac{78}{-91}$

$= \frac{78 \div 13}{-91 \div 13}$

$= \frac{6}{-7}$ (HCF of 78, 91 = 13)

(ii) $\frac{-216}{162}$

$= \frac{-216 \div 54}{162 \div 54}$

$= \frac{-1}{3}$ (HCF of 216 , 162 = 54)

(iii) $\frac{-195}{-520}$

$= \frac{195}{520}$

$= \frac{195 \div 65}{520 \div 65}$

$= \frac{3}{8}$ (LCM of 195 , 520 , = 65)

Question 4.

Which of the following are pairs of equivalent rational numbers

(i) $\frac{-4}{13}$, $\frac{60}{-195}$

(ii) $\frac{7}{-15}$, $\frac{-35}{-75}$

(iii) $\frac{16}{-20}$, $\frac{-56}{70}$

Solution:

(i) $\frac{-4}{13}$, $\frac{60}{-195}$

$= \frac{60}{-195}$

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

$= \frac{4(-1)}{-13(-1)}$

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

$\frac{-4}{13}$ and $\frac{60}{-195}$ are equivalent.

(ii) $\frac{7}{-15}$, $\frac{-35}{-75}$

$= \frac{-35}{-75}$

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

$= \frac{7}{15}$

$\frac{7}{-15}$ and $\frac{-35}{-75}$ are not equivalent.

(iii) $\frac{16}{-20}, \frac{-56}{70}$

$= \frac{16 \div 4}{20 \div 4}$

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

$\frac{-56}{70}$

$= \frac{-56 \div 14}{70 \div 14}$

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

(i) and (ii) are equivalent rational .

Question. 5.

Arrange the following rational numbers in ascending order:

(i) $\frac{-5}{-6}, \frac{-17}{18}, \frac{23}{-24}, \frac{-11}{-13},$

(ii) $\frac{-25}{6}, \frac{15}{-4}, \frac{-17}{8}, \frac{-53}{12}$

Solution :

(i) $\frac{-5}{-6}, \frac{-17}{18}, \frac{23}{-24}, \frac{-11}{-13},$

LCM of 6,18,24,13 = 936

$\frac{-5}{-6} = \frac{-5 \times 156}{-6 \times 156} = \frac{-780}{936}$

$\frac{-17}{18} = \frac{23 \times (-39)}{-24 \times (-39)} = \frac{-884}{936}$

$\frac{23}{-24} = \frac{23 \times (-39)}{-24 \times (-39)} = \frac{-897}{936}$

$\frac{-11}{-13} = \frac{-11\times(-72)}{-13\times(-72)} = \frac{792}{936}$

Arranging in ascending order,

$\frac{-897}{936}, \frac{-884}{936}, \frac{-780}{936}, \frac{792}{936}$

$\frac{23}{-24}, \frac{-17}{18}, \frac{-5}{-6}, \frac{-11}{-13}$ are in ascending order

(ii) $\frac{-25}{6}, \frac{15}{-4}, \frac{-17}{8}, \frac{-53}{12}$

LCM of 4,6,8 ,12 = 24

$\frac{-25}{6} = \frac{-25\times4}{6\times4} = \frac{-100}{24}$

$\frac{15}{-4} = \frac{-15\times(-6)}{-4\times(-6)} = \frac{-90}{24}$

$\frac{-17}{8} = \frac{-17\times3}{8\times3} = \frac{-51}{24}$

$\frac{-53}{-12} = \frac{-53\times2}{12\times2} = \frac{-106}{24}$

Arranging in ascending order,

$\frac{-106}{24}, \frac{-100}{24}, \frac{-90}{24}, \frac{-51}{24}$

$\frac{-53}{12}, \frac{-25}{6}, \frac{15}{4}, \frac{-17}{8}$ are in ascending order

Question 6.

Arrange the rational numbers $\frac{-7}{10}, \frac{5}{-8}, \frac{2}{-3}, \frac{-1}{4}, \frac{-3}{5}$

In the descending order.

Solution

$\frac{-7}{10}, \frac{5}{-8}, \frac{2}{-3}, \frac{-1}{4}, \frac{-3}{5}$

LCM of 10, 8, 3, 4, 5 = 120

$\frac{-7}{10} = \frac{-7\times12}{10\times12} = \frac{-84}{120}$

$\frac{5}{-8} = \frac{5\times(-15)}{-8\times(-15)} = \frac{-75}{120}$

$\frac{2}{-3} = \frac{2\times(-40)}{-3\times(-40)} = \frac{-80}{120}$

$\frac{-1}{4} = \frac{-1\times30}{12\times2} = \frac{-30}{120}$

$\frac{-3}{5} = \frac{-3\times24}{5\times24} = \frac{-72}{120}$

Now arranging in descending order,

$\frac{-30}{120}, \frac{-72}{120}, \frac{-75}{120}, \frac{-80}{120}, \frac{-84}{120}$

$\frac{-1}{4}, \frac{-3}{5}, \frac{5}{-8}, \frac{2}{-3}, \frac{-7}{10}$ are in ascending order

Question 7.

Insert five rational numbers between $\frac{-3}{5} and \frac{-1}{2}$,

Solution :

5 rational numbers between $\frac{-3}{5} and \frac{-1}{2}$

LCM of 5,2 = 10

$\frac{-3}{5} = \frac{-3\times2}{5\times2} = \frac{-6}{10}$

$\frac{-1}{2} = \frac{-1\times5}{2\times5} = \frac{-5}{10}$

Multiplying (5+1) to the numerator and denominator.

$\frac{-6}{10} = \frac{-6\times6}{10\times6} = \frac{-36}{60}$

$\frac{-5}{10} = \frac{-5\times6}{10\times6} = \frac{-30}{60}$

Rational number is:

$\frac{-31}{60}, \frac{-32}{60}, \frac{-33}{60}, \frac{-34}{60}, \frac{-35}{60}$

$\frac{-35}{60}, \frac{-34}{60}, \frac{-33}{60}, \frac{-32}{60}, \frac{-31}{60}$

$\frac{-7}{12}, \frac{-17}{30}, \frac{-11}{20}, \frac{-8}{15}, \frac{-31}{60}$

Question 8.

Find the sum:

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

(ii) $-1\frac{1}{12} + \frac{-5}{9}$

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

Solution

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

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

$= \frac{-14-15}{21}$

$= -1\frac{8}{21}$

(ii) $-1\frac{1}{12} + \frac{-5}{9}$

$= \frac{-13}{12} - \frac{-5}{9}$

$= \frac{-39-0}{36}$

$= -1\frac{23}{36}$

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

$= \frac{-12}{5} - \frac{43}{10}$

$= \frac{24-43}{10}$

$= \frac{-19}{10}$

$= -1\frac{9}{10}$

Question 9.

Subtract:

(i) $\frac{-11}{24}\ from\ \frac{-5}{36}$

$= \frac{-5}{36} - \left(\frac{-11}{24}\right)$

$= \frac{-5}{36} + \frac{11}{24}$

$= \frac{-10+33}{72}$ (LCM = 36,24 = 72)

$= \frac{23}{72}$

(ii) $\frac{-8}{15}$ from $-1\frac{2}{5}$

$= -1\frac{2}{5} - \frac{8}{-15}$

$= \frac{-21+8}{15}$

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

(iii) $-2\frac{2}{9}$ from $-3\frac{5}{12}$

$= -3\frac{5}{12} - (-2\frac{2}{9})$

$= \frac{-41}{12} + \frac{20}{9}$

$= \frac{-123+80}{36}$

$= \frac{-36}{43}$

$= -1\frac{7}{36}$