Chapter : 1. RATIONAL NUMBERS

Exercise : 1A

Question: 1

Express

Solution:

For a fraction, $\frac{a}{b}$

$$\frac{a}{b}=\frac{a\times n}{b\times n}$$

Where, n ≠ 0

(i) We have to express $\frac{-3}{5}$ as a rational number with denominator 20.

In order to make the denominator 20, multiply 5 by 4.

Therefore,

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

$$\Rightarrow \frac{-3}{5}=\frac{-12}{20}$$

(ii) We have to express $\frac{-3}{5}$ as a rational number with denominator -30.

In order to make the denominator -30, multiply 5 by -6.

Therefore,

$$\frac{-3}{5}=\frac{-3\times -6}{5\times -6}$$

$$\Rightarrow \frac{-3}{5}=\frac{18}{-30}$$

(iii) We have to express $\frac{-3}{5}$ as a rational number with denominator 35.

In order to make the denominator 35, multiply 5 by 7.

Therefore,

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

$$\Rightarrow \frac{-3}{5}=\frac{-21}{35}$$

(iv) We have to express $\frac{-3}{5}$ as a rational number with denominator -40.

In order to make the denominator 20, multiply 5 by -8.

Therefore,

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

$$\Rightarrow \frac{-3}{5}=\frac{24}{-40}$$

Question: 2

Express

Solution:

For a fraction, $\frac{a}{b}$

$$\frac{a}{b}=\frac{a\div n}{b\div n}$$

Where, n ≠ 0 and n divides both a and b

(i) We have to express $\frac{-42}{98}$ as a rational number with denominator 7.

In order to make the denominator 7, divide 98 by 14.

Therefore,

$$\frac{-42}{98}=\frac{-42\div 14}{98\div 14}$$

$$\Rightarrow \frac{-42}{98}=\frac{-3}{7}$$

Question: 3

Express

Solution:

For a fraction, $\frac{a}{b}$

$$\frac{a}{b}=\frac{a\div n}{b\div n}$$

Where, n ≠ 0 and n divides both a and b

We have to express $\frac{-48}{60}$ as a rational number with denominator 5.

In order to make the denominator 5, divide 60 by 12.

Therefore,

$$\frac{-48}{60}=\frac{-48\div 12}{60\div 12}$$

$$\Rightarrow \frac{-48}{60}=\frac{-4}{5}$$

Question: 4

Express each of t

Solution:

A rational number is in standard or simplest or lowest form when-

1. Numerator and denominator have only 1 as its highest common factor.

2. Denominator is a positive integer.

(i) The HCF of 12 and 30 is 6

Therefore,

$$\frac{-12}{30}=\frac{-12\div 6}{30\div 6}$$

$$\Rightarrow \frac{-12}{30}=\frac{-2}{5}$$

(ii) The HCF of 49 and 14 is 7

Therefore,

$$\frac{-14}{49} = \frac{-14 \div 7}{49 \div 7}$$

$$\Rightarrow \frac{-14}{49} = \frac{-2}{7}$$

(iii) The HCF of 24 and 64 is 8

Therefore,

$$\frac{24}{-64} = \frac{24 \div 8}{-64 \div 8}$$

$$\Rightarrow \frac{24}{-64} = \frac{3}{-8}$$

In order, to make the denominator positive, multiply both numerator and denominator by -1

$$\Rightarrow \frac{24}{-64} = \frac{3}{-8} = \frac{3 \times -1}{-8 \times -1}$$

$$\Rightarrow \frac{24}{-64} = \frac{-3}{8}$$

(iv) The HCF of 36 and 63 is 9

Therefore,

$$\frac{-36}{-63} = \frac{-36 \div 9}{-63 \div 9}$$

$$\Rightarrow \frac{-36}{-63} = \frac{-4}{-7}$$

In order, to make the denominator positive, multiply both numerator and denominator by -1

$$\Rightarrow \frac{-36}{-63} = \frac{-4}{-7} = \frac{-4 \times -1}{-7 \times -1}$$

$$\Rightarrow \frac{-36}{-63} = \frac{4}{7}$$

Question: 5

Which of the two

Solution:

(i) $\frac{3}{8}$ is a positive number and all positive numbers are greater than 0.

Therefore, $\frac{3}{8} > 0$

(ii) $\frac{-2}{9}$ is a negative number and all negative numbers are less than 0.

Therefore, $0 > \frac{-2}{9}$

(iii) Both $\frac{-3}{4}$ and $\frac{1}{4}$ have the same denominator 4.

Therefore, we can directly compare both the numbers.

Since, 1 > -3

Therefore, $\frac{-3}{4} > \frac{1}{4}$

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

Therefore, we can directly compare both the numbers.

Since, -4 > -5

Therefore, $\frac{-4}{7} > \frac{-5}{7}$

(v) $\frac{2}{3}$ and $\frac{3}{4}$ have different denominators.

Therefore, we take LCM of 3 and 4 that is 12.

Now,

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

And,

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

Since, 9 > 8

Therefore, $\frac{9}{12} > \frac{8}{12}$

Hence, $\frac{2}{3} > \frac{3}{4}$

(vi) We can write $-1 = \frac{-1}{1}$

$\frac{-1}{2}$ and $\frac{-1}{1}$ have different denominators.

Therefore, we take LCM of 1 and 2 that is 2.

Now,

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

And,

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

Since, -1 > -2

Therefore, $\frac{-1}{2} > \frac{-2}{2}$

Hence, $\frac{-1}{2} > -1$

Question: 6

Which of the two

Solution:

(i) $\frac{-4}{3}$ and $\frac{-8}{7}$ have different denominators.

Therefore, we take LCM of 3 and 7 that is 21.

Now,

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

And,

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

Since, -24 > -28

Therefore, $\frac{-24}{21} > \frac{-28}{21}$

Hence, $\frac{-8}{7} > \frac{-4}{3}$

(ii)

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

$\frac{-7}{9}$ and $\frac{-5}{8}$ have different denominators.

Therefore, we take LCM of 9 and 8 that is 72.

Now,

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

And,

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

Since, -45 > -56

Therefore, $\frac{-45}{72} > \frac{-56}{72}$

Hence, $\frac{-5}{8} > \frac{-7}{9}$

(iii)

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

$\frac{-1}{3}$ and $\frac{-4}{5}$ have different denominators.

Therefore, we take LCM of 3 and 5 that is 15.

Now,

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

And,

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

Since, -5 > -12

Therefore, $\frac{-5}{15} > \frac{-12}{15}$

Hence, $\frac{-1}{3} > \frac{-4}{5}$

(iv)

$$\frac{9}{-13} = \frac{9 \times -1}{-13 \times -1} = \frac{-9}{13}$$

And,

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

$\frac{-9}{13}$ and $\frac{-7}{12}$ have different denominators.

Therefore, we take LCM of 13 and 12 that is 156.

Now,

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

And,

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

Since, -91 > -108

Therefore, $\frac{-91}{156} > \frac{-108}{156}$

Hence, $\frac{-7}{12} > \frac{-9}{13}$

(v)

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

$\frac{-7}{10}$ and $\frac{-4}{5}$ have different denominators.

Therefore, we take LCM of 10 and 5 that is 10.

Now,

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

And,

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

Since, -7 > -8

Therefore, $\frac{-7}{10} > \frac{-8}{10}$

Hence, $\frac{-7}{10} > \frac{-4}{5}$

(vi)

We can write $-3 = \frac{-3}{1}$

$\frac{-3}{1}$ and $\frac{-12}{5}$ have different denominators.

Therefore, we take LCM of 1 and 5 that is 5.

Now,

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

And,

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

Since, -12 > -15

Therefore, $\frac{-12}{5} > \frac{-15}{5}$

Hence, $\frac{-12}{5} > -3$

Question: 7

Fill in the blank

Solution:

(i) Clearly,

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

(ii)

$$\frac{5}{-13}=\frac{5\times-1}{-13\times-1}=\frac{-5}{13}$$

$\frac{-5}{13}$ and $\frac{-35}{91}$ have different denominators.

Therefore, we take LCM of 13 and 91 that is 91.

Now,

$$\frac{-5}{13}=\frac{-5\times7}{13\times7}=\frac{-35}{91}$$

And,

$$\frac{-35}{91}=\frac{-35\times1}{91\times1}=\frac{-35}{91}$$

Clearly, $\frac{-35}{91}=\frac{-35}{91}$

Hence,

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

(iii) We can write $-2=\frac{-2}{1}$

$\frac{-2}{1}$ and $\frac{-13}{5}$ have different denominators.

Therefore, we take LCM of 1 and 5 that is 5.

Now,

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

And,

$$\frac{-13}{5}=\frac{-13\times1}{5\times1}=\frac{-13}{5}$$

Since, -10 > -13

Therefore, $\frac{-10}{5}>\frac{-13}{5}$

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

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

$\frac{-2}{3}$ and $\frac{-5}{8}$ have different denominators.

Therefore, we take LCM of 3 and 8 that is 24.

Now,

$$\frac{-2}{3}=\frac{-2\times 8}{3\times 8}=\frac{-16}{24}$$

And,

$$\frac{-5}{8}=\frac{-5\times 3}{8\times 3}=\frac{-15}{24}$$

Since, -16 < -15

Therefore, $\frac{-16}{24}<\frac{-15}{24}$

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

(v)

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

$\frac{3}{5}$ is a positive number and all positive numbers are greater than 0.

Therefore, $0<\frac{3}{5}$

Hence, $0<\frac{-3}{-5}$

(vi) $\frac{-8}{9}$ and $\frac{-9}{10}$ have different denominators.

Therefore, we take LCM of 9 and 10 that is 90.

Now,

$$\frac{-8}{9}=\frac{-8\times 10}{9\times 10}=\frac{-80}{90}$$

And,

$$\frac{-9}{10}=\frac{-9\times 9}{10\times 9}=\frac{-81}{90}$$

Since, -80 > -81

Therefore, $\frac{-80}{90}>\frac{-81}{90}$

Hence, $\frac{-8}{9}>\frac{-9}{10}$

Question: 8

Arrange the follo

Solution:

(i)

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

And,

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

Since, the denominators of all the numbers are different therefore we will take LCM of the denominators.

LCM of 9, 12, 18 and 3 = 36

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

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

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

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

Clearly,

-24 < -16 < -15 < -14

Therefore,

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

Hence,

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

(ii)

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

And,

$$\frac{9}{-24}=\frac{9\times -1}{-24\times -1}=\frac{-9}{24}$$

Since, the denominators of all the numbers are different therefore we will take LCM of the denominators.

LCM of 4, 12, 16 and 24 = 48

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

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

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

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

Clearly,

-36 < -21 < -20 < -18

Therefore,

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

Hence,

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

(iii)

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

Since, the denominators of all the numbers are different therefore we will take LCM of the denominators.

LCM of 5, 10, 15 and 20 = 60

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

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

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

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

Clearly,

-44 < -42 < -39 < -36

Therefore,

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

Hence,

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

(iv)

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

Since, the denominators of all the numbers are different therefore we will take LCM of the denominators.

LCM of 7, 14, 28 and 42 = 84

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

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

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

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

Clearly,

-54 < -48 < -46 < -39

Therefore,

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

Hence,

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

Question: 9

Arrange the follo

Solution:

(i)

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

And,

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

Since, the denominators of all the numbers are different therefore we will take LCM of the denominators.

LCM of 1, 6and 3 = 6

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

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

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

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

Clearly,

2 > -12 > -13 > -16

Therefore,

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

Hence,

$$\frac{1}{3} > \frac{-2}{1} > \frac{-13}{6} > \frac{-8}{3}$$

(ii)

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

And,

$$\frac{17}{-30} = \frac{17 \times -1}{-30 \times -1} = \frac{-17}{30}$$

Since, the denominators of all the numbers are different therefore we will take LCM of the denominators.

LCM of 10, 15, 20 and 30 = 60

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

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

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

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

Clearly,

-18>-28>-33>-34

Therefore,

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

Hence,

$$\frac{-3}{10} > \frac{-7}{15} > \frac{-11}{20} > \frac{-17}{30}$$

(iii)

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

Since, the denominators of all the numbers are different therefore we will take LCM of the denominators.

LCM of 6, 12, 18 and 24 = 72

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

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

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

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

Clearly,

-42>-52>-60>-69

Therefore,

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

Hence,

$$\frac{-7}{12} > \frac{-13}{18} > \frac{-5}{6} > \frac{-23}{24}$$

(iv)

Since, the denominators of all the numbers are different therefore we will take LCM of the denominators.

LCM of 11, 22, 33 and 44 = 132

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

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

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

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

Clearly,

-92>-114>-117>-120

Therefore,

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

Hence,

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

Question: 10

Which of the foll

Solution:

(i) Every whole number a can be represented as $\frac{a}{1}$

Therefore, every whole number is a rational number.

(ii) Every integer a can be represented as $\frac{a}{1}$

Therefore, every integer is a rational number.

(iii) 0 can be represented as $\frac{0}{1}$

Therefore, 0 is a whole number and a rational number.

Exercise : 1B

Question: 1

Represent each of

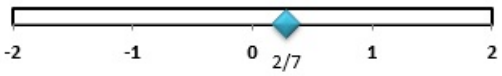
Solution:

(i) $\frac{1}{3}$ is greater than 0 and less than 1.

Therefore, it lies between 0 and 1

(ii) $\frac{2}{7}$ is greater than 0 and less than 1.

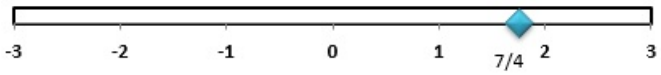
Therefore, it lies between 0 and 1



(iii) $1\frac{3}{4} = \frac{(4\times1)+3}{4} = \frac{4+3}{4} = \frac{7}{4}$

$\frac{7}{4}$ is greater than 1 and less than 2.

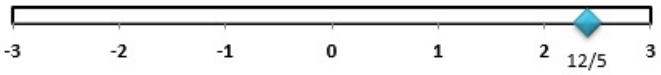
Therefore, it lies between 1 and 2



(iv) $2\frac{2}{5} = \frac{(5\times2)+2}{5} = \frac{10+2}{5} = \frac{12}{5}$

$\frac{12}{5}$ is greater than 2 and less than 3.

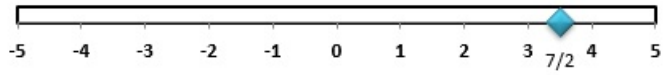
Therefore, it lies between 2 and 3.



(v) $3\frac{1}{2} = \frac{(2\times3)+1}{2} = \frac{6+1}{2} = \frac{7}{2}$

$\frac{7}{2}$ is greater than 3 and less than 4.

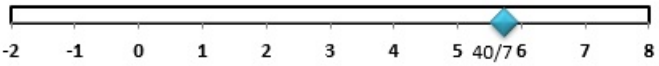
Therefore, it lies between 3 and 4.



(vi) $5\frac{5}{7} = \frac{(7\times5)+5}{7} = \frac{35+5}{7} = \frac{40}{7}$

$\frac{40}{7}$ is greater than 5 and less than 6.

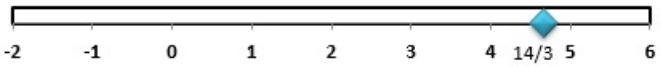
Therefore, it lies between 5 and 6.



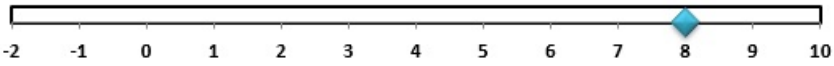
(vii) $4\frac{2}{3} = \frac{(3\times4)+2}{3} = \frac{12+2}{3} = \frac{14}{3}$

$\frac{14}{3}$ is greater than 4 and less than 5.

Therefore, it lies between 4 and 5.



(viii) The number line representation of 8 is



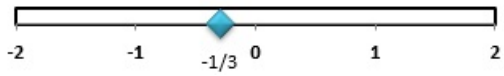
Question: 2

Represent each of

Solution:

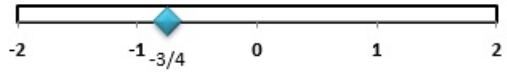
(i) $\frac{-1}{3}$ is greater than -1 and less than 0.

Therefore, it lies between -1 and 0



(ii) $\frac{-3}{4}$ is greater than -1 and less than 0.

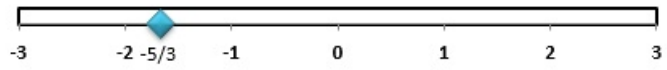
Therefore, it lies between -1 and 0



(iii) $-1\frac{2}{3} = -\frac{(3\times1)+2}{3} = -\frac{3+2}{3} = \frac{-5}{3}$

$\frac{-5}{3}$ is greater than -2 and less than -1`.

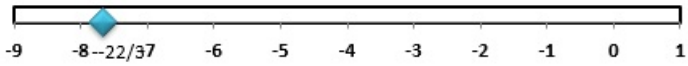
Therefore, it lies between -2 and -1



(iv) $-3\frac{1}{7} = -\frac{(7\times3)+1}{3} = -\frac{21+1}{3} = \frac{-22}{3}$

$\frac{-22}{3}$ is greater than -8 and less than -7`.

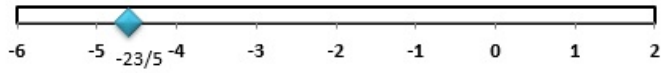
Therefore, it lies between -8 and -7



(v) $-4\frac{3}{5} = -\frac{(5\times4)+3}{5} = -\frac{20+3}{5} = \frac{-23}{5}$

$\frac{-23}{5}$ is greater than -5 and less than -4.

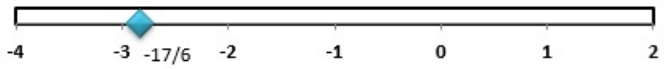
Therefore, it lies between -5 and -4



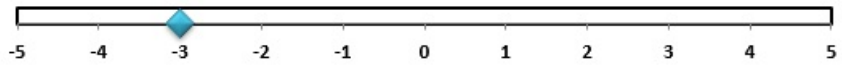
(vi) $-2\frac{5}{6} = -\frac{(6\times2)+5}{6} = -\frac{12+5}{6} = \frac{-17}{6}$

$\frac{-17}{6}$ is greater than -3 and less than -2.

Therefore, it lies between -3 and -2



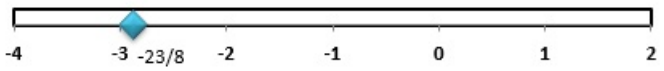
(vii) The number line representation of -3 is



(viii) $-2\frac{7}{8} = -\frac{(8\times2)+7}{8} = -\frac{16+7}{8} = \frac{-23}{8}$

$\frac{-23}{8}$ is greater than -3 and less than -2.

Therefore, it lies between -3 and -2



Question: 3

Which of the foll

Solution:

(i) True

$\frac{-3}{5}$ is a negative number.

All negative numbers are less than 0 and therefore, lie to the left of 0 on the number line.

Hence, $\frac{-3}{5}$ lies to the left of 0 on the number line.

(iii) False

$\frac{-12}{7}$ is a negative number.

All negative numbers are less than 0 and therefore, lie to the left of 0 on the number line.

Hence, $\frac{-12}{7}$ lies to the left of 0 on the number line.

(iii)True

$\frac{1}{3}$ is a positive number.

All positive numbers are greater than 0 and therefore, lie to the right of 0 on the number line.

Hence, $\frac{1}{3}$ lies to the right of 0 on the number line.

$\frac{-5}{2}$ is a negative number.

All negative numbers are less than 0 and therefore, lie to the left of 0 on the number line.

Hence, $\frac{-5}{2}$ lies to the left of 0 on the number line.

Therefore, the rational numbers, $\frac{1}{3}$ and $\frac{-5}{2}$ are on opposite sides of 0 on the number line.

(iv) False

$$\frac{-18}{-13}=\frac{-18\times-1}{-13\times-1}=\frac{18}{13}$$

$\frac{18}{13}$ is a positive number.

All positive numbers are greater than 0 and therefore, lie to the right of 0 on the number line.

Hence, $\frac{18}{13}$ lies to the right of 0 on the number line.

Exercise : 1C

Question: 1

Add the following

Solution:

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

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

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

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

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

$$=\frac{-6-4}{11}$$

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

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

$$=\frac{-11+5}{8}$$

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

To convert it into lowest terms, divide both numerator and denominator by common divisor of both 6 and 8 that is, 2

$$= \frac{-6 \div 2}{8 \div 2}$$

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

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

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

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

To convert it into lowest terms, divide both numerator and denominator by common divisor of both 6 and 3 that is, 3.

$$= \frac{-6 \div 3}{3 \div 3}$$

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

=2

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

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

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

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

To convert it into lowest terms, divide both numerator and denominator by common divisor of both 4 and 6 that is, 2.

$$= \frac{4 \div 2}{6 \div 2}$$

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

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

$$= \frac{-17 + (-1)}{15}$$

$$= \frac{-18}{15}$$

To convert it into lowest terms, divide both numerator and denominator by common divisor of both 18 and 15 that is, 3.

$$= \frac{-18 \div 3}{15 \div 3}$$

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

Question: 2

Add the following

Solution:

(i) Since, the denominators of given rational numbers are different therefore, we take their LCM.

LCM of 4 and 5 = 20

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

And

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

Now,

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

$$=\frac{15}{20}+\frac{-12}{20}$$

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

$$=\frac{15-12}{20}$$

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

(ii) Since, the denominators of given rational numbers are different therefore, we take their LCM.

LCM of 8 and 12 = 24

$$\frac{5}{8}=\frac{5\times 3}{8\times 3}=\frac{15}{24}$$

And

$$\frac{-7}{12}=\frac{-7\times 2}{12\times 2}=\frac{-14}{24}$$

Now,

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

$$=\frac{15}{24}+\frac{-14}{24}$$

$$=\frac{15+(-14)}{24}$$

$$=\frac{15-14}{24}$$

$$=\frac{1}{24}$$

(iii) Since, the denominators of given rational numbers are different therefore, we take their LCM.

LCM of 9 and 6 = 18

$$\frac{-8}{9}=\frac{-8\times 2}{9\times 2}=\frac{-16}{18}$$

And

$$\frac{11}{6}=\frac{11\times 3}{6\times 3}=\frac{33}{18}$$

Now,

$$\frac{-8}{9}+\frac{11}{6}$$

$$=\frac{-16}{18}+\frac{33}{18}$$

$$=\frac{-16+33}{18}$$

$$=\frac{17}{18}$$

(iv) Since, the denominators of given rational numbers are different therefore, we take their LCM.

LCM of 16 and 24 = 48

$$\frac{-5}{16}=\frac{-5\times 3}{16\times 3}=\frac{-15}{48}$$

And

$$\frac{7}{24}=\frac{7\times 2}{24\times 2}=\frac{14}{48}$$

Now,

$$\frac{-5}{16}+\frac{7}{24}$$

$$=\frac{-15}{48}+\frac{14}{48}$$

$$=\frac{-15+14}{48}$$

$$=\frac{-1}{48}$$

(v) Since, the denominators of given rational numbers are negative therefore, we will make them positive.

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

Now, since, the denominators of given rational numbers are different therefore, we take their LCM.

LCM of 18 and 27 = 54

$$\frac{-7}{18}=\frac{-7\times 3}{18\times 3}=\frac{-21}{54}$$

And

$$\frac{8}{27}=\frac{8\times 2}{27\times 2}=\frac{16}{54}$$

Now,

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

$$=\frac{-21}{54}+\frac{16}{54}$$

$$= \frac{-21 + 16}{54}$$

$$= \frac{-5}{54}$$

(vi) Since, the denominators of given rational numbers are negative therefore, we will make them positive.

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

And,

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

Now, since, the denominators of given rational numbers are different therefore, we take their LCM.

LCM of 12 and 15 = 60

$$\frac{-1}{12} = \frac{-1 \times 5}{12 \times 5} = \frac{-5}{60}$$

And

$$\frac{-2}{15} = \frac{-2 \times 4}{15 \times 4} = \frac{-8}{60}$$

Now,

$$\frac{-5}{60} + \frac{-8}{60}$$

$$= \frac{-5 + (-8)}{60}$$

$$= \frac{-5 - 8}{60}$$

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

(vii) We can write -1 as $\frac{-1}{1}$.

Now, since, the denominators of given rational numbers are different therefore, we take their LCM.

LCM of 1 and 4 = 4

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

And

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

Now,

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

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

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

(viii) We can write 2 as $\frac{2}{1}$.

Now, since, the denominators of given rational numbers are different therefore, we take their LCM.

LCM of 1 and 4 = 4

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

And

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

Now,

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

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

$$=\frac{8-5}{4}$$

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

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

On adding, any number to 0 we get the same number.

Therefore,

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

Question: 3

Verify the follow

Solution:

(i)LCM of 5 and 7 = 35

$$\frac{-12}{5}=\frac{-12\times 7}{5\times 7}=\frac{-84}{35}$$

And,

$$\frac{2}{7}=\frac{2\times 5}{7\times 5}=\frac{10}{35}$$

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

Similarly,

LCM of 7 and 5 = 35

$$\frac{2}{7}=\frac{2\times 5}{7\times 5}=\frac{10}{35}$$

And,

$$\frac{-12}{5}=\frac{-12\times 7}{5\times 7}=\frac{-84}{35}$$

$$\text{RHS} = \frac{2}{7} + \frac{-12}{5} = \frac{10}{35} + \frac{-84}{35} = \frac{10 + (-84)}{35} = \frac{10 - 84}{35} = \frac{-74}{35}$$

i.e., LHS = RHS

Hence,

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

Verified

(ii)LCM of 13 and 8 = 104

$$\frac{-5}{8} = \frac{-5 \times 13}{8 \times 13} = \frac{-65}{104}$$

And,

$$\frac{-9}{13} = \frac{-9 \times 8}{13 \times 8} = \frac{-72}{104}$$

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

Similarly,

LCM of 8 and 13 = 104

$$\frac{-9}{13} = \frac{-9 \times 8}{13 \times 8} = \frac{-72}{104}$$

And,

$$\frac{-5}{8} = \frac{-5 \times 13}{8 \times 13} = \frac{-65}{104}$$

$$\text{RHS} = \frac{-9}{13} + \frac{-5}{8} = \frac{-72}{104} + \frac{-65}{104} = \frac{-72 + (-65)}{35} = \frac{-72 - 65}{35} = \frac{-137}{104}$$

i.e., LHS = RHS

Hence,

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

Verified

(iii) 3 can be written as $\frac{3}{1}$

LCM of 1 and 12 = 12

$$\frac{3}{1} = \frac{3 \times 12}{1 \times 12} = \frac{36}{12}$$

And,

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

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

Similarly,

LCM of 1 and 12 = 12

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

And,

$$\frac{3}{1}=\frac{3\times 12}{1\times 12}=\frac{36}{12}$$

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

i.e., LHS = RHS

Hence,

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

Verified

(iv) Since, the denominators are negative we will make them positive.

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

And,

$$\frac{12}{-35}=\frac{12\times -1}{=35\times -1}=\frac{-12}{35}$$

LCM of 7 and 35 = 35

$$\frac{-2}{7}=\frac{-2\times 5}{7\times 5}=\frac{-10}{35}$$

And,

$$\frac{-12}{35}=\frac{-12\times 1}{35\times 1}=\frac{-12}{35}$$

$$\text{LHS}=\frac{-2}{7}+\frac{-12}{35}=\frac{-10}{35}+\frac{-12}{35}=\frac{-10+(-12)}{35}=\frac{-10-12}{35}=\frac{-22}{35}$$

Similarly,

LCM of 7 and 5 = 35

$$\frac{-12}{35}=\frac{-12\times 1}{35\times 1}=\frac{-12}{35}$$

And,

$$\frac{-2}{7}=\frac{-2\times 5}{7\times 5}=\frac{-10}{35}$$

$$\text{RHS}=\frac{-12}{35}+\frac{-2}{7}=\frac{-12}{35}+\frac{-10}{35}=\frac{-12+(-10)}{35}=\frac{-12-10}{35}=\frac{-22}{35}$$

i.e., LHS = RHS

Hence,

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

Verified

Question: 4

Verify the follow

Solution:

(i)

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

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

$$=\left(\frac{3\times 5+(-2)\times 4}{20}\right)+\frac{-7}{10}$$

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

$$=\frac{7}{20}+\frac{-7}{10}$$

$$=\frac{7\times 1+(-7)\times 2}{20}$$

$$=\frac{7\times 1+(-7)\times 2}{20}$$

$$=\frac{7-14}{20}$$

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

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

$$=\frac{3}{4}+\left(\frac{(-2)\times 2+(-7)\times 1}{10}\right)$$

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

$$=\frac{3}{4}+\frac{-11}{10}$$

$$=\frac{3\times 5+(-11)\times 2}{20}$$

$$=\frac{15-22}{20}$$

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

RHS = LHS

Verified

(ii)

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

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

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

$$=\left(\frac{-7\times 5+(-2)\times 11}{55}\right)+\frac{-13}{22}$$

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

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

$$= \frac{-57 \times 2 + (-13) \times 5}{110}$$

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

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

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

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

$$= \frac{-7}{11} + \left(\frac{(-2) \times 22 + (-13) \times 5}{-110}\right)$$

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

$$= \frac{-7}{11} + \frac{-109}{110}$$

$$= \frac{-7 \times 10 + (-109) \times 1}{110}$$

$$= \frac{-70 - 109}{20}$$

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

RHS = LHS

Verified

(iii)

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

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

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

$$= \frac{-1}{1} + \left(\frac{-2 \times 4 + (-3) \times 3}{12}\right)$$

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

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

$$= \frac{-1 \times 12 + (-17) \times 1}{12}$$

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

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

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

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

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

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

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

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

$$= \frac{-20 - 9}{20}$$

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

RHS = LHS

Verified

Question: 5

Fill in the blank

Solution:

(i) $\frac{-3}{17}$

By Commutative property, i.e., a+b=b+a

Therefore,

$$\frac{-3}{17} + \frac{-12}{5} = \frac{-12}{5} + \frac{-3}{17}$$

(ii) $\frac{-21}{8}$

By Commutative property, i.e., a+b=b+a

Therefore,

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

(iii) $\frac{-8}{13}$

By Associative property, i.e., (a+b)+c=a+(b+c)

Therefore,

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

(iv) $\frac{-9}{11}$

By Associative property, i.e., (a+b)+c=a+(b+c)

Therefore,

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

(v) $\frac{-3}{11}$

By Associative property, i.e., (a+b)+c=a+(b+c)

Therefore,

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

(vi) 0,0

0 is the additive identity that is, if we add 0 to any number the result will be the number itself.

a+0=0+a

Also, By Commutative property, i.e., a+b=b+a

We get,

$$\frac{-16}{7}+0=0+\frac{-16}{7}=\frac{-16}{7}$$

Question: 6

Find the additive

Solution:

Additive inverse of a number $\frac{a}{b}$ is the number $-\frac{a}{b}$ such that, $\frac{a}{b}+\left(\frac{-a}{b}\right)=0$

Therefore,

(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)

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

Therefore, Additive inverse of $\frac{-15}{4}$ is $\frac{15}{4}$

(vi)

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

Additive inverse of $\frac{16}{5}$ is $\frac{-16}{5}$

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

(viii) Additive inverse of 0 is 0

(ix)

$$\frac{19}{-6}=\frac{19\times-1}{-6\times-1}=\frac{-19}{6}$$

Therefore, Additive inverse of $\frac{-19}{6}$ is $\frac{19}{6}$

(x)

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

Additive inverse of $\frac{8}{7}$ is $\frac{-8}{7}$

Question: 7

Subtract:

Solution:

(i)

Since the denominators of both the numbers are different therefore, we will take their LCM

LCM 0f 3 and 4 = 12

$$\frac{3}{4}=\frac{3\times3}{4\times3}=\frac{9}{12}$$

And,

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

Therefore,

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

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

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

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

(ii)

Since the denominators of both the numbers are different therefore, we will take their LCM

LCM 0f 6 and 3 = 6

$$\frac{-5}{6}=\frac{-5\times1}{6\times1}=\frac{-5}{6}$$

And,

$$\frac{1}{3}=\frac{1\times2}{3\times2}=\frac{2}{6}$$

Therefore,

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

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

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

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

$$= \frac{7}{6}$$

(iii)

Since the denominators of both the numbers are different therefore, we will take their LCM

LCM 0f 9 and 5 = 45

$$\frac{-8}{9} = \frac{-8 \times 5}{9 \times 5} = \frac{-40}{45}$$

And,

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

Therefore,

$$\frac{-3}{5} - \left(\frac{-8}{9}\right)$$

$$= \frac{-27}{45} - \left(\frac{-40}{45}\right)$$

$$= \frac{-27 - (-40)}{45}$$

$$= \frac{-27 + 40}{45}$$

$$= \frac{13}{45}$$

(iv)

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

Since the denominators of both the numbers are different therefore, we will take their LCM

LCM 0f 1 and 7 =7

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

And,

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

Therefore,

$$-1 - \left(\frac{-9}{7}\right)$$

$$= \frac{-7}{7} - \left(\frac{-9}{7}\right)$$

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

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

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

(v)

We can write, $1 = \frac{1}{1}$

Since the denominators of both the numbers are different therefore, we will take their LCM

LCM 0f 1 and 11 = 11

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

And,

$$\frac{-18}{11} = \frac{-18 \times 1}{11 \times 1} = \frac{-18}{11}$$

Therefore,

$$1 - \left(\frac{-18}{11}\right)$$

$$= \frac{11}{11} - \left(\frac{-18}{11}\right)$$

$$= \frac{11 - (-18)}{11}$$

$$= \frac{11 + 18}{11}$$

$$= \frac{29}{11}$$

(vi)

$$0 - \left(\frac{-13}{9}\right)$$

$$= 0 + \frac{13}{9}$$

$$= \frac{13}{9}$$

(vii)

Since the denominators of both the numbers are different therefore, we will take their LCM

LCM 0f 13 and 5 = 65

$$\frac{-6}{5} = \frac{-6 \times 13}{5 \times 13} = \frac{-78}{65}$$

And,

$$\frac{-32}{13} = \frac{-32 \times 5}{13 \times 5} = \frac{-160}{65}$$

Therefore,

$$\frac{-6}{5} - \left(\frac{-32}{13}\right)$$

$$= \frac{-78}{65} - \left(\frac{-160}{65}\right)$$

$$= \frac{-78 - (-160)}{65}$$

$$= \frac{-78 + 160}{65}$$

$$= \frac{82}{65}$$

(viii)

We can write, $-7 = \frac{-7}{1}$

Since the denominators of both the numbers are different therefore, we will take their LCM

LCM 0f 1 and 7 = 7

$$\frac{-7}{1} = \frac{-7 \times 7}{1 \times 7} = \frac{-49}{7}$$

And,

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

Therefore,

$$= \frac{-4}{7} - (-7)$$

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

$$= \frac{-4 - (-49)}{7}$$

$$= \frac{-4 + 49}{7}$$

$$= \frac{45}{7}$$

Question: 8

Using the rearran

Solution:

Rearrangement property says that, the numbers in an addition expression may be arranged and grouped in any order.

Therefore,

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

We arrange the numbers with same denominators together,

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

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

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

Now, we take LCM of 3 and 5=15

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

And,

$$\frac{-8}{5}=\frac{-8\times 3}{5\times 3}=\frac{-24}{15}$$

Therefore,

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

$$=\left(\frac{10}{15}\right)+\left(\frac{-24}{15}\right)$$

$$=\frac{10+(-24)}{15}$$

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

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

(ii)

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

We arrange the numbers,

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

LCM of 3 and 6 =6

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

And,

$$\frac{-11}{6}=\frac{-11\times 1}{6\times 1}=\frac{-11}{6}$$

LCM of 4 and 8 =8

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

And,

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

Now,

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

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

$$=\left(\frac{-27}{6}\right)+\left(\frac{1}{8}\right)$$

Now, we take LCM of 6 and 8=24

$$\frac{-27}{6}=\frac{-27\times 4}{6\times 4}=\frac{-108}{24}$$

And,

$$\frac{1}{8}=\frac{1\times 3}{8\times 3}=\frac{3}{24}$$

Therefore,

$$\left(\frac{-27}{6}\right)+\left(\frac{1}{8}\right)$$

$$=\left(\frac{-108}{24}\right)+\left(\frac{3}{24}\right)$$

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

$$=\frac{-105}{24}$$

In lowest terms,

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

(iii)

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

We arrange the numbers,

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

LCM of 20 and 10 =20

$$\frac{-13}{20}=\frac{-13\times 1}{20\times 1}=\frac{-13}{20}$$

And,

$$\frac{7}{10}=\frac{7\times 2}{10\times 2}=\frac{14}{20}$$

LCM of 14 and 7 =14

$$\frac{11}{14}=\frac{11\times 1}{14\times 1}=\frac{11}{14}$$

And,

$$\frac{-5}{7}=\frac{-5\times 2}{7\times 2}=\frac{-10}{14}$$

Now,

$$\left(\frac{-13}{20}+\frac{14}{20}\right)+\left(\frac{11}{14}+\frac{-10}{14}\right)$$

$$=\left(\frac{-13+14}{20}\right)+\left(\frac{11+(-10)}{14}\right)$$

$$=\left(\frac{1}{20}\right)+\left(\frac{1}{14}\right)$$

Now, we take LCM of 20 and 14=140

$$\frac{1}{20}=\frac{1\times 7}{20\times 7}=\frac{7}{140}$$

And,

$$\frac{1}{14}=\frac{1\times 10}{14\times 10}=\frac{10}{140}$$

Therefore,

$$\left(\frac{1}{20}\right)+\left(\frac{1}{14}\right)$$

$$=\left(\frac{7}{140}\right)+\left(\frac{10}{140}\right)$$

$$=\frac{7+10}{140}$$

$$=\frac{17}{140}$$

(iv)

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

We arrange the numbers,

$$=\left(\frac{-6}{7}+\frac{-15}{7}\right)+\left(\frac{-5}{6}+\frac{-4}{9}\right)$$

LCM of 4 and 9 =18

$$\frac{-4}{9}=\frac{-4\times 2}{9\times 2}=\frac{-8}{18}$$

And,

$$\frac{-5}{6}=\frac{-5\times 3}{6\times 3}=\frac{-15}{18}$$

Now,

$$\left(\frac{-6}{7}+\frac{-15}{7}\right)+\left(\frac{-8}{18}+\frac{-15}{18}\right)$$

$$=\left(\frac{-6+(-15)}{7}\right)+\left(\frac{-8+(-15)}{18}\right)$$

$$=\left(\frac{-6-15}{7}\right)+\left(\frac{-8-15}{18}\right)$$

$$=\left(\frac{-21}{7}\right)+\left(\frac{-23}{18}\right)$$

In lowest terms,

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

Now, we take LCM of 1 and 18=18

$$\frac{-3}{1}=\frac{-3\times 18}{1\times 18}=\frac{-54}{18}$$

And,

$$\frac{-23}{18}=\frac{-23\times 1}{18\times 1}=\frac{-23}{18}$$

Therefore,

$$=\left(\frac{-3}{1}\right)+\left(\frac{-23}{18}\right)$$

$$=\left(\frac{-54}{18}\right)+\left(\frac{-23}{18}\right)$$

$$= \frac{-54 + (-23)}{18}$$

$$= \frac{-54 - 23}{18}$$

$$= \frac{-77}{18}$$

Question: 9

The sum of two ra

Solution:

Sum of two rational numbers = -2

One number = $\frac{-14}{5}$

Let the other rational number = x

Now,

According to question,

$$\frac{-14}{5} + x = -2$$

$$\Rightarrow x = -2 - \frac{-14}{5}$$

$$\Rightarrow x = \frac{-10 - (-14)}{5}$$

$$\Rightarrow x = \frac{-10 + 14}{5}$$

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

Therefore, the other rational number is $\frac{4}{5}$

Question: 10

The sum of two ra

Solution:

Sum of two rational numbers = $\frac{-1}{2}$

One number = $\frac{5}{6}$

Let the other rational number = x

Now,

According to question,

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

$$\Rightarrow x = \frac{-1}{2} - \frac{5}{6}$$

$$\Rightarrow x = \frac{-3 - 5}{6}$$

$$\Rightarrow x = \frac{-8}{6}$$

In lowest terms,

$$x = \frac{-8 \div 2}{6 \div 2} = \frac{-4}{3}$$

Therefore, the other rational number is $\frac{-4}{3}$

Question: 11

What number shoul

Solution:

Let the number = x

Now,

According to question,

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

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

$$\Rightarrow x = \frac{-12 - (-5)}{8}$$

$$\Rightarrow x = \frac{-12 + 5}{8}$$

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

Therefore, $\frac{-7}{8}$ should be added to $\frac{-5}{8}$ so as to get $\frac{-3}{2}$

Question: 12

What number shoul

Solution:

Let the number = x

Now,

According to question,

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

$$\Rightarrow x = \frac{5}{7} - (-1)$$

$$\Rightarrow x = \frac{5 - (-7)}{7}$$

$$\Rightarrow x = \frac{5 + 7}{7}$$

$$\Rightarrow x = \frac{12}{7}$$

Therefore, $\frac{12}{7}$ should be added to -1 so as to get $\frac{5}{7}$

Question: 13

What number shoul

Solution:

Let the number = x

Now,

According to question,

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

$$\Rightarrow x = \frac{-2}{3} - (\frac{-1}{6})$$

$$\Rightarrow x = \frac{-4-(-1)}{6}$$

$$\Rightarrow x = \frac{-4+1}{6}$$

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

In lowest terms,

$$x = \frac{-3 \div 3}{6 \div 3} = \frac{-1}{2}$$

Therefore, $\frac{-1}{2}$ should be subtracted from $\frac{-2}{3}$ so as to get $\frac{-1}{6}$

Question: 14

(i) Which rationa

Solution:

(i) A Additive inverse of a number $\frac{a}{b}$ is the number $-\frac{a}{b}$ such that, $\frac{a}{b} + \left(\frac{-a}{b}\right) = 0$

0 is the rational number that is its own additive inverse

(ii) Let there be 2 rational numbers, $\frac{a}{b}$ and $\frac{c}{d}$ where, b≠0 and d≠0

$$\frac{a}{b} - \frac{c}{d}$$

LCM of b and d = bd

$$= \frac{ad-bc}{bd}$$

Where, bd ≠ 0

Therefore, $\frac{ad-bc}{bd}$ is a rational number

Hence,

Yes, the difference of two rational numbers a rational number

(iii) Yes, addition is commutative on rational numbers

Let there be 2 rational numbers, $\frac{a}{b}$ and $\frac{c}{d}$ where, b≠0 and d≠0

Then,

$$\frac{a}{b} + \frac{c}{d} = \frac{c}{d} + \frac{a}{b}$$

(iv) Yes, addition is associative on rational numbers

Let there be 3 rational numbers, $\frac{a}{b}$, $\frac{c}{d}$ and $\frac{e}{f}$ where, b≠0 , d≠0 and f≠0

Then,

$$\frac{a}{b}+\left(\frac{c}{d}+\frac{e}{f}\right)=\left(\frac{a}{b}+\frac{c}{d}\right)+\frac{e}{f}$$

(v) No, subtraction is not commutative on rational numbers

Let there be 2 rational numbers, $\frac{a}{b}$ and $\frac{c}{d}$ where, b≠0 and d≠0

Then,

$$\frac{a}{b}+\frac{c}{d}\neq\frac{c}{d}+\frac{a}{b}$$

(vi) No, addition is not associative on rational numbers

Let there be 3 rational numbers, $\frac{a}{b}$, $\frac{c}{d}$ and $\frac{e}{f}$ where, b≠0 , d≠0 and f≠0

Then,

$$\frac{a}{b}+\left(\frac{c}{d}+\frac{e}{f}\right)\neq\left(\frac{a}{b}+\frac{c}{d}\right)+\frac{e}{f}$$

(vii) Negative of a negative rational number is the number itself without the negative sign.

Exercise : 1D

Question: 1

Find each of the

Solution:

(i)

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

$$=\frac{3\times-7}{5\times8}$$

$$=\frac{-21}{40}$$

(ii)

$$\frac{-9}{2}\times\frac{5}{4}$$

$$=\frac{-9\times5}{2\times4}$$

$$=\frac{-45}{8}$$

(iii)

$$\frac{-6}{11}\times\frac{-5}{3}$$

$$=\frac{-6\times-5}{11\times3}$$

$$=\frac{30}{33}$$

In lowest terms,

$$\frac{30}{33}=\frac{30\div3}{33\div3}=\frac{10}{11}$$

(iv)

$$\frac{-2}{3} \times \frac{6}{7}$$

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

$$= \frac{-12}{21}$$

In lowest terms,

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

(v)

$$\frac{-12}{5} \times \frac{10}{-3}$$

$$= \frac{-12 \times 10}{5 \times -3}$$

$$= \frac{-120}{-15} = \frac{-120 \times -1}{-15 \times -1} = \frac{120}{15}$$

In lowest terms,

$$\frac{120}{15} = \frac{120 \div 3}{15 \div 3} = \frac{40}{5}$$

Further,

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

(vi)

$$\frac{25}{-9} \times \frac{3}{-10}$$

$$= \frac{25 \times 3}{-9 \times -10}$$

$$= \frac{75}{90}$$

In lowest terms,

$$\frac{75}{90} = \frac{75 \div 15}{90 \div 15} = \frac{5}{6}$$

(vii)

$$\frac{5}{-18} \times \frac{-9}{20}$$

$$= \frac{5 \times -9}{-18 \times 20}$$

$$= \frac{-45}{-360} = \frac{-45 \times -1}{-360 \times -1} = \frac{45}{360}$$

In lowest terms,

$$\frac{45}{360} = \frac{45 \div 45}{360 \div 45} = \frac{1}{8}$$

(viii)

$$\frac{-13}{15} \times \frac{-25}{26}$$

$$= \frac{-13 \times -25}{15 \times 26}$$

$$= \frac{325}{390}$$

In lowest terms,

$$\frac{325}{390} = \frac{325 \div 5}{390 \div 5} = \frac{65}{78}$$

Further,

$$\frac{65}{78} = \frac{65 \div 13}{78 \div 13} = \frac{5}{6}$$

(ix)

$$\frac{16}{-21} \times \frac{14}{5}$$

$$= \frac{16 \times 14}{-21 \times 5}$$

$$= \frac{224}{-105} = \frac{224 \times -1}{-105 \times -1} = \frac{-224}{105}$$

In lowest terms,

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

(x)

$$\frac{-7}{6} \times 24$$

$$= \frac{-7}{6} \times \frac{24}{1}$$

$$= \frac{-7 \times 24}{6 \times 1}$$

$$= \frac{-168}{6}$$

In lowest terms,

$$\frac{-168}{6} = \frac{-168 \div 2}{6 \div 2} = \frac{-84}{3}$$

Further,

$$\frac{-84}{3} = \frac{-84 \div 3}{3 \div 3} = \frac{-28}{1} = -28$$

(xi)

$$\frac{7}{24} \times -48$$

$$= \frac{7}{24} \times \frac{-48}{1}$$

$$= \frac{7 \times -48}{24 \times 1}$$

$$= \frac{-336}{24}$$

In lowest terms,

$$\frac{-336}{24} = \frac{-336 \div 4}{24 \div 4} = \frac{-84}{6}$$

Further,

$$\frac{-84}{6} = \frac{-84 \div 6}{6 \div 6} = \frac{-14}{1} = -14$$

(xii)

$$\frac{-13}{5} \times -10$$

$$= \frac{-13}{5} \times \frac{-10}{1}$$

$$= \frac{-13 \times -10}{5 \times 1}$$

$$= \frac{130}{5}$$

In lowest terms,

$$\frac{130}{5} = \frac{130 \div 5}{5 \div 5} = \frac{26}{1} = 26$$

Question: 2

Verify each of th

Solution:

(i)

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

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

$$= \frac{-15}{63}$$

In lowest terms,

$$\frac{-15}{63} = \frac{-15 \div 3}{63 \div 3} = \frac{-5}{21}$$

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

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

$$= \frac{-15}{63}$$

In lowest terms,

$$\frac{-15}{63} = \frac{-15 \div 3}{63 \div 3} = \frac{-5}{21}$$

LHS=RHS

Verified

(ii)

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

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

$$= \frac{-104}{63}$$

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

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

$$= \frac{-104}{63}$$

LHS=RHS

Verified

(iii)

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

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

$$= \frac{-84}{-180} = \frac{-84 \times -1}{-180 \times -1} = \frac{84}{180}$$

In lowest terms,

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

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

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

$$= \frac{-84}{-180} = \frac{-84 \times -1}{-180 \times -1} = \frac{84}{180}$$

In lowest terms,

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

LHS=RHS

Verified

(iv)

$$\text{LHS} = -8 \times \frac{-13}{12}$$

$$= \frac{-8 \times -13}{12}$$

$$= \frac{104}{12}$$

In lowest terms,

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

$$\text{RHS}=\frac{-13}{12}\times -8$$

$$=\frac{-13\times -8}{12}$$

$$=\frac{104}{12}$$

In lowest terms,

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

LHS=RHS

Verified

Question: 3

Verify each of th

Solution:

(i)

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

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

$$=\frac{5\times 12}{7\times 13}\times\frac{7}{18}$$

$$=\frac{60}{91}\times\frac{7}{18}$$

$$=\frac{60\times 7}{91\times 18}$$

$$=\frac{420}{1638}$$

In lowest terms,

$$\frac{420}{1638}=\frac{420\div 42}{1638\div 42}=\frac{10}{13}$$

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

$$=\frac{5}{7}\times\frac{12\times 7}{13\times 18}$$

$$=\frac{5}{7}\times\frac{84}{234}$$

$$=\frac{420}{1638}$$

In lowest terms,

$$\frac{420}{1638}=\frac{420\div 42}{1638\div 42}=\frac{10}{13}$$

LHS=RHS

Verified

(ii)

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

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

$$=\frac{-13}{24}\times\frac{-12\times35}{5\times36}$$

$$=\frac{-13}{24}\times\frac{-420}{180}$$

$$=\frac{60\times7}{24\times180}$$

$$=\frac{5460}{4320}$$

In lowest terms,

$$\frac{5460}{4320}=\frac{5460\div10}{4320\div10}=\frac{546}{432}$$

Further,

$$\frac{546}{432}=\frac{546\div6}{432\div6}=\frac{91}{72}$$

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

$$=\frac{-13\times-12}{24\times5}\times\frac{35}{36}$$

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

$$=\frac{156\times35}{120\times36}$$

$$=\frac{5460}{4320}$$

In lowest terms,

$$\frac{5460}{4320}=\frac{5460\div10}{4320\div10}=\frac{546}{432}$$

Further,

$$\frac{546}{432}=\frac{546\div6}{432\div6}=\frac{91}{72}$$

LHS=RHS

Verified

(iii)

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

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

$$= \frac{-9 \times -10}{5 \times 3} \times \frac{21}{-4}$$

$$= \frac{90}{15} \times \frac{21}{-4}$$

$$= \frac{90 \times 21}{15 \times -4}$$

$$= \frac{1890}{-60} = \frac{1890 \times -1}{-60 \times -1} = \frac{-1890}{60}$$

In lowest terms,

$$\frac{-1890}{60} = \frac{-1890 \div 10}{60 \div 10} = \frac{-189}{6}$$

Further,

$$\frac{-189}{6} = \frac{-189 \div 3}{6 \div 3} = \frac{-63}{2}$$

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

$$= \frac{-9}{5} \times \frac{-10 \times 21}{3 \times -4}$$

$$= \frac{-9}{5} \times \frac{-210}{-12}$$

$$= \frac{-9 \times -210}{5 \times -12}$$

$$= \frac{1890}{-60} = \frac{1890 \times -1}{-60 \times -1} = \frac{-1890}{60}$$

In lowest terms,

$$\frac{-1890}{60} = \frac{-1890 \div 10}{60 \div 10} = \frac{-189}{6}$$

Further,

$$\frac{-189}{6} = \frac{-189 \div 3}{6 \div 3} = \frac{-63}{2}$$

LHS=RHS

Verified

Question: 4

Fill in the blank

Solution:

(i)

By Commutative Property, i.e, a × b = b × a

$$\frac{-23}{17} \times \frac{18}{35} = \frac{18}{35} \times \frac{-23}{17}$$

(ii)

By Commutative Property, i.e, a × b = b × a

$$-38 \times \frac{-7}{19} = \frac{-7}{19} \times -38$$

(iii)

By Associative Property, i.e, (a × b) × c = a × (b × c)

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

(iv)

By Associative Property, i.e, (a × b) × c = a × (b × c)

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

Question: 5

Find the multipli

Solution:

A multiplicative inverse for a number x, is a number which when multiplied by x yields the multiplicative identity, 1

The multiplicative inverse of a rational number $\frac{a}{b}$ is $\frac{b}{a}$.

Therefore,

(i) The multiplicative inverse of $\frac{13}{25}=\frac{25}{13}$.

(ii) The multiplicative inverse of $\frac{-17}{12}=\frac{12}{-17}$.

In standard form,

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

(iii) The multiplicative inverse of $\frac{-7}{24}=\frac{24}{-7}$.

In standard form,

$$\frac{24}{-7}=\frac{24\times-1}{-7\times-1}=\frac{-24}{7}$$

.

(iv) The multiplicative inverse of $18=\frac{1}{18}$.

(v) The multiplicative inverse of $-6=\frac{1}{-6}$.

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

(vi) The multiplicative inverse of $\frac{-3}{-5}=\frac{-5}{-3}$.

In standard form,

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

(vii) The multiplicative inverse of -1 =-1.

(viii) The multiplicative inverse of $\frac{0}{2}$ is undefined.

Since, $\frac{2}{0}$ is undefined.

(ix) The multiplicative inverse of $\frac{2}{-5}=\frac{-5}{2}$.

(x) The multiplicative inverse of $\frac{-1}{8} = \frac{8}{-1}$.

In standard form,

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

Question: 6

Find the value of

Solution:

Let there be a rational number $\frac{a}{b}$ then $\left(\frac{a}{b}\right)^{-1} = \frac{b}{a}$

Therefore,

(i)

$$\left(\frac{5}{8}\right)^{-1} = \frac{8}{5}$$

(ii)

$$\left(\frac{-4}{9}\right)^{-1} = \frac{9}{-4} = \frac{9 \times -1}{-4 \times -1} = \frac{-9}{4}$$

(iii)

$$(-7)^{-1} = \left(\frac{-7}{1}\right)^{-1} = \frac{1}{-7} = \frac{1 \times -1}{-7 \times -1} = \frac{-1}{7}$$

(iv)

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

Question: 7

Verify the follow

Solution:

(i)

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

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

$$= \frac{3}{7} \times \left(\frac{5 \times 13 + 12 \times 6}{78}\right)$$

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

$$= \frac{3}{7} \times \left(\frac{137}{78}\right)$$

$$= \frac{3 \times 137}{7 \times 78}$$

$$= \frac{411}{546}$$

In lowest terms,

$$\frac{411}{546}=\frac{411\div 3}{546\div 3}=\frac{137}{182}$$

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

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

$$=\frac{15}{42}+\left(\frac{36}{91}\right)$$

$$=\frac{15\times 13+36\times 6}{546}$$

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

$$=\frac{411}{546}$$

In lowest terms,

$$\frac{411}{546}=\frac{411\div 3}{546\div 3}=\frac{137}{182}$$

LHS=RHS

Verified

(ii)

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

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

$$=\frac{-15}{4}\times\left(\frac{3\times 5+(-12)\times 7}{35}\right)$$

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

$$=\frac{-15}{4}\times\left(\frac{-69}{35}\right)$$

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

$$=\frac{1035}{140}$$

In lowest terms,

$$\frac{1035}{140}=\frac{1035\div 5}{140\div 5}=\frac{207}{28}$$

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

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

$$=\frac{-45}{28}+\left(\frac{180}{20}\right)$$

$$= \frac{-45 \times 5 + 180 \times 7}{140}$$

$$= \frac{-225 + 1260}{140}$$

$$= \frac{1035}{140}$$

In lowest terms,

$$\frac{1035}{140} = \frac{1035 \div 5}{140 \div 5} = \frac{207}{28}$$

LHS=RHS

Verified

(iii)

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

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

$$= \left(\frac{-8 \times 4 + (-13) \times 1}{12}\right) \times \left(\frac{5}{6}\right)$$

$$= \left(\frac{-32 - 13}{12}\right) \times \left(\frac{5}{6}\right)$$

$$= \frac{-45}{12} \times \frac{5}{6}$$

$$= \frac{-45 \times 5}{12 \times 6}$$

$$= \frac{-225}{72}$$

In lowest terms,

$$\frac{-225}{72} = \frac{-225 \div 9}{72 \div 9} = \frac{-25}{8}$$

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

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

$$= \frac{-40}{18} + \left(\frac{-65}{72}\right)$$

$$= \frac{-40 \times 4 + (-65) \times 1}{72}$$

$$= \frac{-160 - 65}{72}$$

$$= \frac{-225}{72}$$

In lowest terms,

$$\frac{-225}{72} = \frac{-225 \div 9}{72 \div 9} = \frac{-25}{8}$$

LHS=RHS

Verified

(iv)

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

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

$$=\frac{-16}{7}\times\left(\frac{-8\times 2+(-7)\times 3}{18}\right)$$

$$=\frac{-16}{7}\times\left(\frac{-16-21}{18}\right)$$

$$=\frac{-16}{7}\times\left(\frac{-37}{18}\right)$$

$$=\frac{-16\times -37}{7\times 18}$$

$$=\frac{592}{126}$$

In lowest terms,

$$\frac{592}{126}=\frac{592\div 2}{126\div 2}=\frac{296}{63}$$

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

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

$$=\frac{128}{63}+\left(\frac{112}{42}\right)$$

$$=\frac{128\times 2+112\times 3}{126}$$

$$=\frac{256+336}{126}$$

$$=\frac{592}{126}$$

In lowest terms,

$$\frac{592}{126}=\frac{592\div 2}{126\div 2}=\frac{296}{63}$$

LHS=RHS

Verified

Question: 8

Name the property

Solution:

(i) Commutative law i.e., a b = b a

(ii) Associative law i.e., a(bc) = (ab)c

(iii) Distributive law i.e., a(b + c) = ab + ac

(iv) Property of multiplicative identity i.e., a× 1=1× a

(v) Property of multiplicative inverse i.e., $\frac{a}{b} \times \frac{b}{a}=1$

(vi) Multiplicative property of 0 i.e., a× 0=0

Question: 9

Fill in the blank

Solution:

(i) 1

(ii) No

(iii) 1 and -1

(iv) Not

(v) $\frac{1}{a}$

(vi) a

(vii) Positive

(viii) Negative

Exercise : 1E

Question: 1

Simplify:

Solution:

(i)

$$\frac{4}{9} \div \frac{-5}{12}$$

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

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

$$= \frac{48}{-45} = \frac{48 \times -1}{-45 \times -1} = \frac{-48}{45}$$

In lowest terms,

$$\frac{-48}{45} = \frac{-48 \div 3}{45 \div 3} = \frac{-16}{15}$$

(ii)

$$-8 \div \frac{-7}{16}$$

$$= \frac{-8}{1} \div \frac{-7}{16}$$

$$= \frac{-8}{1} \times \frac{16}{-7}$$

$$= \frac{-8 \times 16}{1 \times -7}$$

$$= \frac{-128}{-7} = \frac{-128 \times -1}{-7 \times -1} = \frac{128}{7}$$

(iii)

$$\frac{-12}{7} \div -18$$

$$= \frac{-12}{7} \div \frac{-18}{1}$$

$$= \frac{-12}{7} \times \frac{1}{-18}$$

$$= \frac{-12 \times 1}{7 \times -18}$$

$$= \frac{-12}{-126} = \frac{-12 \times -1}{-126 \times -1} = \frac{12}{126}$$

In lowest terms,

$$\frac{12}{126} = \frac{12 \div 6}{126 \div 6} = \frac{2}{21}$$

(iv)

$$\frac{-1}{10} \div \frac{-8}{5}$$

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

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

$$= \frac{-5}{-80} = \frac{-5 \times -1}{-80 \times -1} = \frac{5}{80}$$

In lowest terms,

$$\frac{5}{80} = \frac{5 \div 5}{80 \div 5} = \frac{1}{16}$$

(v)

$$\frac{-16}{35} \div \frac{-15}{14}$$

$$= \frac{-16}{35} \times \frac{14}{-15}$$

$$= \frac{-16 \times 14}{35 \times -15}$$

$$= \frac{-224}{-525} = \frac{-224 \times -1}{-525 \times -1} = \frac{224}{525}$$

In lowest terms,

$$\frac{224}{525} = \frac{224 \div 7}{525 \div 7} = \frac{32}{75}$$

(vi)

$$\frac{-65}{14} \div \frac{13}{7}$$

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

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

$$= \frac{-455}{182} = \frac{-455 \times -1}{182 \times -1} = \frac{-455}{182}$$

In lowest terms,

$$\frac{-455}{182} = \frac{-455 \div 7}{182 \div 7} = \frac{-65}{26}$$

Further,

$$\frac{-65}{26} = \frac{-65 \div 13}{26 \div 13} = \frac{-5}{2}$$

Question: 2

Verify whether th

Solution:

(i)

$$\frac{13}{5} \div \frac{26}{10} = \frac{26}{10} \div \frac{13}{5}$$

$$\text{LHS} = \frac{13}{5} \div \frac{26}{10}$$

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

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

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

$$\text{RHS} = \frac{26}{10} \div \frac{13}{5}$$

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

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

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

Since, RHS = LHS

Therefore, True

(ii)

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

$$\text{LHS} = -9 \div \frac{3}{4}$$

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

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

$$= \frac{-36}{3} = -12$$

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

$$= \frac{3}{4} \times \frac{1}{-9}$$

$$= \frac{3 \times 1}{4 \times -9}$$

$$= \frac{3}{-36} = \frac{-1}{12}$$

Since, RHS ≠ LHS

Therefore, False

(iii)

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

$$\text{LHS} = \frac{-8}{9} \div \frac{-4}{3}$$

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

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

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

$$\text{RHS} = \frac{-4}{3} \div \frac{-8}{9}$$

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

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

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

Since, RHS ≠ LHS

Therefore, False

(iv)

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

$$\text{LHS} = \frac{-7}{24} \div \frac{3}{-16}$$

$$= \frac{-7}{24} \times \frac{-16}{3}$$

$$= \frac{-7 \times -16}{24 \times 3}$$

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

$$\text{RHS} = \frac{3}{-16} \div \frac{-7}{24}$$

$= \frac{3}{-16} \times \frac{24}{-7}$

$= \frac{3 \times 24}{-16 \times -7}$

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

Since, RHS ≠ LHS

Therefore, False

Question: 3

Verify whether th

Solution:

(i)

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

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

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

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

$= \frac{15}{9} \div \frac{5}{2}$

$= \frac{15}{9} \times \frac{2}{5}$

$= \frac{15 \times 2}{9 \times 5}$

$= \frac{30}{45} = \frac{30 \div 15}{45 \div 15} = \frac{2}{3}$

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

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

$= \frac{5}{9} \div \frac{2}{15}$

$= \frac{5}{9} \times \frac{15}{2}$

$= \frac{5 \times 15}{9 \times 2}$

$= \frac{75}{18} = \frac{75 \div 3}{18 \div 3} = \frac{25}{6}$

RHS ≠ LHS

Hence, False

(ii)

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

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

$= \left(\frac{-16}{1} \div \frac{6}{5}\right) \div \frac{-9}{10}$

$= \left(\frac{-16}{1} \times \frac{5}{6}\right) \div \frac{-9}{10}$

$= \left(\frac{-16 \times 5}{1 \times 6}\right) \div \frac{-9}{10}$

$= \frac{-80}{6} \div \frac{-9}{10}$

$= \frac{-80}{6} \times \frac{10}{-9}$

$= \frac{-80 \times 10}{6 \times -9}$

$= \frac{-800}{-54} = \frac{800}{54} = \frac{800 \div 2}{54 \div 2} = \frac{400}{27}$

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

$= \frac{-16}{1} \div \left(\frac{6}{5} \div \frac{-9}{10}\right)$

$= \frac{-16}{1} \div \left(\frac{6}{5} \times \frac{10}{-9}\right)$

$= \frac{-16}{1} \div \frac{60}{-45}$

$= \frac{-16}{1} \times \frac{-45}{60}$

$= \frac{-16 \times -45}{1 \times 60}$

$= \frac{720}{60} = \frac{720 \div 60}{60 \div 60} = 12$

RHS ≠ LHS

Hence, False

(iii)

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

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

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

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

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

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

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

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

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

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

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

$$= \frac{-3}{5} \div \frac{-12 + 490}{35}$$

$$= \frac{-3}{5} \div \frac{478}{35}$$

$$= \frac{-3}{5} \times \frac{35}{478}$$

$$= \frac{-3 \times 35}{5 \times 478}$$

$$= \frac{-105}{2390} = \frac{-105 \div 5}{2390 \div 5} = \frac{-21}{478}$$

RHS ≠ LHS

Hence, False

Question: 4

The product of tw

Solution:

Product of two rational numbers = -9

One rational number = -12

Let the other rational number = x

Now,

According to the question,

-12 × x = -9

$$\Rightarrow x = \frac{-9}{-12}$$

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

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

Hence, the other rational number is $\frac{3}{4}$

Question: 5

The product of tw

Solution:

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

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

Let the other rational number = x

Now,

According to the question,

$$\frac{-4}{3} \times x = \frac{-16}{9}$$

$$\Rightarrow x = \frac{-16}{9} \div \frac{-4}{3}$$

$$\Rightarrow x = \frac{-16}{9} \times \frac{3}{-4}$$

$$\Rightarrow x = \frac{-16 \times 3}{9 \times -4}$$

$$\Rightarrow x = \frac{-48}{-36} = \frac{-48 \times -1}{-36 \times -1} = \frac{48}{36}$$

$$\Rightarrow x = \frac{48}{36} = \frac{48 \div 12}{36 \div 12} = \frac{4}{3}$$

Hence, the other rational number is $\frac{4}{3}$

Question: 6

By what rational

Solution:

Let x be multiplied by $\frac{-15}{56}$ to get $\frac{-5}{7}$

It can be written as,

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

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

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

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

$$\Rightarrow x = \frac{-280}{-105} = \frac{-280 \times -1}{-105 \times -1} = \frac{280}{105}$$

$$\Rightarrow x = \frac{280}{105} = \frac{280 \times 35}{105 \times 35} = \frac{8}{3}$$

Hence, it should be multiplied by is $\frac{8}{3}$

Question: 7

By what rational

Solution:

Let x be multiplied by $\frac{-8}{39}$ to get $\frac{1}{26}$

It can be written as,

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

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

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

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

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

$$\Rightarrow x = \frac{-39}{208} = \frac{-39 \div 13}{208 \div 13} = \frac{-3}{16}$$

Hence, it should be multiplied by is $\frac{-3}{16}$

Question: 8

By what number sh

Solution:

Let $\frac{-33}{8}$ be divided by x to get $\frac{-11}{2}$

It can be written as,

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

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

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

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

$$\Rightarrow x = \frac{-66}{-88} = \frac{-66 \times -1}{-88 \times -1} = \frac{66}{88}$$

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

Hence, it should be multiplied by is $\frac{3}{4}$

Question: 9

Divide the sum of

Solution:

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

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

$$= \frac{13 \times 7 + (-12) \times 5}{35}$$

$$= \frac{91 - 60}{35}$$

$= \frac{31}{35}$

Product of $\frac{-31}{7}$ and $\frac{1}{-2}$ -

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

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

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

$= \frac{31}{14}$

Now,

According to the question,

$\frac{31}{35} \div \frac{31}{14}$

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

$= \frac{2}{5}$

Question: 10

Divide the sum of

Solution:

According to the question,

$\left(\frac{65}{12} + \frac{8}{3}\right) \div \left(\frac{65}{12} - \frac{8}{3}\right)$

$= \left(\frac{65 \times 1 + 8 \times 4}{12}\right) \div \left(\frac{65 \times 1 - 8 \times 4}{12}\right)$

$= \left(\frac{65 + 32}{12}\right) \div \left(\frac{65 - 32}{12}\right)$

$= \left(\frac{97}{12}\right) \div \left(\frac{33}{12}\right)$

$= \frac{97}{12} \times \frac{12}{33}$

$= \frac{97}{33}$

Question: 11

Fill in the blank

Solution:

(i)

$\frac{9}{8} \div \text{x(let)} = \frac{-3}{2}$

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

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

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

$$\Rightarrow x = \frac{18}{-24} = \frac{18 \times -1}{-24 \times -1} = \frac{-18}{24}$$

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

Therefore,

$$\frac{9}{8} \div \frac{-3}{4} = \frac{-3}{2}$$

(ii)

$$x(\text{let}) \div \frac{-7}{5} = \frac{10}{19}$$

$$\Rightarrow x = \frac{10}{19} \times \frac{-7}{5}$$

$$\Rightarrow x = \frac{10 \times -7}{19 \times 5}$$

$$\Rightarrow x = \frac{-70}{95} = \frac{-70 \div 5}{95 \div 5} = \frac{-14}{19}$$

Therefore,

$$\frac{-14}{19} \div \frac{-7}{5} = \frac{10}{19}$$

(iii)

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

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

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

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

Therefore,

$$\frac{4}{5} \div (-3) = \frac{-4}{15}$$

(iv)

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

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

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

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

$$\Rightarrow x = \frac{-60}{-6} = \frac{-60 \times -1}{-6 \times -1} = \frac{60}{6}$$

$$\Rightarrow x = \frac{60}{6} = \frac{60 \div 6}{6 \div 6} = 10$$

Therefore,

$$-12 \div 10 = \frac{-6}{5}$$

Question: 12

(i) Are rational

Solution:

(i) No rational numbers are not always closed under division,

Since, $\frac{a}{0} = \infty$ which is not a rational number

(ii) No rational numbers are not always commutative under division,

Let $\frac{a}{b}$ and $\frac{c}{d}$ be two rational numbers.

$$\frac{a}{b} \div \frac{c}{d} = \frac{ad}{bc}$$

And

$$\frac{c}{d} \div \frac{a}{b} = \frac{bc}{ad}$$

Therefore,

$$\frac{a}{b} \div \frac{c}{d} \neq \frac{c}{d} \div \frac{a}{b}$$

Hence, rational numbers are not always commutative under division

(iii) No rational numbers are not always associative under division,

Let $\frac{a}{b}$, $\frac{c}{d}$ and $\frac{e}{f}$ be two rational numbers.

$$\frac{a}{b} \div \left(\frac{c}{d} \div \frac{e}{f}\right) = \frac{ade}{bcf}$$

And

$$\left(\frac{a}{b} \div \frac{c}{d}\right) \div \frac{e}{f} = \frac{adf}{bce}$$

Therefore,

$$\frac{a}{b} \div \left(\frac{c}{d} \div \frac{e}{f}\right) \neq \left(\frac{a}{b} \div \frac{c}{d}\right) \div \frac{e}{f}$$

Hence, rational numbers are not always associative under division.

(iv) No we cannot divide 1 by 0.

Since, $\frac{a}{0} = \infty$ which is not defined.

Exercise : 1F

Question: 1

Find a rational n

Solution:

To find a rational number x between two rational numbers $\frac{a}{b}$ and $\frac{c}{d}$, we use

$$x = \frac{1}{2}\left(\frac{a}{b} + \frac{c}{d}\right)$$

Therefore, to find rational number x (let) between $\frac{1}{4}$ and $\frac{1}{3}$

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

$$\Rightarrow x = \frac{1}{2}\left(\frac{1 \times 3 + 1 \times 4}{12}\right)$$

$$\Rightarrow x = \frac{1}{2}\left(\frac{3 + 4}{12}\right)$$

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

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

Question: 2

Find a rational n

Solution:

To find a rational number x between two rational numbers $\frac{a}{b}$ and $\frac{c}{d}$, we use

$$x = \frac{1}{2}\left(\frac{a}{b} + \frac{c}{d}\right)$$

Therefore, to find rational number x (let) between 2 and 3

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

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

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

Question: 3

Find a rational n

Solution:

To find a rational number x between two rational numbers $\frac{a}{b}$ and $\frac{c}{d}$, we use

$$x = \frac{1}{2}\left(\frac{a}{b} + \frac{c}{d}\right)$$

Therefore, to find rational number x (let) between $\frac{-1}{3}$ and $\frac{1}{2}$

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

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

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

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

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

Question: 4

Find two rational

Solution:

To find a rational number x between two rational numbers $\frac{a}{b}$ and $\frac{c}{d}$, we use

$$x = \frac{1}{2}\left(\frac{a}{b} + \frac{c}{d}\right)$$

Therefore, to find rational number x (let) between -3 and -2

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

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

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

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

Now if we find a rational number between $\frac{-5}{2}$and -2 it will also be between -3 and -2 since $\frac{-5}{2}$ lies between -3 and -2

Therefore, to find rational number y (let) between $\frac{-5}{2}$and -2

$$y = \frac{1}{2}\left(\frac{-5}{2} + (-2)\right)$$

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

$$\Rightarrow y = \frac{1}{2}(\frac{-5-4}{2})$$

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

Question: 5

Find three ration

Solution:

To find a rational number x between two rational numbers $\frac{a}{b}$ and $\frac{c}{d}$, we use

$$x = \frac{1}{2}\left(\frac{a}{b} + \frac{c}{d}\right)$$

Therefore, to find rational number x (let) between 4 and 5

$$x = \frac{1}{2}(4 + 5)$$

$$\Rightarrow x = \frac{1}{2} \times 9$$

$\Rightarrow x = \frac{9}{2}$

Now if we find a rational number between 4 and $\frac{9}{2}$ it will also be between 4 and 5 since $\frac{9}{2}$ lies between 4 and 5

Therefore, to find rational number y (let) between 4 and $\frac{9}{2}$

$y = \frac{1}{2}\left(4 + \frac{9}{2}\right)$

$\Rightarrow y = \frac{1}{2}(\frac{8+9}{2})$

$\Rightarrow y = \frac{1}{2} \times \frac{17}{2}$

$\Rightarrow y = \frac{17}{4}$

Now if we find a rational number between $\frac{9}{2}$ and 5 it will also be between 4 and 5 since $\frac{9}{2}$ lies between 4 and 5

Therefore, to find rational number z (let) between $\frac{9}{2}$ and 5

$z = \frac{1}{2}\left(\frac{9}{2} + 5\right)$

$\Rightarrow z = \frac{1}{2}(\frac{9+10}{2})$

$\Rightarrow z = \frac{1}{2} \times \frac{19}{2}$

$\Rightarrow z = \frac{19}{4}$

Question: 6

Find three ration

Solution:

To find a rational number x between two rational numbers $\frac{a}{b}$ and $\frac{c}{d}$, we use

$x = \frac{1}{2}\left(\frac{a}{b} + \frac{c}{d}\right)$

Therefore, to find rational number x (let) between $\frac{2}{3}$ and $\frac{3}{4}$

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

$\Rightarrow x = \frac{1}{2}(\frac{8+9}{12})$

$\Rightarrow x = \frac{1}{2} \times \frac{17}{12}$

$\Rightarrow x = \frac{17}{24}$

Now if we find a rational number between $\frac{2}{3}$ and $\frac{17}{24}$ it will also be between $\frac{2}{3}$ and $\frac{3}{4}$ since $\frac{17}{24}$ lies between $\frac{2}{3}$ and $\frac{3}{4}$

Therefore, to find rational number y (let) between $\frac{2}{3}$ and $\frac{17}{24}$

$$y = \frac{1}{2}\left(\frac{2}{3} + \frac{17}{24}\right)$$

$$\Rightarrow y = \frac{1}{2}\left(\frac{16+17}{24}\right)$$

$$\Rightarrow y = \frac{1}{2} \times \frac{33}{24}$$

$$\Rightarrow y = \frac{33}{48}$$

Now if we find a rational number between $\frac{17}{24}$ and $\frac{3}{4}$ it will also be between $\frac{2}{3}$ and $\frac{3}{4}$ since $\frac{17}{24}$ lies between $\frac{2}{3}$ and $\frac{3}{4}$

Therefore, to find rational number z (let) between $\frac{17}{24}$ and $\frac{3}{4}$

$$z = \frac{1}{2}\left(\frac{17}{24} + \frac{3}{4}\right)$$

$$\Rightarrow z = \frac{1}{2}\left(\frac{17+18}{24}\right)$$

$$\Rightarrow z = \frac{1}{2} \times \frac{35}{24}$$

$$\Rightarrow z = \frac{35}{48}$$

Question: 7

Find 10 rational

Solution:

We can write $\frac{-3}{4}$ as $\frac{-9}{12}$ (Since, $\frac{-3}{4} = \frac{-3\times3}{4\times3} = \frac{-9}{12}$)

And,

We can write $\frac{5}{6}$ as $\frac{10}{12}$ (Since, $\frac{5}{6} = \frac{5\times2}{6\times2} = \frac{10}{12}$)

Now clearly, rational numbers between them are,

$$\frac{-8}{12}, \frac{-7}{12}, \frac{-7}{12}, \frac{-6}{12}, \frac{-5}{12}, \frac{-4}{12}, \frac{-3}{12}, \frac{-2}{12}, \frac{-1}{12}, 0, \frac{1}{12}, \frac{2}{12}, \frac{3}{12}, \frac{4}{12}, \frac{5}{12}, \frac{6}{12}, \frac{7}{12}, \frac{8}{12} \text{ and } \frac{9}{12}$$

Any 10 rational numbers are,

$$\frac{-8}{12}, \frac{-7}{12}, \frac{-7}{12}, \frac{-6}{12}, \frac{-5}{12}, \frac{-4}{12}, \frac{-3}{12}, \frac{-2}{12}, \frac{-1}{12}, 0, \text{and} \frac{1}{12}$$

Question: 8

Find 12 rational

Solution:

We can write -1 as $\frac{-10}{10}$ (Since, $\frac{-1}{1} = \frac{-1\times10}{1\times10} = \frac{-10}{10}$)

And,

We can write 2 as $\frac{20}{10}$ (Since, $2 = \frac{2\times10}{1\times10} = \frac{20}{10}$)

Now clearly any 12 rational numbers between -1 and 2 are,

$\frac{-9}{10}, \frac{-8}{10}, \frac{-7}{10}, \frac{-6}{10}, \frac{-5}{10}, \frac{-4}{10}, \frac{-3}{10}, \frac{-2}{10}, \frac{-1}{10}, 0, \frac{1}{10}$ and $\frac{2}{10}$

Exercise : 1G

Question: 1

From a rope 11 m

Solution:

Length of rope = 11 m

Length of first piece cut = $2\frac{3}{5}\text{m}$

Length of second piece cut = $3\frac{3}{10}\text{m}$

Total length cut = Length of first piece cut + Length of second piece cut

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

$= \frac{13}{5}\text{m} + \frac{33}{10}\text{m}$

$= \frac{26+33}{10}\text{m}$

$= \frac{59}{10}\text{m}$

Length of remaining rope = Length of rope - Total length cut

$= 11\text{m} - \frac{59}{10}\text{m}$

$= \frac{110-59}{10}\text{m}$

$= \frac{51}{10}\text{m}$

$= 5\frac{1}{10}\text{m}$

Hence, Length of remaining rope = $5\frac{1}{10}\text{m}$

Question: 2

A drum full of ri

Solution:

Weight of drum full of rice = $40\frac{1}{6}$ kg

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

Weight of rice Weight of drum full of rice - Weight of empty drum

$= 40\frac{1}{6}\text{kg} - 13\frac{3}{4}\text{kg}$

$= \frac{241}{6}\text{kg} - \frac{55}{4}\text{kg}$

$= \frac{482-165}{12}\text{kg}$

$= \frac{317}{12}\text{kg}$

$= 26\frac{5}{12}\text{kg}$

Hence, Weight of rice = $26\frac{5}{12}\text{kg}$

Question: 3

A basket contains

Solution:

Weight of basket with three types of fruits = $19\frac{1}{3}$kg

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

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

Weight of pears = Weight of basket with three types of fruits – (Weight of apples + Weight of oranges)

$= 19\frac{1}{3}\text{kg} - (8\frac{1}{9}\text{kg} + 3\frac{1}{6}\text{kg})$

$= \frac{58}{3}\text{kg} - (\frac{73}{9}\text{kg} + \frac{19}{6}\text{kg})$

$= \frac{58}{3}\text{kg} - (\frac{146+57}{18}\text{kg})$

$= \frac{58}{3}\text{kg} - \frac{203}{18}\text{kg}$

$= \frac{348-203}{18}\text{kg}$

$= \frac{145}{18}\text{kg}$

$= 8\frac{1}{18}\text{kg}$

Hence, Weight of pears $= 8\frac{1}{18}\text{kg}$

Question: 4

On one day a rick

Solution:

Total Earnings = Rs 160

Spend on tea and snacks = Rs $26\frac{3}{5}$

Spend on food = Rs $50\frac{1}{2}$

Spend on repairs = Rs $16\frac{2}{5}$

Total Expenditure = Spend on tea and snacks + Spend on food + Spend on repairs

$= \text{Rs } 26\frac{3}{5} + \text{ Rs } 50\frac{1}{2} + \text{ Rs } 16\frac{2}{5}$

$= \text{Rs}\ \frac{133}{5} + \text{Rs}\ \frac{101}{2} + \text{Rs}\ \frac{82}{5}$

$= \text{Rs}\ \frac{266 + 505 + 164}{10}$

$= \text{Rs}\ \frac{935}{10}$

Savings= Total Earnings - Total Expenditure

$= \text{Rs}\ 160 - \text{Rs}\ \frac{935}{10}$

$= \text{Rs}\ \frac{1600 - 935}{10}$

$= \text{Rs}\ \frac{665}{10}$

$= \text{Rs}\ 66\frac{1}{2}$

Hence, Savings = $\text{Rs}\ 66\frac{1}{2}$

Question: 5

Find the cost of<

Solution:

Cost of cloth per meter = $\text{Rs}\ 63\frac{3}{4}$

Total meters = $3\frac{2}{5}\text{m}$

Cost of total cloth = Cost of cloth per meter × Total meters

$= \text{Rs}\ 63\frac{3}{4} \times 3\frac{2}{5}\text{m}$

$= \text{Rs}\ \frac{255}{4} \times \frac{17}{5}$

$= \text{Rs}\ \frac{4335}{20} = \frac{4335 \div 5}{20 \div 5} = \frac{867}{4}$

$= \text{Rs}\ 216\frac{3}{4}$

Therefore, total cost = $\text{Rs}\ 216\frac{3}{4}$

Question: 6

A car is moving a

Solution:

Speed of car = $60\frac{2}{5}\text{km/hr}$

Total hours = $6\frac{1}{4}\text{hrs}$

Total Distance = Speed of car × Total hours

$= 60\frac{2}{5}\text{km/hr} \times 6\frac{1}{4}\text{hrs}$

$= \frac{302}{5}\text{km/hr} \times \frac{25}{4}\text{hrs}$

$= \frac{7550}{20}\text{km}$

$= \frac{755}{2}\text{km}$

$= 377\frac{1}{2}\text{km}$

Therefore, Total Distance $= 377\frac{1}{2}\text{km}$

Question: 7

Find the area of

Solution:

Length of park = $36\frac{3}{5}\text{m}$

Breadth of park = $16\frac{2}{3}\text{m}$

Area of park = Length of park × Breadth of park

$= 36\frac{3}{5}\text{m} \times 16\frac{2}{3}\text{m}$

$= \frac{183}{5}\text{m} \times \frac{50}{3}\text{m}$

$= \frac{183 \times 50}{5 \times 3}\text{m}$

$= \frac{9150}{15}\text{m}^2$

$= 610\,\text{m}^2$

Hence, Area of park $= 610\,\text{m}^2$

Question: 8

Find the area of

Solution:

Side of plot = $8\frac{1}{2}\text{m}$

Area of plot = Side of plot × Side of plot

$= 8\frac{1}{2}\text{m} \times 8\frac{1}{2}\text{m}$

$= \frac{17}{2}\text{m} \times \frac{17}{2}\text{m}$

$= \frac{17 \times 17}{2 \times 2}\text{m}$

$= \frac{289}{4}\text{m}^2$

$= 72\frac{1}{4}\,\text{m}^2$

Hence, Area of plot $= 72\frac{1}{4}\ m^2$

Question: 9

One liters of pet

Solution:

Cost of one litre petrol $= Rs\ 63\frac{3}{4} = Rs\frac{255}{4}$

Cost of 34 litre petrol = 34 × Cost of one litre petrol

$= 34 \times Rs\frac{255}{4}$

$= Rs\frac{34 \times 255}{4}$

$= Rs\frac{8670}{4}$

$= Rs\frac{4335}{2}$

$= Rs\ 2167\frac{1}{2}$

Cost of 34 litre petrol $= Rs\ 2167\frac{1}{2}$

Question: 10

An aeroplane cove

Solution:

Distance covered in one hour = 1020 km

Distance covered in $4\frac{1}{6}$ hours $= 4\frac{1}{6}$ × Distance covered in one hour

$= 4\frac{1}{6} \times 1020\ km$

$= \frac{25}{6} \times 1020\ km$

$= \frac{25 \times 1020}{6} km$

$= \frac{25500}{6} km$

$= 4250\ km$

Distance covered in $4\frac{1}{6}$ hours $= 4250\ km$

Question: 11

The cost of

Solution:

Cost of $3\frac{1}{2}m$ of cloth = Rs $166\frac{1}{4}$

Cost of $1m$ of cloth = Cost of $3\frac{1}{2}m$ of cloth $\div\ 3\frac{1}{2}$

$= Rs\ 166\frac{1}{4} \div\ 3\frac{1}{2}$

$= \text{Rs}\ \frac{665}{4} \div \frac{7}{2}$

$= \text{Rs}\ \frac{665}{4} \times \frac{2}{7}$

$= \text{Rs}\ \frac{1330}{28}$

$= \text{Rs}\ 47\frac{1}{2}$

Cost of 1m of cloth$= \text{Rs}\ 47\frac{1}{2}$

Question: 12

A cord of length<

Solution:

Length of cord = $71\frac{1}{2}\text{m}$

No of pieces = 26

Length of each piece = Length of cord ÷ No of pieces

$= 71\frac{1}{2}\text{m} \div 26$

$= \frac{143}{2}\text{m} \div 26$

$= \frac{143}{2}\text{m} \times \frac{1}{26}$

$= \frac{143}{2}\text{m} \times \frac{1}{26}$

$= \frac{143}{2 \times 26}\text{m}$

$= \frac{143}{52}\text{m}$

$= \frac{11}{4}\text{m}$

$= 2\frac{3}{4}\text{m}$

Length of each piece$= 2\frac{3}{4}\text{m}$

Question: 13

The area of a roo

Solution:

Area of room = $65\frac{1}{4}\text{m}^2$

Breadth of room = $5\frac{7}{16}\text{m}$

Length of room = Area of room ÷ Breadth of room

$= 65\frac{1}{4}\text{m}^2 \div 5\frac{7}{16}\text{m}$

$= \frac{261}{4}\text{m}^2 \div \frac{87}{16}\text{m}$

$= \frac{261}{4}\text{m}^2 \times \frac{16}{87}\text{m}$

$= \frac{4176}{348}\text{m}$

$= 12\,\text{m}$

Length of room$= 12\,\text{m}$

Question: 14

The product of tw

Solution:

Product of two fractions = $9\frac{3}{5}$

First fraction = $9\frac{3}{7}$

Second fraction = Product of two fractions ÷ First fraction

$= 9\frac{3}{5} \div 9\frac{3}{7}$

$= \frac{48}{5} \div \frac{66}{7}$

$= \frac{48}{5} \times \frac{7}{66}$

$= \frac{336}{330}$

$= \frac{56}{55}$

$= 1\frac{1}{55}$

Second fraction $= 1\frac{1}{55}$

Question: 15

In a school

Solution:

Fraction of boys = $\frac{5}{8}$

Fraction of girls =1-$\frac{5}{8} = \frac{3}{8}$

Number of girls= 240

Number of girls = Total students × $\frac{3}{8}$

⇒ 240 = Total students × $\frac{3}{8}$

⇒ Total students = 240 ÷ $\frac{3}{8}$

$= 240 \times \frac{8}{3}$

$= \frac{240 \times 8}{3}$

$= \frac{1920}{3} = 640$

Total students =640

Number of boys = Total students - Number of girls

=640 – 240 = 400

Number of boys= 400

Question: 16

After reading

Solution:

Fraction read = $\frac{7}{9}$

Fraction left = $1 - \frac{7}{9} = \frac{2}{9}$

Pages left = 40

Pages left = $\frac{2}{9} \times$Total pages

40= $\frac{2}{9} \times$Total pages

⇒ Total pages = $40 \div \frac{2}{9}$

$= 40 \times \frac{9}{2}$

$= 180$

Total pages = 180

Question: 17

Rita had Rs. 300.

Solution:

Total money = Rs 300

Fraction spent on notebooks = $\frac{1}{3}$

Amount spent on notebooks = $\frac{1}{3} \times 300$ = Rs 100

Amount left = Rs 300 – Rs 100 =Rs 200

Fraction spent on stationary = $\frac{1}{4}$

Amount spent on stationary = $\frac{1}{4} \times 200$ = Rs 50

Money left = Rs 300 – Rs 150 = Rs 150

Question: 18

Amit earns Rs. 32

Solution:

Total earnings = Rs 32000

Amount spend on food = $\frac{1}{4} \times \text{Rs } 32000 = \text{Rs } 8000$

Amount left = Rs 32000 - Rs 8000 = Rs 24000

Amount spend on house rent = $\frac{3}{10} \times \text{Rs } 24000 = \text{Rs } 7200$

Amount left = Rs 24000- Rs 7200 = Rs 16800

Amount spend on education = $\frac{5}{21} \times \text{Rs } 16800 = \text{Rs } 4000$

Amount left = Rs 16800 - Rs 4000 = Rs 12800

Money left = Rs 12800

Question: 19

If

Solution:

Let the number be x

$\frac{3}{5}$ of x = $\frac{3}{5}$x

$\frac{2}{7}$ of x = $\frac{2}{7}$x

According to the question,

$$\frac{3}{5}x - \frac{2}{7}x = 44$$

$$\Rightarrow \frac{3x \times 7 - 2x \times 5}{35} = 44$$

$$\Rightarrow \frac{21x - 10x}{35} = 44$$

$$\Rightarrow \frac{11}{35} \times x = 44$$

$$\Rightarrow x = 44 \div \frac{11}{35}$$

$$\Rightarrow x = 44 \times \frac{35}{11}$$

$$\Rightarrow x = \frac{1540}{11}$$

$$\Rightarrow x = 140$$

The number is 140

Question: 20

At a cricket test

Solution:

Fraction of spectators covered = $\frac{2}{7}$

Fraction left = $1 - \frac{2}{7} = \frac{7-2}{7} = \frac{5}{7}$

Number of spectators in open = 15000

According to the question,

Number of spectators in open = Total number of spectators × $\frac{5}{7}$

$\Rightarrow 15000 = \frac{5}{7} \times \text{Total number of spectators}$

$\Rightarrow \text{Total number of spectators } = 15000 \div \frac{5}{7}$

$\Rightarrow \text{Total number of spectators } = 15000 \times \frac{7}{5}$

$\Rightarrow \text{Total number of spectators } = 21000$

Exercise : 1H

Question: 1

Solution:

$\frac{-5}{16} + \frac{7}{12}$

LCM of 12 and 16 = 48

$= \frac{-5 \times 3 + 7 \times 4}{48}$

$= \frac{-15 + 28}{48}$

$= \frac{13}{48}$

Question: 2

Solution:

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

And,

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

$\Rightarrow \frac{8}{-15} + \frac{4}{-3} = \frac{-8}{15} + \frac{-4}{3}$

$= \frac{-8 \times 3 + (-4) \times 15}{45}$

$= \frac{-24 - 60}{45}$

$= \frac{-84}{45} = \frac{-84 \div 3}{45 \div 3} = \frac{-28}{15}$

Question: 3

Solution:

$\frac{7}{-26} = \frac{7 \times -1}{-26 \times -1} = \frac{-7}{26}$

$\Rightarrow \frac{7}{-26} + \frac{16}{39} = \frac{-7}{26} + \frac{16}{39}$

$= \frac{-7 \times 3 + 16 \times 2}{78}$

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

$$= \frac{11}{78}$$

Question: 4

Solution:

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

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

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

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

$$= \frac{21 - 5}{7}$$

$$= \frac{16}{7}$$

Question: 5

Solution:

$$\frac{31}{-4} = \frac{31 \times -1}{-4 \times -1} = \frac{-31}{4}$$

$$\Rightarrow \frac{31}{-4} + \frac{-5}{8} = \frac{-31}{4} + \frac{-5}{8}$$

$$= \frac{-31 \times 2 + (-5) \times 1}{8}$$

$$= \frac{-62 - 5}{8}$$

$$= \frac{-67}{8}$$

Question: 6

What should be ad

Solution:

Let the number added be x.

Then,

$$\frac{7}{12} + x = \frac{-4}{15}$$

$$\Rightarrow x = \frac{-4}{15} - \frac{7}{12}$$

$$= \frac{-4 \times 4 - 7 \times 5}{60}$$

$$= \frac{-16 - 35}{8}$$

$$= \frac{-51}{60} = \frac{-51 \div 3}{60 \div 3} = \frac{-17}{20}$$

Question: 7

Solution:

$$\frac{2}{3} + \frac{-4}{5} + \frac{7}{15} + \frac{-11}{20}$$

LCM of 3, 5, 15, 20

$$= \frac{2 \times 20 + (-4) \times 12 + 7 \times 4 + (-11) \times 3}{60}$$

$$= \frac{40 - 48 + 28 - 33}{60}$$

$$= \frac{68 - 81}{60}$$

$$= \frac{-31}{60}$$

Question: 8

The sum of two nu

Solution:

Let the number added be x.

Then,

$$\frac{5}{6} + x = \frac{-4}{7}$$

$$\Rightarrow x = \frac{-4}{7} - \frac{5}{6}$$

$$= \frac{-4 \times 6 - 5 \times 7}{42}$$

$$= \frac{-24 - 35}{42}$$

$$= \frac{-59}{42}$$

Question: 9

What should be ad

Solution:

Let the number added be x.

Then,

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

$$\Rightarrow x = \frac{-2}{3} - \frac{-5}{7}$$

$$= \frac{-2 \times 7 - (-5) \times 3}{21}$$

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

$= \frac{1}{21}$

Question: 10

What should be su

Solution:

Let the number subtracted be x.

Then,

$\frac{-5}{3} - x = \frac{5}{6}$

$\Rightarrow x = \frac{-5}{3} - \frac{5}{6}$

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

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

$= \frac{-15}{6} = \frac{-15 \div 3}{6 \div 3} = \frac{-5}{2}$

Question: 11

Solution:

We know,For any real number a≠0, $a^{-1} = \frac{1}{a}$ So, $\left(\frac{-3}{7}\right)^{-1} = \frac{7}{-3} = \frac{7 \times -1}{-3 \times -1} = \frac{-7}{3}$

Question: 12

The product of tw

Solution:

Let the other number be x.

Then,

$\frac{14}{27} \times x = \frac{-28}{81}$

$\Rightarrow x = \frac{-28}{81} \div \frac{14}{27}$

$\Rightarrow x = \frac{-28}{81} \times \frac{27}{14}$

$\Rightarrow x = \frac{-756}{1134} = \frac{-756 \div 378}{1134 \div 378} = \frac{-2}{3}$

Question: 13

The product of tw

Solution:

Let the other number be x.

Then,

$\frac{-15}{14} \times x = \frac{-16}{35}$

$$\Rightarrow x = \frac{-16}{35} \div \frac{-15}{14}$$

$$\Rightarrow x = \frac{-16}{35} \times \frac{14}{-15}$$

$$\Rightarrow x = \frac{-224}{-525} = \frac{-224 \times -1}{-525 \times -1} = \frac{224}{525}$$

$$\Rightarrow x = \frac{224}{525} = \frac{224 \div 7}{525 \div 7} = \frac{32}{75}$$

Question: 14

What should be su

Solution:

Let the number subtracted be x.

Then,

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

$$\Rightarrow x = \frac{-3}{5} - \frac{-2}{1}$$

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

$$\Rightarrow x = \frac{-3 + 10}{5}$$

$$\Rightarrow x = \frac{7}{5}$$

Question: 15

The sum of two ra

Solution:

Let the other number be x.

Then,

$$\frac{-10}{3} + x = \frac{-3}{1}$$

$$\Rightarrow x = \frac{-3}{1} - \frac{-10}{3}$$

$$\Rightarrow x = \frac{-3 \times 3 - (-10) \times 1}{3}$$

$$\Rightarrow x = \frac{-9 + 10}{3}$$

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

Question: 16

Which of the foll

Solution:

$\frac{-12}{26}$ is not in standard form since 12 and 26 have a common divisor 2.

$\frac{28}{-105}$ is not in standard form since its denominator is negative.

Therefore, only $\frac{-49}{71}$and $\frac{-9}{16}$ are in standard forms as their numerator and denominator have no common divisor and their denominators are positive.

Question: 17

Solution:

$$\frac{-9}{16} \times \frac{8}{15}$$

$$= \frac{-9 \times 8}{16 \times 15}$$

$$= \frac{-72}{240} = \frac{-72 \div 24}{240 \div 24} = \frac{-3}{10}$$

Question: 18

Solution:

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

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

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

$$= \frac{-15}{18} = \frac{-15 \div 3}{18 \div 3} = \frac{-5}{6}$$

Question: 19

Solution:

$$\frac{4}{9} \div x = \frac{-8}{15}$$

$$\Rightarrow x = \frac{4}{9} \div \frac{-8}{15}$$

$$\Rightarrow x = \frac{4}{9} \times \frac{15}{-8}$$

$$\Rightarrow x = \frac{4 \times 15}{9 \times -8}$$

$$\Rightarrow x = \frac{60}{-72} = \frac{60 \times -1}{-72 \times -1} = \frac{-60}{72}$$

$$\Rightarrow x = \frac{-60}{72} = \frac{-60 \div 6}{72 \div 6} = \frac{-5}{6}$$

Question: 20

Additive inverse

Solution:

Additive inverse of a number $\frac{a}{b}$ is the number $-\frac{a}{b}$ such that, $\frac{a}{b} + \left(\frac{-a}{b}\right) = 0$

Therefore,

Additive inverse of $\frac{-5}{9}$ is $\frac{5}{9}$

Question: 21

Reciprocal of

Solution:

Reciprocal of $\frac{-3}{4} = \frac{4}{-3}$

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

Question: 22

A rational number

Solution:

Rational number between $\frac{-2}{3}$ and $\frac{1}{4}$

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

$$= \frac{1}{2}\left(\frac{-2 \times 4 + 1 \times 3}{12}\right)$$

$$= \frac{1}{2}\left(\frac{-8 + 3}{12}\right)$$

$$= \frac{1}{2} \times \frac{-5}{12}$$

$$= \frac{-5}{24}$$

Question: 23

The reciprocal of

Solution:

Let $\frac{-a}{b}$ be a negative rational number

Then, its reciprocal will be $\frac{-b}{a}$ which is also a negative rational number.

Hence, the reciprocal of a negative rational number is a negative rational number

Exercise : CCE TEST PAPER-1

Question: 1

Find the additive

Solution:

Additive inverse of a number $\frac{a}{b}$ is the number $-\frac{a}{b}$ such that, $\frac{a}{b} + \left(\frac{-a}{b}\right) = 0$

Therefore,

(i) $\frac{7}{-10} = \frac{7 \times -1}{-10 \times -1} = \frac{-7}{10}$

Additive inverse of $\frac{-7}{10}$ is $\frac{7}{10}$

(ii) Additive inverse of $\frac{8}{5}$ is $\frac{-8}{5}$

Question: 2

The sum of two ra

Solution:

Sum of two rational numbers = -4

First number = $\frac{-11}{5}$

Second number = Sum of two rational numbers - First number

$$= -4 - \frac{-11}{5}$$

$$= \frac{-20 - (-11)}{5}$$

$$= \frac{-20 + 11}{5}$$

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

Second number= $\frac{-9}{5}$

Question: 3

What number shoul

Solution:

Let the number added be x

Then,

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

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

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

$$\Rightarrow x = \frac{10 + 9}{15}$$

$$\Rightarrow x = \frac{19}{15}$$

Question: 4

What number shoul

Solution:

Let the number subtracted be x

Then,

$$\frac{-3}{4} - x = \frac{-1}{2}$$

$$\Rightarrow x = \frac{-3}{4} - \frac{-1}{2}$$

$$\Rightarrow x = \frac{-3 \times 1 - (-1) \times 2}{4}$$

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

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

Question: 5

Find the multipli

Solution:

Multiplicative inverse of a rational number $\frac{a}{b} = \frac{b}{a}$

Therefore,

(i) Negative inverse of $\frac{-3}{4} = \frac{4}{-3}$

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

(ii) Negative inverse of $\frac{11}{4} = \frac{4}{11}$

Question: 6

The product of tw

Solution:

Let the other number be x

Then,

$$-12 \times x = -8$$

$$\Rightarrow x = -8 \div -12$$

$$\Rightarrow x = \frac{-8}{-12} = \frac{-8 \times -1}{-12 \times -1} = \frac{8}{12}$$

$$\Rightarrow x = \frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$$

Question: 7

Evaluate:

Solution:

(i)

$$\frac{-3}{5} \times \frac{10}{7}$$

$$= \frac{-3 \times 10}{5 \times 7}$$

$$= \frac{-30}{35} = \frac{-30 \div 5}{35 \div 5} = \frac{-6}{7}$$

(ii)

$$\left(\frac{-5}{8}\right)^{-1}$$

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

(iii)

$(-6)^{-1}$

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

Question: 8

Name the property

Solution:

(i) Commutative law of multiplication i.e., a b = b a

(ii) 1 as multiplicative identity i.e., a × 1 = b × 1

(iii) Associative law of multiplication i.e., a(bc) = (ab)c

(iv) Multiplicative property of 0 i.e., a× 0=0

(v) Distributive law of multiplication over addition i.e., a(b + c) = ab + ac

Question: 9

Find two rational

Solution:

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

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

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

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

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

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

Now,

Rational number between $\frac{1}{12}$ and $\frac{1}{2}$

$$= \frac{1}{2}\left(\frac{1}{12} + \frac{1}{2}\right)$$

$$= \frac{1}{2}\left(\frac{1 \times 1 + 1 \times 6}{12}\right)$$

$$= \frac{1}{2}\left(\frac{1 + 6}{12}\right)$$

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

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

Question: 10

What should be ad

Solution:

Let the number added be x

Then,

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

$$\Rightarrow x=\frac{1}{3}-\frac{-3}{5}$$

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

$$\Rightarrow x=\frac{-5+9}{15}$$

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

Question: 11

What should be ad

Solution:

Let the number added be x

Then,

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

$$\Rightarrow x=\frac{3}{4}-\frac{-2}{3}$$

$$\Rightarrow x=\frac{3\times 3-(-2)\times 4}{12}$$

$$\Rightarrow x=\frac{9+8}{12}$$

$$\Rightarrow x=\frac{17}{12}$$

Question: 12

Solution:

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

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

Question: 13

The product of tw

Solution:

Let the other number be x

Then,

$$\frac{-3}{10}\times x=\frac{-1}{4}$$

$$\Rightarrow x=\frac{-1}{4}\div\frac{-3}{10}$$

$$\Rightarrow x=\frac{-1}{4}\times\frac{10}{-3}$$

$$\Rightarrow x = \frac{-1 \times 10}{4 \times -3}$$

$$\Rightarrow x = \frac{-10}{-12} = \frac{-10 \times -1}{-12 \times -1} = \frac{10}{12}$$

$$\Rightarrow x = \frac{10}{12} = \frac{10 \div 2}{12 \div 2} = \frac{5}{6}$$

Question: 14

Solution:

$$\frac{-5}{6} \div \frac{-2}{3}$$

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

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

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

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

Question: 15

Solution:

$$\frac{4}{3} \div x = \frac{-5}{2}$$

$$\Rightarrow x = \frac{4}{3} \div \frac{-5}{2}$$

$$\Rightarrow x = \frac{4}{3} \times \frac{2}{-5}$$

$$\Rightarrow x = \frac{4 \times 2}{3 \times -5}$$

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

Question: 16

Reciprocal of

Solution:

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

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

Question: 17

A rational number

Solution:

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

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

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

$$= \frac{1}{2}\left(\frac{-4 + 3}{6}\right)$$

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

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

Question: 18

Fill in the blank

Solution:

(i)

$$\frac{25}{8} \div x = -10$$

$$\Rightarrow x = \frac{25}{8} \div -10$$

$$\Rightarrow x = \frac{25}{8} \times \frac{1}{-10}$$

$$\Rightarrow x = \frac{25 \times 1}{8 \times -10}$$

$$\Rightarrow x = \frac{25}{-80} = \frac{25 \times -1}{-80 \times -1} = \frac{-25}{80}$$

$$\Rightarrow x = \frac{-25}{80} = \frac{-25 \div 5}{80 \div 5} = \frac{-5}{16}$$

(ii)

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

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

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

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

$$\Rightarrow x = \frac{-18}{-24} = \frac{-18 \times -1}{-24 \times -1} = \frac{18}{24}$$

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

(iii)

$$-1 + x = \frac{-2}{9}$$

$$\Rightarrow x = \frac{-2}{9} - (-1)$$

$$\Rightarrow x = \frac{-2 \times 1 - (-1) \times 9}{9}$$

$$\Rightarrow x = \frac{-2+9}{9}$$

$$\Rightarrow x = \frac{7}{9}$$

(iv)

$$\frac{2}{3} - x = \frac{1}{15}$$

$$\Rightarrow x = \frac{2}{3} - \frac{1}{15}$$

$$\Rightarrow x = \frac{2\times 5 - 1\times 1}{15}$$

$$\Rightarrow x = \frac{10-1}{15}$$

$$\Rightarrow x = \frac{9}{15} = \frac{9\div 3}{15\div 3} = \frac{3}{5}$$

Question: 19

Write 'T' for tru

Solution:

(i) true

Let there be two rational numbers $\frac{a}{b}$ and $\frac{c}{d}$

Then,

$$\frac{a}{b} - \frac{c}{d} = \frac{ad-bc}{bd}$$

which is also a rational number

Hence, Rational numbers are always closed under subtraction.

(ii) false

$$\frac{a}{0} = \infty$$

Hence, Rational numbers are not always closed under division.

(iii) false

$$\frac{1}{0} = \infty$$

Hence, $\frac{1}{0} \neq 0$

(iv) false

Let there be two rational numbers $\frac{a}{b}$ and $\frac{c}{d}$

Then,

$$\frac{a}{b} - \frac{c}{d} = \frac{ad-bc}{bd}$$

And

$$\frac{c}{d} - \frac{a}{b} = \frac{bc-ad}{bd}$$

Therefore,

$$\frac{a}{b}-\frac{c}{d} \neq \frac{c}{d}-\frac{a}{b}$$

Hence, Subtraction is not commutative on rational numbers.

(v) true

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