MATHEMATICS

Chapter 1: Rational Numbers

Rational Numbers

Introduction to Rational Numbers

The numbers which are involved in many mathematical applications such as addition, subtraction and multiplication which are inherently closed with many mathematical processes are called Rational numbers.

Whole Numbers and Natural Numbers

Natural numbers are set of numbers starting from 1 counting up to infinity. The set of natural numbers is denoted as 'N'.Whole numbers are set of numbers starting from 0 and going up to infinity. So basically they are natural numbers with the zero added to the set. The set of whole numbers is denoted as 'W'Closure Property Closure property is applicable for whole numbers in the case of addition and multiplication while it isn't in the case for subtraction and division. This applies to natural numbers as well. Commutative Property Commutative property applies for whole numbers and natural numbers in the case of addition and multiplication but not in the case of subtraction and division. Associative Property Associative property applies for whole numbers and natural numbers in the case of addition and multiplication but not in the case of subtraction and division.

Integers

In simple terms Integers are natural numbers and their negatives. The set of Integers is denoted as 'Z' or 'I' Closure Property Closure property applies to integers in the case of addition, subtraction and multiplication but not division. Commutative Property Commutative property applies to integers in the case of of addition and multiplication but not subtraction and division. Associative Property Associative property applies to integers in the case of addition and multiplication but not subtraction and division.

Rational Numbers

A rational number is a number that can be represented as a fraction of two integers in the form of

$$\frac{p}{q}$$

, where q must be non-zero. The set of rational numbers is denoted as Q.

For example:

$$\frac{-5}{7}$$

is a rational number where -5 and 7 are integers. Even 2 is a rational number since it can be written as

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

where 2 and 1 are integers.

Properties of Rational Numbers

Closure Property of Rational Numbers

For any two rational numbers a and b a × b = c∈Q i.e. For two rational numbers say a and b the results of addition, subtraction and multiplication operations gives a rational number. Since the sum of two numbers ends up being a rational number, we can say that the closure property applies to rational numbers in the case of addition.

For example: The sum of

$$\frac{2}{3} + \frac{3}{4} = \frac{(8+9)}{12} = \frac{17}{12}$$

is also a rational number where 17 and 12 are integers. The difference between two rational numbers result in a rational number. Therefore, the closure property applies for rational numbers in the case of subtraction.

For example: The difference between

$$\frac{4}{5} - \frac{3}{4} = \frac{(16-15)}{20} = \frac{1}{20}$$

is also a rational number where 1 and 20 are integers. The multiplication of two rational numbers results in a rational number. Therefore we can say that the closure property applies to rational numbers in the case of multiplication as well.

For example: The product of

$$\frac{1}{2} \times \frac{-4}{5} = \frac{-4}{10} = \frac{-2}{5}$$

which is also a rational number where -2 and 5 are integers. In the case with division of two rational numbers, we see that for a rational number a, a÷0 is not defined. Hence we can say that the closure property does not apply for rational numbers in the case of division.

Commutative Property of Rational Numbers

For any two rational numbers a and ba × b = b × a. i.e., Commutative property is one where in the result of an equation must remain the same despite the change in the order of operands. Given two rational numbers a and b, (a + b) is always going to be equal to (b + a). Therefore, addition is commutative for rational numbers.

For example:

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

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

Considering the difference between two rational numbers a and b, (a−b) is never the same as (b − a). Therefore, subtraction is not commutative for rational numbers.

For example:

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

Whereas

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

When we consider the product of two rational numbers a and b, (a×b) is the same as (b × a). Therefore, multiplication is commutative for rational numbers.

For example:

$\frac{2}{3}\times\frac{4}{3}=\frac{8}{9}$

$\frac{4}{3}\times\frac{2}{3}=\frac{8}{9}$

Considering the division of two numbers a and b, (a ÷ b) is different from (b ÷ a). Therefore, division is not commutative for rational numbers.

For example: $2 \div 3 = \frac{2}{3}$

is definitely different from $3 \div 2 = \frac{3}{2}$

Associative Property of Rational Numbers

For any three rational numbers a, b and c, (a × b) × c = a × (b × c). i.e., Associative property is one where the result of an equation must remain the same despite a change in the order of operators. Given three rational numbers a, b and c, it can be said that: (a + b) + c = a + (b + c). Therefore, addition is associative. (a − b) – c ≠ a − (b − c). Because (a - b) - c = a – b - c whereas a - (b - c) = a – b + c. Therefore, we can say that subtraction is not associative. (a × b) × c = a × (b × c). Therefore, multiplication is associative. (a ÷ b) ÷ c ≠ (a ÷ b) ÷ c. Therefore, division is not associative.

Distributive Property of Rational Numbers

Given three rational numbers a, b and c, the distributivity of multiplication over addition and subtraction is respectively given as: a(b + c) = ab + ac a(b − c) = ab – ac

Negatives and Reciprocals

Negation of a Number

For a rational number

$$\frac{a}{b}$$

$\frac{a}{b} + 0 = \frac{a}{b}$

i.e., when zero is added to any rational number the result is the same rational number. Here '0′ is known as additive identity for rational numbers. If

$\left(\frac{a}{b}\right) + \left(-\frac{a}{b}\right) = \left(-\frac{a}{b}\right) + \left(\frac{a}{b}\right) = 0$, then it can be said that the additive inverse or negative of a rational number ab is −ab. Also −

$$\frac{a}{b}$$

For example: The additive inverse of $\left(\frac{-21}{8}\right)$

$$is - \left(-\frac{21}{8}\right) = \left(\frac{21}{8}\right)$$

Reciprocal of a Number

For any rational number

$$\frac{a}{b}$$

$\frac{a}{b} \times 1 = \frac{a}{b}$

i.e., When any rational numbers is multiplied by '1' the result is same rational number. Therefore '1' is called multiplicative identity for rational numbers. If

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

= 1, then it can be said that the cd is reciprocal or the multiplicative inverse of a rational number

$$\frac{a}{b}$$

Also

$$\frac{a}{b}$$

is reciprocal or the multiplicative inverse of a rational number

$$\frac{c}{d}$$

For example: The reciprocal of

$\frac{2}{3}$ is $\frac{3}{2}$

As

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

Representing on a Number Line

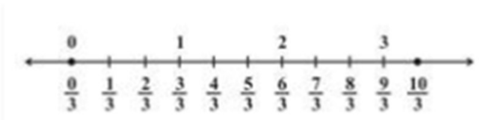
Representation of Rational Numbers on the Number Line

In order to represent a given rational number an, where a and n are integers, on the number line:

Step 1: Divide the distance between two consecutive integers into 'n′ parts.

For example: If we are given a rational number 23, we divide the space between 0 and 1, 1 and 2 etc. into three parts.

Step 2: Label the rational numbers till the range includes the number you need to mark



Similar steps can be followed for negative rational numbers by repeating the steps towards negative direction.

Rational Numbers between Two Rational Numbers

The number of rational numbers between any two given rational numbers aren't definite, unlike that of whole numbers and natural numbers.

For example: Between natural numbers 2 and 10 there are exactly 7 numbers but between

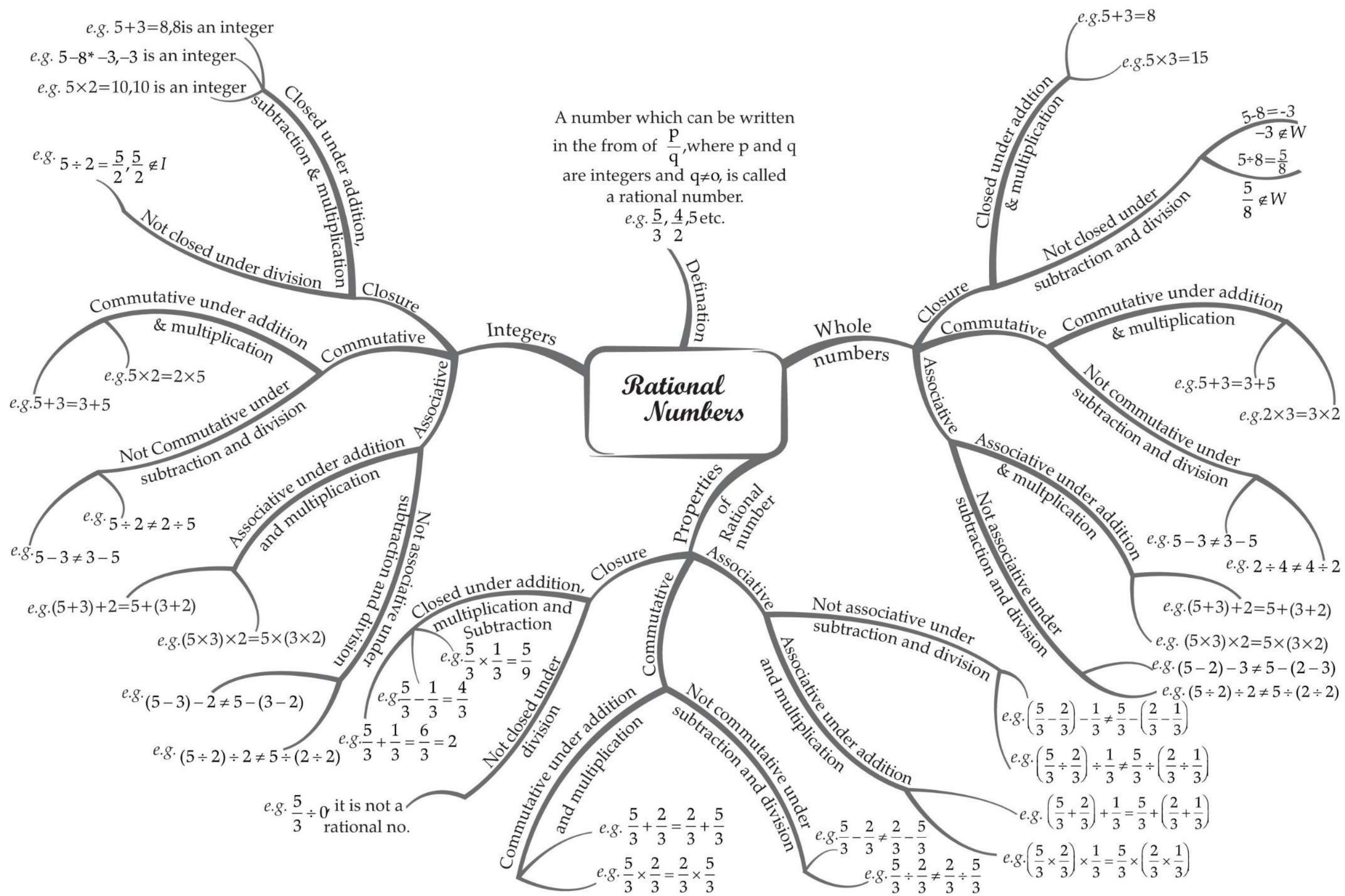
$$\frac{2}{10}$$

and

$$\frac{8}{10}$$

there are infinite numbers that could exist. Method 1 Given two rational numbers, ensure both of them have the same denominators. Once there is a common denominator, we can pick out any rational number that lies in between. Method 2 Given two rational numbers, we can always find a rational number between them by calculating their mean or midpoint.

MIND MAP : LEARNING MADE SIMPLE CHAPTER-1



Important Questions

Multiple Choice Questions-

Question 1. Which of the following forms a pair of equivalent rational numbers?

(a) $\frac{24}{40}$ and $\frac{35}{50}$
(b) $\frac{-25}{35}$ and $\frac{55}{-77}$
(c) $\frac{-8}{15}$ and $\frac{-24}{48}$
(d) $\frac{9}{72}$ and $\frac{-3}{21}$

Question 2. Which number is in the middle if $\frac{-1}{6}, \frac{4}{9}, \frac{6}{-7}, \frac{2}{5}$ and $\frac{-3}{4}$ arranged in descending order?

(a) $\frac{2}{5}$
(b) $\frac{4}{9}$
(c) $\frac{-1}{6}$
(d) $\frac{-6}{7}$

Question 3. Find the multiplicative inverse of -13.

(a) 13

(b) -13

(c) $\frac{-1}{13}$

(d) 12

Question 4. Which of the following statements is true?

(a) Every fraction is a rational number.

(b) Every rational number is a fraction.

(c) Every integer is a rational number.

(d) Both (a) and (c).

Question 5. Which of the following is the identity element under addition?

(a) 1

(b) -1

(c) 0

(d) None of these

Question 6. What is the additive inverse of $\frac{-2}{3}$?

(a) 0

(b) 1

(c) $\frac{2}{3}$

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

Question 7. Write the additive inverse of $\frac{4}{5}$.

(a) 1

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

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

(d) 0

Question 8. Which among the following is a rational number equivalent to $\frac{-5}{-3}$?

(a) $\frac{-25}{15}$

(b) $\frac{25}{-15}$

(c) $\frac{25}{15}$

(d) $\frac{-25}{30}$

Question 9. Which of the following is the reciprocal of the reciprocal of a rational number?

(a) -1

(b) 1

(c) 0

(d) The number itself

Question 10. How is $\frac{-28}{84}$ expressed as a rational number with numerator 4?

(a) $\frac{4}{7}$

(b) $\frac{-4}{12}$

(c) $\frac{4}{12}$

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

Very Short Questions:

1. Pick up the rational numbers from the following numbers.

   $\frac{6}{7}, \frac{-1}{2}, 0, \frac{1}{0}, \frac{100}{0}$

2. Find the reciprocal of the following rational numbers:

(a) $\frac{-3}{4}$
(b) 0
(c) $\frac{6}{11}$
(d) $\frac{5}{-9}$

3. Write two such rational numbers whose multiplicative inverse is same as they are.
4. What properties, the following expressions show?

(i) $\frac{2}{3} + \frac{4}{5} = \frac{4}{5} + \frac{2}{3}$
(ii) $\frac{1}{3} \times \frac{2}{3} = \frac{2}{3} \times \frac{1}{3}$

5. What is the multiplicative identity of rational numbers?
6. What is the additive identity of rational numbers?
7. If a $= \frac{1}{2}$, b $= \frac{3}{4}$, verify the following:

(i) a × b = b × a

(ii) a + b = b + a

8. Multiply $\frac{5}{8}$ by the reciprocal of $\frac{-3}{8}$
9. Find a rational number between $\frac{1}{2}$ and $\frac{1}{3}$
10. Write the additive inverse of the following:

(a) $\frac{-6}{7}$
(b) $\frac{101}{213}$

Short Questions :

1. Write any 5 rational numbers between $\frac{-5}{6}$ and $\frac{7}{8}$.
2. Identify the rational number which is different from the other three: $\frac{2}{3}, \frac{-4}{5}, \frac{1}{2}, \frac{1}{3}$. Explain your reasoning.
3. Calculate the following:

(a) $\frac{-4}{5} \times \frac{3}{7} + \frac{4}{5} \times \frac{3}{7}$ (b) $\frac{1}{2} \times \frac{5}{6} + \frac{1}{3} \times \frac{1}{4}$

4. Represent the following rational numbers on number lines.

(a) $\frac{-2}{3}$
(b) $\frac{3}{4}$
(c) $\frac{3}{2}$

5. Find 7 rational numbers between $\frac{1}{3}$ and $\frac{1}{2}$.

6. Show that:

7. If $x = \frac{1}{2}, y = -\frac{2}{3}$ and $z = \frac{1}{4}$, verify that x × (y × z) = (x × y) × z.

8. If the cost of $4\frac{1}{2}$ litres of milk is ₹$89\frac{1}{2}$, find the cost of 1 litre of milk.

9. The product of two rational numbers is $\frac{15}{56}$. If one of the numbers is $-\frac{5}{48}$, find the other.

10. Let O, P and Z represent the numbers 0, 3 and -5 respectively on the number line. Points Q, R and S are between O and P such that OQ = QR = RS = SP.

What are the rational numbers represented by the points Q, R and S. Next choose a point T between Z and 0 so that ZT = TO. Which rational number does T represent?

Long Questions :

1. Let a, b, c be the three rational numbers where $a = \frac{2}{3}, b = \frac{4}{5}$ and $c = \frac{-5}{6}$

Verify:

(i) a + (b + c) = (a + b) + c (Associative property of addition)

(ii) a × (b × c) – (a × b) × c (Associative property of multiplication)

2. Rajni had a certain amount of money in her purse. She spent ₹ $10\frac{1}{4}$ in the school canteen, bought a gift worth ₹ $25\frac{3}{4}$ and gave ₹ $16\frac{1}{2}$ to her friend. How much she have to begin with?

3. One-third of a group of people are men. If the number of women is 200 more than the men, find the total number of people.

4. **Name the property under multiplication used in each of the following:**

(i) $\frac{-8}{9} \times 1 = 1 \times \frac{-8}{9} = \frac{-8}{9}$

(ii) $\frac{-21}{23} \times \frac{-3}{7} = \frac{-3}{7} \times \frac{-21}{23}$

(iii) $\frac{-17}{25} \times \frac{25}{-17} = 1$

Answer Key-

Multiple Choice questions-

1. (b) $\frac{-25}{35}$ and $\frac{55}{-77}$
2. (c) $\frac{-1}{6}$
3. (c) $\frac{-1}{13}$
4. (d) Both (a) and (c).
5. (c) 0
6. (c) $\frac{2}{3}$
7. (b) $\frac{-4}{5}$
8. (c) $\frac{25}{15}$
9. (d) The number itself
10. (b) $\frac{-4}{12}$

Very Short Answer :

1. Since rational numbers are in the form of $\frac{a}{b}$ where b ≠ 0.

   Only $\frac{6}{7}, \frac{-1}{2}$ and 0 are the rational numbers.

2. (a) Reciprocal of $\frac{-3}{4}$ is $\frac{-4}{3}$

   (b) Reciprocal of 0, i.e. $\frac{1}{0}$ is not defined.

   (c) Reciprocal of $\frac{6}{11}$ is $\frac{11}{6}$

   (d) Reciprocal of $\frac{5}{-9} = \frac{-9}{5}$

3. Reciprocal of $1 = \frac{1}{1} = 1$

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

   Hence, the required rational numbers are -1 and 1.

4. (i) $\frac{2}{3} + \frac{4}{5} = \frac{4}{5} + \frac{2}{3}$ shows the commutative property of addition of rational numbers.

   (ii) $\frac{1}{3} \times \frac{2}{3} = \frac{2}{3} \times \frac{1}{3}$ shows the commutative property of multiplication of rational numbers.

5. 1 is the multiplication identity of rational numbers.
6. 0 is the additive identity of rational numbers.

7.

Given that $a = \frac{1}{2}$ and $b = \frac{3}{4}$

(*i*) $a \times b = b \times a$

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

$$\text{LHS} = \frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$$

$$\text{RHS} = \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$$

Thus, $a \times b = b \times a$. (Verified)

(*ii*) $a + b = b + a$

$$\Rightarrow \quad \frac{1}{2} + \frac{3}{4} = \frac{3}{4} + \frac{1}{2}$$

$$\text{LHS} = \frac{1}{2} + \frac{3}{4} = \frac{5}{4}$$

8.

Reciprocal of $\frac{-3}{8} = \frac{-8}{3}$

$$\therefore \quad \frac{5}{\cancel{8}_1} \times \frac{-\cancel{8}^1}{3} = \frac{-5}{3}$$

9. Rational number between

$$\frac{1}{2} \text{ and } \frac{1}{3} = \left(\frac{1}{2} + \frac{1}{3}\right) \times \frac{1}{2}$$

$$= \left(\frac{3+2}{6}\right) \times \frac{1}{2} = \frac{5}{6} \times \frac{1}{2} = \frac{5}{12}$$

Thus, a rational number between $\frac{1}{2}$ and $\frac{1}{3}$ is $\frac{5}{12}$.

10.

(*a*) Additive inverse of $\frac{-6}{7} = -\left(\frac{-6}{7}\right) = \frac{6}{7}$

(*b*) Additive inverse of $\frac{101}{213} = \frac{-101}{213}$

Short Answer :

1.

$$\frac{-5}{6} = \frac{-5 \times 4}{6 \times 4} = \frac{-20}{24}$$

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

Thus, rational numbers $\frac{-19}{24}, \frac{-18}{24}, \frac{-17}{24}, \ldots \frac{20}{24}$ lie between $\frac{-5}{6}$ and $\frac{7}{8}$.

2. $\frac{-4}{5}$ is the rational number which is different from the other three, as it lies on the left side of zero while others lie on the right side of zero on the number line.

3.

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

(Using distributive property)

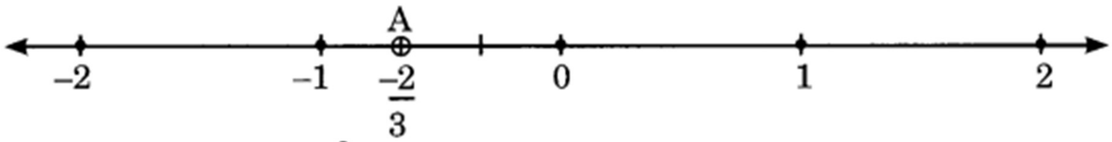
$= \frac{3}{7} \times 0 = 0$

(b) $\frac{1}{2} \times \frac{5}{6} + \frac{1}{3} \times \frac{1}{4}$

$= \frac{5}{12} + \frac{1}{12} = \frac{5+1}{12} = \frac{\not{6}}{\not{12}_2} = \frac{1}{2}$

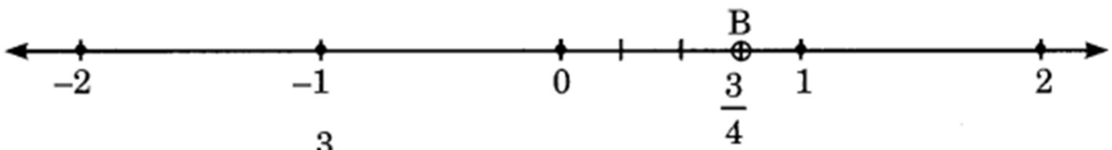
4.

(a)



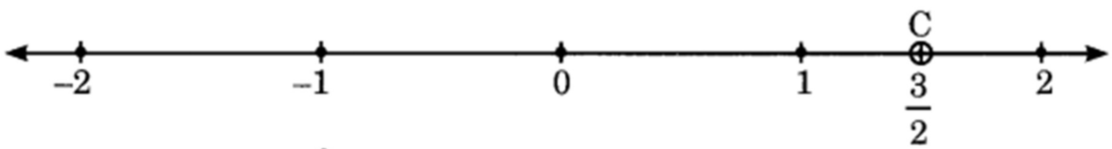
Here, A represents $\frac{-2}{3}$.

(b)



Here, B represents $\frac{3}{4}$.

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



Here, C represents $\frac{3}{2}$.

5.

$$\frac{1}{3} = \frac{1\times 30}{3\times 30} = \frac{30}{90}$$

$$\frac{1}{2} = \frac{1\times 45}{2\times 45} = \frac{45}{90}$$

$$\therefore \quad \frac{30}{90} < \frac{31}{90} < \frac{32}{90} < \frac{33}{90} < \frac{34}{90}$$

$$< \frac{35}{90} < \frac{36}{90} < \frac{37}{90} < \ldots < \frac{45}{90}.$$

Thus, the required rational numbers between $\frac{1}{2}$ and $\frac{1}{3}$ are

$\frac{31}{90}, \frac{32}{90}, \frac{33}{90}, \frac{34}{90}, \frac{35}{90}, \frac{36}{90}, \frac{37}{90}$

i.e. $\frac{31}{90}, \frac{16}{45}, \frac{11}{30}, \frac{17}{45}, \frac{7}{18}, \frac{2}{5}, \frac{37}{90}$.

6.

$$\text{LHS} = \left(\frac{-8}{9}\times\frac{1}{-5}\right)+\left(\frac{-8}{9}\times\frac{-7}{11}\right)$$

$$= \frac{-8}{-45}+\frac{56}{99} = \frac{8}{45}+\frac{56}{99}$$

$$= \frac{88+280}{495} = \frac{368}{495}$$

[LCM of 45 and 99 is 495]

$$\text{RHS} = \frac{-8}{9}\times\left(\frac{1}{-5}+\frac{-7}{11}\right)$$

$$= \frac{-8}{9}\times\left(\frac{-1}{5}-\frac{7}{11}\right) = \frac{-8}{9}\times\left(\frac{-11-35}{55}\right)$$

$$= \frac{-8}{9}\times\frac{-46}{55} = \frac{368}{495}$$

LHS = RHS. Hence proved.

7. We have $x = \frac{1}{2}$, $y = -\frac{2}{3}$ and $z = \frac{1}{4}$

LHS = x × (y × z)

$$= \frac{1}{2}\times\left(\frac{-2}{3}\times\frac{1}{4}\right) = \frac{1}{\cancel{2}_1}\times\frac{-\cancel{2}^1}{12}$$

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

RHS = $(x \times y) \times z$

$$= \left(\frac{1}{\cancel{2}_1}\times\frac{-\cancel{2}^1}{3}\right)\times\frac{1}{4}$$

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

LHS = RHS. Hence verified.

8.

$4\frac{1}{2}$ litres $= \frac{9}{2}$ litres

Cost of $\frac{9}{2}$ litres of milk is ₹$89\frac{1}{4}$ = ₹$\frac{357}{4}$

Cost of 1 litre of milk = ₹$\frac{357}{4} \div \frac{9}{2}$

$$= ₹\left(\frac{\overset{119}{\cancel{357}}}{\cancel{4}_2} \times \frac{\cancel{2}^1}{\cancel{9}_3}\right)$$

$$= ₹\frac{119}{6} = ₹\,19\frac{5}{6}$$

9. Product of two rational numbers $= \frac{15}{56}$

One number $= \frac{-5}{48}$

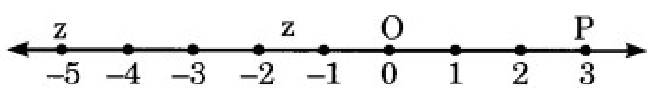
Other number = Product ÷ First number

$$= \frac{15}{56} \div \frac{-5}{48} = \frac{\cancel{15}^3}{\cancel{56}_7} \times \frac{-\cancel{48}^6}{\cancel{5}_1}$$

$$= \frac{3 \times (-6)}{7 \times 1} = \frac{-18}{7}$$

Hence, the other number $= \frac{-18}{7}$

10.



As OQ = QR = RS = SP and OQ + QR + RS + SP = OP

therefore Q, R and S divide OP into four equal parts.

So, R is the mid-point of OP, i.e. $R = \frac{0+3}{2} = \frac{3}{2}$

Q is the mid-point of OR, i.e. $Q = \frac{1}{2}\left(0 + \frac{3}{2}\right) = \frac{3}{4}$

and S is the mid-point of RP, i.e. $S = \frac{1}{2}\left(\frac{3}{2} + 3\right) = \frac{9}{4}$

therefore, $Q = \frac{3}{4}$, $R = \frac{3}{2}$ and $S = \frac{9}{4}$

Also Z T = TO

So, T is the mid-point of OZ, i.e. $T = \frac{0+(-5)}{2} = \frac{-5}{2}$

Long Answer :

1.

(i) $$\text{L.H.S} = a + (b + c)$$

$$= \frac{2}{3} + \left[\frac{4}{5} + \left(\frac{-5}{6}\right)\right]$$

$$= \frac{2}{3} + \left[\frac{24-25}{30}\right] = \frac{2}{3} + \left(\frac{-1}{30}\right)$$

$$= \frac{20-1}{30} = \frac{19}{30}$$

$$\text{R.H.S. of } (i) = (a + b) + c$$

$$= \left(\frac{2}{3} + \frac{4}{5}\right) + \left(\frac{-5}{6}\right)$$

$$= \left(\frac{10+12}{15}\right) + \left(\frac{-5}{6}\right)$$

$$= \frac{22}{15} - \frac{5}{6} = \frac{44-25}{30} = \frac{19}{30}$$

So, $\frac{2}{3} + \left[\frac{4}{5} + \left(\frac{-5}{2}\right)\right] = \left(\frac{2}{3} + \frac{4}{5}\right) + \left(\frac{-5}{6}\right)$

Hence verified.

(ii) $\text{L.H.S} = a \times (b \times c) = \frac{2}{3} \times \left[\frac{4}{5} \times \left(\frac{-5}{6}\right)\right]$

$$= \frac{2}{3} \times \left(\frac{-20}{30}\right) = \frac{2}{3} \times \left(\frac{-2}{3}\right)$$

$$= \frac{2 \times (-2)}{3 \times 3} = \frac{-4}{9}$$

R.H.S. $= (a \times b) \times c$

$$= \left(\frac{2}{3} \times \frac{4}{5}\right) \times \left(\frac{-5}{6}\right)$$

$$= \frac{2 \times 4}{3 \times 5} \times \frac{-5}{6}$$

$$= \frac{8}{15} \times \left(\frac{-5}{6}\right)$$

$$= \frac{8 \times (-5)}{15 \times 6} = \frac{-40}{90} = \frac{-4}{9}$$

So, $\frac{2}{3} \times \left[\frac{4}{5} \times \left(\frac{-5}{6}\right)\right] = \left[\frac{2}{3} \times \frac{4}{5}\right] \times \left(\frac{-5}{6}\right)$

2. Amount given to school canteen = ₹ $10\frac{1}{4}$

Amount given to buy gift = ₹ $25\frac{3}{4}$

Amount given to her friend = ₹ $16\frac{1}{2}$

To begin with Rajni had

$$= ₹10\frac{1}{4} + ₹25\frac{3}{4} + ₹16\frac{1}{2}$$

$$= ₹\left(\frac{41}{4} + \frac{103}{4} + \frac{33}{2}\right)$$

$$= ₹\left(\frac{41 + 103 + 66}{4}\right) = ₹\frac{210}{4}$$

$$= ₹52\frac{2}{4} = ₹52\frac{1}{2}$$

3. Number of men in the group $= \frac{1}{3}$ of the group

Number of women $= 1 - \frac{1}{3} = \frac{2}{3}$

Difference between the number of men and women $= \frac{2}{3} - \frac{1}{3} = \frac{1}{3}$

If difference is $\frac{1}{3}$, then total number of people = 1

If difference is 200, then total number of people

$= 200 \div \frac{1}{3}$

= 200 × 3 = 600

Hence, the total number of people = 600

4.

$(i) \frac{-8}{9} \times 1 = 1 \times \frac{-8}{9} = \frac{-8}{9}$ (The role of 1)

$(ii) \frac{-21}{23} \times \frac{-3}{7} = \frac{-3}{7} \times \frac{-21}{23}$ (Using property of commutativity)

$(iii) \frac{-17}{25} \times \frac{25}{-17} = 1 \left(\text{multiplicative inverse of } \frac{-17}{25} \text{ is } \frac{25}{-17}\right)$