Vision Empower & XRCVC

Teacher Instruction KIT

RATIONAL NUMBERS

Syllabus: Karnataka State Board
Subject: Mathematics
Grade: 7
Textbook Name: MATHEMATICS – Text cum Workbook (Revised) – Seventh standard
Chapter Number & Name: 9 Rational Numbers

1. OVERVIEW

1.1 OBJECTIVE & PREREQUISITES

Objective

Children will be able to

- Define rational numbers.
- Order and compare rational numbers.
- Represent rational numbers on the number line.
- Use the basic operations on rational numbers.

Prerequisite concepts

- Basic operations on fractions.
- Introduction to integers.

TIK_MATH_G7_FRACTIONS AND DECIMALS.
TIK_MATH_G6_CH6_Integers.

Content Index

*Kindly Note: Activities marked with * are mandatory*

3.2 CONCEPT INTRODUCTION ACTIVITIES

Rational numbers

Activity 4: Rational numbers

Equivalent rational numbers

Activity 5: Equivalent rational numbers

2. LEARN

2.1 KEY POINTS

- A rational number is defined as a number that can be expressed in the form of p/q, where p and q are integers and $q \neq 0$.
- A rational number is said to be in the standard form if its denominator is a positive integer and the numerator and denominator have no common factor other than 1.
- If the numerator and the denominator are of the same sign then the rational number is a positive rational number.
- If the numerator and the denominator are of the opposite signs then the rational number is a negative rational number.

2.2 LEARN MORE

None

3. ENGAGE

3.1 INTEREST GENERATION ACTIVITY

Revise and recall

Activity 1: Revise and recall

Materials Required: Tactile diagrams of the number line (numbers from -6 to $+6$ on the number line) and "Bindi"

Prerequisites: Natural numbers, whole numbers, and integers

Activity Flow

- *Divide the students into a group of four.*
- *Distribute the tactile diagrams to each group.*
- *Revise the concept of natural numbers, ask them to mark natural numbers on the tactile diagram of the number line using "bindi" or ask them to read the natural numbers which are on the number line.*
- *Revise the concept of whole numbers, ask them to mark it on the new tactile diagram of the number line, or ask them to read the whole numbers which are on the number line.*

- *Revise the concept of integers, ask them to mark it on the diagram of the number line, or ask them to read the integers which are on the number line.*
- *Ask the students to find the pattern among natural numbers, whole numbers, and integers.*
    - *Natural numbers are 1, 2, 3, …… It starts at 1.*
    - *Whole numbers are 0, 1, 2, 3, …… It includes zero and all natural numbers.*
    - *Integers are….* $-3\ ,\ -2\ ,\ -1\ ,\ 0\ ,\ 1\ ,\ 2\ ,\ 3$, *….It includes the natural and whole numbers.*
- *Ask the following questions :*
    - *What are the uses of natural numbers/ whole numbers and integers in our daily life?*
    - *Why do we need different types of numbers?*
    - *What is the use of fractional numbers and decimal numbers?*
- *Discuss with the class how we use fractions and decimals in everyday life such as in recipes, medicine.*

Note: Ask the students to keep the tactile sheet safe, they will use it later.

Walking on the plank

Activity 2: Walking on the plank

Materials Required: Two dice.

A Dice with S, S, S, T, T, T on its sides another dice with $1\ ,\ 2\ ,\ 3\ ,\ -1,\ -2\ ,\ -3$ on its sides. (Stick small size bindi to denote S and big size bindi to denote T. For integers, on the side of 4, 5 and 6, stick two bindis to denote -2 , 3 bindis to denote -3 and 1 bindi to denote -1.

Prerequisites: Operations on integers

Activity Flow

- *Divide the students into two groups.*
- *Ask the children to assume that they all are on a pirate ship.*
- *Sometimes in the pirate ship, people are made to walk on a flat piece of timber. At one end of the plank, there is a treasure and at the other end, there is a shark.*
- *The walker starts from the middle of the plank. They walk based on the captain's commands.*
- *First, one group will act as a walker and the other group as a captain crew and vice versa.*
- *The captain crew will throw both the dice together, based on the combination of dice the walker has to walk.*
- *Place a chair at the center of the classroom.*
- *Ask the children to consider that chair is the center of the plank. On their left side of the chair, there is a shark and on the right side, there is a treasure.*

- *Place a big bag as a shark at some distance on the left side of the chair.*
- *Place a book as a treasure at some distance on the right side of the chair.*
- *For example, the dice with T, T, T, S, S, S on it tells the walker to face the treasure or the shark. On the other dice, if +1 comes up, they walk one step forward from their place. If -2 comes up, they walk two steps backwards. For example, T and -2 means face the treasure and walk two steps backwards from their place.*
    - *All walkers start from the centre. Those who reach the books are the winners of the game. One person walks at a time.*

Ask the following questions:

1. *How was the game?*
2. *In which direction did you go for the positive integers?*
3. *In which direction did you go for the negative integers?*
4. *Where should the positive numbers be written on the number line?*

Recall and practice

Activity 3: Recall and practice

Materials Required: None

Prerequisites: Addition, subtraction, multiplication, and fractions

Activity Flow

1. *Find the value of*
    a. $5/6+2/6$
    b. $2/3+4/6$
    c. $-4+(-5)$
    d. $12*-12$
    e. $-23*-5$
2. *Answer the following questions:*
    a. *a positive number + a positive number =*
    b. a positive number * a positive number =
    c. a positive number * a negative number =
    d. a negative number * a negative number =
    e. *zero* / a positive number =
    f. *zero* / a negative number =
    g. zero * a positive number =
    h. a positive number / a negative number =
    i. a negative number / a negative number =
3. *Find the value of*

a. $?*3=-3$

b. $-4*-8=$

c. $0/-2=$

3.2 CONCEPT INTRODUCTION ACTIVITIES

Rational numbers

Activity 4: Rational numbers

Materials Required: Tactile diagram (The one which students have used for the first activity) and "Bindi".

Prerequisites: Integers and fractions

Activity Flow

Students have learned the concept of integers in chapter 1. Recall the concept of integers before moving into a rational number. It will help to understand the concept.

- *Give the following example to the students.*
  - *Yesterday Gita bought a cycle for 3000 rupees and she sold it for an extra 500. What is the selling price?*
- *Ask the students to write an equation for the above statement.*
  - *I,e* $3000+500=$ Selling price
- *Give the same example with a loss of 500 and ask them to write it in an equation form.*
  - *The profit of 500 rupees can be written as 500. If there were a loss of 500 rupees, it can be written as* -500.
- *i.e,* $3000-500=$ Selling price
- *Ask them how they have used the integers to represent the opposite situations.*
  - *In the above statement, integers are used to denote opposite situations involving numbers. Similarly, other situations that involve fractional numbers.*
  - *For example, we can represent a distance of 750m above sea level as* $3/4$ *km.*
- *Ask the students how can they represent 750m below sea level?*
- *Explain the need for rational numbers.*
  - *750m below the sea level can be denoted by* $-3/4$ *km.*
  - $-3/4$ *is not a fractional number as well as it is not an integer.*

Rational Numbers:

A rational number is defined as a number that can be expressed in the form of p/q*, where p and q are integers and* $q \neq 0$.

For example, $3/4$ *is a rational number. The denominator and numerator both are integers, the denominator is not equal to zero.*

Ask the students to give a few examples of a rational number.

Practice:

- *Divide the students into pairs.*
- *Ask the students to discuss the following questions with their pairs:*
  Is it a Rational number or not?
  - *Is* $-8/9$ *a rational number?*
  - *Is 2 a rational number?*
  - *Is* 0.2 *a rational number?*
  - *Is* $5/6$ *a rational number?*
  - *Is every natural number a rational number?*
  - *Is zero a rational number?*
- *Ask them to give their answer and reason for their answers.*
- *Discuss and explain the answer to each question.*

For example, 2 is a natural number, it can be written as $2/1$ *, it satisfies the* p/q *rule as well as* $q \neq 0$*. Similarly,* 0.2 *can be written as* $2/10$
Rational numbers include fractions, decimals, and integers.
Zero is a rational number because it can be written in any of the following forms:
$0/1$ or $0/-1$ or $0/2$

- *Ask the students to mark the rational numbers on the tactile diagram of the number line which they had used for their first activity.*

Equivalent rational numbers

Activity 5: Equivalent rational numbers
Materials Required: None
Prerequisites: Fractions and integers

Activity Flow
Students have learned about equivalent fractions in chapter 2. Refer to TIK_MATH_G6_CH7_Fractions.

Note: When fractions have different numbers in them but have the same value, they are called equivalent fractions. For example, $1/2 = 2/4$
Equivalent fractions can be found by multiplying or dividing both the numerator and the denominator by the same number(non zero integers).

- *Ask the students to find equivalent fractions for the following fractional number.*
  - $4/6$

- *Similarly, ask them to find the equivalent fractions for* $-2/3$.

Positive and negative rational numbers

Activity 6: Positive and negative rational numbers

Materials Required: None
Prerequisites: Integers

Activity Flow

- *Ask the students to say five positive numbers above 200 and five negative numbers less than* -2 .
    - *For example, numbers less than* -2 *are* -3 , -4 , -5 , -7.

On a number line, the numbers to the right of zero are positive numbers and the numbers to the left of are negative numbers.

Positive rational numbers

A rational number is positive if its numerator and denominator are of the same sign.

- *Ask the students to consider a rational number* $6/7$
    - *Here, both the denominator and numerator are positive integers. Such a rational number is called a positive rational number.*
- *Ask the student to write five positive rational numbers.*

Negative rational numbers

- *Ask the students to consider a rational number* $-3/4$
- *Explain, if there is a negative integer on the numerator and a positive integer on the denominator. Such a rational number is a negative rational number.*
- *Use the following examples to explain negative rational numbers:*

Example 1:
Consider $8/(-5)$.
If the denominator is a negative integer, then change the negative integer into a positive integer. Multiply the denominator and the numerator by -1 to change the denominator into a positive integer.

    - *Multiply and divide by* -1 , *that is* , $\frac{8}{-5}\times\frac{-1}{-1}=-\frac{8}{5}$
    - $8/-5=-8/5$, *equivalent rational numbers.*
    - $-8/5$ *is a negative rational number because the numerator is a negative integer and the denominator is a positive integer.*
- *Ask the students to write five negative rational numbers.*

Note: Multiplying the fraction by a number which equals 1, gives equivalent fractions. Therefore, we multiplied the fraction by $-1/-1$

Standard form of a rational number

Activity 7: Standard form of a rational number

Materials Required: None
Prerequisites: Fractions

Activity Flow
A rational number is said to be in the standard form if its denominator is a positive integer and the numerator and denominator have no common factor other than 1.

- *Eg,* $1/2,\ 3/4,\ -3/2$

To convert a rational number into standard form, explain the following process to the students.

- *Obtain a rational number.*
- *Check whether the denominator is a positive number or not. If it is a negative number, multiply and divide the numerator and denominator by* -1 *,so that the denominator becomes positive.*
- *Find the HCF of the denominator and numerator, if it is 1, then the given rational number in its standard form or else divide the denominator and numerator with its common factor until we get HCF as 1.*
- *Give the following example to explain the above process:*

Consider $16/24$

Obtain a rational number, $16/24$
$16/24$*, the denominator is a positive integer.*
HCF of 16, 24 is 8, it's not equal to 1.

To find HCF :

The factors of 16 are: 1, 2, 4, 8, 16
The factors of 24 are: 1, 2, 3, 4, 6, 8, 12, 24
The common factors of 16 and 24 are 1 and 8, so the HCF is $1*8=8$

Divide the denominator and numerator by common factor until we get HCF as 1.

I.e, Divide by 2, $16/24=8/12$*, HCF is not equal to 1*
Again divide by 2, $8/12=4/6$ *HCF is not equal to 1*
Again divide by 2 , $4/6=2/3$ *HCF is equal to 1*
Therefore, the standard form of $16/24$ *is* $2/3$

(Or)
If the HCF is not equal to 1, we can also directly divide the fraction by HCF to get a standard form.
I.e, divide the numerator and denominator of $16/24$ *by 8, we get* $2/3$

- *Ask the students, whether the given rational numbers are in its standard form or not?*
  1. $2/3$
  2. $-3/2$
  3. $3/9$

Comparison of rational numbers

Activity 8: Comparison of rational numbers

Materials Required: None

Prerequisites: Comparison of fractions, comparison of decimals, comparison of integers and LCM (Refer to TIK_MATH_G6_CH6_Integers, TIK_MATH_G7_CH2_Fractions and decimals)

Activity Flow

- *Ask the following questions and encourage the discussions in the class:*
    1. *Which is greater, 30 or 98? why?*
    2. *Which is greater, 1 or* -9*? why?*
    3. *Find the smallest number among the given numbers:* $100, -67, 0.01, -200$
    4. *Find the greatest number?* $4/5$ *or* $7/8$

Students have learned how to compare two integers, fractions, and decimals.

- *Tell the students that two positive rational numbers can be compared in the same way as they did in the fractions.*
- *Recall the following facts using an example*
    - *Every positive rational number is greater than zero.*
      For example, $1/2 = 0.5$
      0.5 lies between 0 and 1 on a number line. 0.5 *is greater than zero.*
    - *Every negative rational number is lesser than zero.*
      Consider - $-3/2$
      $-3/2 = -1.5$
      -1.5 *lies between* -1 *and* -2
      -1.5 *is lesser than zero*
    - *Every positive rational number is greater than every negative rational number.*
    - *Every rational number represented by a point on the number line is greater than every rational number represented by points on its left.*

For example, Consider $2/3$ *and* $-4/5$, $-3/4$ *and* $5/-6$

- *Take* $2/3$ *and* $-4/5$
    - *Positive rational numbers are* $5/-6$ *always greater than the negative rational numbers.*
    - *Therefore,* $2/3$ *is greater than* $-4/5$
- *Take the second example,* $-3/4$ *and* $5/-6$
    - *In order to compare two negative rational numbers:*
    - *Obtain the rational number,* $-3/4$ *and* $5/-6$
    - *Write the two rational numbers with positive denominators.*
    - $-3/4$*, the denominator is a positive integer.*
    - $5/-6$*, the denominator is a negative number so convert it into a positive denominator. Multiply the number by* $-1/-1$*, we get* $-5/6$
- *Find the LCM of two denominators.*
    - *I.e, LCM of 4 and 6 = 12*
    - *Therefore,* $-3/4 = (-3*3)/(4*3) = -9/12$
    - *Similarly,* $-5/6 = (-5*2)/(6*2) = -10/12$
    - *Both the denominators are the same so we can compare the numerators. -10 comes before* -9 *on the number line (numbers are in increasing order from left to right on the number line).*

- *Hence, $-9/12$ is greater than $-10/12$*

Note: We can compare the rational numbers only if the denominators are the same.

War to compare the rational numbers

Activity 9: War to compare the rational numbers

Materials Required: Braille cards of Rational numbers

Prerequisites: Comparison of fractions, Comparison of integers, and LCM

Activity Flow

- *Tell the students that they are going to play a war game.*
- *Divide the class into groups of four or five.*
- *Distribute four rational numbers to each group.*
- *Tell the students, not to read the braille cards until they get instruction from the instructor.*
- *Inform the students this is the war between each group.*
- *They have to arrange the given braille cards in ascending order.*
- *Instruct to start the game.*
- *The group who finishes the game first is the winner.*

Rational numbers between two rational numbers

Activity 10: Rational numbers between two rational numbers

Materials Required: None

Prerequisites: Equivalent fractions, integers, and LCM

Activity Flow

- *Ask the students to find out the numbers lies between*
  - *0 and 5*
  - *0 and 2*
  - *-2 and 5*
  - *-2 and $+2$*
- *Tell the students that the number of integers between two integers is limited (finite).*
- *Explain the following steps to find the rational numbers between the two rational numbers.*

Consider, $-5/7$ and $-9/7$.

- *$-5/7$ and $-9/7$, rational numbers with the same denominators.*
- *In a number line of a rational number with the denominator 7, the rational numbers between them can be $-6/7$, $-7/7$, $-8/7$, etc.*
- *We can also write, $-5/7$ as $-15/21$*
  - *ie $(-5*3)/(7*3) = -15/21$, (equivalent rational number)*
- *Similarly, $-9/7$ as $-27/21$*
- *Thus, rational numbers between $-15/21$ and $-27/21$ can be $-17/21$, $-18/21$, $-19/21$, $-20/21$, $-21/21$, ……., $-27/21$.*
- *We observe that we can find infinite rational numbers between every two rational numbers.*

To find the rational numbers between two rational numbers with different denominators. First, find their equivalent fraction with the same denominator and then find the rational numbers between them.

- *Explain to the students, how to find the rational numbers between two rational numbers with different denominators.*
- *For example* $-1/3$,*and* $5/9$

Both rational numbers have different denominators.

- $-1/3 = (-1*3)/(3*3) = -3/9$ *(convert the rational number with the same denominator)*
- *Numbers between* $-3/9$ and $5/9$ are $-3/9$, $-2/9$, $-1/9$, $0/9$, $1/9$, $2/9$, $3/9$, $4/9$

Addition/Subtraction of rational numbers with same denominators

Activity 11: Addition/Subtraction of rational numbers with same denominators

Materials Required: Tactile diagram of the number line(rational numbers with denominator 4 on the number line).

Prerequisites: Addition and subtraction of integers

Activity Flow

When we add a positive number, we have to move towards the right on the number line; Similarly, when we add/subtract a negative number we have to move towards the left on the number line.

- *Explain the addition and subtraction using a number line.*
- *Distribute the tactile number line to the students.*
- *Ask them to read the numbers on the number line and inform them that they are going to add two rational numbers with the same denominators.*
- *Ask the distance between two consecutive numbers on the number line. i,e* $\frac{1}{4}$.

Consider, $-3/4 + 5/4$

- *Ask the students to find* $-\frac{3}{4}$ *on the number line. Ask them to start at* $-\frac{3}{4}$.
- $5/4$ *is a positive rational number, so ask them to move 5 units from* $-\frac{3}{4}$ *towards the right. The number they reach is the sum of* $-\frac{3}{4}$ *and* $5/4$
- *Explain, the numerator of the second fractional number is 5, so moving 5 units. We are not considering the denominators of two rational numbers because both the denominators are the same.*
  - *i.e,* $-3/4 + 5/4 = 2/4$

Similarly, ask the students to find $2/4 - 3/4$

- *Ask them to start at* $2/4$, *then ask them to move 3 units towards the left. The place they reach is the difference between* $2/4$ *and* $-3/4$.
- *Explain, the numerator of the second fractional number is 3. so moving 3 units.*
    - *i.e,* $2/4-3/4=-1/4$

Ask the students the find the value of following questions using the number line

1. $1/4+5/4=?$
2. $2/4+(-5/4)=?$
3. $6/4-1/4=?$

Method 2: Addition

If a/b *and* c/b *are two rational numbers with same denominators then*

$(a/b)+(c/b)=(a+c)/b$.

Consider $5/9$ *and* $-11/9$

1. *Write the numerators of two rational numbers with their common denominator*
    - *i.e,* $\dfrac{(5+(-11))}{9}$
2. *Add the numerator of given rational numbers.*
    - *i.e,* $(5+(-11))=(5-11)=-6$
    - *Note: students have learned operations on integers*
3. *Write a rational number whose numerator is the sum of two given rational numbers and retain the common denominator*
    - *i.e,* $-6/11$

Ask the students to find the value of

1. $(-13/7)+(6/7)$
2. $(19/5)+(-7/5)$

Subtraction

Similarly, If a/b *and* c/b *are two rational numbers with same denominators then*

$(a/b)-(c/b)=(a-c)/b$.

To find the difference of $5/7$ *from* $13/7$

- *We can write it as* $13/7-5/7$
- $13/7-5/7=(13-5)/7$
- *Therefore,* $13/7-5/7=8/9$.

Addition/Subtraction of rational numbers with different denominators

Activity 12: Addition/Subtraction of rational numbers with different denominators

Materials Required: None

Prerequisites: Addition and subtraction of integers, addition and subtraction of fractional numbers.

Activity Flow

When denominators of rational numbers are different. In that case, we have to take LCM of the given denominators. Find the equivalent rational number with the LCM as a denominator and then add the two rational numbers.

Consider $5/6$ *and* $-3/7$

The denominators of the given two rational numbers are 6 and 7 respectively.

- *Ask the students to check whether the denominators of the given rational numbers are positive or not. if it's not, ask them to change into a positive integer.*
- *Ask the students to find the LCM of the two denominators.*
  - *The LCM of 6 and 7 is 42.*
- *Ask the students to rewrite the given rational number to its equivalent rational number with the LCM as 42.*
  - $5/6 = (5*7)/(6*7) = 35/42$
  - $-3/7 = (-3*6)/(7*6) = -18/42$
  - *Therefore,* $5/6 + (-3/7) = (35/42) + (-18/42)$
- *Ask them to add the two rational numbers*
  - $a/b - c/b = (a-c)/b$
  - $(35/42) + (-18/42) = (35-18)/42 = 17/42$
  - *Note: students have learned LCM, the addition of fractions, subtraction of fractions, and operations on integers. Refer to TIK_MATH_G7_CH2_Fractions and decimals.*

The subtraction of rational numbers with different denominators is the same as the addition of two rational numbers with different denominators.

For example, subtract 9 from $4/5$

We can write 9 as $9/1$

- *Ask the students to check whether the denominators of the given rational numbers are positive integers. if it's not, ask them to change into positive integers.*
- *The denominators are different so, find the LCM of the 1 and 5*
  - *LCM of 1 and 5 = 5*

- *Ask the students to rewrite the given rational number to its equivalent rational number with the LCM as 5.*
    - *i.e,* $9/1 = (9*5)/(1*5) = 45/5$
    - *Therefore,* $\frac{4}{5} - 9 = \frac{4}{5} - \frac{45}{5}$
- *Ask them to subtract the two rational numbers*
    - $4/5 - 45/5 = (4-45)/5 = -41/5$

Magic square

Activity 13: Magic square

Materials Required: Braille cards of rational numbers $(-1/4\ ,\ -2/4\ ,\ -3/4\ ,\ 0\ ,\ 1/4\ ,\ 2/4\ ,\ 3/4\ ,\ 4/4\ ,\ 5/4\ )$ *and tactile diagram of a magic square* $(3*3)$

Prerequisites: Addition/Subtraction of fractions, addition/subtraction of integers, and addition/ subtraction of rational numbers

Activity Flow

1. *Tell the students that they are going to play a game called Magic Square.*
2. *Divide the students into a group of four.*
3. *Give the braille cards of rational numbers and the tactile magic square (3 by 3) to the students.*
4. *The magic square has three by three square grids in it.*
5. *In a magic square, the sum of rows, the sum of columns, and the sum of diagonals should be the same.*
6. *In each square grid, ask them to place one rational number. So, each row will get 3 rational numbers and each column will get 3 rational numbers.*
7. *Ask the students to arrange the rational numbers such a way that the sum of numbers in each row, the sum of numbers in each column, and the sum of numbers in each diagonal should have the same value.*
   i.e, Sum of Row1 = Sum of Row2 = Sum of Row 3 = Sum of Column1 = Sum of Column2 = Sum of Column 3 = Sum of Diagonal 1= Sum of Diagonal 2.
8. *Give some reward to the group that finishes the game correctly.*

Note: Each group should get the braille cards of $(-1/4\ ,\ -2/4\ ,\ -3/4\ ,\ 0\ ,\ 1/4\ ,\ 2/4\ ,\ 3/4\ ,\ 4/4\ ,\ 5/4\ )$ *to complete the magic square.*

Multiplication of rational numbers

Activity 14: Multiplication of rational numbers

Materials Required: None

Prerequisites: Multiplication of fractions and multiplication of integers. Refer to TIK_MATH_G7_CH2_Fraction, activity 3.

Activity Flow

- *To learn the multiplication of rational numbers, students need to know the multiplication of fractions.*
- *The fraction multiplication rule is multiplying the numerators together and multiplying the denominators together.*

For example $3/4*3/5=(3*3)/(4*5)=9/20$

- *Ask the students to find the value of*
  - $6/3*3/4=?$
  - $12/3*3/12=?$
  - $16/8*14/7=?$
- *Tell the students, similarly, we will follow the same rule for multiplying rational numbers.*
  Therefore, a product of two rational numbers = product of numerators/ product of denominators.

If a/b *and* c/d *are two rational numbers then,* $(a/b)*(c/d)=(a*c)/(b*d)$

- *Ask the students to find the value of* $(8/3)\times(5/-2)$
  i.e, $(8/3)\times(5/-2)=(8\times5)/(3\times-2)=-40/6$
- *Ask the students to find the products of*
  1. $3/7\times14/5$
  2. $13/6\times-18/91$
  3. $-11/9\times-51/44$
  4. $4/3\times3/4$

Note: Every non zero rational number has its multiplicative inverse.

Multiplicative Inverse:

The multiplicative inverse of a/b is b/a. *Thus,* $(a/b\times b/a)=(b/a\times a/b)=1$

Take the number 8.

- *Ask the students, what number can we multiply to 8 to get 1?*
  $8*?=1$.
- *Can you think of any integers that would work? No*
- *Ask the value of* $8/8$.
- *Explain to the students that if they multiply 8 by* $1/8$, *they will get 1.*
  $8*1/8=1$.
  The multiplicative inverse of 8 is $1/8$. *Similarly, the multiplicative inverse of* $1/8$ *is 8.*
- *Ask the multiplicative inverse of* $2/3$.

$2/3 * 3/2 = 1$.

The multiplicative inverse of $2/3$ is $3/2$.

Division of rational numbers

Activity 15: Division of rational numbers

Materials Required: None

Prerequisites: Division of fractions and reciprocals

Activity Flow :

Students have already learned that the division of fractions is the inverse of multiplication. Refer to TIK_MATH_G7_CH2_Fractions and decimals, activity 5.

I.e. $\frac{3}{4} \div \frac{4}{5} = \frac{3}{4} * (\text{reciprocal of } 4/5)$,

Therefore, $\frac{3}{4} * (\text{ reciprocal of } 4/5) = \frac{3}{4} * \frac{4}{5} = \frac{12}{20}$

- *Explain to the students that the division of a rational number is the same as a division of a fraction by a fraction.*

For example, $-6/25 \div 3/5$

- $-6/25 * (\text{ reciprocal of } 3/5)$
- *Reciprocal of* $3/5$ *is* $5/3$
- *Therefore,* $-6/25 * (\text{ reciprocal of } 3/5) = -6/25 * 5/3 = -30/75$

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

A rational number includes natural numbers, whole numbers, integers, and fractions.
The natural numbers are used to count the objects. For example, to count the number of boys and girls in your class or to count the number of chairs in the class, etc.
To represent nothing we use the symbol/number 0. For example, yesterday I had 4 chocolates, then I ate the four chocolates, now I have zero chocolates. I.e, nothing.
To measure the temperature below 0 degrees or to measure the sea level below zero, the integers are used.

4. EXERCISES & REINFORCEMENT

4.1 EXERCISES & REINFORCEMENT

Practice and Recall

Activity 16: Recall and practice

Materials Required: None

Prerequisites: None

Activity Flow

List five rational numbers between:

(i) -1 and 0

(ii) -2 and -1

(iii) $-4/4$ and $2/3$

(iv) $-1/2$ and $2/3$

2. Write four more rational numbers in each of the following patterns:

(i) $-3/5\ ,\ -6/10\ ,\ -9/15\ ,\ -12/20\ ,\ldots\ldots$

(ii) $-1/4\ ,\ -2/8\ ,\ -3/12\ ,\ldots\ldots$

3. Give four rational numbers equivalent to:

(i) $-2/7$

(ii) $-5/3$

4. Which of the following pairs represent the same rational number?

(i) $-7/21$ and $3/8$

(ii) $-16/20$ and $20/-25$

(iii) $-2/3$ and $2/3$

5. Rewrite the following rational numbers in the simplest form:

(i) $-8/6$

(ii) $25/45$

(iii) $-44/72$

(iii) $-8/10$

6. Which is greater in each of the following:

(i) $2/3\ ,\ 5/2$

(ii) $-5/6\ ,\ -4/3$

(iii) $-1/4\ ,\ 1/4$

7. Write the following rational numbers in ascending order:

(i) $-3/5\ ,\ -2/5\ ,-1/5$

(ii) $-1/3\ ,\ -2/9\ ,\ -4/3$

8. Find the sum

(i) $5/4+(-11/4)$

(ii) $5/3+3/5$

(iii) $-2/3+0$

9. Find

(i) $7/24-17/36$

(ii) $5/63-(-6/21)$

(iii) $-6/13-(-7/15)$

10. Find the product

(i) $\frac{9}{2} \times (-\frac{7}{4})$

(ii) $\frac{3}{10} * (-9)$

(iii) $3 / -5 * -5 / 3$

11. Find the value of

(i) -4 divided by $\frac{2}{3}$

(ii) $-4 / 5$ divided by (-3)

(iii) $-3 / 5$ divided by 2

4.2 IMPORTANT GUIDELINES*

Exercise Reading

It is very important that the children practice their learning as well as their reading. Hence have the children read out the newly learned concepts from their textbooks or other available resources.

Perform Textbook Activity

It is good practice to have the children perform the textbook activities. Your textbook activities might not be accessible hence go through this resource to learn how to make textbook content accessible

Provide Homework

To evaluate their understanding and to help the student revise and implement the new learnt concept ensure to provide them with homework. Students should perform one or two of the questions mentioned above or from the textbook exercises with the teacher in Class and the remaining may be given for homework. Also, ensure that the student knows their special skills linked to independently using their accessible books as it will be critical to doing homework independently

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