Gajera International School, Katargam

Class – VII

Subject – Maths

Chapter – Rational numbers

Date 07/04/2020

Introduction to rational numbers :

Natural Numbers

All positive integers like 1, 2, 3, 4……..are natural numbers.

Whole Numbers

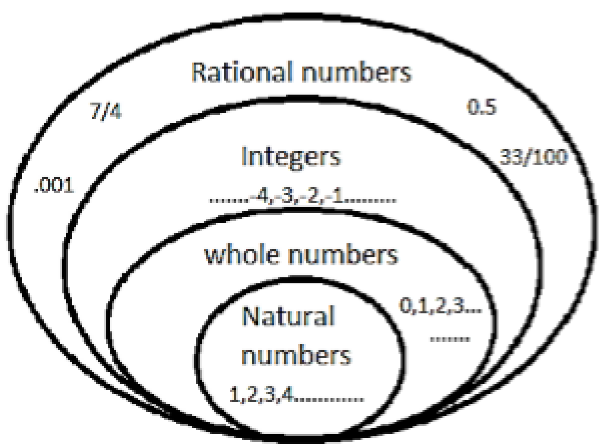
All natural numbers including 0 are whole numbers.

Integers

All negative and positive numbers including 0 are called Integers.

Rational Numbers

Rational Numbers are the numbers that can be expressed in the form p/q where p and q are integers (q ≠ 0). It includes all natural, whole numbers, fractions and integers.



Equivalent Rational Numbers

By multiplying or dividing the numerator and denominator of a rational number by the same integer, we can obtain another rational number equivalent to the given rational number.

Numbers are said to be equivalent if they are proportionate to each other.

Example

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

Thus $\frac{2}{3}$ is equivalent to $\frac{1}{2}$

$$\frac{4}{8} \div \frac{2}{2} = \frac{2}{4}$$

Thus $\frac{2}{4}$ is equivalent to $\frac{4}{8}$

Therefore 1/2, 2/4, 4/8 are equivalent to each other as they are equal to each other.

Positive and Negative Rational Numbers

1. Positive Rational Numbers are the numbers whose both the numerator and denominator are positive.

Example: 3/4, 12/24 etc.

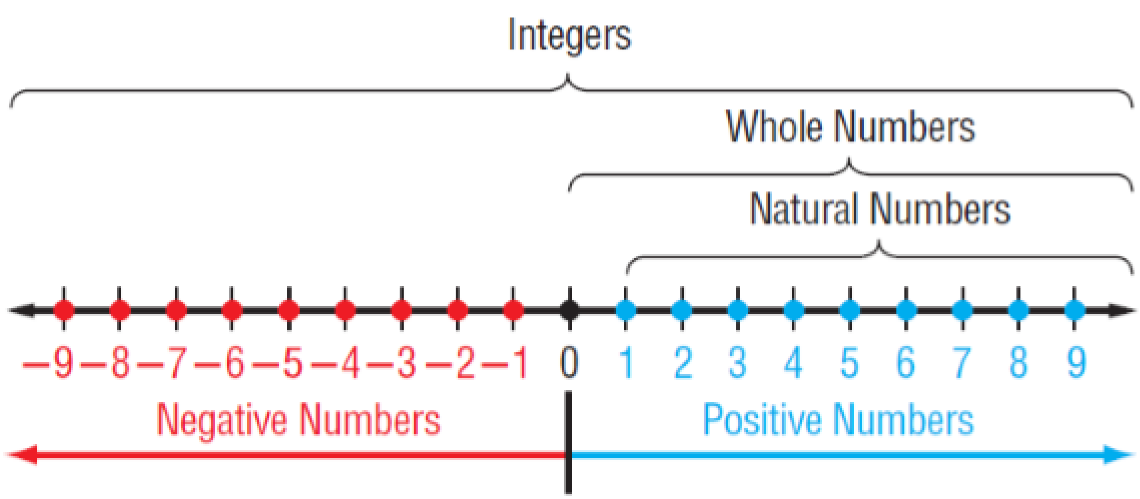
2. Negative Rational Numbers are the numbers whose one of the numerator or denominator is negative.

Example: (-2)/6, 36/(-3) etc.

Remark: The number 0 is neither a positive nor a negative rational number.

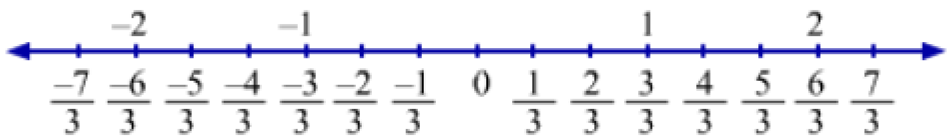
Rational Numbers on the Number Line

Representation of whole numbers, natural numbers and integers on a number line is done as follows



Rational Numbers can also be represented on a number line like integers i.e. positive rational numbers are on the right to 0 and negative rational numbers are on the left of 0.

Representation of rational numbers can be done on a number line as follows



Rational Numbers in Standard Form

A rational number is in the standard form if its denominator is a positive integer and there is no common factor between the numerator and denominator other than 1.

If any given rational number is not in the standard form then we can reduce it to its standard form or the lowest form by dividing its numerator and denominator by their HCF ignoring its negative sign.

Example

Find the standard form of 12/18

Solution

$$\frac{12}{18} \div \frac{6}{6} = \frac{2}{3}$$

2/3 is the standard or simplest form of 12/18

Comparison of Rational Numbers

1. To compare the **two positive rational numbers**we need to make their denominator same, then we can easily compare them.

Example

Compare 4/5 and 3/8 and tell which one is greater.

Solution

To make their denominator same, we need to take the LCM of the denominator of both the numbers.

LCM of 5 and 8 is 40.

$$\frac{4}{5} \times \frac{8}{8} = \frac{32}{40}$$

$$\frac{3}{8} \times \frac{5}{5} = \frac{15}{40}$$

$$\frac{32}{40} > \frac{15}{40}$$

$$\text{Hence,} \frac{4}{5} > \frac{3}{8}$$

2. To compare **two negative rational numbers**, we compare them ignoring their negative signs and then reverse the order.

Example

Compare - (2/5) and – (3/7) and tell which one is greater.

Solution

To compare, we need to compare them as normal numbers.

LCM of 5 and 7 is 35.

$$\frac{2}{5}\times\frac{7}{7}=\frac{14}{35}$$

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

$$\frac{15}{35}>\frac{14}{35}\text{ So we get }\frac{14}{35}>-\frac{15}{35}$$

by reversing the order of the numbers.

$$\text{Hence, }-\frac{2}{5}>-\frac{3}{7}$$

3. If we have **to compare one negative and one positive rational number** then it is clear that the positive rational number will always be greater as the positive rational number is on the right to 0 and the negative rational numbers are on the left of 0.

Example

Compare 2/5 and – (2/5) and tell which one is greater.

Solution

It is simply that 2/5 > - (2/5)

Operations on Rational Numbers

1. Addition

a. Addition of two rational numbers with the same denominator

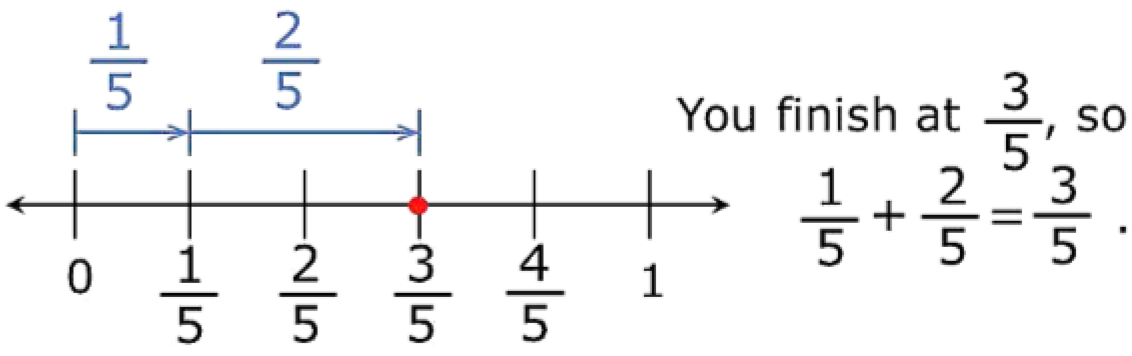
i. We can add it using a **number line**.

Example:

Add 1/5 and 2/5

Solution:

On the number line we have to move right from 0 to 1/5 units and then move 2/5 units more to the right.



ii. If we have to **add two rational numbers** whose denominators are same then we simply add their numerators and the denominator remains the same.

Example

Add 3/11 and 7/11.

Solution

As the denominator is the same, we can simply add their numerator.

$$\frac{3}{11}+\frac{7}{11}=\frac{3+7}{11}=\frac{10}{11}$$

b. Addition of two Rational Numbers with different denominator

If we have to add two rational numbers with different denominators then we have to take the LCM of denominators and find their equivalent rational numbers with the LCM as the denominator, and then add them.

Example

Add 2/5 and 3/7.

Solution

To add the two rational numbers, first, we need to take the LCM of denominators the find the equivalent rational numbers.

LCM of 5 and 7 is 35.

$$\frac{2}{5}\times\frac{7}{7}=\frac{14}{35}$$

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

$$\frac{14}{35}+\frac{15}{35}=\frac{29}{35}$$

c. Additive Inverse

Like integers, the additive inverse of rational numbers is also the same.

$$a + (-a) = 0$$

This shows that the additive inverse of 3/7 is - (3/7)

This shows that

$$\frac{3}{7} + \left(-\frac{3}{7}\right) = 0$$

2. Subtraction

If we have to subtract two rational numbers then we have to add the additive inverse of the rational number that is being subtracted to the other rational number.

a - b = a + (-b)

Example

Subtract 4/21 from 8/21.

Solution

i. In the first method, we will simply subtract the numerator and the denominator remains the same.

$$\frac{8}{21} - \frac{4}{21} = \frac{8-4}{21} = \frac{4}{21}$$

ii. In the second method, we will add the additive inverse of the second number to the first number.

$$\frac{8}{21} - \frac{4}{21} = \frac{8}{21} + \left(-\frac{4}{21}\right) = \frac{4}{21}$$

Worksheet :

1.State true or false.

a) Every integer is rational number.

b) Zero is not rational number.

c) 1/0 is a rational number.

d) Zero is the smallest rational number.

e) Every rational number is an integer.

2. Solve the following.

1. Compare the following rational numbers.

a) -4/7 , -7/17 b) 18/14 , 9/7

2. Arrange in ascending order.

a) -4/5, -8/9, -6/7, -3/4

b) -5/7, -6/8, 4/(-9) , -5/12

3. Arrange in descending order.

-3/5, 11/18, 4/9, 3/10

4. Represent following on number line.

a) ¾ b) 7/3 c) -5/9 d) -12/5.

5. Write three equivalent rational number for 3/8.

6. Find a and y such that 3/4 = 336/a and 5/8 = y/a.

7. Write following rational numbers in standard form.

a) 5/(-9) b) -3/(-8) c) 4/(-30) d) -6/(-72).