

ONLINE TEACHING MATERIAL

MATHEMATICS

SESSION-2020-21

CLASS-VIII

TOPIC: RATIONAL NUMBERS

DAY-1

❖ NCERT MATERIAL

CLICK THE LINK GIVEN BELOW:

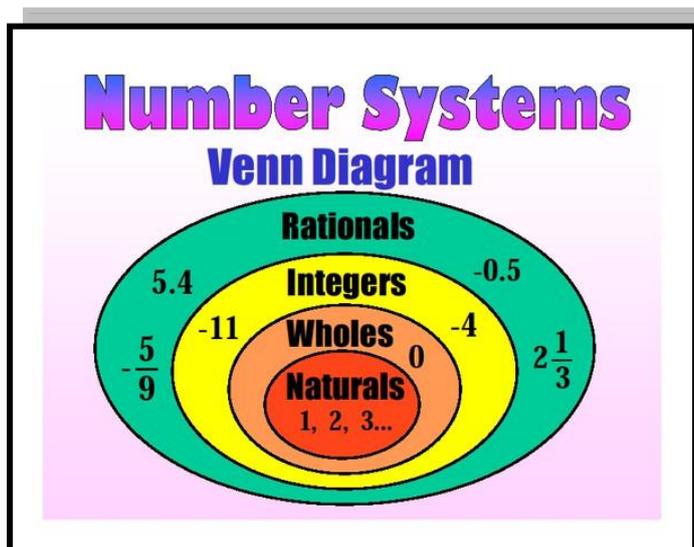
<http://ncert.nic.in/textbook/textbook.htm?hemh1=1-16>

❖ TEACHING MATERIAL

RATIONAL NUMBERS: Those numbers which are in the form of p/q where both p and q are integers and $q \neq 0$ are called rational numbers.

Ex $2/3, 8/9, 0$.

- ❖ A rational number is said to be positive if its numerator and denominator are either positive or negative.
- ❖ A rational number is said to be negative if its numerator and denominator are of opposite signs.
- ❖ A rational number a/b is said to be in standard form if a and b are integers having no common divisor except 1 and a and b are positive
- ❖ 0 is called the identity element for addition of rational numbers.



Some irrational numbers - first few decimal digits:

π

=3.14159265358979323846264338327950288419716939...

$\sqrt{2}$

=1.4142135623730950488016887242096980785696718753769...

$\sqrt{3}$

=1.73205080756887729352744634150587236694280525381...

N = the set of natural numbers

Q = the set of rational numbers

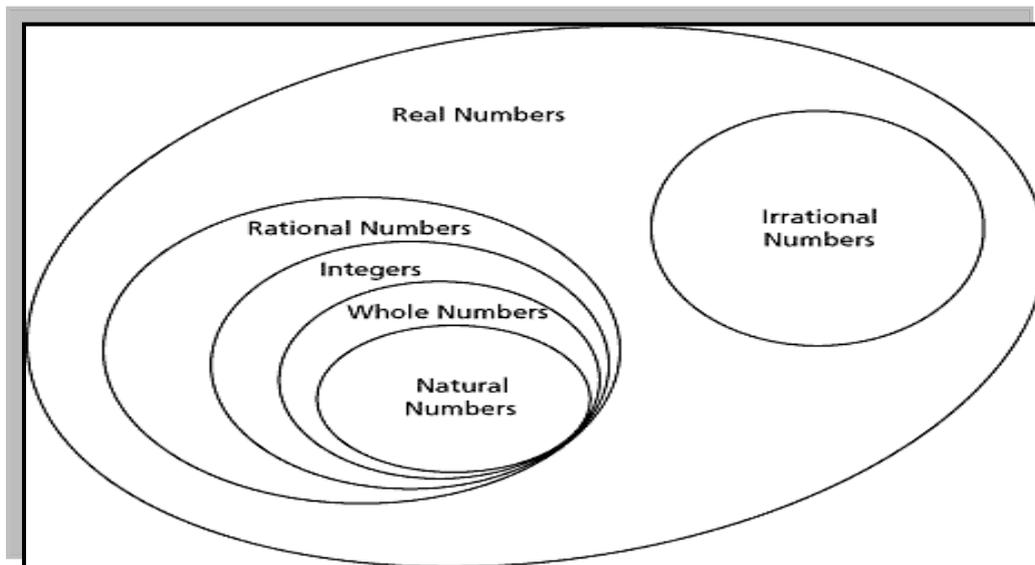
R = the set of real numbers

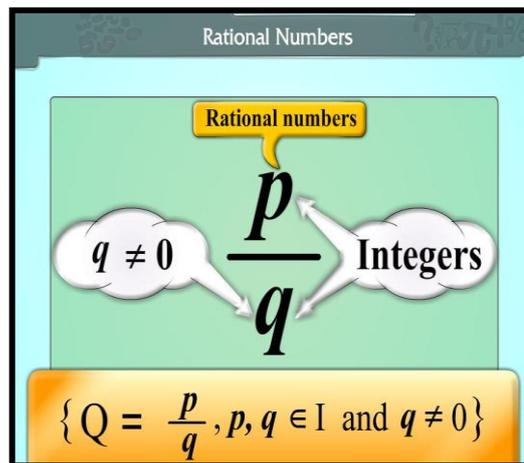
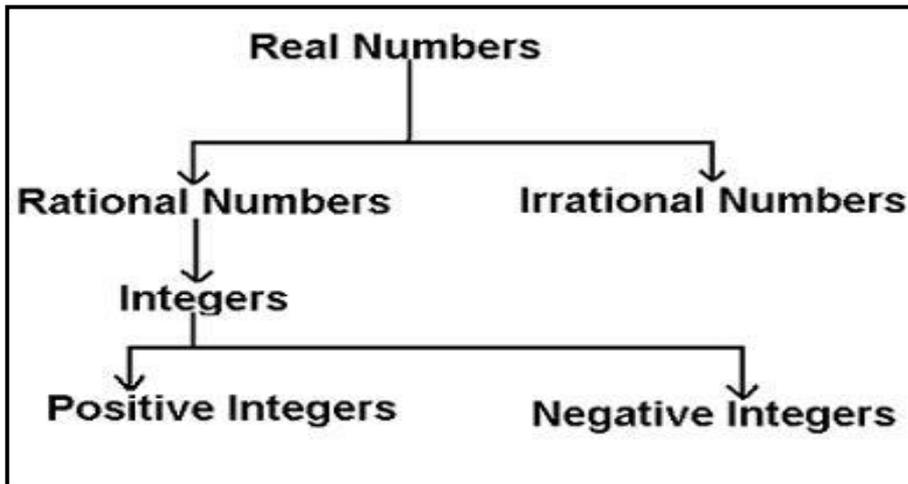
P = the set of prime numbers

Z = the set of integers

E = the set of even integers

O = the set of odd integers





❖ VIDEO-LINKS

CLICK THE LINKS GIVEN BELOW FOR REFERENCE

<https://www.youtube.com/watch?v=G9n8HbMdUIk>

<https://byjus.com/maths/rational-numbers-between-two-numbers/>

❖ PPT LINKS

CLICK THE LINKS GIVEN BELOW FOR REFERENCE

<https://www.slideshare.net/maisha/rational-numbers-34475493>

<https://www.learnpick.in/prime/documents/ppts/details/890/real-numbers-ppt>

❖ DOCUMENTS LINKS

CLICK THE LINKS GIVEN BELOW FOR REFERENCE

https://physicscatalyst.com/class8/Rational_numbers.php

DAY-2

Properties of addition of Rational numbers

1. **Closure property** - The sum of any two rational numbers is always a rational number.
2. **Commutative property** - If a and b are two rational numbers ,then $a + b = b + a$
3. **Associative property** - If a, b, c are three rational numbers ,then $a + (b + c) = (a + b) + c$
4. **Additive identity** - The sum of any rational number and 0 is the rational number itself.

❖ VIDEO-LINKS

CLICK THE LINKS GIVEN BELOW FOR REFERENCE

<https://www.youtube.com/watch?v=kc4IKblFfBI>

<https://www.youtube.com/watch?v=FOL2FENoJOo>

❖ PPT LINKS

<https://www.toppr.com/guides/maths/rational-numbers/properties-of-rational-numbers/>

<https://slideplayer.com/slide/14090823/>

❖ OTHER LINKS

Closure, associative and commutative property of rational numbers

<https://www.khanacademy.org/math/in-math-by-grade/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-rational-nos/xa9e4cdc50bd97244:properties-of-rational-numbers/e/closure-property-of-rational-numbers?modal=1>

Distributive property of rational numbers

[khanacademy.org/math/in-math-by-grade/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-rational-nos/xa9e4cdc50bd97244:properties-of-rational-numbers/e/distributivity-of-multiplication-over-addition-for-rational-numbers?modal=1](https://www.khanacademy.org/math/in-math-by-grade/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-rational-nos/xa9e4cdc50bd97244:properties-of-rational-numbers/e/distributivity-of-multiplication-over-addition-for-rational-numbers?modal=1)

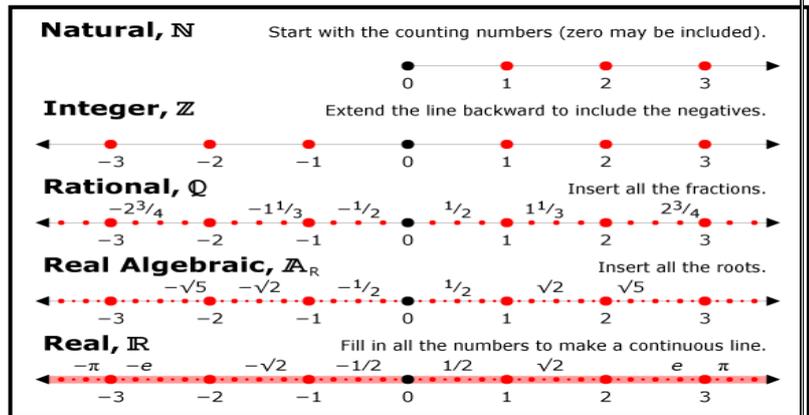
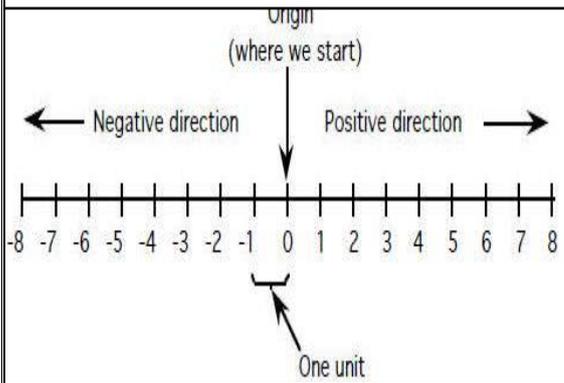
DAY-3

Properties of subtraction of Rational numbers

1. **Closure property** - If a and b are two rational numbers, then $a - b$ is also a rational number.
2. **Commutative property** - The subtraction of rational numbers is not always commutative.
3. **Associative property** - The subtraction of rational numbers is not associative.

Properties of multiplication of Rational numbers

1. **Closure property**- the product of any two rational numbers is always a rational number.
- 2 **Commutative property** - If a and b are two rational numbers, then. $a \times b = b \times a$
3. **Associative property** - If a, b, c are three rational numbers, then $a \times (b \times c) = (a \times b) \times c$



❖ VIDEO-LINKS

Identity property of 1

<https://youtu.be/6nZp2QGeQ9k>

Identity property of 0

<https://youtu.be/uXTRmzXlorI>

Inverse property of addition

<https://youtu.be/bjVn4WGmNis>

Inverse property of multiplication

<https://youtu.be/XMwnJUprid8>

Finding reciprocal of a fraction

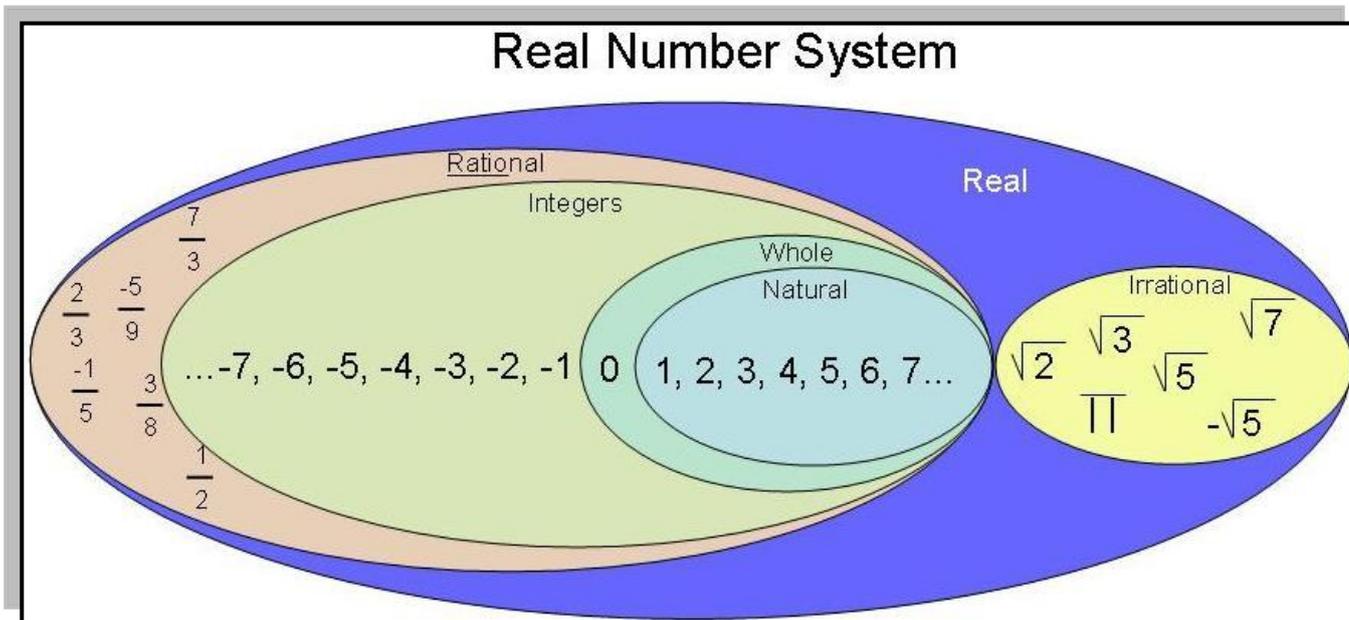
<https://www.khanacademy.org/math/in-math-by-grade/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-rational-nos/xa9e4cdc50bd97244:rational-numbers-additive-and-multiplicative-inverse-reciprocals-and-identities/e/finding-reciprocal-of-a-fraction>

Additive and multiplicative inverse of a rational number

<https://www.khanacademy.org/math/in-math-by-grade/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-rational-nos/xa9e4cdc50bd97244:rational-numbers-additive-and-multiplicative-inverse-reciprocals-and-identities/e/additive-and-multiplicative-inverse-of-a-rational-number>

DAY-4

To find rational numbers between given two rational numbers – If a and b are two rational numbers where $a < b$, then $(a + b)/2$ is a rational number between a and b and same process to be continued to get more rational numbers.



❖ VIDEO-LINKS

<https://www.youtube.com/watch?v=DjqGCnPLKfK>

<https://www.youtube.com/watch?v=DjqGCnPLKfK>

<https://www.youtube.com/watch?v=fnReWIhHz4s>

❖ PPT LINKS

<https://www.slideshare.net/kscallion/rational-numbers>

https://edurev.in/studytube/Rational-Numbers-between-two-Rational-NumbersIntro/0bbb0b41-29aa-4af4-bf3e-1072d25a4ce8_v

❖ GEO-GEBRA LINKS

<https://www.geogebra.org/t/rational-numbers?lang=en>

<https://www.geogebra.org/m/j2xQjMZb>

Finding Rational Numbers between Two Rational Number

- The simplest method to find a rational number between 2 rational numbers x and y is to divide their sum by 2.

Example: 31 and 41. The rational number between them is $(3 + 4)/2 = 3+4=72$

Example: For numbers with common denominator like 320 and 920 , the rational number between them can be 420, 520, 620, 720, 820, etc.

- For a negative and a positive number like $3-3$ and 320 , we have $-220, -120, 020, 120, 220$, etc.
- We can write 320 as 30200 and 920 as 90200 . Thus, rational number between 320 and 920 can also be 31200, 32200, 33200, 34200, 89200 and so on .
- For finding rational numbers between two rational numbers with different denominators, we first find their equivalent fraction with the same denominator and then find the rational number between them. For example, for finding numbers between -13 and 59 . , we convert -13 to $-1 \times 33 \times 3 = -39$. Now, we have $-29, -19, 09, 19, 29, 39, 49$ between them.

Rational numbers between two rational numbers

<https://www.khanacademy.org/math/in-math-by-grade/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-rational-nos/xa9e4cdc50bd97244:rational-numbers-between-two-rational-numbers/e/rational-numbers-between-two-rational-numbers?modal=1>

Finding real numbers between two rational numbers

<https://www.khanacademy.org/math/in-math-by-grade/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-rational-nos/xa9e4cdc50bd97244:rational-numbers-between-two-rational-numbers/e/finding-rational-numbers-between-two-rational-numbers?modal=1>

Ordering rational numbers

https://youtu.be/i1i2_9wg6N8

Decimals & fractions on the number line

<https://youtu.be/uC09taczvOo>

Fractions on a number line

<https://youtu.be/Z0WsfO-RI8Y>

DAY-5

FEW MORE POINTS TO DISCUSS

Expression of integers as rational numbers

Any integer n can be expressed as a rational number $\frac{n}{1}$. This form is known as the canonical form of the integer.

Irreducible Fractions

All rational numbers can be expressed as an irreducible fraction $\frac{x}{y}$ where x and y integers and y is not equal to zero. The canonical form of any rational number is expressed by dividing both the numerator and denominator by their greatest common divisor.

Equality of Two Rational Numbers

Two rational numbers $\frac{x}{y}$ and $\frac{a}{b}$ are said to be equal if $x=b$ and $y=a$, as well as $xb=ay$.

Order of a Rational Number

A rational number $\frac{a}{b}$ is said to be greater than $\frac{x}{y}$ if and only if $ay > bx$

Addition and Subtraction of Rational Numbers

Two rational numbers $\frac{a}{b}$ and $\frac{c}{d}$ are added as follows:

$$\frac{a}{b} + \frac{c}{d} = \frac{ad+bc}{bd}$$

Similarly the subtraction is done as $\frac{a}{b} - \frac{c}{d} = \frac{ad-bc}{bd}$

Example 1:

Identify each of the following as irrational or rational: $\frac{3}{4}$, $\frac{90}{12007}$, 12 and $\sqrt{5}$.

Solution:

Since a rational number is the one that can be expressed as a ratio. This indicates that it can be expressed as a fraction wherein both denominator and numerator are whole numbers.

- $\frac{3}{4}$ is a rational number as it can be expressed as a fraction.
- Fraction $\frac{90}{12007}$ is rational.
- 12, also be written as $\frac{12}{1}$. Again a rational number.
- Value of $\sqrt{5} = 2.2360\dots$, does not end. Cannot be written as a fraction. It is an irrational number.

Example 2:

Identify whether mixed fraction, $1\frac{1}{2}$ is a rational number.

Solution:

The Simplest form of $1\frac{1}{2}$ is $\frac{3}{2}$

Numerator = 3, which is an integer

Denominator = 2, is an integer and not equal to zero.

So, yes, $\frac{3}{2}$ is a rational number.

Example 3:

Determine whether the given numbers are rational or irrational.

(a) 1.75 (b) 0.01 (c) 0.5 (d) 0.09 (e) $\sqrt{3}$

Solution:

The given numbers are in decimal format. To find whether the given number is decimal or not, we have to convert it into the fraction form (i.e.,) p/q

ASSIGNMENT
Section A

Write the correct answer in each of the following:

1. What should be subtracted from $-3/5$ to get -2 ?
a) $7/5$ b) $-13/5$ c) $13/5$ d) None of these
2. What is the additive inverse of $9/5$?
a) $-9/5$ b) 0 c) $5/9$ d) None of these
3. What is the reciprocal of $-3/4$?
a) $4/3$ b) $3/4$ c) $-4/3$ d) None of these
4. Which of the following numbers is in standard form?
a) $-12/26$ b) $-49/70$ c) $-3/5$ d) $2/-10$
5. A rational number between $-2/3$ and $1/4$ is
a) $5/12$ b) $-5/12$ c) $-5/24$ d) $5/24$

SECTION B

6. List the properties of addition that are satisfied by the following statements.

a) $\frac{1}{3} + \frac{5}{9} = \frac{5}{9} + \frac{1}{3}$

b) $\left(\frac{7}{8} + \frac{3}{8}\right) + \frac{5}{8} = \frac{7}{8} + \left(\frac{3}{8} + \frac{5}{8}\right)$

7. Draw a number line and represent the following rational numbers on it.

a) $1/2$ b) $1/3$ c) $7/6$ d) $11/6$

8. Using rearrangement property find the sum of the following.

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

b) $\frac{4}{7} + \frac{-8}{9} + \frac{-5}{21} + \frac{1}{3}$

9. Simplify the following expressions

a) $\frac{-2}{5} - \left(\frac{-3}{10}\right) - \left(\frac{-4}{15}\right)$

Long Answer - Rational Numbers

https://diksha.gov.in/play/collection/do_312796455267672064117183?contentType=TextBook&contentId=do_31279851824164044816023

Multiple Choice Question - Rational Numbers

https://diksha.gov.in/play/collection/do_312796455267672064117183?contentType=TextBook&contentId=do_31279872740342988817355

Short Answer - Rational Numbers

https://diksha.gov.in/play/collection/do_312796455267672064117183?contentType=TextBook&contentId=do_31279851801828556816022

OTHER LINKS

<https://olympiadtester.com/cbse-exam-guide/class-8/mathematics/online-practice-tests/rational-numbers/01>