

NUMBER SYSTEM

1. Natural Numbers

Definition: Natural numbers are the numbers that we use for counting objects.

Natural Numbers = 1, 2, 3, 4, 5, 6, 7, 8, . . .

They start from 1 and continue endlessly.

Examples: 1, 5, 25, 100, 999

0 is generally not included in Natural Numbers.

Symbol: N

$N = \{1, 2, 3, 4, 5, \dots\}$

2. Whole Numbers

Definition: Whole numbers are all the natural numbers together with 0.

Whole Numbers = 0, 1, 2, 3, 4, 5, 6,

Examples: 0, 7, 15, 50, 1000

0 is included in Whole Numbers.

Symbol: W

$W = \{0, 1, 2, 3, 4, 5, \dots\}$

3. Integers

Definition: Integers are the set of positive numbers, negative numbers, and zero, without fractions or decimals.

Integers = . . . , -3, -2, -1, 0, 1, 2, 3, . . .

Symbol: Z

$Z = \{., -3, -2, -1, 0, 1, 2, 3, \dots\}$

Real-Life Example:

1. If the temperature is 5°C, it can be represented by +5.
2. If the temperature is 5°C below zero, it can be represented by -5.

4. Rational Numbers

Definition: A rational number is a number that can be written in the form:

p/q , where p and q are integers and $q \neq 0$ and gcd of p and q is 1.

Examples: 1, 2, 3, 4, -5, 7, 2, 0.

Note: 0 is also a rational number.

Symbol: Q

5. Irrational Numbers

Definition: An irrational number is a number that cannot be written in the

p/q , where p and q are integers and $q \neq 0$ and gcd of p and q is 1.

Not every square root is irrational is irrational.

6. Real Number:

Definition: Real numbers are all the numbers that can be represented on the number line.

Real numbers include both: Rational numbers and Irrational numbers.

Real Numbers = Rational Numbers + Irrational Numbers

Symbol: R

RELATIONSHIP BETWEEN NUMBER SYSTEMS

The different types of numbers are related to each other.

$N \subset W \subset Z \subset Q \subset R$ and Irrational Numbers $\subset R$ but irrational numbers are not rational numbers.

KEY POINTS TO REMEMBER:

Every Natural Number is a Whole Number.

Every Whole Number is an Integer.

Every Integer is a Rational Number.

Every Rational Number is a Real Number.

Irrational Numbers are also Real Numbers.