📘 Class 9 Maths – Chapter 1: Number System (Full Notes)

🔹 1. What is a Number?

A number is used to count, measure and compare things. It can be positive, negative, whole, fractional or even something like root 2 or π. These all fall under the Number System.

🔹 2. Types of Numbers

✅ Natural Numbers

These are counting numbers starting from 1.

Example: 1, 2, 3, 4, ...

✅ Whole Numbers

Natural numbers along with 0.

Example: 0, 1, 2, 3, ...

✅ Integers

All whole numbers and their negative counterparts.

Example: ..., -3, -2, -1, 0, 1, 2, ...

✅ Rational Numbers

Numbers that can be written as p/q, where q ≠ 0.

Their decimal expansion either ends (terminates) or repeats.

Example: 1/2 = 0.5, 2/3 = 0.666...

✅ Irrational Numbers

Numbers that cannot be written as p/q.

Their decimal form never ends and never repeats.

Example: √2, π

✅ Real Numbers

All Rational and Irrational numbers together.

Example: -5, 0, 2/3, √3, π

🔹 3. Decimal Expansion

Rational numbers have terminating or repeating decimals.

Irrational numbers have non-terminating and non-repeating decimals.

🔹 4. Number Line

Every real number can be represented on a number line.

Rational numbers lie at fixed positions.

Irrational numbers are placed using constructions or approximations.

🔹 5. Laws of Exponents

1. $a^m \times a^n = a^{m+n}$

2. $a^m \div a^n = a^{m-n}$

3. $(a^m)^n = a^{m \times n}$

4. $a^0 = 1$ (if $a \neq 0$)

5. $a^{-n} = 1/a^n$

🔹 6. 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.

Division by 0 is not defined.

🔹 7. Some Examples

4 is a rational number because 4 = 4/1

√2 is an irrational number

-5 is an integer

0 is a whole number but not a natural number

🔹 8. Summary

The Number System includes all the numbers we use in daily life. It is important to understand which number belongs to which category to solve mathematical problems correctly. Real numbers are the combination of both rational and irrational numbers.

📌 Teacher's Tip:
Always try to write the number in p/q form to check if it's rational. If the decimal stops or repeats — it's rational. If it goes on and never repeats — it's irrational.
