Types of Numbers

1. Natural Numbers ($\mathbb{N}$)

- **Definition:** Counting numbers starting from 1, 2, 3, 4, ...
- **Note:** Sometimes 0 is included, depending on context.
- **Example:** 1, 2, 3, 10, 100 are natural numbers.

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2. Integers ($\mathbb{Z}$)

- **Definition:** Whole numbers that can be positive, negative, or zero.
- **Example:** -3, -2, -1, 0, 1, 2, 3

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3. Prime Numbers

- **Definition:** A number greater than 1 that has exactly **two** factors: 1 and itself.
- **Note:** 1 is **not** a prime number.
- **Example:** 2, 3, 5, 7, 11, 13, 17

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4. Square Numbers

- **Definition:** A number multiplied by itself (n × n).
- **Example:**
  - $1^2 = 1$, $2^2 = 4$, $3^2 = 9$, $4^2 = 16$,$5^2 = 25$

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5. Cube Numbers

- **Definition:** A number multiplied by itself **twice** (n × n × n).
- **Example:**
  - $1^3 = 1$, $2^3 = 8$, $3^3 = 27$, $4^3 = 64$, $5^3 = 125$

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6. Common Factors

- **Definition:** Numbers that divide exactly into two or more other numbers.
- **Example:**
  - Factors of 12: 1, 2, 3, 4, 6, 12
  - Factors of 18: 1, 2, 3, 6, 9, 18
  - **Common factors of 12 and 18:** 1, 2, 3, 6

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7. Common Multiples

- **Definition:** Numbers that are multiples of two or more numbers.
- **Example:**
  - Multiples of 4: 4, 8, 12, 16, 20
  - Multiples of 6: 6, 12, 18, 24

- **Common multiples of 4 and 6:** 12, 24, ...

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8. Rational Numbers (ℚ)

- **Definition:** Numbers that can be written as a **fraction** (a/b), where **a and b are integers and b ≠ 0**.
- **Includes:** integers, terminating decimals, recurring decimals.
- **Example:**
  - 1/2, -4, 0.75 (since 0.75 = 3/4), 0.333... (since 0.333... = 1/3)

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9. Irrational Numbers

- **Definition:** Numbers **that cannot be written as a fraction**. Their decimals go on **forever without repeating**.
- **Example:**
  - √2 = 1.414213... (non-repeating, non-terminating)
  - π = 3.141592...
  - e = 2.718281...

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10. Reciprocals

- **Definition:** The reciprocal of a number **x** is **1/x**.
- **Note:** The reciprocal of a fraction **a/b** is **b/a**.
- **Examples:**
  - Reciprocal of 2 is ½, Reciprocal of 4/5 is 5/4
  - Reciprocal of -3 is -1/3
  - **Zero has no reciprocal** (you cannot divide by zero)