

Important Sets of Numbers:

- **Natural Numbers** – The numbers we use for counting $\{1, 2, 3, 4, 5, 6, \dots\}$.
- **Whole Numbers** – The set of natural numbers plus the number 0: $\{0, 1, 2, 3, 4, 5, 6, \dots\}$.
- **Integers** – The set of whole numbers and their negatives: $\{\dots, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, \dots\}$
 - **Even Integers** – Integers exactly divisible by 2: $\{\dots, -12, -10, -8, -6, -4, -2, 0, 2, 4, 6, 8, 10, 12, \dots\}$
 - **Odd Integers** – Integers that are not exactly divisible by 2: $\{\dots, -13, -11, -9, -7, -5, -3, -1, 1, 3, \dots\}$
- **Prime Numbers** – A prime number is a natural number greater than 1 that is divisible only by itself and 1: $\{2, 3, 5, 7, 11, 13, 17, 19, \dots\}$
- **Composite Numbers** – A composite number is a natural number greater than 1 that is not prime: $\{4, 6, 8, 9, 10, 12, 14, 15, 16, \dots\}$
- **Rational Numbers** – Fractions that have an integer numerator and nonzero integer denominator: $\{\frac{a}{b} | a \text{ is an integer and } b \text{ is a nonzero integer}\}$
- **Irrational Numbers** – Non-terminating, non-repeating decimals.
- **Real Numbers** – Any number that is rational or irrational: $\{x | x \text{ is a rational or irrational number}\}$

Properties of Real Numbers

Real numbers have the following properties: (Assume $a, b,$ and c are real numbers).

- **Associativity for Addition and Multiplication:**

$$(a + b) + c = a + (b + c)$$

$$(ab)c = a(bc)$$

- **Commutativity for Addition and Multiplication:**

$$a + b = b + a$$

$$ab = ba$$

- **The Distributive Property of Multiplication over Division:**

$$a(b + c) = ab + bc$$

$$a(b - c) = ab - ac$$

- **The Double Negative Rule:**

$$-(-a) = a$$