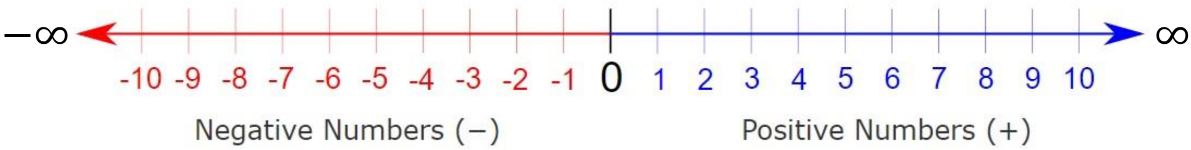
Number System

1. Set of natural numbers (positive integers) $= N = \{1, 2, 3, \ldots\}$
   - Set of prime numbers $= P = \{2, 3, 5, 7, 11, \ldots\}$
   - Set of composite numbers $= \{4, 6, 8, 9, 10, 12, \ldots\}$
2. Set of whole numbers (non-negative integers) $= W = \{0, 1, 2, 3, \ldots\}$
3. Set of integers $= Z = \{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\} = \{0, \pm 1, \pm 2, \pm 3, \ldots\}$
   - Set of even integers $= E = \{0, \pm 2, \pm 4, \pm 6, \ldots\}$
   - Set of odd integers $= O = \{\pm 1, \pm 3, \pm 5, \pm 7, \ldots\}$
4. Set of rational numbers $= Q = \left\{x \mid x = \frac{a}{b} : a, b \in Z, b \neq 0\right\}$

   Rational numbers are formed by dividing two integers. Therefore, all integers, terminating decimals (e.g., 1.5, 3.14) and recurring decimals (e.g., $0.333\ldots = 0.\overline{3}$) are rational numbers. e.g., $\frac{3}{5}, -2, \frac{7}{2}, \sqrt{4}$ etc.
5. Set of irrational numbers $= Q' = \left\{x \mid x \neq \frac{a}{b} : a, b \in Z, b \neq 0\right\}$

   Numbers that are not rational are called irrational numbers. All non-terminating, non-recurring decimals are irrational numbers. e.g., $\frac{\sqrt{3}}{5}, \pi, e, \sqrt{2}$ etc.
6. Set of real numbers $= R = Q \cup Q' = (-\infty, \infty)$

   Infinity "∞" is a symbol used to represent very large numbers and "$-\infty$" is used to represent very small numbers as shown in the number line given below:



   - ✓ Set of positive real numbers $= R^+ = (0, \infty)$
   - ✓ If x is a positive real number, we write it as $x > 0$.
   - ✓ Set of non-negative real numbers $= R^+ \cup \{0\} = [0, \infty)$
   - ✓ If x is a non-negative real number, we write it as $x \geq 0$.
7. Set of complex numbers $= C = \{x \mid x = a + ib : a, b \in R, i = \sqrt{-1}\}$

   $i = \sqrt{-1}$ is not a real number. i (iota) and its multiples are called imaginary numbers. e.g., $i, 2i, -10i$ are imaginary numbers. Complex numbers are combinations of real and imaginary numbers. e.g., $-2, 3i, -2 + 3i, -1 - i$ etc.

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