Linear Equation

What is a Linear Equation?

A linear equation is an algebraic equation in which:

- The highest power of the variable is 1.
- The equation represents a straight line when plotted on a graph.
- It has the form:

$ax + b = c$

Where:

- x is the variable
- a, b, and c are constants
- $a \neq 0$

Examples of Linear Equations:

- $2x + 3 = 9$
- $x - 5 = 10$
- $(\frac{1}{2})x + 4 = 6$

Properties of Linear Equations:

1. **Only one variable:**

A linear equation in one variable contains only one unknown (like x).

2. **Degree of the equation is 1:**

The power of the variable is always 1.

3. **Only one solution:**

Linear equations in one variable always have a unique solution.

4. **Operations on both sides are balanced:**

You can add, subtract, multiply, or divide both sides of the equation by the same number (except 0) without changing the solution.

5. **Graphically represents a straight line.**

Example 1

Solve:

$2x + 5 = 15$

Solution:

Step 1: Subtract 5 from both sides

$2x + 5 – 5 = 15 – 5$

$2x = 10$

Step 2: Divide both sides by 2

$x = \frac{10}{2}$

$x = 5$

Answer: x = 5

Example 2

Solve:

$(\frac{1}{3})\ x – 2 = 4$

Solution:

Step 1: Add 2 to both sides

$(\frac{1}{3})\ x = 4 + 2$

$(\frac{1}{3})\ x = 6$

Step 2: Multiply both sides by 3

$x = 6 \times 3$

$x = 18$

Answer: x = 18

Key Points to Remember:

- A linear equation has only one variable with power 1.
- The equation can be simplified using basic arithmetic operations.
- Always isolate the variable to find the solution.