Linear Equations Formulas (Beginner Guide)

This guide explains the most important linear equation formulas and how to use them. Linear equations are equations where the highest power of the variable is 1.

1) What is a Linear Equation?

A linear equation is an equation that makes a straight line when graphed. Examples: y = 2x + 3, 3x – 5 = 10, 4x + 2y = 8.

2) Common Linear Forms (Formulas)

- **Slope-intercept form:** y = mx + b (m = slope, b = y-intercept)
- **Point-slope form:** y – y■ = m(x – x■) (line through (x■, y■) with slope m)
- **Standard form:** Ax + By = C (A, B, C are numbers; A and B not both 0)
- **Two-point form (slope first):** m = (y■ – y■) / (x■ – x■) then use y = mx + b or point-slope

3) Slope Formula

Slope measures how steep a line is. It is the change in y divided by the change in x:

m = (y■ – y■) / (x■ – x■)

Positive slope rises left to right. Negative slope falls left to right. A slope of 0 is a horizontal line.

4) Writing a Linear Equation

If you know a point and the slope, use point-slope form:

y – y■ = m(x – x■)

Then you can simplify it into slope-intercept form y = mx + b if needed.

5) Finding the y-intercept

The y-intercept is where the line crosses the y-axis. In y = mx + b, the y-intercept is b.

In standard form Ax + By = C, you can find it by setting x = 0 and solving for y.

6) Solving Linear Equations (One Variable)

Goal: isolate the variable. Use inverse operations in reverse order of PEMDAS.

1. Combine like terms on each side (if needed).
2. Move variable terms to one side (add/subtract).
3. Move constant terms to the other side.
4. Divide or multiply to get the variable alone.
5. Check your answer by substituting back.

7) Solving Linear Equations (Two Variables)

These are usually written as Ax + By = C. Common methods include:

- **Substitution:** solve one equation for a variable, substitute into the other.
- **Elimination:** add/subtract equations to eliminate a variable.
- **Graphing:** graph both lines and find the intersection point.

8) Quick Facts

- Parallel lines have the same slope.
- Perpendicular lines have slopes that multiply to –1 (m■ · m■ = –1).
- A vertical line has equation x = constant (slope is undefined).
- A horizontal line has equation y = constant (slope is 0).

Practice Tip: If you get stuck, write what you know (points, slope, intercept) and choose the form that matches your information.