

Writing Equations – Quick Reference

Slope Intercept Form

$$y = mx + b$$

↑ ↑
Slope Y-intercept

If you know the **slope** (or rate) and the **y-intercept** (or constant), then you can easily write an equation in slope intercept form.

Example: If you have a **slope** of **3** and **y-intercept** of **-4**, the equation can be written as:

$$y = 3x - 4$$

↑ ↑
slope y-intercept

Writing Equations Given Slope and a Point

If you are given slope and a point, then you are given **m**, **x**, and **y** for the equation
 $y = mx + b$.

You must have **slope (m)** and the **y-intercept (b)** in order to write an equation.

Step 1: Substitute m, x, y into the equation and solve for b.

Step 2: Use m and b to write your equation in slope intercept form.

Example: Write an equation for the line that has a slope of 2 and passes through the point (3,1).

$$m = 2, \quad x = 3 \quad y = 1$$
$$y = mx + b$$
$$1 = 2(3) + b$$

Substitute for m, x, and y.

$$1 = 6 + b$$

Simplify ($2 \cdot 3 = 6$)

$$1 - 6 = 6 - 6 + b$$

Subtract 6 from both sides.

$$-5 = b$$

Simplify ($1 - 6 = -5$)

$$y = 2x - 5$$

Write your equation.

Writing an Equation Given Two Points

If you are given two points and asked to write an equation, you will have to find the slope and the y-intercept!

Step 1: Find the **slope** using: $\frac{y_2 - y_1}{x_2 - x_1}$

Step 2: Use the slope (from step 1) and **one** of the points to find the **y-intercept**.

Step 3: Write your equation using the **slope** (step 1) and **y-intercept** (step 2).

Example: Write an equation for the line that passes through (1,6) (3,-4).

Step 1: $\frac{-4 - 6}{3 - 1} = \frac{-10}{2} = -5$ **Slope = -5**

Step 2: $y = mx + b$ $m = -5$ (1,6)

$$y = mx + b$$

$$6 = -5(1) + b$$

$$6 = -5 + b$$

$$6 + 5 = -5 + 5 + b$$

$$11 = b$$

Simplify: $-5(1) = -5$.

Add 5 to BOTH sides.

Simplify ($6 + 5 = 11$).

Y-intercept = 11

Step 3: $y = -5x + 11$

Standard Form

$$Ax + By = C$$

The trick with standard form is that **A**, **B**, and **C** must be **integers** AND **A** must be a **positive integer**!

Examples:

$$-3x + 2y = 9$$

Incorrect! -3 must be positive (multiply all terms by -1)

$$3x - 2y = -9$$

Correct! A, B, & C are integers and A is a positive integer.