

# Writing Equations – Quick Reference

## Slope Intercept Form

$$y = mx + b$$

$\uparrow$              $\uparrow$   
 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:

$$y = 3x - 4$$

$\uparrow$              $\uparrow$   
 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•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)

$$y = mx + b$$

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

$$6 = -5 + b$$

Simplify: -5(1) = -5.

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

Add 5 to BOTH sides.

$$11 = b$$

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.