

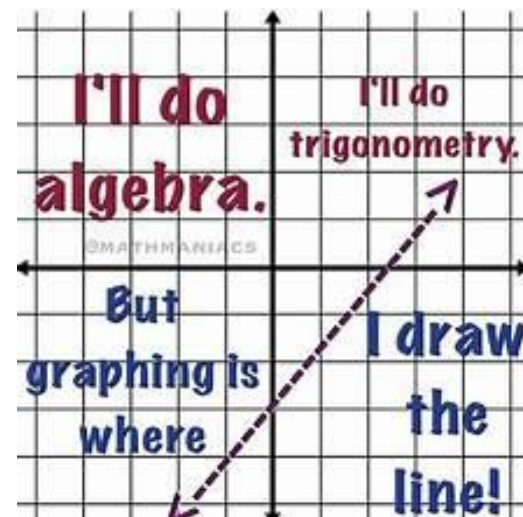
### Review of Lines:

The general form for the equation of a line is  $Ax + By = C$  where  $A$  and  $B$  aren't both zero. The graph of all the solution pairs of the equation form a line.

### Examples:

1.  $2x + 3y = 6$

2.  $4x - y = 8$



**3.**  $-2x + 4y = -10$

**4.**  $4y = 12$

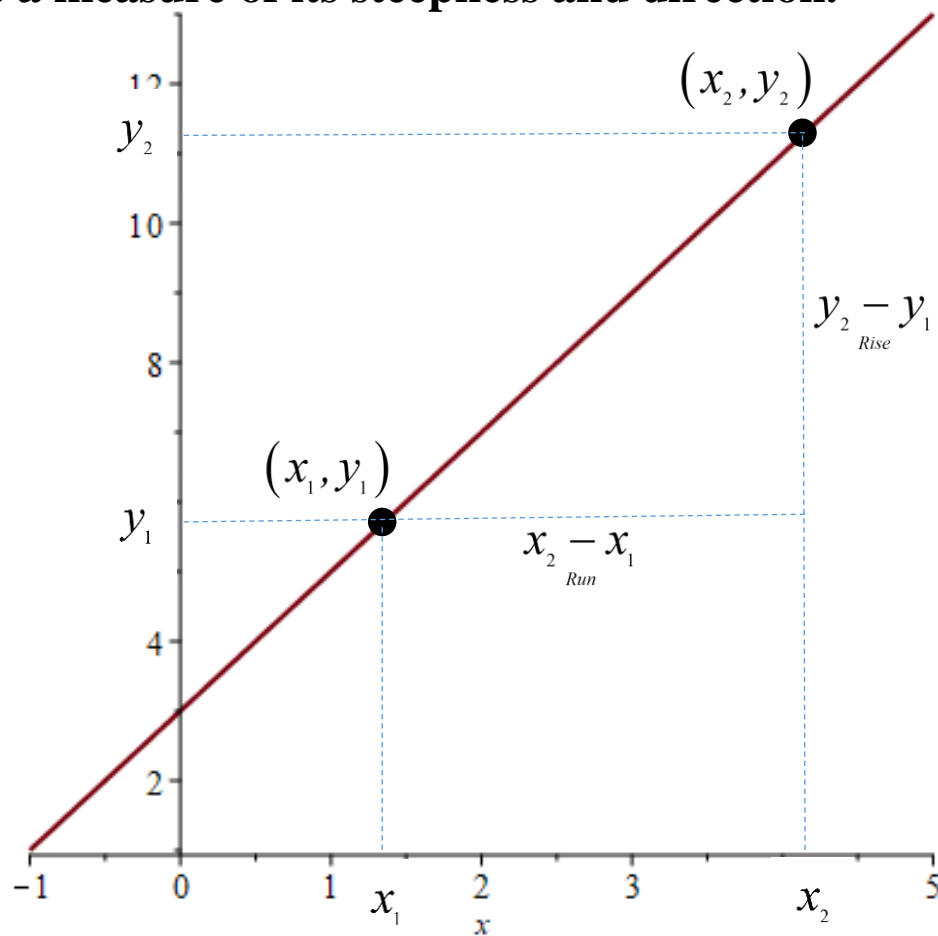
**5.**  $-3x = 24$

**6.**  $x - y = 0$

**7.**  $2x + y = 0$

## Slope:

The slope of a line is a measure of its steepness and direction.



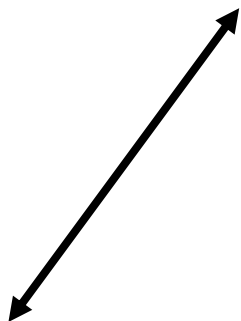
$$\text{slope} = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{Rise}}{\text{Run}}$$

SLOPE

You have to RISE  
before you  
can RUN!

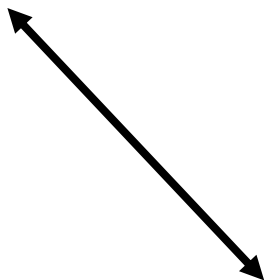


$m > 0$ :



**up to the right**

$m < 0$ :



**down to the right**

$m = 0$ :



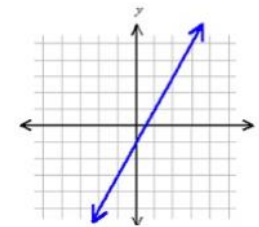
**horizontal**

$m$  undefined:

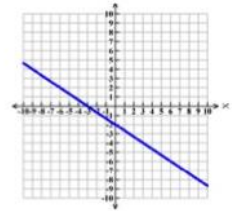


**vertical**

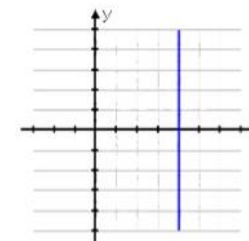
## Types of Slope



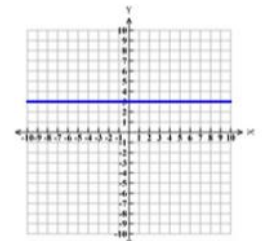
Positive Slope



Negative Slope



Undefined Slope



Zero Slope

**Finding Equations of Lines from their descriptions:**

**Point-Slope Form/Formula:**

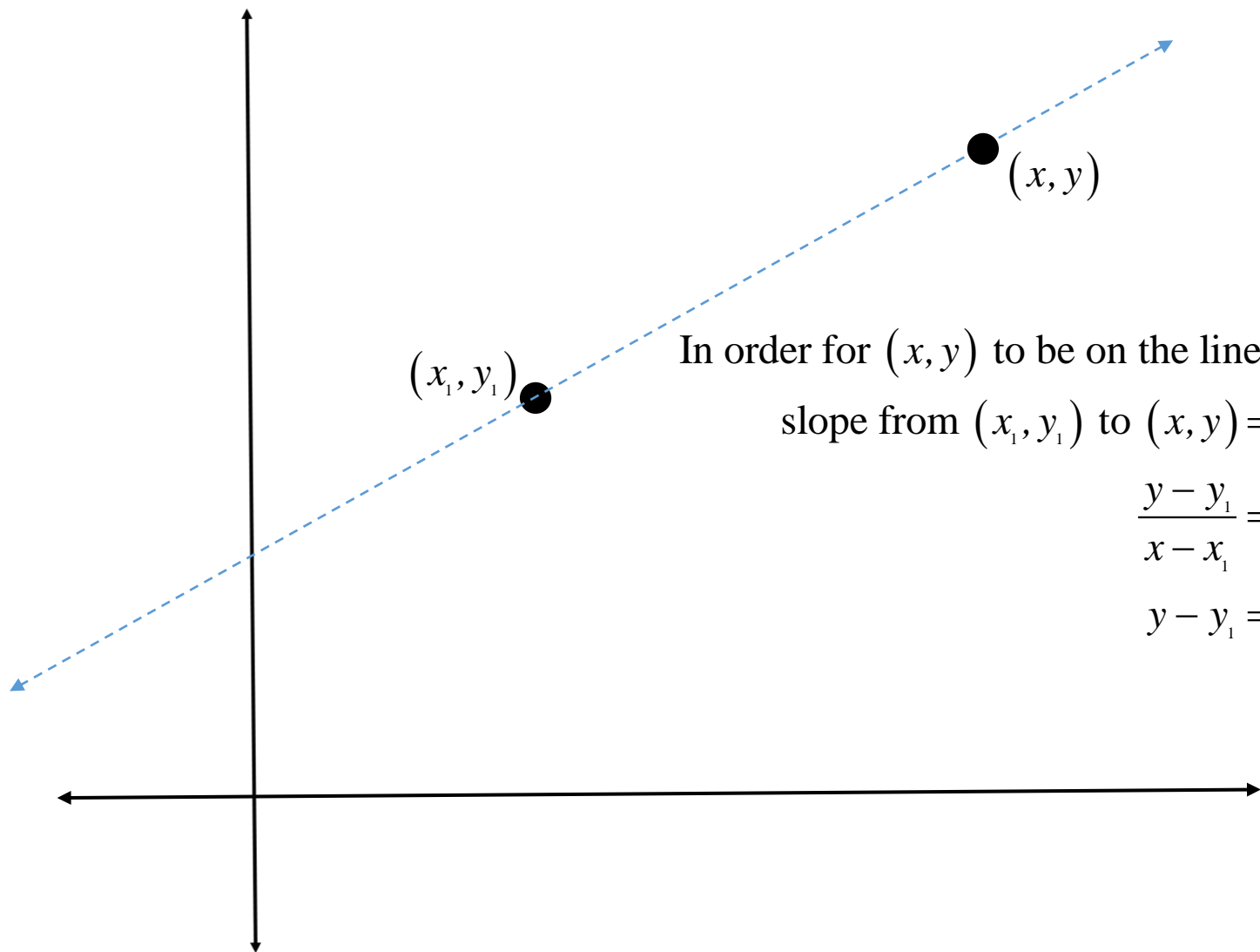
**You are given a point on the line,  $(x_1, y_1)$ , and the slope of the line,  $m$ .**

Point-Slope form

$$(y - y_1) = m(x - x_1)$$

$m$  = slope

$(x_1, y_1)$  = any point on the line



In order for  $(x, y)$  to be on the line:

slope from  $(x_1, y_1)$  to  $(x, y) = m$

$$\frac{y - y_1}{x - x_1} = m$$

$$y - y_1 = m(x - x_1)$$

**Examples:**

**1. Through  $(1, 2)$  with a slope of 3.**

**2. Through  $(1, -2)$  with a slope of  $\frac{1}{2}$ .**

**3. Through  $(-1, 0)$  with a slope of  $-\frac{2}{3}$ .**

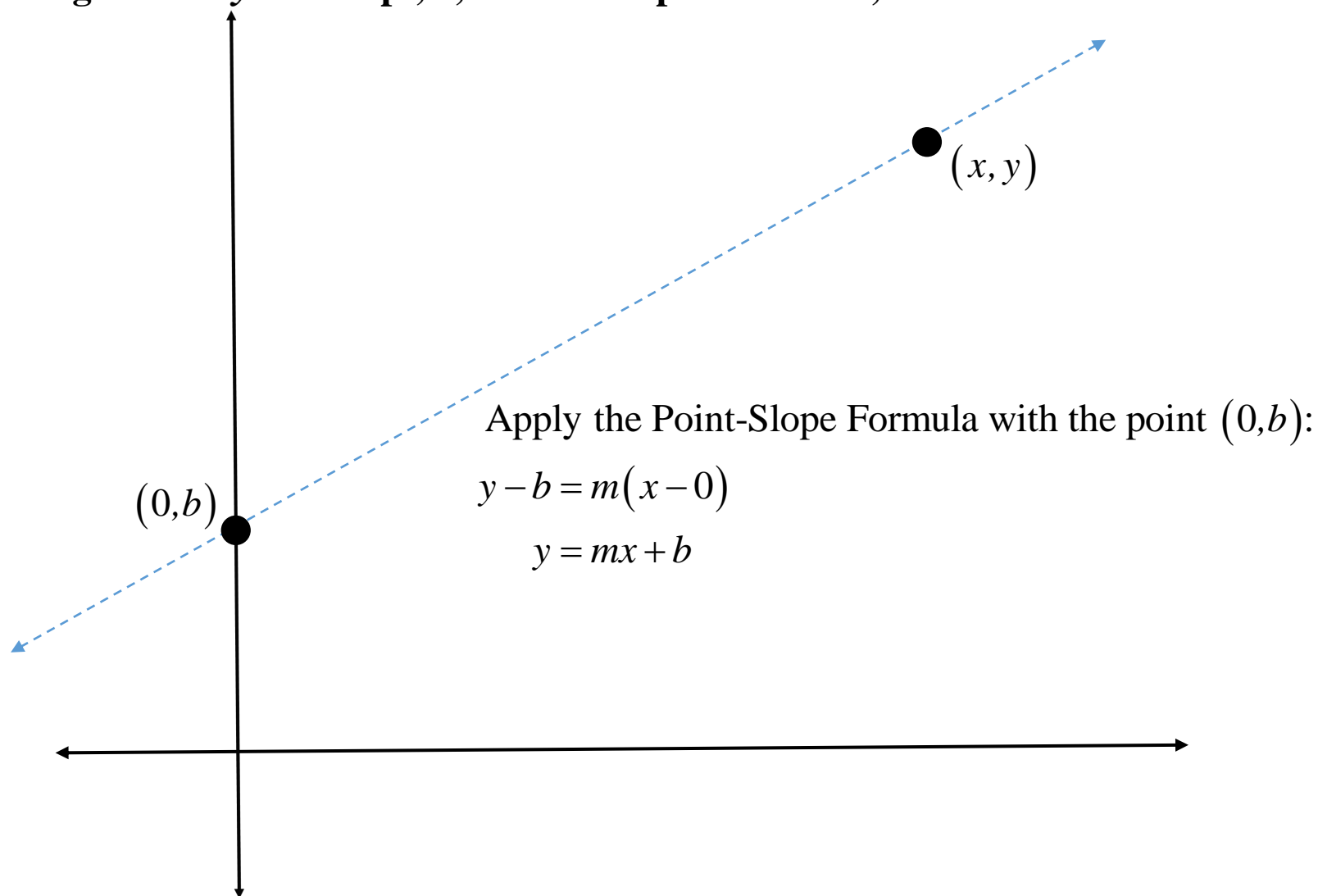
**4. Through  $\left(2, -\frac{1}{2}\right)$  with a slope of 0.**

**5. Through  $(5, -8)$  with undefined slope.**



**Slope-Intercept Form/Formula:**

**You are given the  $y$ -intercept,  $b$ , and the slope of the line,  $m$ .**



### Examples:

1. y-intercept of 2 with a slope of 3.

2. y-intercept of -3 with a slope of  $\frac{1}{2}$ .

3. y-intercept of 0 with a slope of  $-\frac{2}{3}$ .

4. y-intercept of  $\frac{1}{2}$  with a slope of 0.

The diagram shows the equation  $y = mx + b$  in a bold, black font. The variable  $m$  is colored blue, and the variable  $b$  is colored red. A blue curved arrow points from the word "slope" (written in blue) to the blue  $m$ . A red curved arrow points from the word "y-intercept" (written in red) to the red  $b$ .

$$y = mx + b$$

slope

y-intercept

**Determine the slope and y-intercept of the following lines.**

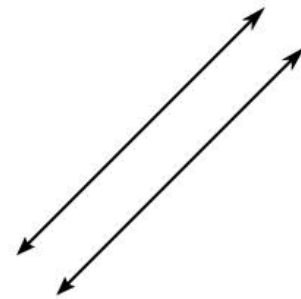
**1.**  $y = 2x + 3$

**2.**  $3y = 6$

**3.**  $9x + 3y = 6$

**4.**  $4x = -8$

Two lines are parallel if their slopes are the \_\_\_\_\_.

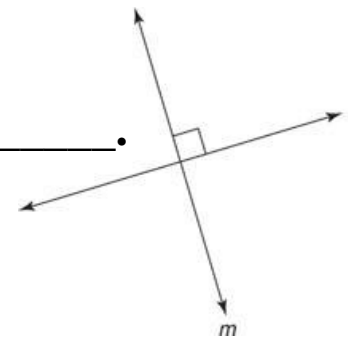


1. Find an equation of the line that passes through the point  $(1, -2)$  and is parallel to the line with equation  $y = -4x + 5$ .

2. Find an equation of the line that passes through the point  $(1, -2)$  and is parallel to the line with equation  $x = 5$ .

Parallel lines have  
got so much in  
common, it's a  
shame they'll  
never meet.

Two non-vertical lines are perpendicular if the product of their slopes is \_\_\_\_\_.



Every vertical line is perpendicular to every horizontal line.

1. Find an equation of the line that passes through the point  $(1, -2)$  and is perpendicular to the line with equation  $y = -4x + 5$ .

2. Find an equation of the line that passes through the point  $(1, -2)$  and is perpendicular to the line with equation  $x = 5$ .

