Math 9 – Analytic Geometry Name: _____

Lesson #2: Slope Intercept Form (part 2) -- Notes Date: _____

Learning Goal: We are learning to write the equation of a line without using a graph.

Recall that the slope intercept form is $y = mx + b$, where *m* is the slope of the line and *b* is the y-intercept. In today's lesson, we are going to focus on creating the equation of a line given various pieces of information.

For all the following examples, create $y = mx + b$. (x, y) are general points

1. $m = \frac{4}{3}$ and $b = -8$

$y = mx + b$

$y = \frac{4}{3}x - 8$

2. $m = -7$ and $(0,5)$ b! b=5

$y = -7x + 5$

3. $m = \frac{-3}{5}$ and $(10,6)$ (x, y)

$y = mx + b$ find b!

$6 = \left(\frac{-3}{5}\right)\left(\frac{10}{1}\right) + b$

$6 = -6 + b$

$+6 \quad +6$

$12 = b$

$y = \frac{-3}{5}x + 12$

4. $m = \frac{2}{7}$ and $(-2,3)$ (x, y)

$y = mx + b$

$3 = \left(\frac{2}{7}\right)\left(\frac{-2}{1}\right) + b$

$3 = \frac{-4}{7} + b$

$+\frac{4}{7} \quad +\frac{4}{7}$

$\times 7 \quad \times 7 \quad 3 + \frac{4}{7} = b$

$\frac{21}{7} + \frac{4}{7} = b$

$\frac{25}{7} = b$

$y = \frac{2}{7}x + \frac{25}{7}$

5. $(-3,3)$ and $(-2,5)$ (x_2, y_2)

Need: m! and b!

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{(5)-(3)}{(-2)-(-3)} = \frac{2}{1}$

$m = 2$

b? $y = mx + b$

$(5) = 2(-2) + b$

$5 = -4 + b$

$+4 \quad +4$

$9 = b$

$3 = 2(-3) + b$

$3 = -6 + b$

$9 = b$

$y = 2x + 9$!!

6. $(-4,5)$ and $(5,2)$

Need m! and b!

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{(2)-(5)}{(5)-(-4)} = \frac{-3}{9} = \frac{-1}{3}$

Find b, using $(5,2)$

$y = mx + b$

$2 = \left(\frac{-1}{3}\right)\left(\frac{5}{1}\right) + b$

$2 = \frac{-5}{3} + b$

$+\frac{5}{3} \quad +\frac{5}{3}$

$\times 3 \quad 2 + \frac{5}{3} = b$

$\times 3 \quad 1$

$\frac{6}{3} + \frac{5}{3} = b$

$\frac{11}{3} = b$

$y = \frac{-1}{3}x + \frac{11}{3}$

7. Create the equation of a line which has the same slope as $4x-5y=-5$ and has the same y-intercept as $3y+5x-9=0$.

① Start w/ slope

$4x-5y=-5$

$+5y \quad +5y$

$4x = -5+5y$

$+5 \quad +5$

$\frac{4x}{5}+\frac{5}{5} = \frac{5y}{5}$ → $\frac{4}{5}x+1=y$

$m=\frac{4}{5}$

② Get y-intercept

$3y+5x-9=0$

$-5x \quad +9 \quad -5x \quad +9$

$\frac{3y}{3} = \frac{-5x}{3}+\frac{9}{3}$

$y=-\frac{5}{3}x+3$

$b=3$

So,

$y=\frac{4}{5}x+3$

8. Create the equation of a line which has the same slope as $8-3y=7x$ and has the same y-intercept as $5x+2y=3$.

① Start w/ slope.

$8-3y=7x$

$+3y \quad -7x$

$-7x$

$-\frac{7x}{3}+\frac{8}{3} = \frac{3y}{3}$

$-\frac{7}{3}x+\frac{8}{3}=y$

$m=\frac{-7}{3}$

② Get "b"

$5x+2y=3$

$-5x \quad -5x$

$\frac{2y}{2} = \frac{-5x}{2}+\frac{3}{2}$

$y=-\frac{5}{2}x+\frac{3}{2}$

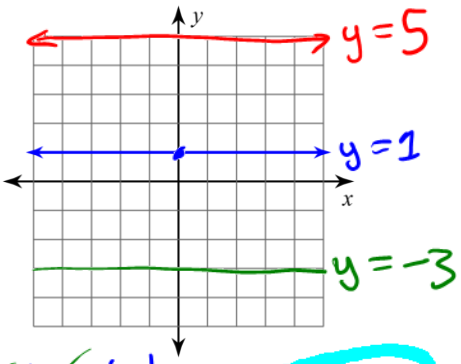
$b=\frac{3}{2}$

So,

$y=-\frac{7}{3}x+\frac{3}{2}$

Horizontal and Vertical Lines: Given the graph, determine the equation of the line:

a)



$m=0$

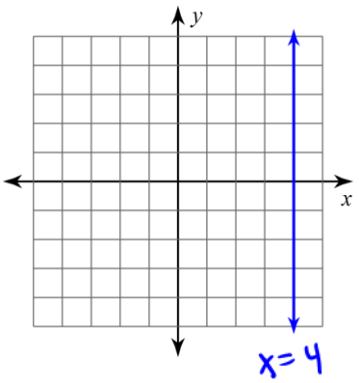
$b=1$

$y=0x+1$

$y=1$

Horizontal line is always $y=\#$

b)



$m=$ undefined

$b=$ no y-int!!

when $x=4$, $y=$ every possible #.

Vertical line is always $x=\#$

Success Criteria:

- I can write the equation of a line if I am given the slope and the y-intercept
- I can find the equation of a line if I am given two ordered pairs by first finding the slope, and then using one of those ordered pairs to find the y-intercept
- I can determine the equation of a vertical and horizontal line