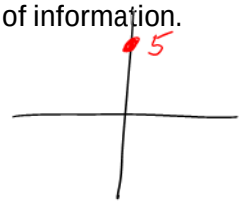
Math 9 – Analytic Geometry Name: _____

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 $y = mx + b$.



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

$y = mx + b$

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

2. $m = -7$ and $(0, 5)$ (5 is y-int, b)

$\therefore y = -7x + 5$

3. $m = \frac{-3}{5}$ and $(10, 6)$ (x, y) — We need the "b"

$y = mx + b$

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

$6 = -6 + b$

$+6 \quad +6$

$12 = b$

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

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

$y = mx + b$

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

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

$\frac{3}{1} + \frac{4}{7} = b$

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

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

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

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

$m = ?$ $b = ?$ m?

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

$y = mx + b$ use $(-2, 5)$

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

$5 = -4 + b$

$+4 \quad +4$

$9 = b$

$\therefore y = 2x + 9$

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

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

$y = mx + b$ Let's use $(5, 2)$

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

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

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

$\frac{6}{3} + \frac{5}{3} = b = \frac{11}{3}$

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

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

$y=mx+b$ — need the m — m — b — from this

① Get slope from:

$4x-5y=-5$

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

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

② Get "b" from:

$3y+5x-9=0$

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

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

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

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 Get slope from:

$8-3y=7x$

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

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

② Get "b" from:

$5x+2y=3$

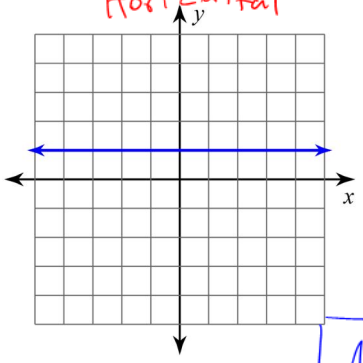
$\frac{2y}{2}=-\frac{5x}{2}+\frac{3}{2}$

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

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

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

a) Horizontal



$m=0$

$b=1$

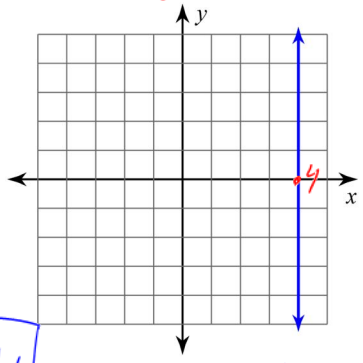
$y=mx+b$

$y=0x+1$

$y=1$

All horizontal lines are $y=b$

b) vertical Line



$m=$ undefined

$b=$ none.

???

$x=4$

All vertical lines are $x=$ "x-intercept"

★ Must memorize ★

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