

Name: _____

Date: Nov 12

Hour: Alg 1

Unit 3b Day 15: Writing Equations of Lines Given m and a solution

Focus Question: How do I write the equation of the line when it is not given to me?

point on the line

A. The Basics

Given each slope and y intercept, write the equation of the line in slope intercept form.

1. $m = 5$ and y intercept is $(0, -2)$

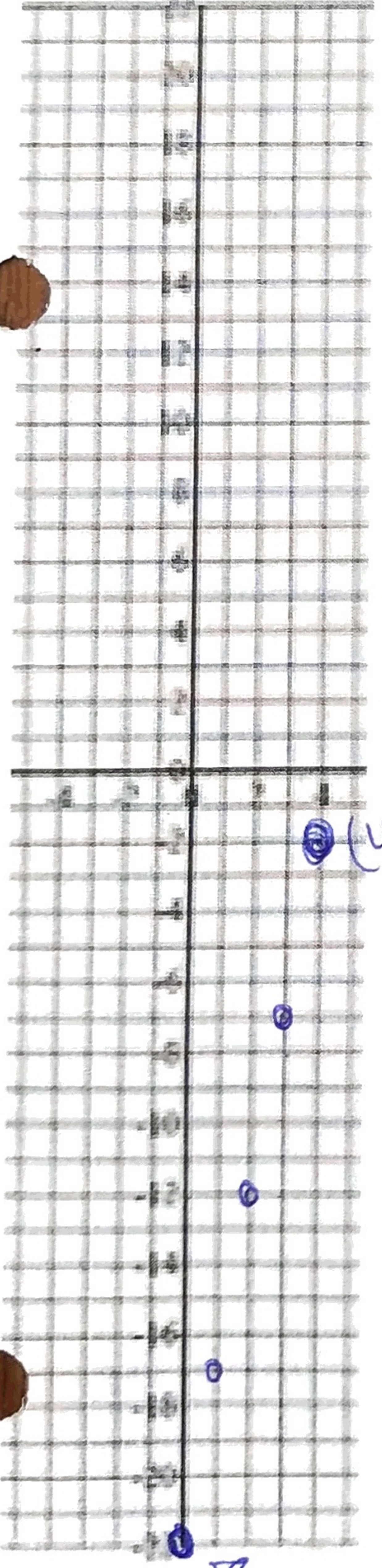
2. $m = -1/2$ and y intercept is $(0, 3)$

$y = 5x - 2$
or $f(x) = 5x - 2$

$y = -\frac{1}{2}x + 3$
 $f(x) = -\frac{1}{2}x + 3$

B. Tougher Ones: The two problems above were easy because slope intercept form requires two things, the slope and the y intercept, both of which you were given above. Most of the time, you are simply given a solution (or point on the line) rather than the y intercept. In this case you must find the y-intercept yourself.

1. Using any method you want (we know graphs, tables, and input/outputs), find the equation of a line with a slope of 5 and a solution of $(4, -2)$. Show your work below. You don't have to use all three methods, just pick the one you are comfortable with.



$m = 5$
up 5
right 1
OR
down 5
left 1

X	Y
0	-22
1	-17
2	-12
3	-7
4	-2

+1

+5

$y = mx + b$ or $f(x) = mx + b$

$-2 = 5(4) + b$

$-2 = 20 + b$

$-20 - 20$

$-22 = b$

$f(x) = 5x - 22$

$b = -22$

C. The mathematician's way

Remember that a solution is an (x, y) ordered pair that makes the equation true.

Therefore we can simply substitute x and y into the slope-intercept equation and solve for b (the y -intercept). So good job if you chose the Input/Output Method!

Find the equation of each line described below.

1. A line with slope of 3 and solution $(-2, 6)$

$$f(x) = 3x + 12$$

$$\begin{aligned} y &= mx + b \\ 6 &= 3(-2) + b \\ 6 &= -6 + b \\ +6 \quad +6 & \\ \hline 12 &= b \end{aligned}$$

2. A line with $m = -\frac{2}{3}$ that contains the point $(6, -5)$

$$f(x) = -\frac{2}{3}x - 1$$

$$\begin{aligned} y &= mx + b \\ -5 &= -\frac{2}{3}(6) + b \\ -5 &= -4 + b \\ +4 \quad +4 & \\ \hline -1 &= b \end{aligned}$$

3. $m = -2$ through the point $(-1, 7)$

$$f(x) = -2x + 5$$

$$\begin{aligned} y &= mx + b \\ 7 &= -2(-1) + b \\ 7 &= 2 + b \\ -2 \quad -2 & \\ \hline 5 &= b \end{aligned}$$

4. The line has a slope of $\frac{4}{5}$ and goes through the point $(-2, 8)$

$$f(x) = \frac{4}{5}x + \frac{48}{5}$$

$$\begin{aligned} y &= mx + b \\ 8 &= \frac{4}{5}(-2) + b \\ 8 &= -\frac{8}{5} + b \\ +\frac{8}{5} \quad +\frac{8}{5} & \\ \hline \frac{48}{5} &= b \end{aligned}$$

$\frac{8}{1} = \frac{8}{1} \cdot \frac{5}{5} = \frac{40}{5}$
 $\frac{40}{5} + \frac{8}{5} = \frac{48}{5}$