Math 9 – Analytic Geometry

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Lesson #2: Slope Intercept Form (part 2)

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

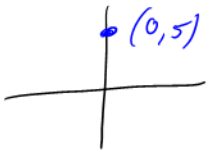
Recall that the slope intercept form is $y = mx + b$, where *m* is the slope of the line and *b* is the y-intercept. In today's lesson, we are going to focus on creating the equation of a line given various pieces of information.

For all the following examples, create $y = mx + b$.

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

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

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



$y = -7x + 5$

$\frac{3}{1} \Rightarrow \frac{21}{7}$

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

$y = mx + b$

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

$+6 \quad +6$

$6 = -6 + b$

$12 = b$

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

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

$y = mx + b$

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

$\frac{3}{1} = -\frac{4}{7} + b \quad (+\frac{4}{7})$

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

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

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

5. $(-3,3)$ 1st and $(-2,5)$ 2nd

First Find Slope

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{5-3}{-2-(-3)}$

$m = \frac{2}{1} = 2$

Next, find y-int using $(-2,5)$

$y = mx + b$

$5 = 2(-2) + b$

$5 = -4 + b$

$9 = b$

$\therefore y = 2x + 9$

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

① calculate m

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{2-5}{5-(-4)}$

$m = \frac{-3}{9}$

$m = -\frac{1}{3}$

② calculate b, y-int using $(5,2)$

$y = mx + b$

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

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

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

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

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

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

$y=mx+b$ — m — b

① Slope from: $4x-5y=-5$

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

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

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

② y-int from: $3y+5x-9=0$

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

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

$b=3$

③ $y=mx+b$

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

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 Slope from: $8-3y=7x$

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

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

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

② y-int from: $5x+2y=3$

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

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

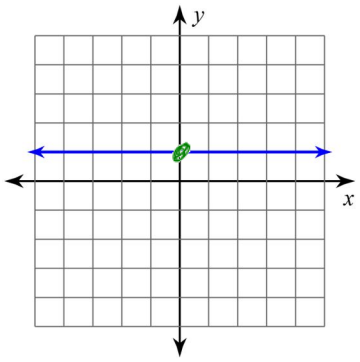
$b=\frac{3}{2}$

③ $y=mx+b$

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

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

a)

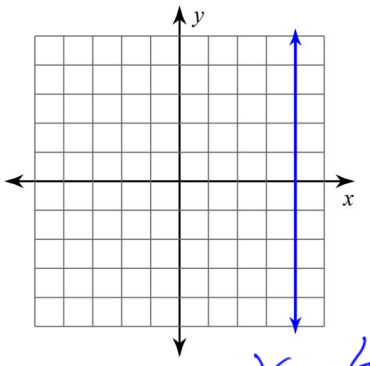


$m=0$ $b=1$

$y=0x+1$

$\rightarrow y=1$

b)



$m=$ undefined

$b=$ none

$x=4$, that's it.

Horizontal lines are $y=\#$

Vertical lines are $x=\#$

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