MTH1W – Analytic Geometry Name: _____

Lesson 7.2: Creating Equations of Lines Date: Dec 2, 2025

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.

Here are the steps:

1. Are you given slope? If yes, move to step 3. If no, do step 2.
2. Calculate the slope using the slope formula.
3. Do you have the y-intercept, meaning ***b*** or **(0,#)**? If yes, insert the **m** and **b** into $y = mx + b$ then done! If no, next step.
4. Pick a point, labeling it (x_1, y_1), then insert the slope (m) and that point into the *Point-Slope Form*, $y - y_1 = m(x - x_1)$. You will then need to work it from there, but I will show you.

P(x, y) ← m-SLOPE

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

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

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

2. $m = 5$ and $(-2, 3)$ (x, y)

$y = mx + b$

$3 = 5(-2) + b$

$3 = -10 + b$

$3 + 10 = b$

$13 = b$

$\therefore y = 5x + 13$

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

$y = mx + b$

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

$6 = -\frac{30}{5} + b$

$6 = -6 + b$

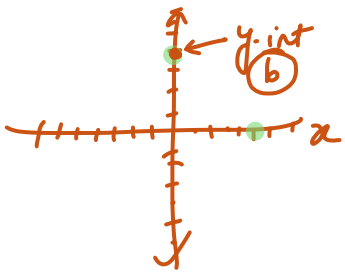
$6 + 6 = b$

$12 = b$

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

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

$\therefore y = -7x + 5$



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

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

$m = \frac{\Delta y}{\Delta x} = \frac{2}{1} = 2$

$y = mx + b$

$3 = 2(-3) + b$

$3 = -6 + b$

$3 + 6 = b$

$b = 9$

$y = 2x + 9$

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

$\Delta x = 9$, $\Delta y = -3$

$m = \frac{\Delta y}{\Delta x} = \frac{-3}{9} = -\frac{1}{3}$

$y = mx + b$

$5 = -\frac{1}{3}(-4) + b$

$5 - \frac{4}{3} = b$

$\frac{15-4}{3} = b$

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

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

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

$3y + 5x - 9 = 0$

$3y = -5x + 9$

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

b

$y = mx + b$

$4x - 5y = -5$

m

$-5y = -4x - 5$

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

$\therefore$ REQUIRED EQUATION

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

8. Create the equation of a line which has the same slope as $8 - 3y = 7x$ and passes through the point $(4,-5)$.

$x \; y$

$8 - 3y = 7x$

m

$-3y = 7x - 8$

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

m

$y = mx + b$

$-5 = -\frac{7}{3}(4) + b$

$-5 = -\frac{28}{3} + b$

$b = -5 + \frac{28}{3} = -\frac{15}{3} + \frac{28}{3} = \frac{13}{3}$

$\therefore$ EQUATION:

$y = -\frac{7}{3}x + \frac{13}{3}$

Success Criteria:

- I can write the equation of a line if I am given the slope and the y-intercept
- I can use the point-slope form to create the equation of a line.