Geometry R – Mrs. Cowen
Unit 2A – Day 2 Notes v2

Name_____
Date_____

Finding Slope & Equations of Lines

The Slope Formula - If Segment AB has endpoints A(x_1, y_1) and B(x_2, y_2) then the slope of segment AB is

m = slope

The slope of $\overline{AB}$ → $$m_{\overline{AB}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$$

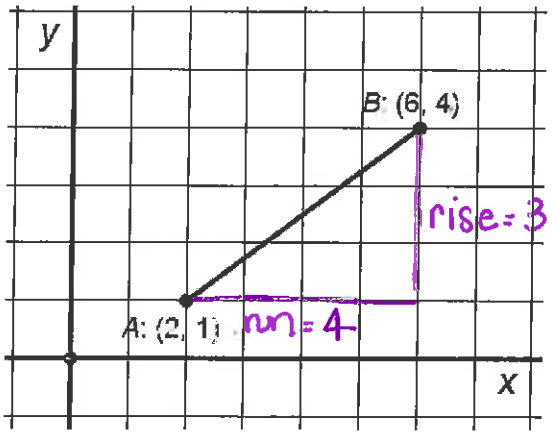
---

1. Use the **Slope Formula** to find the slope of $\overline{AB}$.

$m_{\overline{AB}} = \frac{\text{rise}}{\text{run}} = \frac{3}{4}$

OR

$m_{\overline{AB}} = \frac{4-1}{6-2} = \frac{3}{4}$



Equations of Lines

There are a variety of ways to represent the equation of a line – we will look at 2 common forms:

- **"Slope – Intercept"**
- **"Point – Slope"**

Slope – Intercept Form of a Line: $y = mx + b$

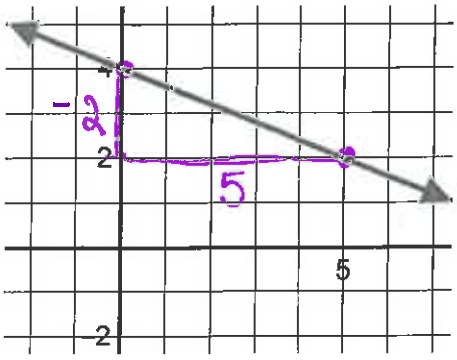
2. Explain what the letters m and b represent in the slope-intercept equation?

m = slope

b = y-intercept – where the line crosses the y-axis.

3. Identify the slope and the y-intercept for each line and use them to write the equation of the line in **Slope-Intercept** form.

a.



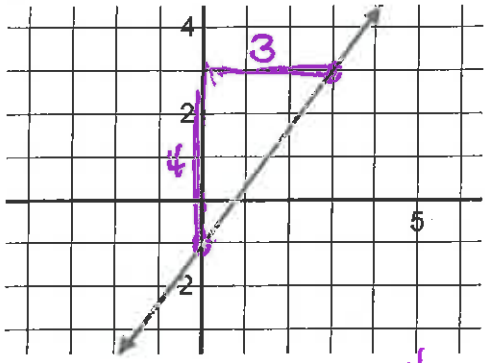
y-int = (0,4)

$m = \frac{-2}{5}$

$b = 4$

$y = \frac{-2}{5}x + 4$

b.



yint (0,-1) $m = \frac{4}{3}$

$b = -1$

$y = \frac{4}{3}x - 1$

4 3. Does the line in part 3 b pass through the point (10, 11)? Justify your conclusion.

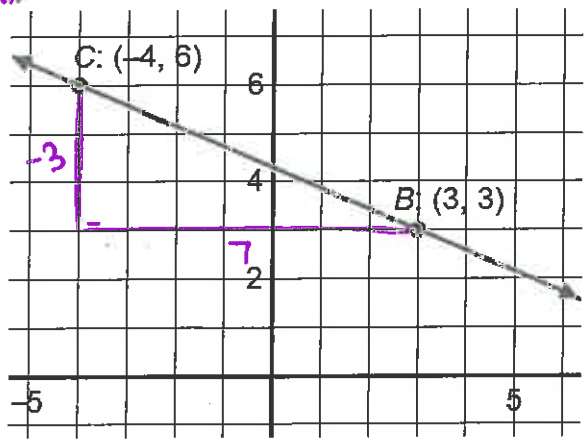
$y = \frac{4}{3}x - 1$

$11 = \frac{4}{3}(10) - 1$

$11 \neq 12.3$

(10,11) does not pass through $y = \frac{4}{3}x - 1$. When you put (10,11) into $y = \frac{4}{3}x - 1$ both sides of the eqn are not equal.

5 4.



a. Determine an equation for line CB (*if possible*).

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

b = not easily found by graph.

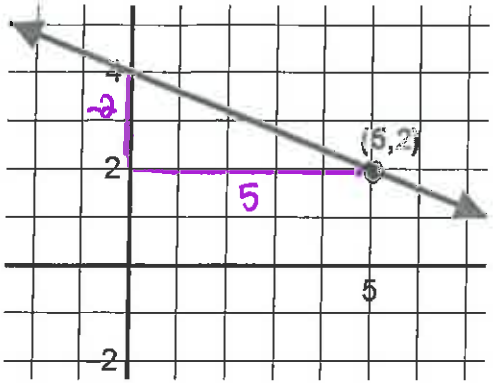
b. Describe the difficulties you experienced in trying to find the equation of this line using **Slope-Intercept** form.

In example 4, "Slope – Intercept" was difficult to use because the y-intercept was not easily found. "Point – Slope" form of a line easily overcomes this difficulty.

Point – Slope Form of a Line: $y - y_1 = m(x - x_1)$ *

where (x_1, y_1) is **any point** on the line.

5.



a. Use **point-slope** form and the indicated point to write the equation of the line:

point $(5, 2)$ (x_1, y_1)

$m = -\frac{2}{5}$

$y - y_1 = m(x - x_1)$

$y - 2 = -\frac{2}{5}(x - 5)$ ← answer.

b. Is this equation **equivalent** to the equation that you wrote in part 2a? Justify your conclusion.

$y - 2 = -\frac{2}{5}(x - 5)$

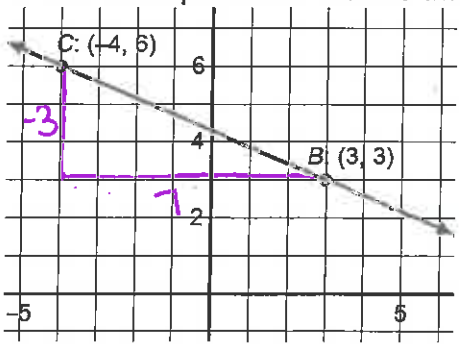
$y - 2 = -\frac{2}{5}x + 2$

$+2 \qquad +2$

$y = -\frac{2}{5}x + 4$

when I solved the eqn for y I got the same equation as 2a (3a)

6. Find the equation of the line through the points C(-4, 6) and B(3, 3).



point $(-4, 6)$

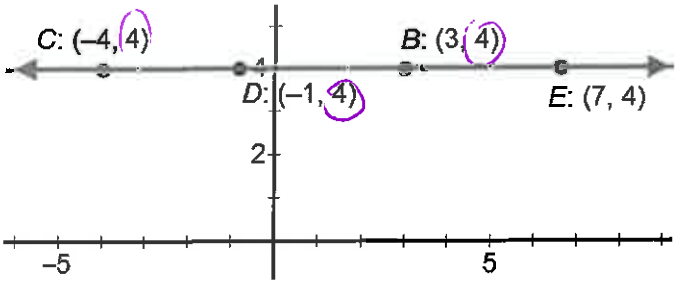
$m = -\frac{3}{7}$

$y - 6 = -\frac{3}{7}(x - -4)$

$y - 6 = -\frac{3}{7}(x + 4)$ ans.

Horizontal & Vertical Lines:

8.



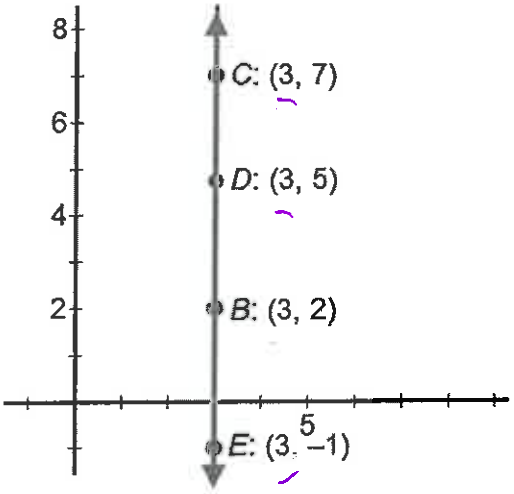
a. What is the slope of this **Horizontal line**?

zero.

b. Since every point on this horizontal line has a y-coordinate of 4, the equation is given as y = 4. Suppose you want the equation of a horizontal line through the point (-5,8). What would it be?

y=8

9.



a. What is the slope of this **Vertical line**?

NO slope or undefined

b. Why can neither Slope-Intercept nor Point-Slope be used to write the equation of a vertical line?

does not pass through y-axis and there is nor slope

c. Since all the points on this vertical line have an x-coordinate of 3, the equation of the line is given as x = 3. Suppose you want the equation of a vertical line through the point (-5, 8). What would it be?

x= -5