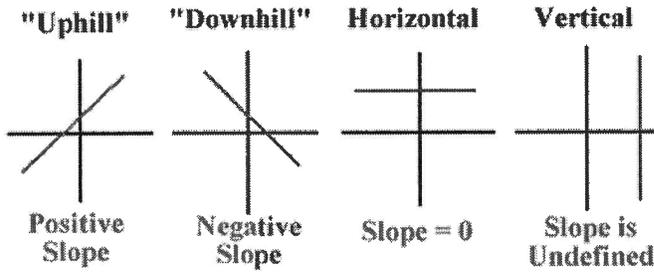


30 - 6.5 Slope



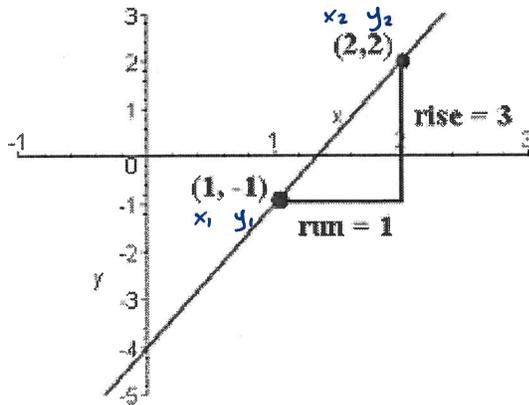
Part 1 - Slope Equations

$$\text{slope} = \frac{\text{vertical change}}{\text{horizontal change}}$$

$$m = \frac{\text{rise}}{\text{run}}$$

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

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

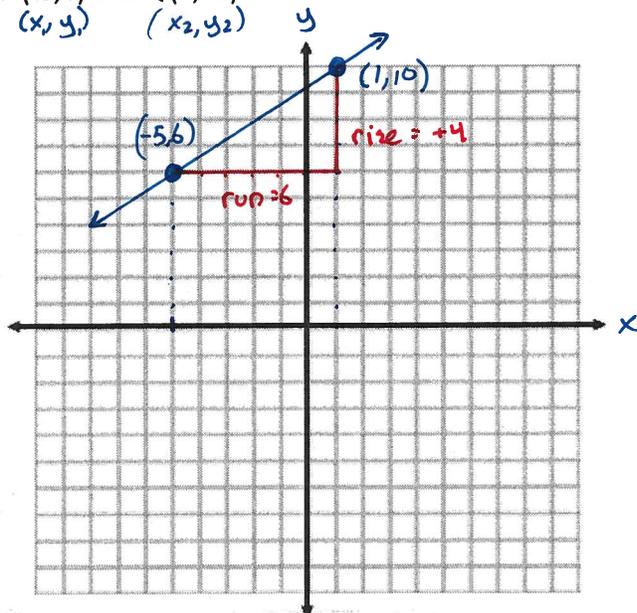


$$m = \frac{\text{rise}}{\text{run}} = \frac{3}{1} = 3$$

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

Q1: What is the slope of the following ordered pairs?

P (-5,6) and Q (1,10)
 (x_1, y_1) (x_2, y_2)

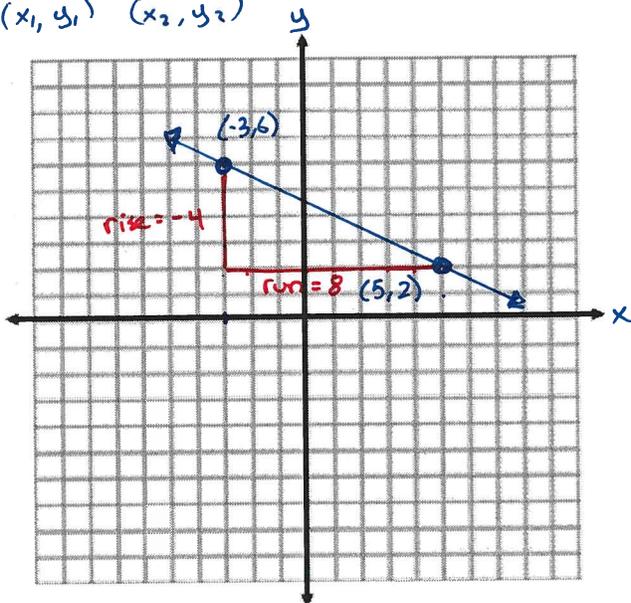


$$m = \frac{\text{rise}}{\text{run}} = \frac{4}{6} = \frac{2}{3}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - 6}{1 - (-5)} = \frac{4}{6} = \frac{2}{3}$$

Q2: What is the slope of the following ordered pairs?

S (-3,6) and T (5,2)
 (x_1, y_1) (x_2, y_2)

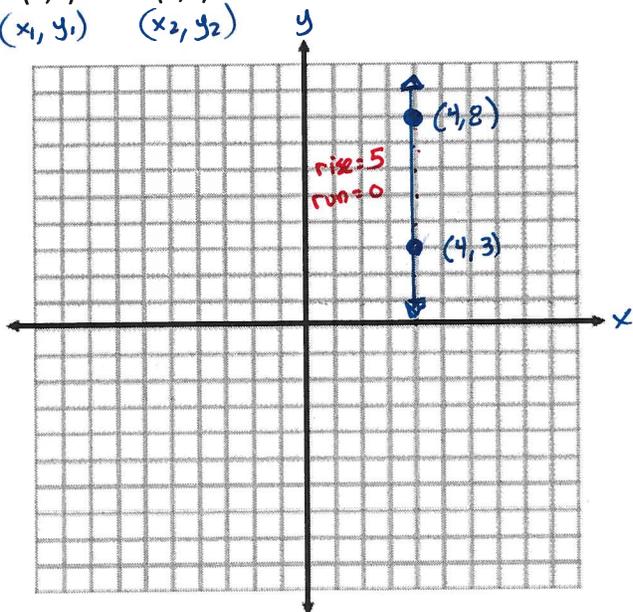


$$m = \frac{\text{rise}}{\text{run}} = \frac{-4}{8} = -\frac{1}{2}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 6}{5 - (-3)} = \frac{-4}{8} = -\frac{1}{2}$$

Q3: What is the slope of the following ordered pairs?

H (4,3) and T (4,8)
 (x_1, y_1) (x_2, y_2)



$$m = \frac{\text{rise}}{\text{run}} = \frac{5}{0} = \text{undefined}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 3}{4 - 4} = \frac{5}{0} = \text{undefined.}$$

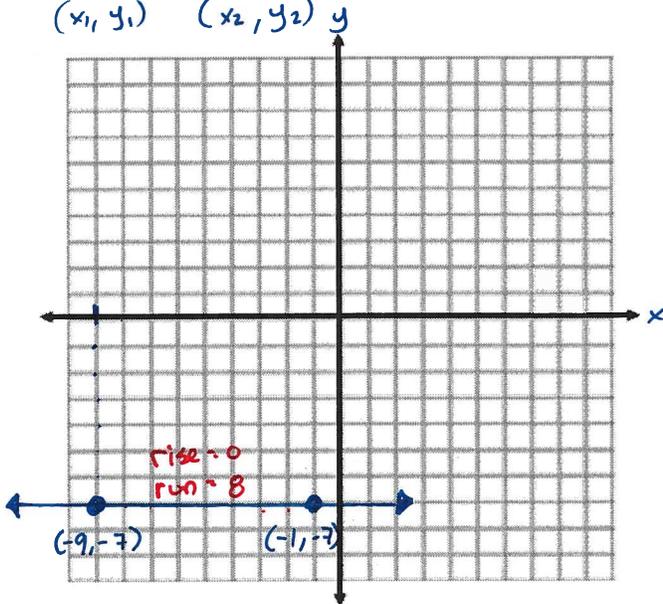
The slope is undefined.

Also, this isn't a function (fails vertical line test).

Q4: What is the slope of the following ordered pairs?

M (-9,-7) and N (-1,-7)

(x_1, y_1) (x_2, y_2)



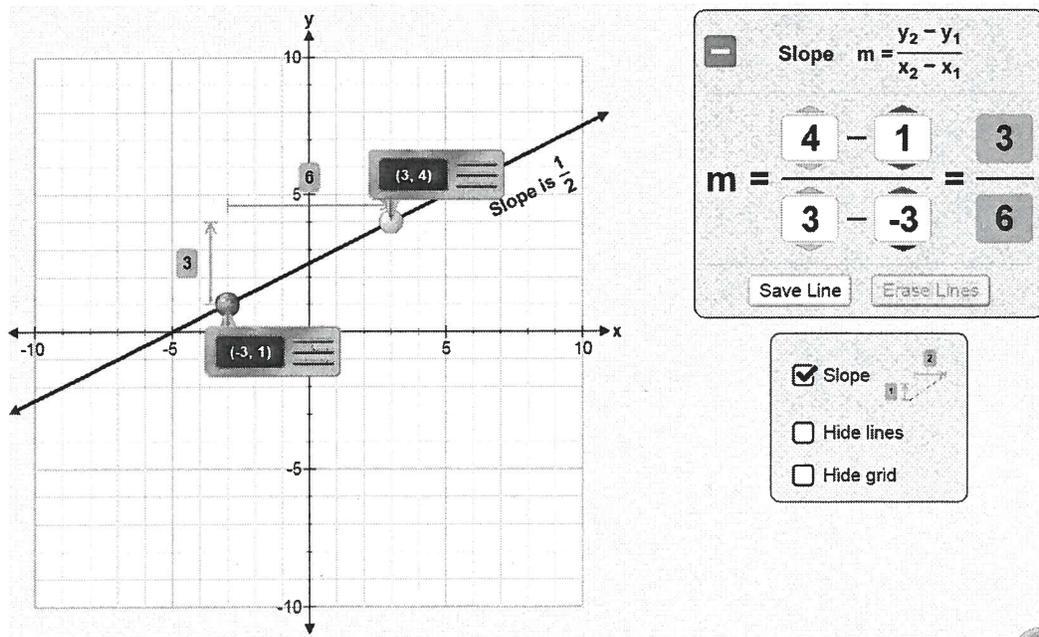
$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{0}{8} = \emptyset$$

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7 - (-7)}{-1 - (-9)} = \frac{0}{8} = \emptyset$$

Part 2 – Colorado PhET Simulation

Colorado PhET – “Graphing Lines”

https://phet.colorado.edu/sims/html/graphing-lines/latest/graphing-lines_en.html



Note that we will be spending an entire day using this simulation in Lesson 40.

Using slope-y-intercept,
slope-point forms.



Part 3 – Graphing a Line using a Point and the Slope

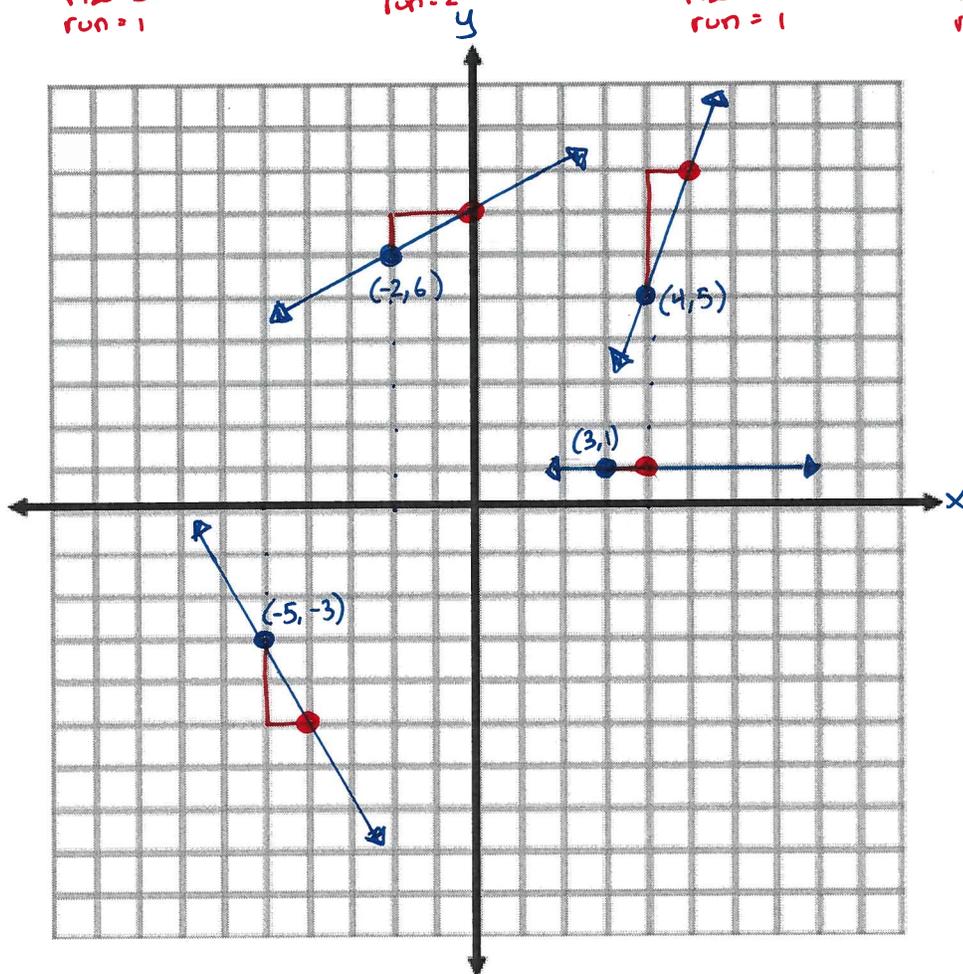
Q5: Graph each line, given a point on the line and its slope.

$(4, 5), m = \frac{3}{1}$
 ①
 rise = 3
 run = 1

$(-2, 6), m = \frac{1}{2}$
 ②
 rise = 1
 run = 2

$(-5, -3), m = -\frac{2}{1}$
 ③
 rise = -2
 run = 1

$(3, 1), m = \frac{0}{1}$
 ④
 rise = 0
 run = 1



Part 4 – Algebra

Q6: The line segment joining each pair of points has the given slope. Determine each value of k .

$(3, k)$ and $(4, 7), m = 4$
 $(x_1, y_1) \quad (x_2, y_2)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} \rightarrow 4 = \frac{7 - k}{4 - 3}$$

$$4 = \frac{7 - k}{1} \rightarrow 4 = 7 - k$$

$$-3 = -k \rightarrow \boxed{k = 3}$$

$(-1, -2)$ and $(k, k + 1), m = \frac{1}{3}$
 $(x_1, y_1) \quad (x_2, y_2)$

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

$$\frac{1}{3} = \frac{(k + 3)}{(k + 1)} = 1(k + 1) = 3(k + 3)$$

$$k + 1 = 3k + 9$$

$$-8 = 2k$$

$$\boxed{k = -4}$$

Part 5 – Word Problems
Strategy:

- Write down the statement: $\frac{\text{_____}}{f(x)}$ depends on $\frac{\text{_____}}{x}$.
- Build a table.
- Use your Slope Equation.

Q7: The world population increased from 5.76 billion in 1996 to 6.37 billion in 2006. Determine the rate of change in the world's population.

Population depends on time
 $f(x)$ x

x	$f(x)$ or y
1996	5.76 b
2006	6.37 b

$$\Rightarrow \begin{array}{l} (x, y) \\ (1996, 5.76b) \\ x_1 \quad y_1 \\ (2006, 6.37b) \\ x_2 \quad y_2 \end{array}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6.37b - 5.76b}{2006 - 1996}$$

$$m = \frac{0.61b}{10} = \underline{0.061 \text{ billion per year}}$$

(Would have also accepted 61 million per year).

Q8: A carpenter makes cabinets for a construction company and must meet a daily quota. The manager checks his inventory after 4 days and finds that there are 56 cabinets. After 9 days, the same carpenter has made 126 cabinets. Calculate the rate of change.

Cabinets depend on days
 $f(x)$ x

x	$f(x)$ or y
4	56
9	126

$$\Rightarrow \begin{array}{l} (x, y) \\ (4, 56) \\ x_1 \quad y_1 \\ (9, 126) \\ x_2 \quad y_2 \end{array}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{126 - 56}{9 - 4} = \frac{70}{5} = \underline{14 \text{ cabinets per day}}$$

Part 6 – Textbook Practice