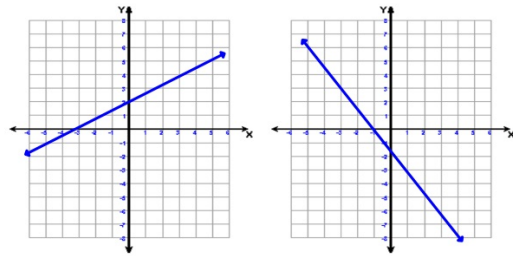


Lesson 4.2 Slope of a Line

Learning Targets:

- Find the slope of a line
 - * from a **graph**
 - * from a **table**

x	1	4	7	10
y	8	6	4	2



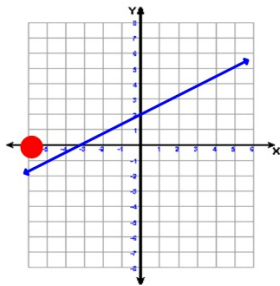
- Graph a line given a point and a slope

$$(x, y) \quad m = 1/2$$

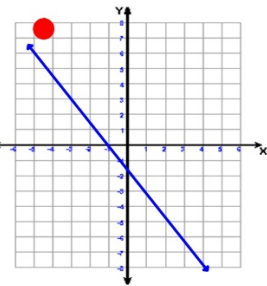
Slope:

"m"

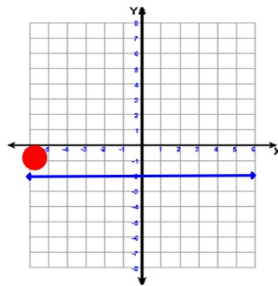
The slope of a line describes the "tilt" of the line.



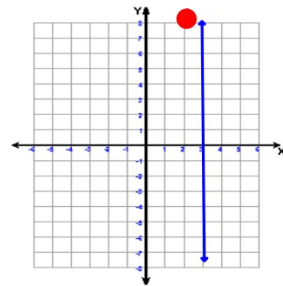
positive
"Up"



negative
"down"



zero
"boring"



undefined
"Unwanted!!!"



(read the line from left to right)



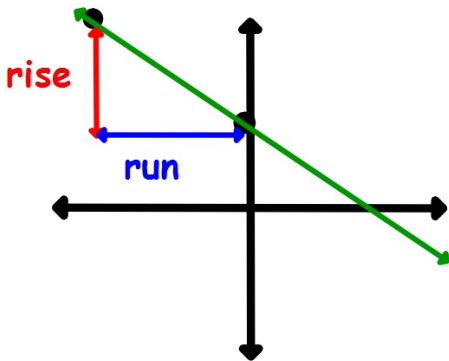
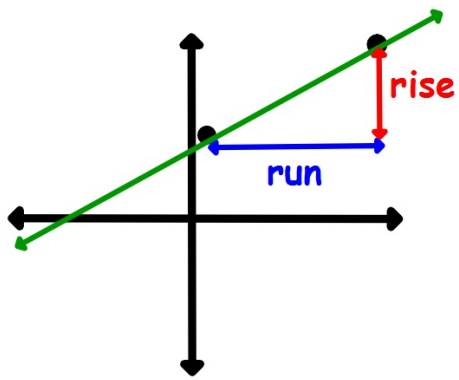
Slope: "m"

Mathematically: The slope "m" of a line is
The change in y (the rise) over the change in x (the run)

$$y = mx + b$$

↑
slope

$$m = \frac{\text{Rise}}{\text{Run}}$$



$$m = \frac{\text{Rise}}{\text{Run}}$$

Labeling Points with Subscript

(x, y)

(x_1, y_1) "x sub 1, y sub 1"

(X_1, Y_1)

x^2 exponents are written with superscript

Slope: "m"

Given Two Points (x_1, y_1) (x_2, y_2)

$$\frac{\Delta \text{ in } y}{\Delta \text{ in } x}$$

Change in values of y
Change in values of x

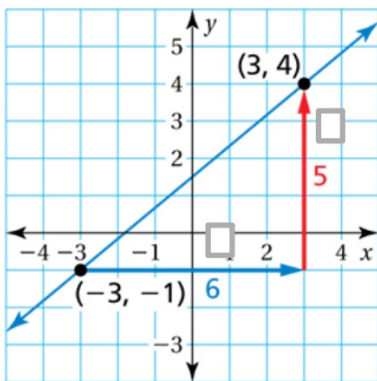
$$= \frac{y_2 - y_1}{x_2 - x_1}$$

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

This is a formula
you MUST memorize!

Describe the slope of the line. Then find the slope.

a.



The slope is Positive

Use two points to find the value of the slope. (rise over run)

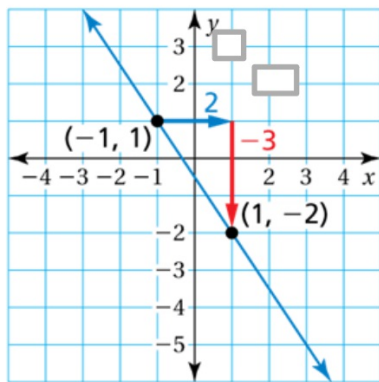
$$\begin{array}{cc} \text{pt 1} & \text{pt 2} \\ (-3, -1) & \text{and } (3, 4) \\ x_1 \quad y_1 & x_2 \quad y_2 \end{array}$$

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

Talk and Turn: With your partner,

Describe the slope of the line. Then find the slope.

b.



The slope is negative

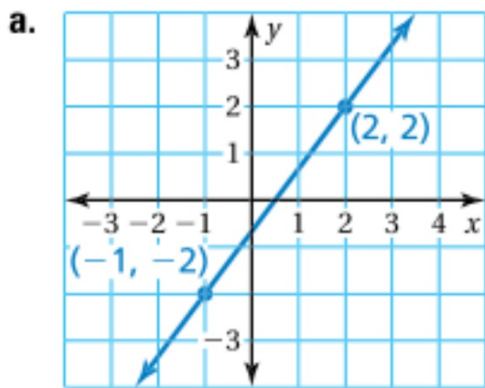
Use two points to find the value of the slope (rise over run)

$$\begin{array}{cc} (-1, 1) & (1, -2) \\ x_1, y_1 & x_2, y_2 \end{array}$$

$$\frac{-3}{2}$$

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

Describe the slope, then Find the slope of the line



Graph #1

Pt 1 (2, 2) Pt 2 (-1, -2)

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

$$\frac{-4}{-3}$$

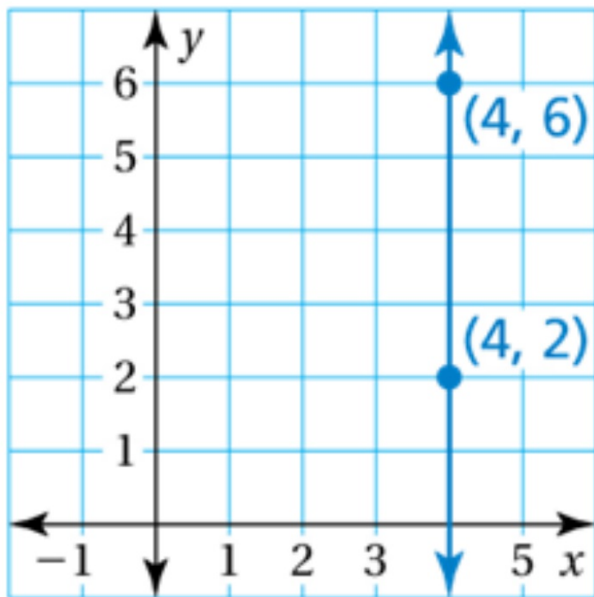
same thing

Graph 2

Pt 1 (-1, -2) Pt 2 (2, 2)

$$\frac{4}{3}$$

Describe the slope, then find the slope of the line



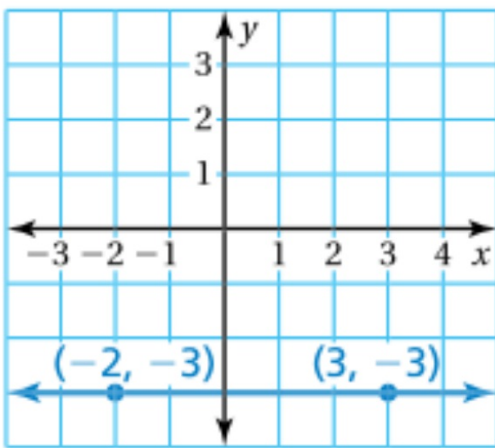
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\begin{array}{cc} (4, 2) & (4, 6) \\ x_1, y_1 & x_2, y_2 \end{array}$$

$$\frac{6 - 2}{4 - 4} = \frac{4}{0}$$

undefined

Describe the slope, then find the slope of the line



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

$$\begin{matrix} (-2, -3) & (3, -3) \\ x_1 & x_2 \\ y_1 & y_2 \end{matrix}$$

$$\frac{-3 - (-3)}{3 - (-2)} = \frac{0}{5} = 0$$

Given two points, find the slope of the line

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

$$\begin{array}{cc} (-2, 4) \\ x_1 & y_1 \end{array}$$

$$\begin{array}{cc} (3, -5) \\ x_2 & y_2 \end{array}$$

$$m = \frac{-5 - 4}{3 - (-2)} = \frac{-9}{5}$$

Finding Slope using a Table

The points in the table lie on a line. How can you find the slope of the line from the table? What is the slope?

x	1	4	7	10
y	8	6	4	2

Choose any two points from the table and use the slope formula.

Points: (1,8) (4,6) (7,4) (10,2)
 x_1 y_1 x_2 y_2

$$m = \frac{2-4}{10-7} = \frac{-2}{3}$$

Writing Slope

Slope is written as a ratio

$$m = 2$$

$$m = -4$$

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

$$m = -\frac{4}{1}$$

Writing Slope

Slope can be written "Both Ways"

$$m = \frac{2}{5} \quad \text{Positive}$$

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

$$m = -\frac{3}{4}$$

Negative

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

You will use the slope like a
Set of directions
to find the next point on the line

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

$$\begin{array}{l} \Delta y \quad 1 \quad \text{up 1} \\ \Delta x \quad 3 \quad \text{right 3} \end{array}$$

$$\begin{array}{l} -1 \quad \text{down 1} \\ -3 \quad \text{left 3} \end{array}$$

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

$$\begin{array}{l} -5 \quad \text{5 down} \\ 4 \quad \text{4 right} \end{array}$$

$$\begin{array}{l} 5 \quad \text{5 up} \\ -4 \quad \text{4 left} \end{array}$$

Graphing a line using SLOPE

Fact: You must find 3-5 points before you can "test" that you have made a line of the equation.

You will use the slope like a
Set of directions
to find the next point on the line

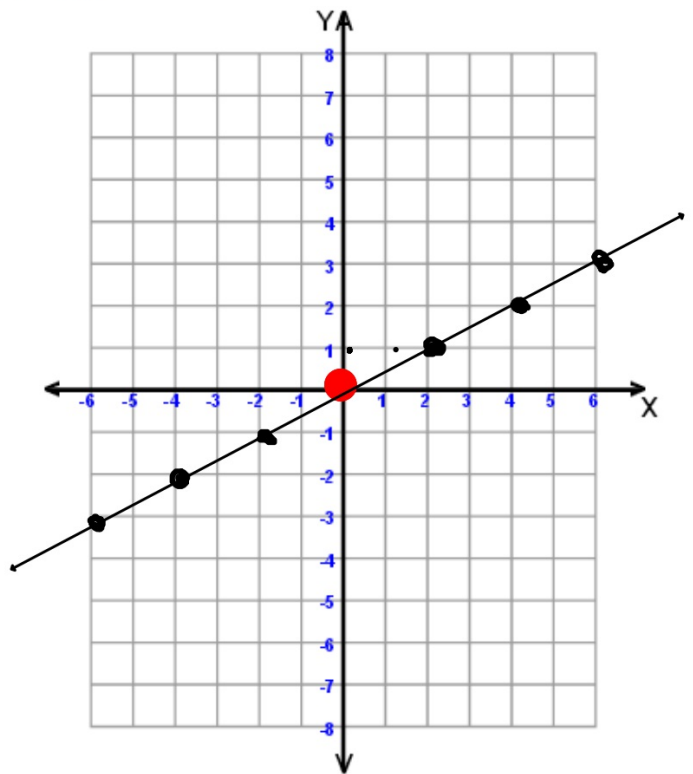
Hey! NO table

$$y = \frac{1}{2}x + 0$$

$$m = \frac{1}{2} \quad \begin{array}{l} \text{up 1} \\ \text{2 right} \end{array}$$

OR

$$m = \frac{-1}{-2} \quad \begin{array}{l} \text{down 1} \\ \text{left 2} \end{array}$$

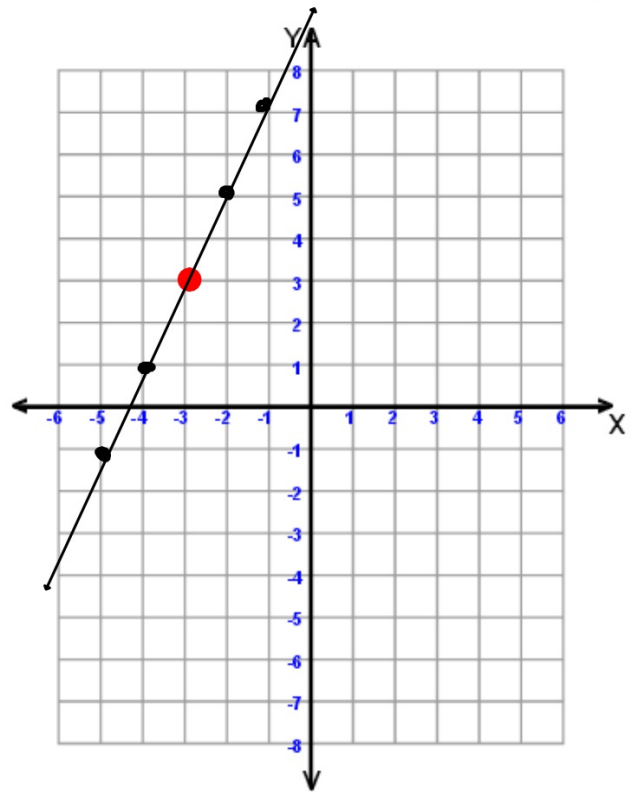


Draw a line with a given slope
through a given point

$(-3, 3)$

slope = 2

$$\frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x} = \frac{2}{1}$$



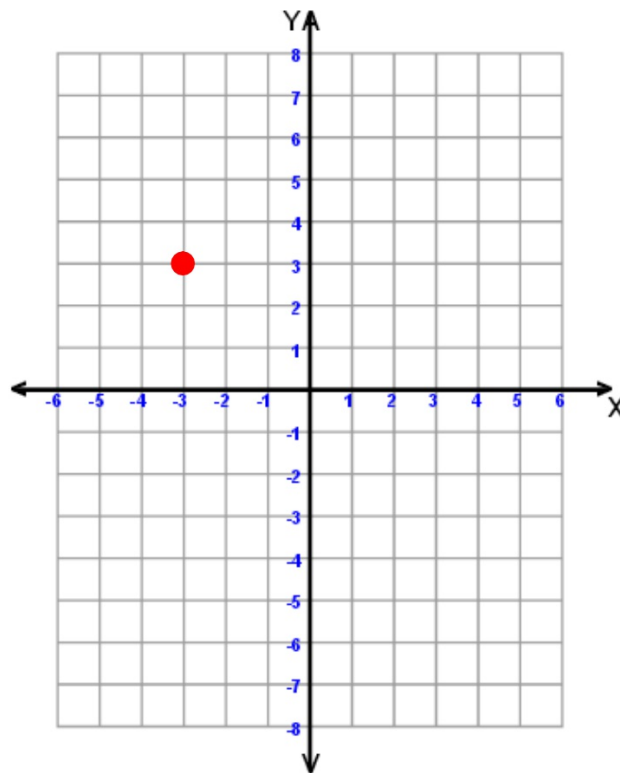
Draw a line with a given slope
through a given point

$$\text{slope} = -4$$

$$\frac{\text{Rise}}{\text{Run}} = \frac{\quad}{\quad}$$

or

$$\frac{\text{Rise}}{\text{Run}} = \frac{\quad}{\quad}$$



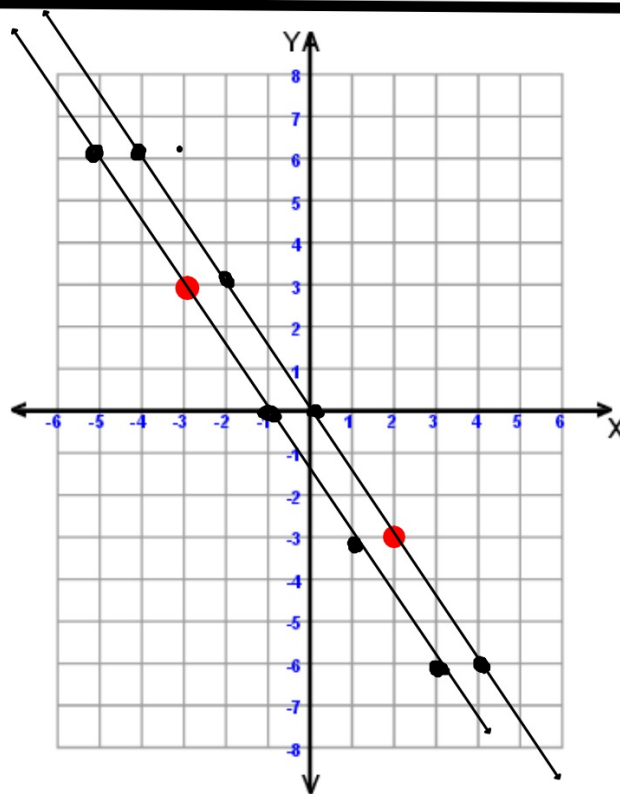
Draw a line with a given slope
through two given points

$(-3, 3)$

$(2, -3)$

$$m = -\frac{3}{2}$$

$$\frac{\text{Rise}}{\text{Run}} = \frac{-3}{2}$$



Homework

pg 153-155

1-11 odd

16-24 even

and 30