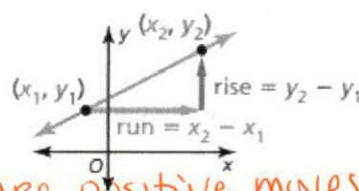


Graphing Linear Equations in Slope-Intercept Form

3.5

The **slope** m of a nonvertical line passing through two points (x_1, y_1) and (x_2, y_2) is the ratio of the **rise** (change in y – denoted as Δy) to the **run** (change in x – denoted as Δx)

$$\text{slope} = m = \frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{y_1 - y_2}{x_1 - x_2}$$

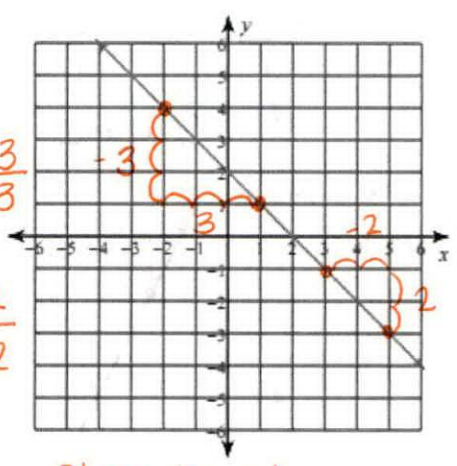


up & right are positive moves
left & down are negative moves

When the line rises from left to right, the slope is positive.
When the line falls from left to right, the slope is negative.

Example 1: Describe the slope of each line. Then find the slope.

a.

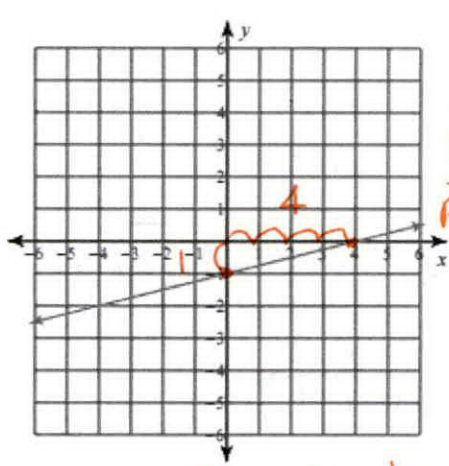


down 3 = -3
Right 3 = 3

up 2 = 2
left 2 = -2

Slope is -1

b.



up 1
Right 4 = 1/4

slope is 1/4

Example 2: Finding slope from a table

a.

x	y
4	20
7	14
10	8
13	2

$\frac{\Delta y}{\Delta x} = \frac{-6}{3}$

+3 < 4 - 1 > -6

+3 < 7 - 4 > -6

+3 < 10 - 7 > -6

+3 < 13 - 10 > -6

choose any 2 points

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{14 - 20}{7 - 4} = \frac{-6}{3} = -2$$

slope is -2

b.

x	y
-1	2
1	2
3	2
5	2

+2 < -1 - (-3) > +0

+2 < 1 - (-1) > +0

+2 < 3 - 1 > +0

+2 < 5 - 3 > +0

$$\frac{\Delta y}{\Delta x} = \frac{0}{2} = 0$$

slope is 0

c.

x	y
-3	-3
-3	0
-3	6
-3	9

+3 < -3 - (-6) > +3

+3 < -3 - (-6) > +3

+3 < -3 - (-6) > +3

+3 < -3 - (-6) > +3

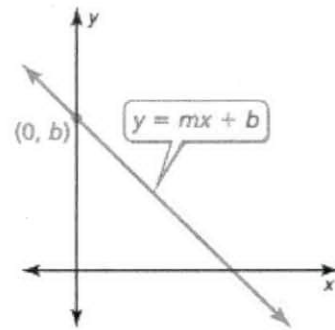
$$\frac{\Delta y}{\Delta x} = \frac{3}{0} = \text{UNID}$$

slope is undefined



Slope-intercept Form of a Linear Equation

Words: A linear equation in the form $y = mx + b$ is in **slope-intercept form**. The slope of the line is m and the y -intercept of the line is b .



Algebra: $y = \boxed{m}x + \boxed{b}$
 slope \uparrow \uparrow y -intercept written as $(0, b)$

A linear equation written in the form $y = 0x + b$, or $y = b$, is a **constant function**. The graph of a constant function is a horizontal line.

notice $m=0 \therefore$ horizontal lines have a slope of 0

Example 3: Find the slope and y -intercept of the graph of each linear equation.

a. $y = 3x - 4$

$m = 3$
 $b = -4$
 y -int $(0, -4)$

b. $y = 6.5$

$m = 0$
 $b = 6.5$
 y -int $(0, 6.5)$

Solve for y

c. $-5x - y = -2$
 $+5x \quad +5x$
 $-y = 5x - 2$
 $\frac{-y}{-1} = \frac{5x}{-1} - \frac{2}{-1}$
 $y = -5x + 2$
 $m = -5$
 $b = 2$
 y -int $(0, 2)$

Example 4: Graph $2x + y = 2$. Identify the x -intercept. $\rightarrow y$ value is 0

$y = -2x + 2$

$2x + (0) = 2$

$2x = 2$

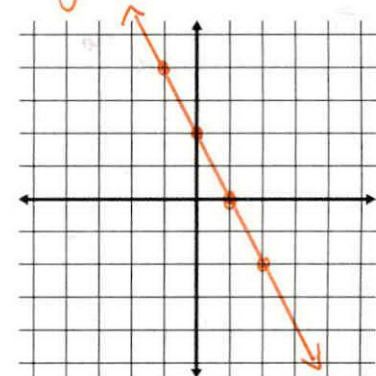
$x = 1$

x -int $(1, 0)$

$m = -\frac{2}{1}$ down 2 right 1
 $b = 2$

y -int $(0, 2)$ start @ y -int when graphing!

Also can be found on the graph



Example 5: A submersible that is exploring the ocean floor begins to ascend to the surface. The elevation h (in feet) of the submersible is modeled by the function $h(t) = 650t - 13,000$, where t is the time (in minutes) since the submersible began to ascend.

$-13,000 \leq h \leq 0$ $0 \leq t \leq 20$

- Graph the function and identify its domain and range.
- Interpret the slope and the intercepts of the graph.

slope is $\frac{650}{1} \rightarrow$ how fast the submersible is ascending to the surface 650 ft per minute
 y -int is $(0, -13000)$
 \rightarrow where the submersible began its ascent, 13,000-ft below the surface

