Key

Slope

$\frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}} = m = \text{rate of change}$

Recall:

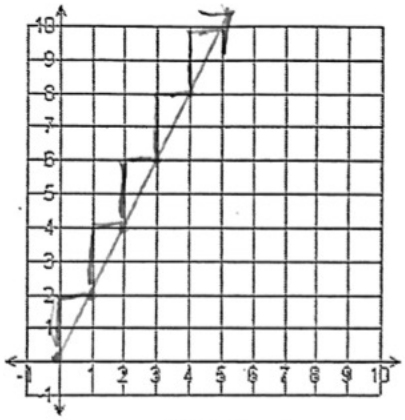
Marcus can download two songs from the Internet each minute. This is shown in the table below.

Time (minutes, x	0	1	2	3	4
Number of Songs, y	0	2	4	6	8

(+1, +1, +1, +1 across the time row; +2, +2, +2, +2 across the songs row)

We previously discovered that the rate of change is 2 (2 songs per minute). Rate of change is also referred to as SLOPE. → slope = 2

Graph:



$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{\text{"up"}}{\text{"over"}}$

$m = \frac{\text{up } 2}{\text{over } 1} = \frac{2}{1}$

Not $\frac{1}{2}$

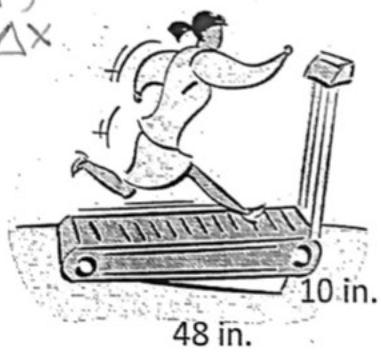
Remember, slope (rate of change) is always $\frac{\text{rise (vertical change)}}{\text{run (horizontal change)}}$ $\frac{\Delta y}{\Delta x}$

Example: Treadmill

$m = \frac{\text{rise}}{\text{run}} = \frac{10}{48} = \frac{5}{24}$

Slope = $\frac{5}{24}$

Not $\frac{24}{5}$



Example: Hiking Trail:

A hiking trail rises 6 feet for every horizontal change of 100 feet. What is the slope of the hiking trail?

$m = \frac{\text{rise}}{\text{run}} = \frac{6}{100} = \frac{3}{50}$

Slope = $\frac{3}{50}$

This means that the trail rises 3 feet (vertically) for every 50 feet horizontally

Note: $\frac{-10}{-7} = \frac{10}{7}$ $\frac{-10}{7} = -\frac{10}{7}$ $\frac{10}{-7} = -\frac{10}{7}$

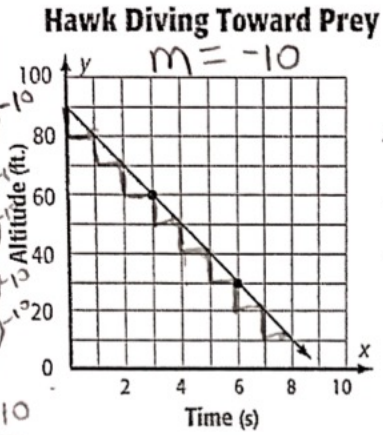
Counting Slope from a Graph

Up: Positive	Down: Negative
Right: Positive	Left: Negative

Memorize

x	y
0	90
1	80
2	70
3	60
4	50
5	40

+1, +1, +1, +1, +1 (x) ; -10, -10, -10, -10, -10 (y)

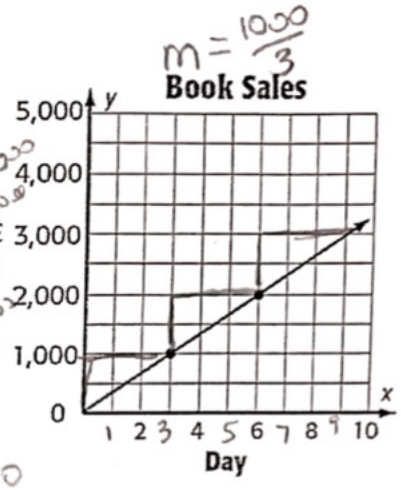


$m = \frac{\Delta y}{\Delta x} = \frac{-10}{1}$

x	y
0	0
3	1000
6	2000
9	3000

+3, +3, +3 (x) ; +1000, +1000, +1000 (y)

$m = \frac{1000}{3}$



$m = \frac{\Delta y}{\Delta x} = \frac{1000}{3}$

Slope Formula:

Pick two points from the line above.

x_1, y_1 x_2, y_2

(3, 60) (4, 50)

$m = \frac{\text{change in } y}{\text{change in } x} = \frac{50-60}{4-3}$

$m = \frac{-10}{1}$

$m = -10$

Pick two points from the line above

x_1, y_1 x_2, y_2

(3, 1000) (9, 3000)

$m = \frac{\Delta y}{\Delta x} = \frac{3000-1000}{9-3}$

$m = \frac{2000}{6} = \frac{1000}{3}$

$m = \frac{1000}{3}$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{50-60}{4-3} = \frac{-10}{1}$$

Slope Formula

$$Slope = \frac{vertical\ change}{horizontal\ change} = \frac{rise}{run} = \frac{change\ in\ y}{change\ in\ x} = \frac{y_2 - y_1}{x_2 - x_1}$$