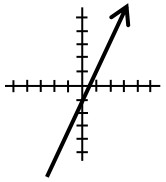
WHAT IS THE SLOPE OF A LINE?

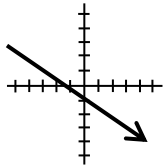
The slope of a line is a measure of how much the line *slants* and in which direction it is slanting.

The letter "m" is used to designate slope, and we assume all lines enter the graph from the left.



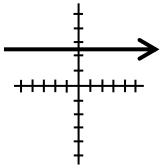
m = 2

(Line slants up to the right, so the slope is positive)



m = -0.8

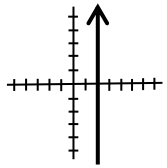
(Line slants down to the right, sothe slope is negative)



m = 0

(Line slants neither up nor down, so the slope is zero)

Horizontal lines always have a slope of zero.

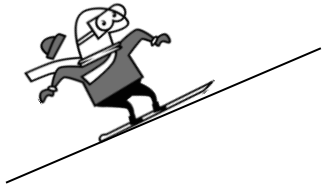


m = undefined

(the slope is undefined)

Vertical lines have slopes that are undefined.

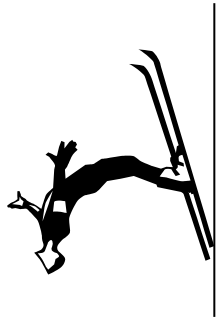
Think of ski slopes to help understand the slope of a line:



Positive Slope
(Skiing up)

Negative Slope
(Skiing down)

Zero Slope
(Skiing horizontally)

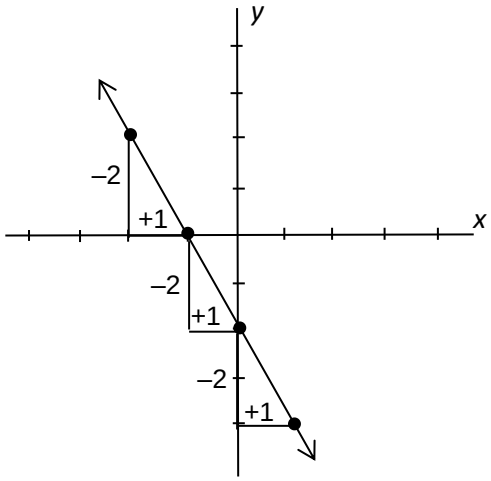


Undefined Slope
(Skiing vertically is impossible, thus, "undefined")

THREE WAYS TO FIND SLOPE

A line consists of two or more points, and in the x-y coordinate plane, the slope of a line is a ratio of the difference in the y values to the difference in the x values of two points. The difference in y values is called "rise", and the difference in x values is the "run".

We use the letter "m" for slope; if the coordinates of the two points are (x_1, y_1) and (x_2, y_2), then the slope (m) $= \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$

Given Two Points	Given an Equation	Given a Graph
Use the Slope Formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$	Put equation into slope-intercept form: $y = mx + b$	Count from one point on the line to another, using the Rise and the Run.
Example (1, -4) and (-2, 3) First label the x and y coordinates and then plug them into the slope formula: (1, -4) (x_1, y_1) (-2, 3) (x_2, y_2) $m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{3 - (-4)}{-2 - 1} = \frac{7}{-3}$ Slope is the rise divided by the run; the rise = 7 and the run = –3, so slope $m = \frac{\text{rise}}{\text{run}} = \frac{7}{-3} = -\frac{7}{3}$	Example $3x - y = 5$ Change the equation into the slope-intercept form, $y = mx + b$, so it will be easy to identify the slope (m) and the y-intercept (b). Add -3x to both sides of the equation $-y = -3x + 5$ Divide both sides of the equation by -1 $\frac{-y}{-1} = \frac{-3x}{-1} + \frac{5}{-1}$ $y = 3x - 5$ The coefficient of x is the slope of the line, or m. In rise and run terms, the rise is 3 and the run is 1. (3 = 3/1) The slope is 3 and the y-intercept is -5	Example Using the graph below -  Count from one point to the next: go down 2 units, then go to the right 1 unit. DOWN is a negative rise. RIGHT is a positive run. The rise over the run is (-2) over (+1); therefore, the slope is -2. $m = \frac{\text{rise}}{\text{run}} = \frac{-2}{1} = -2$