Learning Centre

Slope



The **slope** of a line is a numerical way of describing the "steepness" and the direction of the line. It tells you nothing about the position of the line—where it is on the xy-plane

To find the slope of a line from its equation, rewrite the equation in the form y = mx + b, so that the y is isolated on one side. The coefficient on x is the slope (m).

Example 1: Find the slope of the equation 9x + 3y = 8

Solution: Isolate the y, and then extract the x coefficient:

$$9x + 3y = 8$$

 $3y = -9x + 8$
 $y = -3x + \frac{8}{3}$

Therefore the slope is -3.

To find the slope between two points, use the mnemonic "**rise over run**" to remember what to do. If the coordinates of the points are (x_1, y_1) and (x_2, y_2) :

 $m = \frac{rise}{run} = \frac{changein y}{changein x} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

Example 2: Find the slope of the line containing the points (3, 6) and (7, 10).

Solution: Use the rise-over-run formula:

m =
$$\frac{rise}{run}$$
 = $\frac{y_2 - y_1}{x_2 - x_1}$
= $\frac{10 - 6}{7 - 3}$
= $\frac{4}{4} = 1$

Therefore the slope is 1.

Vertical lines have an infinite, or undefined, slope since there is no "run" to the line; they don't have an x component to divide by. Vertical lines have equations in the form "x = a".

Horizontal lines have a slope of 0 since there is no "rise" to the line; there's no y



component to divide into. Horizontal lines have equations in the form "y = b".

EXERCISES

- A. Find the slope of the line:
 - 1) y = 5x 3 4) x = 7
 - 2) 2y = 3x + 4 5) y = 8
 - 3) 3y + 4x = 5
- B. Find the slope of the line passing through each pair of points:
 - 1) (1, 2), (3, 4) 4) (-1, -3), (-9, -8)
 - 2) (-3, 5), (-9, 10) 5) (5, 6), (3, 6)

3) (4, 8), (4, 10)

SOLUTIONS A. (1) 5 (2) $\frac{3}{2}$ (3) $-\frac{4}{3}$ (4) undefined (5) 0 B. (1) 1 (2) $-\frac{5}{6}$ (3) undefined (4) $\frac{5}{8}$ (5) 0



This work is licensed under a Creative Commons Attribution 4.0 International License