Slope

VANCOUVER COMMUNITY COLLEGE

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:

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

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):

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

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

Solution: Use the rise-over-run formula:

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

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

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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