

MTH 143 Section 1.3 – Linear Functions – Pg 78

A linear function can be written in the form $y = mx + b$

Two distinct points will determine its graph. Often, intercepts are used to graph a function.

The x-intercept is where the graph crosses the x-axis. To find it, let $y = 0$ and solve for x .
 The y-intercept is where the graph crosses the y-axis. To find it, let $x = 0$ and solve for y .

Find the x- and y-intercepts of $4x + 5y = 8$.

$$\begin{aligned} \frac{5y}{5} &= \frac{8-4x}{5} & \text{x-intercept: } (2,0) & \quad \frac{4x}{4} &= -5y+8 & \quad -2 &= \frac{-5}{4}y \\ 0 &= \frac{8-4x}{5} & & \quad 0 &= \frac{-5y+8}{4} & \quad y &= \frac{8}{5} \\ 0 &= 8-4x & & \quad 0 &= \frac{-5}{4}y+2 & \quad \text{y-intercept: } (0, \frac{8}{5}) \\ x &= 2 & & & & & \end{aligned}$$

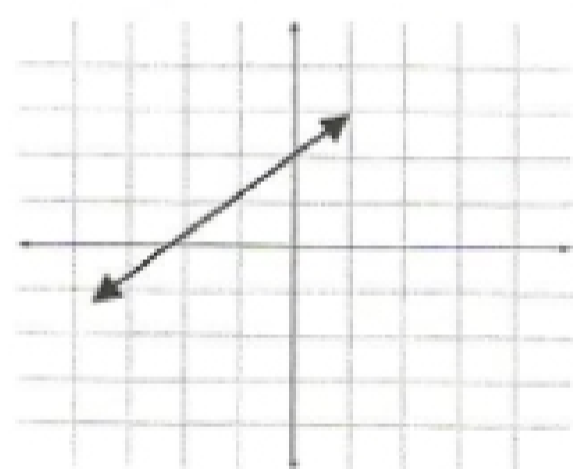
The slope of a non-vertical line through points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$, is

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

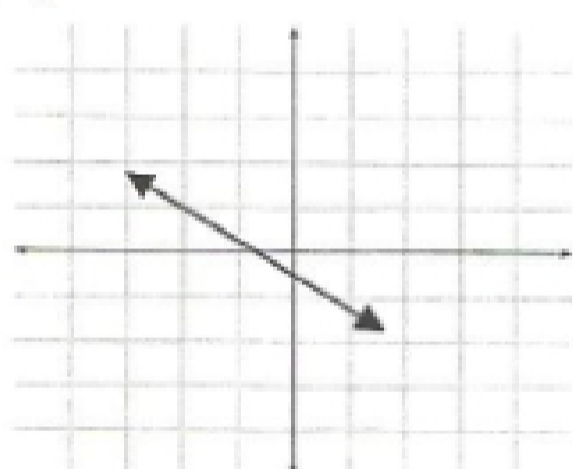
ex: find the slope of the line through (1,4) & (5,3).

$$\frac{4-3}{1-5} = \frac{1}{-4}$$

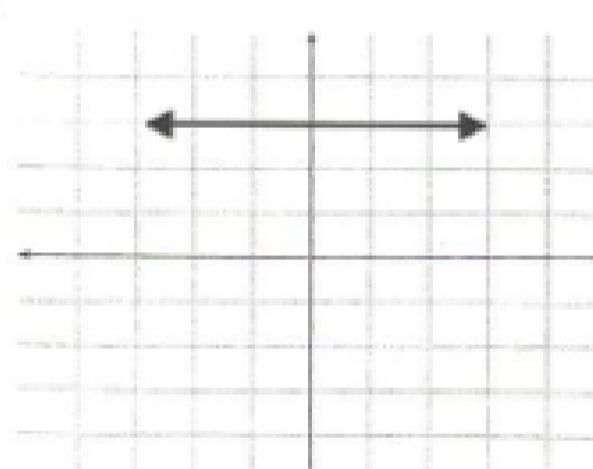
There are 4 scenarios for slope:



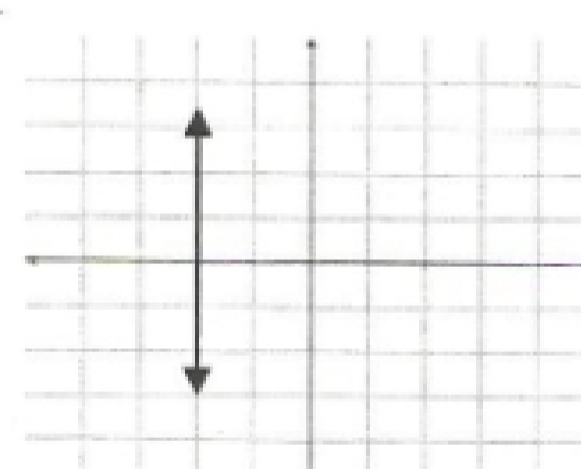
Slope is positive



Slope is negative



Slope is zero
horizontal line
 $y = b$



Slope is undefined
vertical line
 $x = b$

The point-slope form of a line with slope m through the point (x_1, y_1) is
 $y - y_1 = m(x - x_1)$
 (not valid for final answers)

The slope-intercept form of a line with slope m and y-intercept $(0, b)$ is
 $y = mx + b$

Try these examples: