

Slope & Y-Intercept

Slope can be described in several ways:

- Steepness of a line
- Rate of change → rate of increase or decrease
- "Rise over Run" → $\frac{\text{Rise}}{\text{Run}} \rightarrow \frac{y}{x}$
- Change (difference) in y over change (difference) in $x \rightarrow \frac{y_2 - y_1}{x_2 - x_1}$
- "m" in $y = mx + b$

Slope can be calculated in several different ways: graphs, tables, formulas, word problems, and equations.

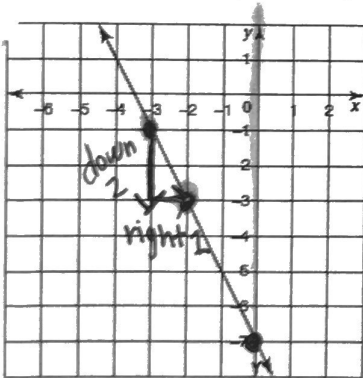
A **y-intercept** is the point where the graph crosses the y-axis. Its coordinate will always be the point $(0, b)$, where b stands for the number on the y-axis where the graph crosses and the value of the x-coordinate will always be 0.

- "b" in $y = mx + b$

Slope from a Graph

Ex. Calculate the slope & y-intercept of each of the graphs.

A. Slope: $\frac{-2}{1}$ OR $-2 = m$ y-intercept: $-7 = b$



$$\frac{\text{rise}}{\text{run}} = \frac{\text{down } 2}{\text{right } 1} = \frac{-2}{+1}$$

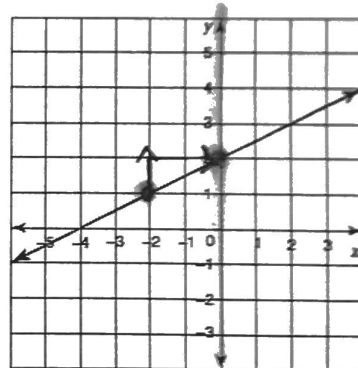
OR

$$-2$$

$(0, -7)$

Equation: $y = mx + b$ $y = -2x - 7$

B. Slope: $\frac{1}{2} = m$ y-intercept: $2 = b$

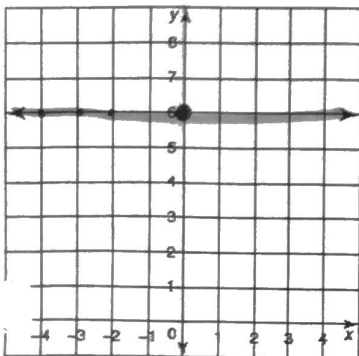


$$\frac{\text{rise}}{\text{run}} = \frac{\text{up } 1}{\text{right } 2} = \frac{+1}{+2}$$

$(0, 2)$
↓
y-intercept

Equation: $y = \frac{1}{2}x + 2$

C. Slope: 0 y-intercept: 6

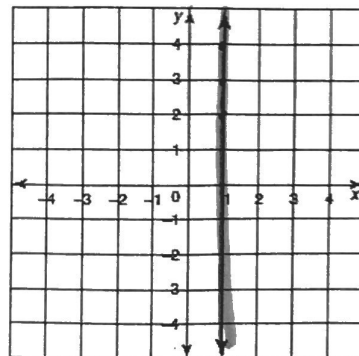


$$\frac{\text{rise}}{\text{run}} = \frac{0}{1} = 0$$

$(0, 6)$
↓
y-int.

Equation: $y = (0)(x) + 6$
 $y = 0 + 6$
 $y = 6$

D. Slope: Undefined y-intercept: none

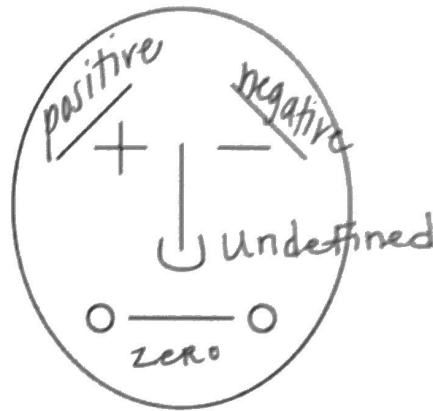


$$\frac{\text{rise}}{\text{run}} = \frac{1}{0} = \frac{\text{emr}}{0}$$

⇓
undefined

Equation: $x = 1$

4 Types of Slope: Positive, Negative, Undefined, Zero



MR. SLOPE GUY

Slope from a Formula

Slope Formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

where (x_1, y_1) & (x_2, y_2) are coordinate points

Ex. Calculate the slope of two points using the slope formula.

A. $(9, 3), (19, -17)$ $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-17 - 3}{19 - 9} = \frac{-20}{10} = \boxed{-2}$

B. $(1, -19), (-2, -7)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7 - (-19)}{-2 - 1} = \frac{12}{-3} = \boxed{-4}$$

Slope from a Table

Ex. Calculate the slope from the tables below using the slope formula. Choose any two consecutive set of points.

x	y
-1	13
0	-2
4	-62
10	-152

$(-1, 13), (0, -2)$
 $x_1 \ y_1 \quad x_2 \ y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 13}{0 - (-1)} = \frac{-15}{1} = \boxed{-15}$$

x	y
7	9
18	9
29	9
40	9

$(7, 9), (18, 9)$
 $x_1 \ y_1 \quad x_2 \ y_2$

$$m = \frac{9 - 9}{18 - 7} = \frac{0}{11} = \boxed{0} \checkmark$$

check:
 $(18, 9), (29, 9)$
 $x_1 \ y_1 \quad x_2 \ y_2$
 $m = \frac{9 - 9}{29 - 18} = \frac{0}{11} = \boxed{0} \checkmark$