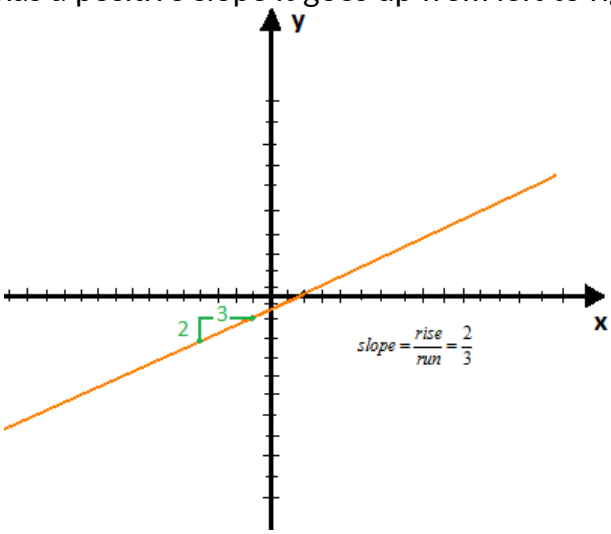
Slope

The slope of a line measures the steepness of the line. The slope is associated with "rise over run". Rise means how many units you move **up** or **down** from point to point. On the graph that would be **a change in the *y* values.**
Run means how far **left** or **right** you move from point to point. On the graph, that would mean **a change of *x* values.**

$$slope = \frac{rise}{run} = \frac{change\ in\ y-coordinates}{change\ in\ x-coordinates}$$

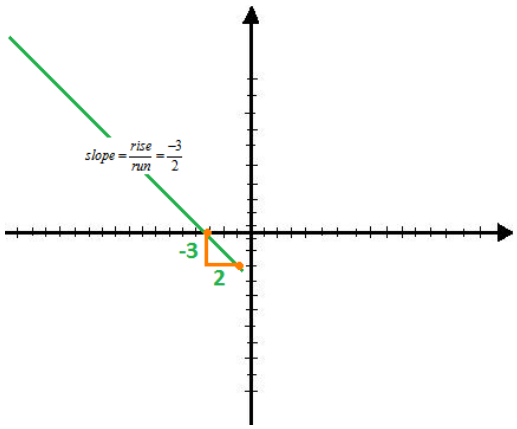
The slope can be positive, negative, zero or undefined. We will study each case independently.

Positive slope: when a line has a positive slope it goes up from left to right.



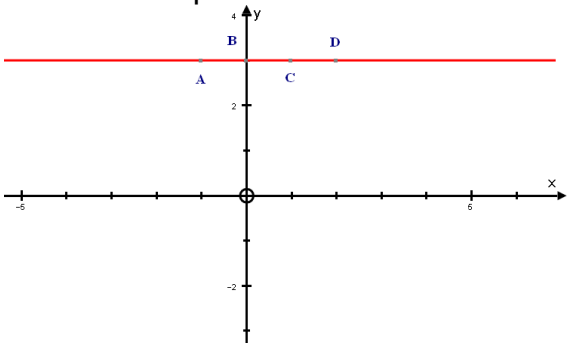
$$slope = \frac{rise}{run} = \frac{2}{3}$$

Negative slope: when a line has a negative slope it goes down from left to right.



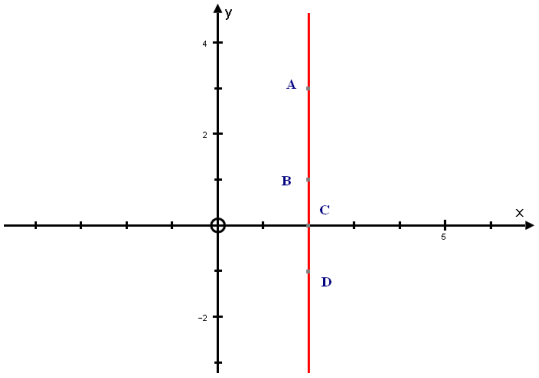
$$slope = \frac{rise}{run} = \frac{-3}{2}$$

Zero slope: when a line is horizontal the slope is 0.



$$slope = \frac{rise}{run} = 0$$

Undefined slope: when the line is vertical the slope is undefined.



Slope = undefined

Rule 1: To find the slope of a straight line passing through two points $A(x_1, y_1)$ and $B(x_2, y_2)$, we use the formula: $m = slope = \frac{rise}{run} = \frac{change\ in\ y-coordinates}{change\ in\ x-coordinates} = \frac{y_2 - y_1}{x_2 - x_1}$

Example 1 : Find the slope of the straight line that passes through (-5, 1) and (3, -4).

$$m = slope = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4-1}{3-(-5)} = \frac{-5}{8}$$

Example 2 : Find the slope of the straight line that passes through (6, 2) and (-4, 2).

$$m = slope = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-2}{-4-6} = \frac{0}{-10} = 0$$

It is ok to have a 0 in the numerator. Remember that $\frac{0}{n} = 0$.

$\Rightarrow$The straight line is horizontal

Example 3 : Find the slope of the straight line that passes through (-1, 4) and (-1, 6).

$$m = slope = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6-4}{-1-(-1)} = \frac{2}{-1+1} = \frac{2}{0} \qquad undefined$$

$\Rightarrow$The straight line is vertical