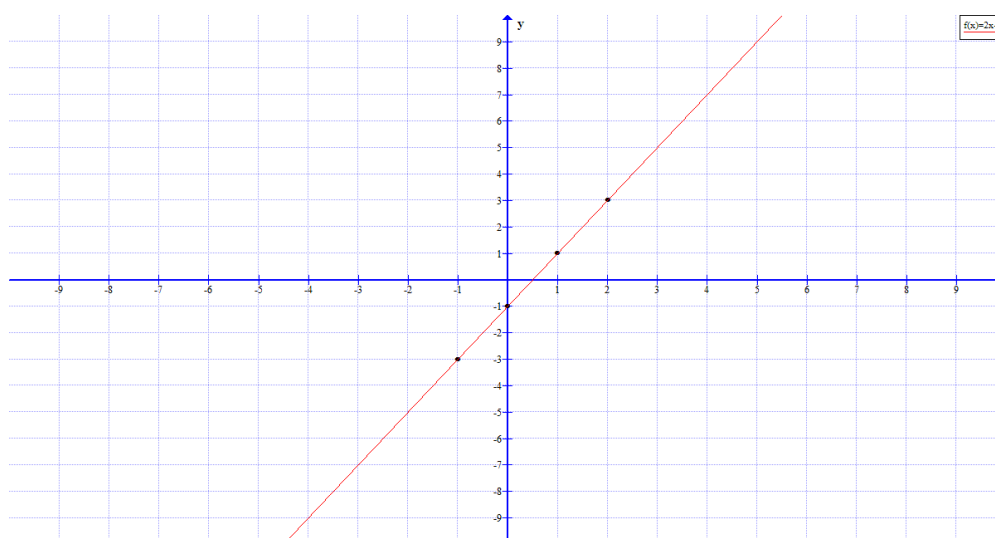


Slopes and Intercepts

In mathematics, lines in a coordinate system have steepness. The steepness of a line is called its **slope or gradient**. The vertical change is called the **change in y (rise)** and The horizontal change is called the **change in x (run)**.

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



To find the slope of the line from the given graph, use any two points on the line and then find the rise and the run. Let us use the points (1,1) and (2,3) on the graph, starting from (1,1) to (2,3) the rise is 2 and the run is 1. So the slope is 2.

The slope of a line also can be determined from the coordinates of any two points of the line. The change in y can be found by subtracting the y-coordinates. Likewise, the change in x can be found by subtracting the x-coordinates. Make sure you subtract in the same order.

$$\text{slope} = \frac{3-1}{2-1} = \frac{2}{1} = 2$$

$$\text{Let us use the points } (-1,-3) \text{ and } (0,-1) \text{ slope} = \frac{-3-(-1)}{-1-0} = \frac{-3+1}{-1} = \frac{-2}{-1} = 2$$

The slope of a horizontal line is 0. Why?

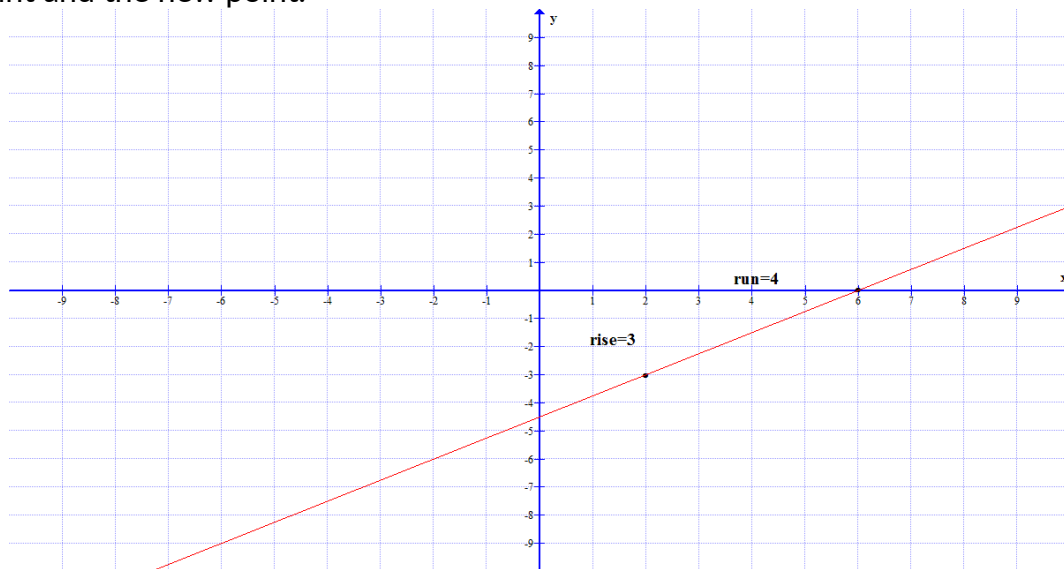
A vertical line has no slope. Why?

Example 1: Graph the line that contains (2,-3) and has a slope of $\frac{3}{4}$.

Step1: graph the given point (2,-3)

Step2: From the graphed point, use the given slope the rise is 3, so count 3 units upwards and then the run is 4, so go to the right 4 units.

Step3: Graph the point you reached and then draw the line connecting the given point and the new point.



The different forms of linear functions:

- 1) **Standard form:** $Ax + By = C$, where **A**, **B** and **C** are any numbers, and A and B are not both zero.
- 2) **Slope Intercept Form:** $y = mx + b$, where **m** is the slope and **b** is the y-intercept.
- 3) **Point Slope Form:** $y - y_1 = m(x - x_1)$, where **m** is the slope and (x_1, y_1) is the point.

We can graph linear equation using the x-intercept and the y-intercept.

The x-intercept is the point of intersection of the line and the x- axis, $(x, 0)$.

The y-intercept is the point of intersection of the line and the y- axis, $(0, y)$.

Note

- 1) To find the x-intercept, replace $y=0$ in the given equation and then find the value of x.
- 2) To find the y-intercept, replace $x=0$ in the given equation and then find the value of y.