Horizontal and Vertical Lines

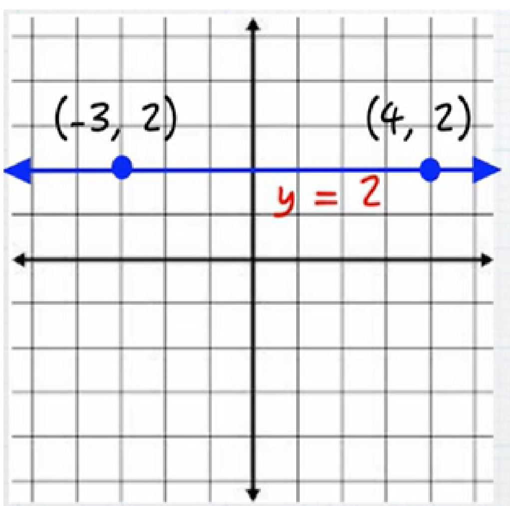
by Sophia

WHAT'S COVERED

This tutorial covers horizontal and vertical lines, through the exploration of:

1. Horizontal Lines

Below is an example of a horizontal line. Because it's horizontal, the y-coordinate is the same for all points on the line no matter what the value of x is. If you look at two points on the line, (-3, 2) and (4, 2), you can see that the y value is 2 at both points. Therefore, you can write the equation for the line as y equals 2, because the y value is always 2.



KEY CONCEPT

In general, all horizontal lines can be written as $y = a$, where a is a constant value.

Another important feature of horizontal lines is that the slope of all horizontal lines is 0, because there is no change in the y value between any two points on the line, and the numerator will always be 0 when calculating the slope between any two points on the horizontal line.

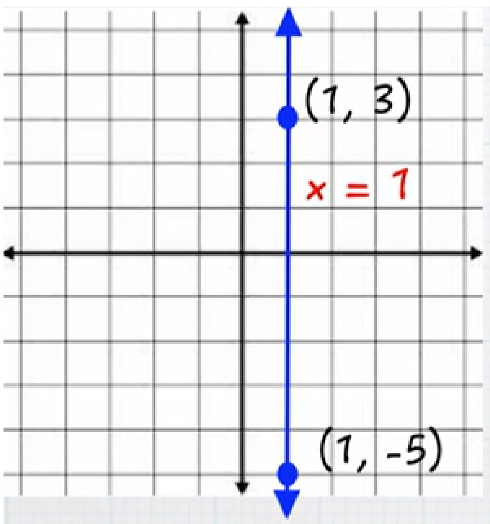
FORMULA TO KNOW

Slope for Horizontal Lines

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad y_2 - y_1 = 0 \textit{ for horizontal lines}$$

2. Vertical Lines

Below is an example of a vertical line. Because it's vertical, the x-coordinate is the same for all points on the line no matter what the value of y is. If you look at two points on the line, (1, -5,) and (1, 3), you can see that the x value is 1 at both points. Therefore, you can write the equation for the line as x equals 1, because the x value is always 1.



KEY CONCEPT

In general, all vertical lines can be written as x = a, where a is a constant value.

Another important feature of vertical lines is that the slope of all vertical lines is undefined because there is no change in the x value between any two points on the line. You can see from the slope formula that because the x values are always the same, the denominator will always be 0 when calculating the slope between any two points on a vertical line.

FORMULA TO KNOW

Slope for Vertical Lines

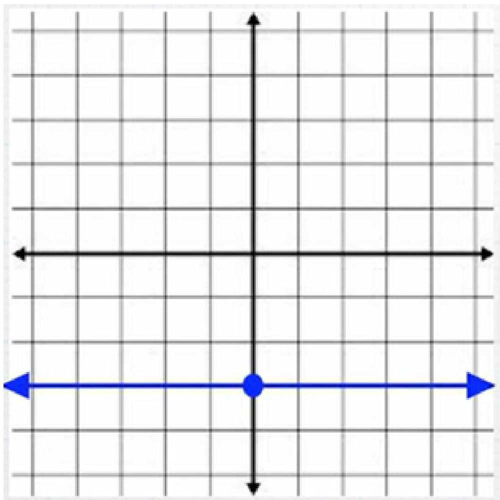
$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad x_2 - x_1 = 0 \textit{ for vertical lines}$$

3. Graphing Horizontal and Vertical Lines

You can also graph horizontal and vertical lines from an equation.

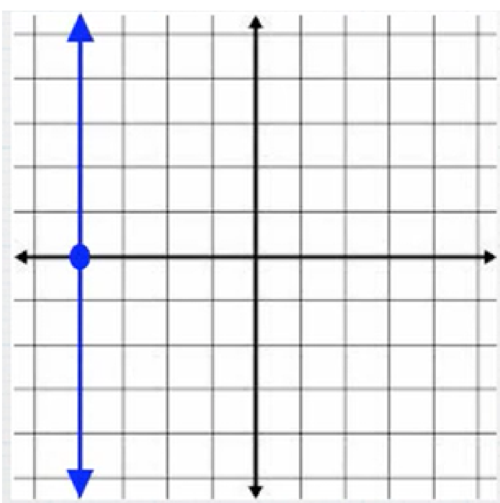
EXAMPLE Suppose you have y equals -3. You know that this will be a horizontal line because the y value will be -3 for all points on the line, and the graph will go through -3 on the y-axis. Therefore, to graph this equation, you find -3 on the y-axis and draw a horizontal line through the point.

$y = -3$



EXAMPLE Suppose you have x equals -4. You know that this will be a vertical line because the x value will be -4 for all points on the line, and the graph will go through -4 on the x-axis. Therefore, to graph this equation, find -4 on the x-axis and draw a vertical line through the point.

$x = -4$



SUMMARY

Today you learned about **graphing horizontal and vertical lines**. You learned that the y-coordinate for all horizontal lines is the same no matter what the value of x is, and that all horizontal lines have a slope of 0. You also learned that the x-coordinate for all vertical lines is the same no matter what the value of y is, and that all vertical lines have a slope that is undefined.

Source: This work is adapted from Sophia author Colleen Atakpu.

FORMULAS TO KNOW

Slope for Horizontal Lines

$$m = \frac{y_2 - y_1}{x_2 - x_1}, y_2 - y_1 = 0$$

Slope for Vertical Lines

$$m = \frac{y_2 - y_1}{x_2 - x_1}, x_2 - x_1 = 0$$

