



Examples

The Slope of a Line

Based on power point presentations by Pearson Education, Inc.
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Learning Objectives

1. Define and calculate the slope of a line.
2. Identify the slopes of increasing, decreasing, vertical, and horizontal lines.
3. Identify the slope and the y -intercept in the equation of a line.

Example 1: Calculate the Slope of a Line

Find the slope of the line passing through the points $(4, -2)$ and $(-1, 5)$.

Here you can say that $(4, -2)$ is (x_1, y_1) and $(-1, 5)$ is (x_2, y_2) . However, you can also state that $(4, -2)$ is (x_2, y_2) and $(-1, 5)$ is (x_1, y_1) . In either case, you will get the same answer.

Let's say that $(4, -2)$ is (x_1, y_1) and $(-1, 5)$ is (x_2, y_2) . Be sure not to get confused! Then

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - (-2)}{-1 - 4} = \frac{7}{-5} = -\frac{7}{5}$$

NOTE: Regardless of the sign of the x -coordinates or the y -coordinates, the minus sign between the y -values and the x -values in the slope calculation must always be there.

Example 2: Calculate the Slope of a Line

Find the slope of the line passing through the points $(-1, 3)$ and $(-4, -6)$.

Here you can say that $(-1, 3)$ is (x_1, y_1) and $(-4, -6)$ is (x_2, y_2) . However, you can also state that $(-4, -6)$ is (x_1, y_1) and $(-1, 3)$ is (x_2, y_2) . In either case, you will get the same answer.

Let's say that $(-4, -6)$ is (x_1, y_1) and $(-1, 3)$ is (x_2, y_2) . Be sure not to get confused! Then

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - (-6)}{-1 - (-4)} = \frac{3 + 6}{-1 + 4} = \frac{9}{3} = 3$$

NOTE: Regardless of the sign of the x -coordinates or the y -coordinates, the minus sign between the y -values and the x -values in the slope calculation must always be there.

Example 3: Calculate the Slope of a Line

Find the slope of the line passing through the points (6, 3) and (6, 4).

Let's say that (6, 3) is (x_1, y_1) and (6, 4) is (x_2, y_2) . Be sure not to get confused! Then

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 3}{6 - 6} = \frac{1}{0}$$

Since there is a 0 in the denominator, this particular slope is undefined.

Example 4: Calculate the Slope of a Line

Find the slope of the line passing through the points (1, 5) and (-9, 5).

Let's say that (1, 5) is (x_1, y_1) and (-9, 5) is (x_2, y_2) . Be sure not to get confused! Then

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 5}{-9 - 1} = \frac{0}{-10} = 0$$

Since there is a 0 in the numerator, this particular slope equals 0. Please note the difference between Example 3 and Example 4!

Example 5: Identify the Slopes of Lines

Identify the slopes of the graphs of the following lines. State whether the lines are increasing, decreasing, horizontal, or vertical.

1. $y = 3x + 9$

$m = 3$, the slope is positive, therefore, the line is an increasing

2. $y = -5x - 2$

$m = -2$, the slope is negative, therefore, the line is an decreasing

3. $y = 6$

horizontal line, $m = 0$

4. $x = -1$

vertical line, m is undefined

Example 6: Identify the Slope and the y -Intercept

Identify the slope, the y -intercept, and the ordered pair associated with the y -intercept given the linear equation $5x + 4y - 9 = 0$.

The equation is in general form. We must change it to slope-intercept form $y = mx + b$.

We will move the x -term and the constant to the right side of the equation into its proper position next to the equal sign as follows

$$4y = -5x + 9$$

Next, we divide both sides of the equation by 4 to get the following:

$$y = -\frac{5}{4}x + \frac{9}{4}$$

We find that the slope is $-\frac{5}{4}$ and the y -intercept is $\frac{9}{4}$.

The ordered pair associated with the y -intercept is $\left(0, \frac{9}{4}\right)$.