

## Finding Slope

***The idea of slope or rate of change is SUPER IMPORTANT to know throughout Algebra 1. There are many ways to find slope as we will discuss here and it is important to know all of these ways well.***

$$\text{Slope} = \frac{\text{change in } y}{\text{change in } x}$$

This is the GENERAL FORMULA of slope. Regardless of what method is used to find slope, this is the basic idea of how to calculate slope.

### **Finding Slope from 2 points:**

This is typically the most common way to find slope. It has a more specific formula that still follows the general formula above.

$$\text{Slope} = \frac{y_2 - y_1}{x - x_1}$$

This formula shows to find slope from 2 points, first subtract the y coordinates of both points in the numerator before subtracting the x coordinates of both points in the denominator (change in y over change in x).

Let's practice using this formula given 2 points!

**Find the Slope of the line between**  $(-1, 8)$  and  $(3, 5)$ .

Let's identify the  $x_1$ ,  $x_2$ ,  $y_1$  and  $y_2$  from these 2 points first.

$x_1$	$y_1$	$x_2$	$y_2$
$(-1, 8)$		$(3, 5)$	

Now use the formula to find the slope!

$$\text{Slope} = \frac{y_2 - y_1}{x - x_1}$$

$$\text{Slope} = \frac{5 - 8}{3 - (-1)}$$

$$\text{Slope} = \frac{5 - 8}{3 + 1}$$

$$\text{Slope} = \frac{-3}{4}$$

That's it! Let's use these steps for one more problem like this.

**Find the slope of the line between**  $(-9, 4)$  and  $(-1, -6)$ .

Remember  $x_1$  and  $y_1$  are the  $x$  and  $y$  coordinates of the 1st ordered pair while  $x_2$  and  $y_2$  are the  $x$  and  $y$  coordinates of the 2nd ordered pair.

$x_1$	$y_1$	$x_2$	$y_2$
$(-9, 4)$		$(-1, -6)$	

Now use the formula to find slope!

$$\text{Slope} = \frac{-6 - 4}{-1 - (-9)}$$

$$\text{Slope} = \frac{-6 - 4}{-1 + 9}$$

$$\text{Slope} = \frac{-10}{8}$$

$$\text{Slope} = \frac{-5}{4}$$

## Finding Slope from Tables:

Analyzing tables is very important, not only in Algebra 1, but also in higher level classes.

Remember that the first column on a table represents the x values and the second column on a table represents the y values.

Let's practice some table questions!

x	y
-5	6
3	2
7	0

The key to table questions like the one on the above is to pick any 2 rows of the table (preferably numbers that are positive) and find the slope between those 2 rows. If the table is showing a linear relationship, it does not matter which 2 rows are picked.

Since we should try to have the numbers be positive, let's pick (3, 2) and (7,0) - Remember the first column of the table was x values and the second column was y values.

$$\text{Slope} = \frac{0 - 2}{7 - 3}$$

$$\text{Slope} = \frac{-2}{4}$$

$$\text{Slope} = \frac{-1}{2}$$

Let's look at a real world scenario, which is another way slope is tested in Algebra 1.

**What is the amount of money that John puts in his bank account every week?**

Weeks	Money
3	\$20
5	\$56
10	\$146

Even though the problem above is a real-world scenario, the first column of weeks is still the x values and the second column of money is still the y values.

No matter what table you get, the first column is the x values and the second column is the y values. This allows us to follow the same process as the last problem to find slope.

Let's use (3, 20) and (5, 56) for the purpose of dealing with smaller numbers to find the rate of change or the amount of money John is adding every week.

$$\text{Slope} = \frac{56 - 20}{5 - 3}$$

$$\text{Slope} = \frac{36}{2}$$

$$\text{Slope} = 18$$

John adds \$18 to his bank account every week.

### **Finding Slopes from Lines on a Graph:**

To find slope, determine 2 clean intersections (where the line crosses a whole number for the x and y coordinates) and find the change in y over the change in x between those 2 points.

## **Tips for Solving Problems:**

1. Remember the general formula for slope:  $\text{CHANGE IN Y} / \text{CHANGE IN X}$ . Regardless of whether you are looking at 2 points, a table or a graph, follow the same formula.

2. When looking at a table and being asked to find the rate of change or the slope (both mean the same thing), know that the first column of the table will always be the x values and the second column of the table will always be the y values. Knowing this, it is possible to select 2 rows and find the slope between both rows in the table.

3. If the information you are given to find slope involves the values being in a linear relationship (the x and y values change proportionally with each other), then it does not matter which 2 points you select because the slope is constant between any 2 points in the table.