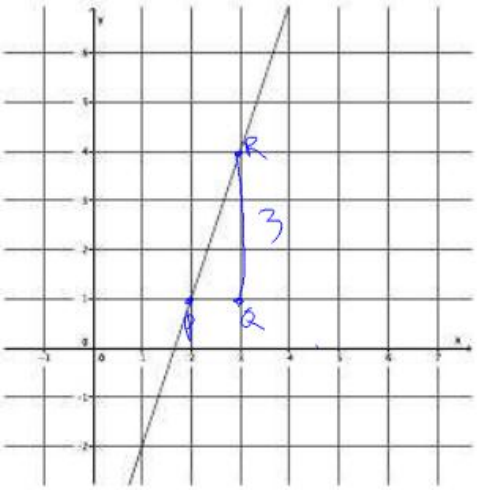
Lesson 16: The Computation of the Slope of a Non-Vertical Line

Classwork

Example 1

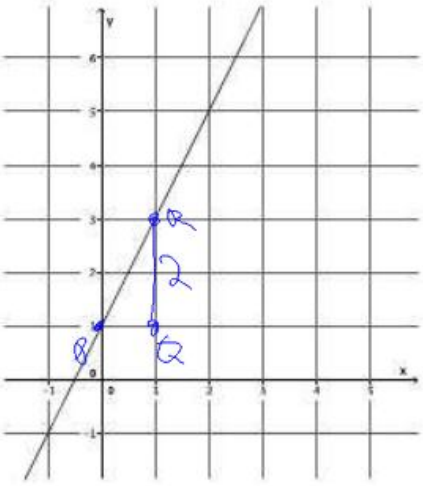
Using what you learned in the last lesson, determine the slope of the line with the following graph.



$m = 3$

Example 2

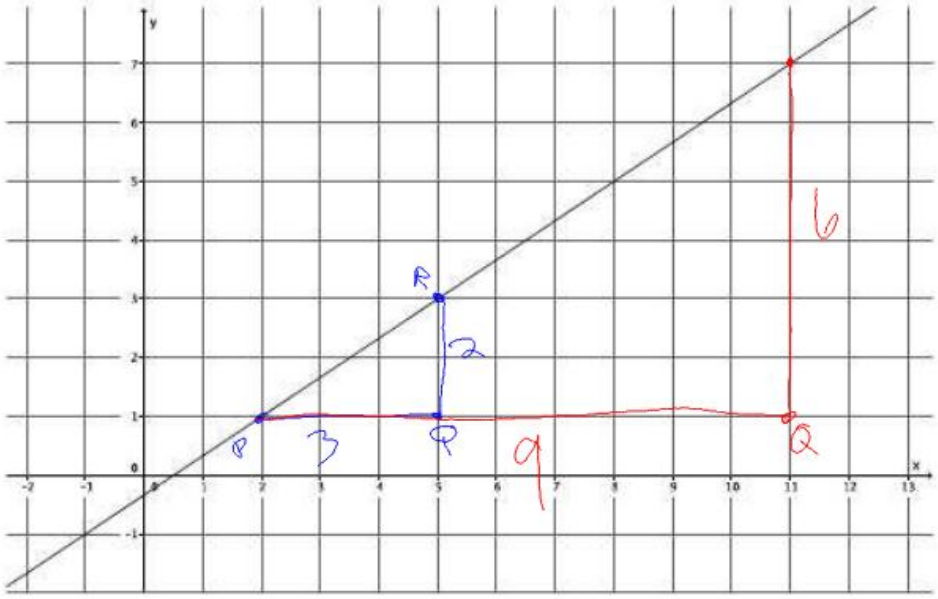
Using what you learned in the last lesson, determine the slope of the line with the following graph.



$m = 2$

Example 3

What is different about this line compared to the last two examples?



$m = \frac{\text{Rise}}{\text{Run}}$

$m = \frac{|QR|}{|PQ|}$

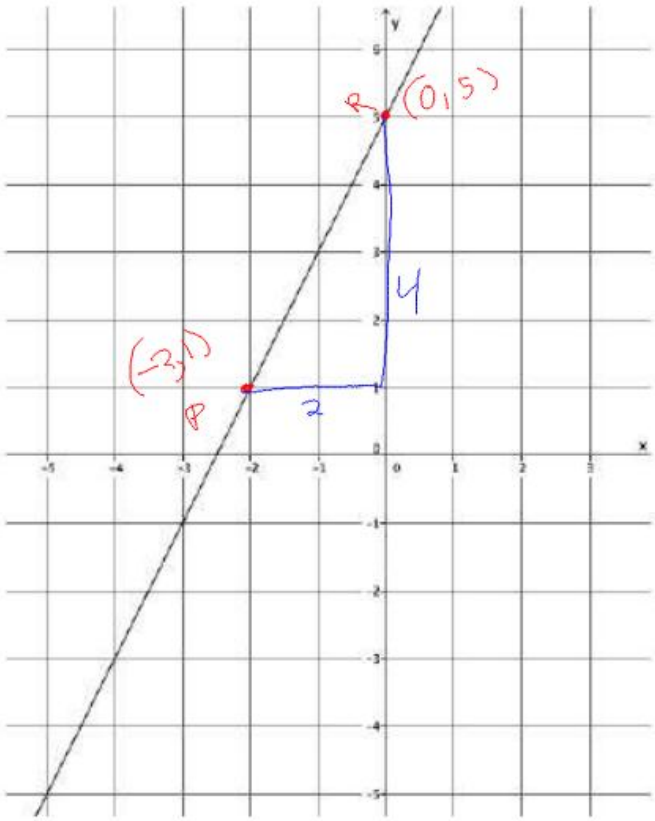
$m = \frac{2}{3}$

$m = \frac{6}{9} = \frac{2}{3}$

We cannot accurately find the slope using the method from the last Lesson.

Exercise

Let's investigate concretely to see if the claim that we can find slope between any two points is true.



$m = \frac{\text{rise}}{\text{run}}$

$m = \frac{\text{difference in } y}{\text{difference in } x}$

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

a. Select any two points on the line to label as P and R.

b. Identify the coordinates of points P and R. $P(\overset{x_1}{-2}, \overset{y_1}{1})$ $R(\overset{x_2}{0}, \overset{y_2}{5})$

c. Find the slope of the line using as many different points as you can. Identify your points and show your work below.

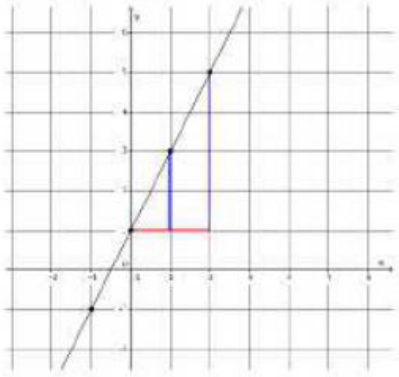
$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{5-1}{0+(+2)} = \frac{4}{2} = 2$

$m = 2$

Lesson Summary

The slope of a line can be calculated using *any* two points on the same line because the slope triangles formed are similar and corresponding sides will be equal in ratio.



On a given non-vertical line, let any two points $P(p_1, p_2)$ and $R(r_1, r_2)$ be chosen. Then, the slope of the line is equal to the ratio:

$$m = \frac{p_2 - r_2}{p_1 - r_1}.$$

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

The numerator in the formula is referred to as the difference in y-values, and the denominator as the difference in x-values.

Problem Set

1. Calculate the slope of the line using two different pairs of points.