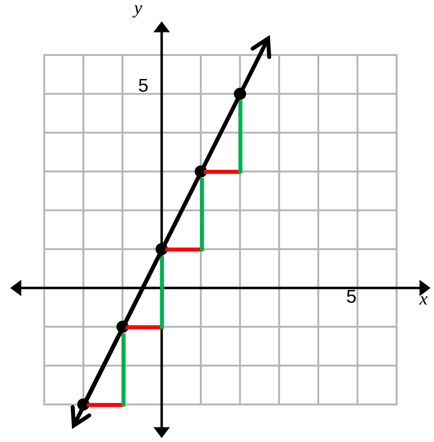
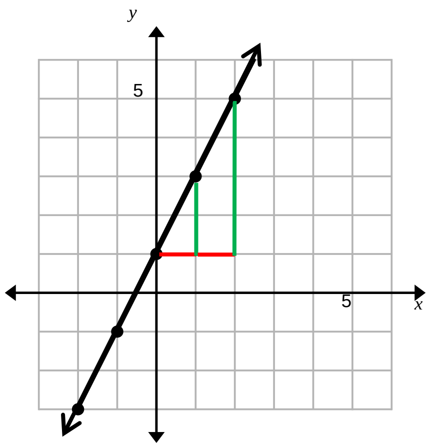
Name ________________________________ Period_________ Date________________

Using Similar Triangles to Explain Slope (page 1)

Look at the line graphed. Let's choose several points with integer coordinates to help us determine the slope of the line. In each case, we will note the horizontal distance by a red segment and the vertical distance by a green segment.



When we compare the change in the *y*-value (2) to the change in the *x*-value (1) for each "slope triangle", we have the ratio $\frac{2}{1}$, which is the slope for the line.



Using the same line, look at a different pair of slope triangles.

The ratio of the larger slope triangle is $\frac{4}{2}$.

The ratio of the smaller slope triangle is $\frac{2}{1}$.

The ratios are equivalent! $\frac{4}{2} = \frac{2}{1} = 2$

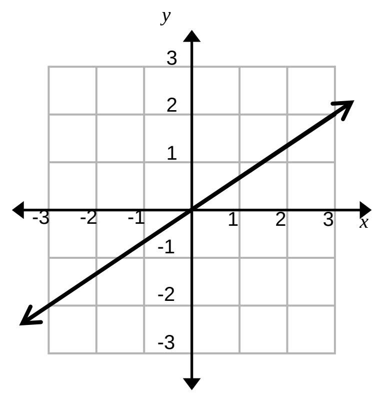
These slope triangles are similar by angle-angle (the right angle and the common angle). When we have similar triangles, we know that the ratios of the corresponding sides must be equal. That is the reason that the slope is the same for both slope triangles.

Example problems:

1. Determine the slope for the line graphed to the right.

   Change in the y-value is 2; change in the x-value is 3.

   Therefore, the slope is $\frac{2}{3}$.

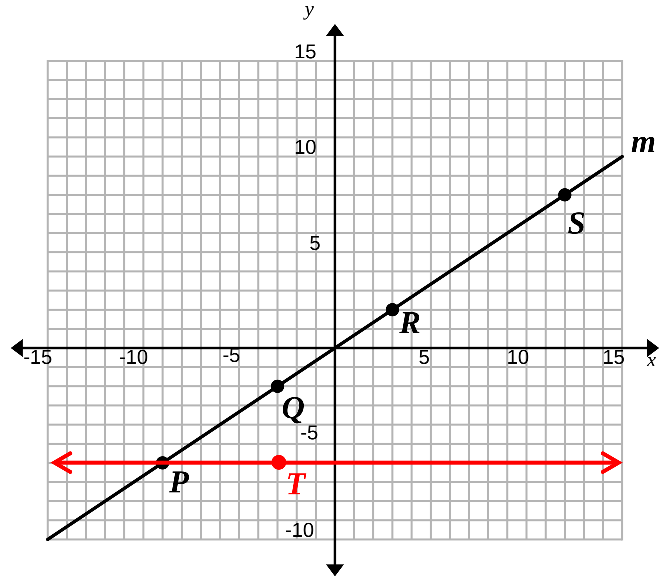


2. Start at (0, 0). Move right 6 units. From the location defined by completing these steps, how many units up is the line?

   Using the slope, move 3 more units to the right and up 2 units, identifies another point on the line (6, 4). Therefore, the answer is 4 units.

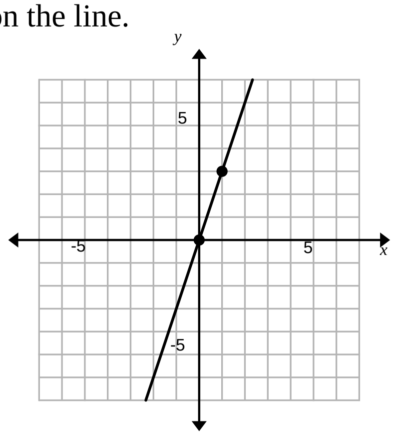
Using Similar Triangles to Explain Slope (page 2)

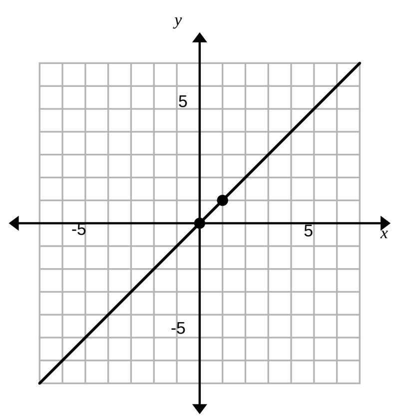
Show another way to show that slope of a line is constant by using similar triangles:

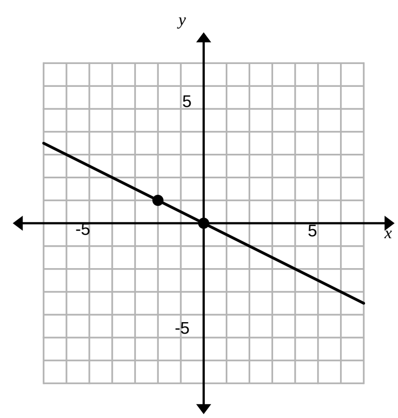


1. On the graph to the right, four points with integer coordinates have been plotted on line *m*.
2. A slope triangle has been started, using points *P* and *Q*. The right angle vertex is labeled *T*. Complete the triangle.
3. Draw the slope triangle using points *R* and *S*. Label the right angle vertex *V*.
4. Extend $\overleftrightarrow{PT}$ (done for you) and $\overleftrightarrow{RV}$ to create horizontal (and parallel) lines across the coordinate plane.
5. Since line *m* is a transversal intersecting the parallel lines you just created, you know that $\angle QPT$ is a corresponding angle to $\angle$______. Corresponding angles are ____________.
6. The two right angles $\angle$____ and $\angle$_____ are ________.
7. Therefore, Δ______ is similar to Δ______ by angle-angle similarity.
8. When we have similar triangles, we know that the ratios of the corresponding sides must be equal. Therefore, the slope of the line is constant. What is the slope of this line? _______
9. Start at (0, 0). Move right 15 units. From the location defined by completing these steps, how many units up is line *m*? _____

For problems 10 - 12, determine (a) the slope of the line and (b) the missing coordinate for a point on the line.







Slope is _______

(2, __)

Slope is _______

(5, __)

Slope is _______

(6, __)