



# Slope

## Reminders:

1. The symbol for slope is  $m$ .
  2. A line that rises from left to right has a positive slope --- 
  3. A line that rises from right to left has a negative slope --- 
-

Slope can be defined in 3 ways.

It can be defined as rise, or  $\frac{\Delta y}{\Delta x}$ ,  
run

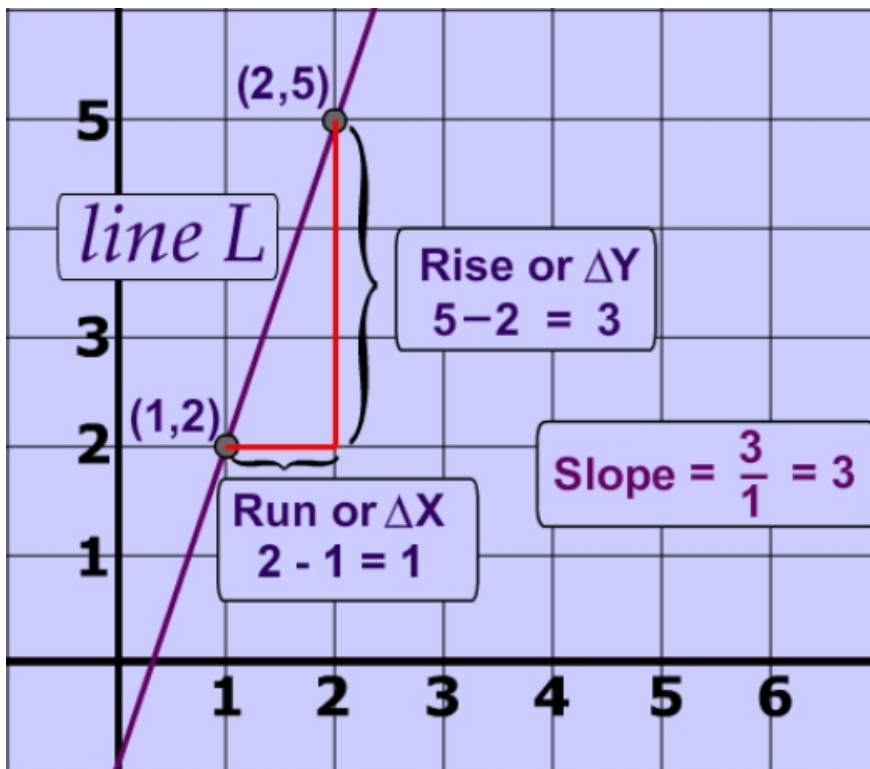
which is read as delta y over delta x.

In this course we will be referring to  
slope as:

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

\* need two points  
 $(2, 3) + (-1, 4)$   
 $(x_1, y_1) \quad (x_2, y_2)$

## Sample Calculation



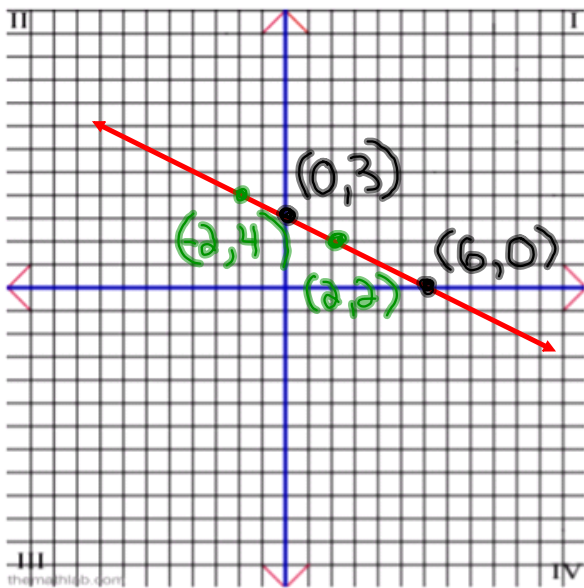
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{5 - 2}{2 - 1}$$

$$m = \frac{3}{1}$$

$$m = 3$$

## Example 1:



$$m = \frac{2-4}{2-(-2)}$$

$$m = \frac{-2}{4}$$

$$m = -\frac{1}{2}$$

**Step 1:** Select 2 points from the graph.

**Point 1-** $(x_1, y_1)$ - $(0, 3)$

**Point 2-** $(x_2, y_2)$ - $(6, 0)$

**Step 2:**  $m = \frac{y_2 - y_1}{x_2 - x_1}$

$$m = \frac{0-3}{6-0}$$

$$m = \frac{-3}{6}$$

$$m = -\frac{1}{2}$$

### Example 2:

Determine the slope of the following line:

$$2x + y = 6$$

**Step 1:** Rearrange into the form  $y = mx + b$

$$y = -2x + 6$$

**Step 2:** Locate the value of “m”

$$m = -2$$

The slope of the line is therefore -2.

### Example 3:

Show that P(3,2), Q(-3, -2), and R(6,4) are collinear. What does "collinear" mean???

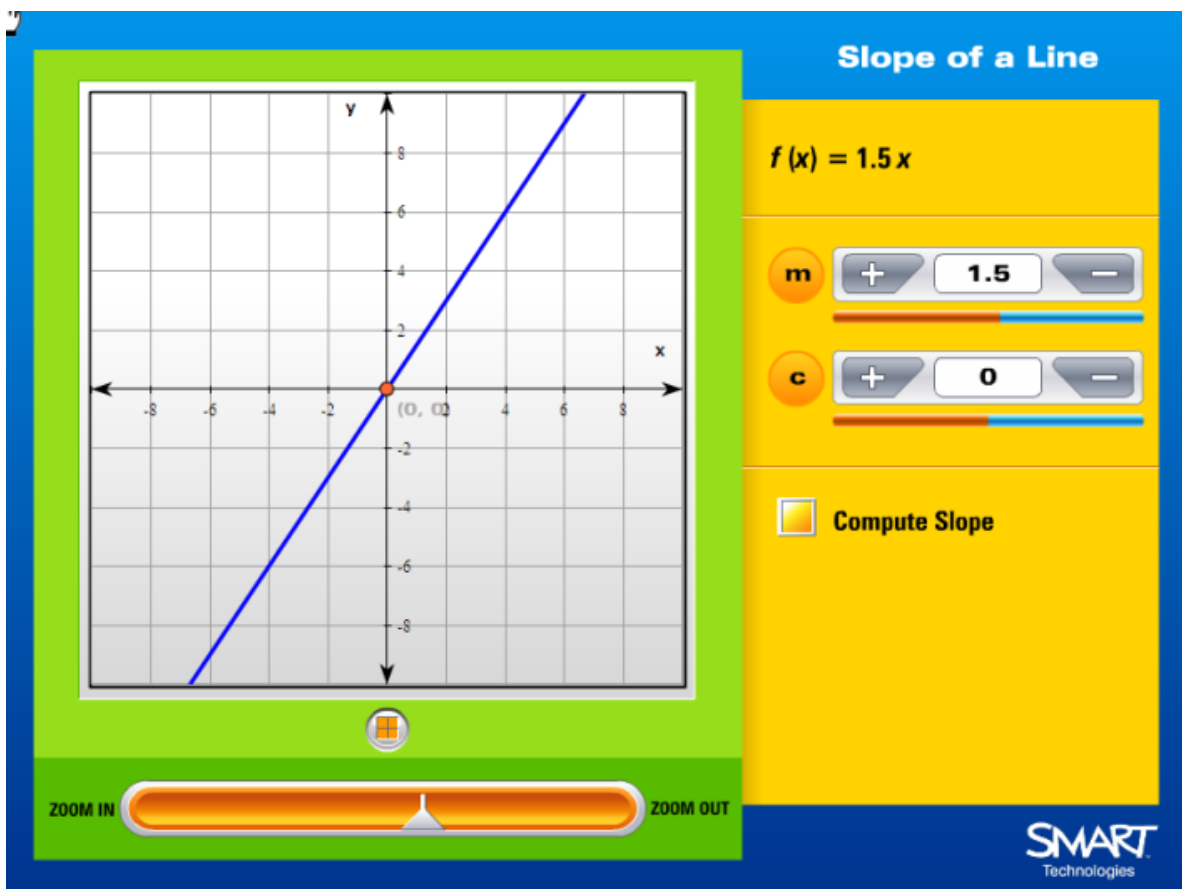
↳ have the same slope

**Step1:** Find the slope of all three pairs of points.

$$m_{PQ} = \frac{y_2 - y_1}{x_2 - x_1} \quad m_{QR} = \frac{y_2 - y_1}{x_2 - x_1} \quad m_{PR} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\begin{aligned} m_{PQ} &= \frac{-2-2}{-3-3} & m_{QR} &= \frac{4-(-2)}{6-(-3)} & m_{PR} &= \frac{4-2}{6-3} \\ &= \frac{-4}{-6} & &= \frac{6}{9} & &= \boxed{\frac{2}{3}} \\ &= \boxed{\frac{2}{3}} & &= \boxed{\frac{2}{3}} & & \end{aligned}$$

**Step2:** If the slope of all three pairs of points is the same, the points lie on the same straight line. Thus, the 3 points are collinear.





Find the slope of the following:

①  $A(-3, 1)$   $B(3, 2)$

$$m = \frac{2-1}{3-(-3)} = \frac{1}{6}$$

②  $3y + 6 = 21x - 3$

$$\frac{3y}{3} = \frac{21x - 9}{3}$$

$$y = 7x - 3$$

$$m = 7$$

⑤ a)  $M(k, 7)$   $N(2, 0)$  Slope = 7  
 $m = \underline{7}$

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

$$7 = \frac{0 - 7}{2 - k}$$

$$\frac{7}{1} = \frac{-7}{2 - k}$$

$$7(2 - k) = -7$$

$$14 - 7k = -7$$

$$\frac{-7k}{-7} = \frac{-21}{-7}$$

$$\boxed{k = 3}$$