

Name: Key  
7/8A

Date: \_\_\_\_\_  
Classwork 9.3

### Slope Formula Average Rate of Change

❖ Finding the **average rate of change** is the same as finding the Slope of a line.

To calculate the slope of any line (also known as the **average rate of change**), you will need two points that are on the line. Simply substitute the coordinates of the points into the slope formula:

$\Delta$  means "Change in"  $\rightarrow$

$$m = \frac{\Delta Y}{\Delta X} = \frac{Y_2 - Y_1}{X_2 - X_1}$$

**\*In the slope formula the 1's and 2's are NOT exponents. They are called subscripts.\***

**Example #1:** Determine the slope of the line that contains the points  $(x_1, y_1) = (2, 5)$  and  $(x_2, y_2) = (8, 9)$ .

Steps for Calculating Average Rate of Change (Slope):

Step 1: Subtract the y-values

Step 2: Subtract the x-values (*order matters*)

Step 3: If you can, **reduce the fraction**.

All slope answers must be in lowest terms.

No mixed numbers.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 5}{8 - 2} = \frac{4}{6} = \boxed{\frac{2}{3}}$$

**Example #2:** Determine the slope of the line that contains the points  $(-2, 12)$  and  $(10, 8)$ .

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 12}{10 - (-2)} = \frac{-4}{12} = \boxed{-\frac{1}{3}}$$

**Example #3:** The linear function,  $f(x)$ , is given in the table below. Find the average rate of change.

★ Can pick any 2 points ★

x	f(x)
0	5
1	1
2	-3
3	-7
4	-11

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 5}{1 - 0} = \frac{-4}{1} = \boxed{-4}$$

$x_1$   $y_1$   
 $x_2$   $y_2$

**Example #4:** The function  $h(x)$  is given in the table below. Which of the following gives its average rate of change over the interval  $2 \leq x \leq 6$ ? Show the calculation that lead to your answer.

x	h(x)
0	10
2	9
4	6
6	3

★ Can pick any 2 points ★

(1)  $-\frac{3}{2}$

(3)  $-\frac{7}{6}$

(2)  $\frac{6}{4}$

(4) -1

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 9}{6 - 2} = \frac{-6}{4} = \boxed{-\frac{3}{2}}$$

**Practice:**

1. Determine the average rate of change of the line that contains the points  $(6, 18)$  and  $(-2, 18)$ .

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{18 - 18}{-2 - 6} = \frac{0}{-8} = \boxed{0}$$

2. Find the slope of a line passing through the following two points.

a.  $(5, 2)$  and  $(5, 6)$

b.  $(1, 4)$  and  $(-8, -11)$

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

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

$$\frac{6 - 2}{5 - 5} = \frac{4}{0}$$

$$\frac{-11 - 4}{-8 - 1} = \frac{-15}{-9} = \boxed{\frac{5}{3}}$$

denominator is 0

**Undefined**

3. The table shows the amount of money a Booster Club made washing cars for a fundraiser. Use the information to find the rate of change in dollars per car.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{80 - 40}{10 - 5} = \frac{40}{5} = \boxed{\frac{8}{1}}$$

Cars Washed	
Number	Money (\$)
5	40
10	80
15	120
20	160

$x_1$   $y_1$   
 $x_2$   $y_2$

4. Find the rate of change for the graph below. Show all work!

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{216 - 144}{18 - 12} = \frac{72}{6} = \boxed{\frac{12}{1}}$$

