

LESSON **3-3** Rate of Change and Slope

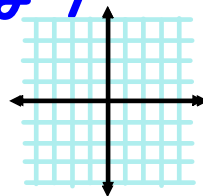
Target 3-1:

I can... find the slope and the rate of change and interpret it in the context of a problem.

T3-1

*The beginning of two variables...*

**Independent Variables**  
x-axis



**Dependent Variables**  
y-axis

Independent variable happens **first**

Dependent variable happens **second**

Time ..... Temperature

Months ..... Amount of Rain

Age ..... Growth

Years in school ..... Knowledge

Hours worked ..... Money Made

Doing your chores ..... Going to the movies

# Rate of Change

Change in Dependent

Change in Independent

OR

Change in y

Change in x

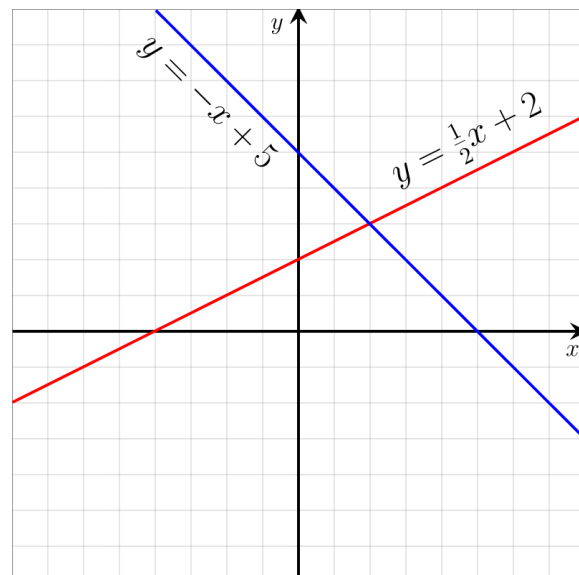
Rise  
Run

OR

**LINEAR**

**CONSTANT**

**RATE OF CHANGE**

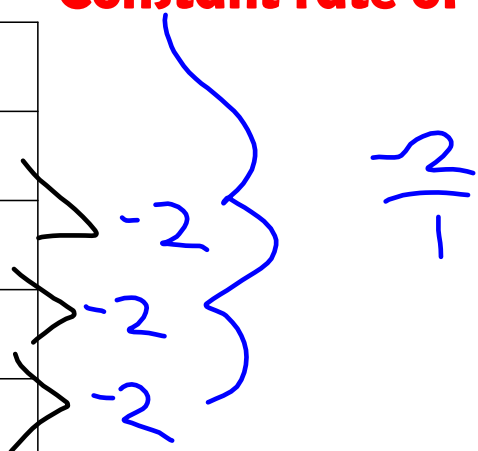


Determine the rate of change from the table.

**Is it linear??**

**Yes -- Constant rate of Change** or

X	Y
-2	4
-1	2
0	0
1	-2

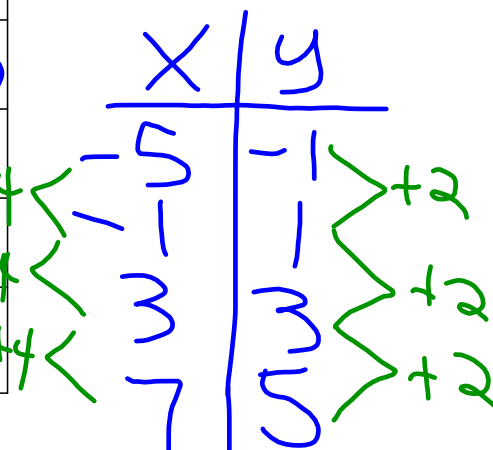


**No --**

Determine the rate of change from the table.

X	Y
-1	1
7	5
-5	-1
3	3

**Is it linear??**



or

**No --**

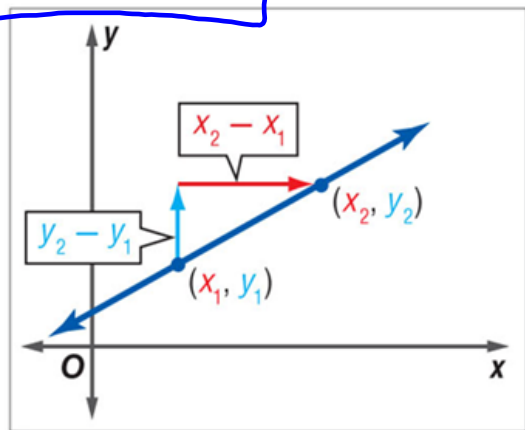
**Yes -- Nice work! Order Matters!**

# SLOPE

**\*\*HUGE CONCEPT\*\***

Similar to rate of change but always left as a fraction (no decimals)

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



Slope:

$(4, 3)$  and  $(2, 6)$   
 $\begin{matrix} x_1 & y_1 & & x_2 & y_2 \end{matrix}$

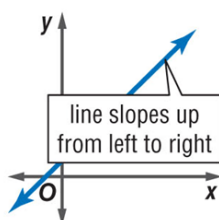
$$\frac{3 - 6}{4 - 2} = \frac{-3}{2} = \frac{3}{-2} = -\frac{3}{2}$$

$$\frac{6 - 3}{2 - 4} = \frac{3}{-2}$$

# SLOPE

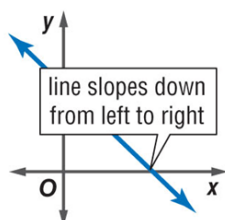
## ConceptSummary Slope

positive slope



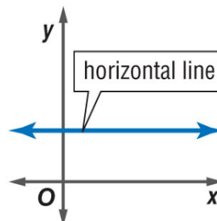
The function values are increasing over the entire domain.

negative slope



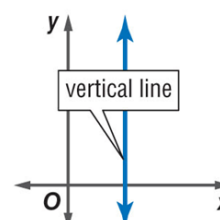
The function values are decreasing over the entire domain.

slope of 0



The function values are constant over the entire domain.

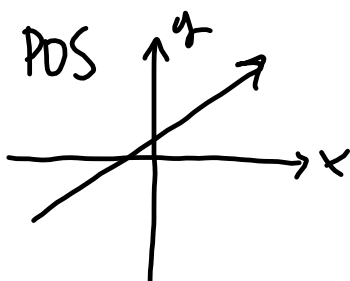
undefined slope



The relation is not a function.

**Find the slope of the line that passes through  $(-3, 2)$  and  $(5, 5)$ .**

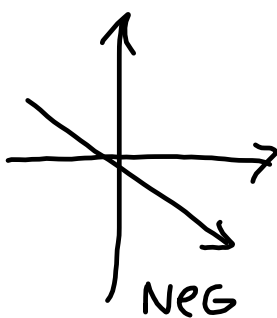
Find the slope of the line that passes through  
 $(-3, -4)$  and  $(-2, -8)$ .



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

$$m = 2$$

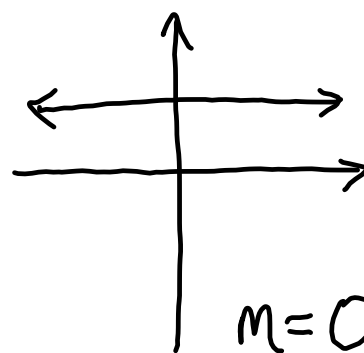
$$m = \frac{5}{1}$$



$$m = -\frac{4}{1}$$

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

$$m = -\frac{3}{4}$$

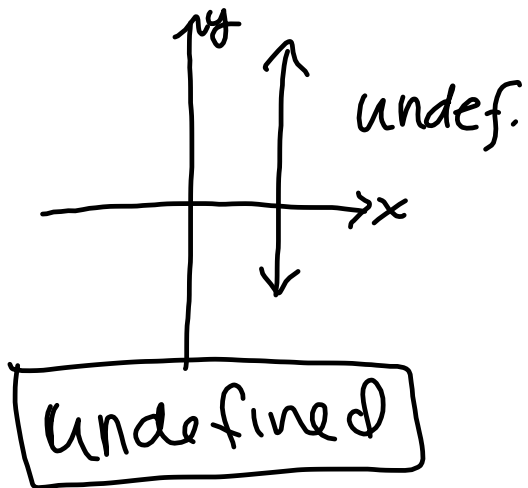


$$m = 0$$

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

$$m = \frac{0}{-8} = 0$$

$$m = \frac{0}{5} = 0$$



$$m = \frac{3}{0} \rightarrow \text{undef.}$$

$$m = \frac{-5}{0}$$

**Find the slope of the line that passes through  
(5, -1) and (5, -3).**

You TRY!

- ① Find the slope of the line that passes through  $(-3, -1)$  and  $(5, -1)$ .
- ② Find the slope of the line that passes through  $(-2, -4)$  and  $(-2, 3)$ .
- ③ Find the slope of the line that passes through  $(-3, -5)$  and  $(-2, -7)$ .

$(12, 8)$  and  $(-2, r)$   $m = -4$

$\frac{8-r}{12+2} = -4$

Now we don't know part of a point but we do know the slope. So we set up an equation to solve using this information.

~~$\frac{8-r}{14} = -4$~~

$-4(14) = 8-r$   
 $-56 = 8-r$   
 $-8 \quad -8$ 

---

 $+64 = +1r$   
 $+1 \quad +1$ 

---

 $64 = r$



$$\begin{matrix} (5, -3) & (-3, r) & m = -\frac{1}{2} \\ x_1, y_1 & x_2, y_2 & \end{matrix}$$

$$\frac{-3 - r}{5 - (-3)} = -\frac{1}{2}$$

~~$$\frac{-3 - r}{8} = -\frac{1}{2}$$~~

$$8 \cdot -1 = 2 \cdot (-3 - r)$$

$$\begin{array}{r} -8 = -6 - 2r \\ +6 \quad +6 \end{array}$$

$$\begin{array}{r} -2 = -2r \\ \hline 1 = r \end{array}$$

$$\boxed{1 = r}$$

## Homework T3-1

Section 3.3 Pg. 178 #36-39,52  
& WKST