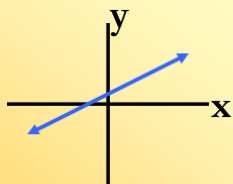


### 3-5 – Slope of a Line Formula

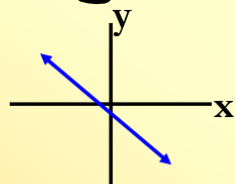
**Slope** – number of units the line rises or falls from left to right (point to point)

$$\text{Slope} = \frac{\text{rise}}{\text{run}} \quad \begin{array}{l} + \text{up} / - \text{down} \\ + \text{right} / - \text{left} \end{array} \quad \boxed{m = \text{slope}}$$

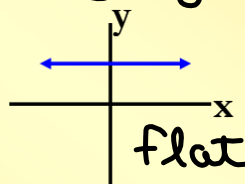
Identify slope by sight:



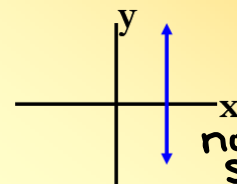
positive  
"rises"  
uphill



negative  
"falls"  
downhill



zero  
Horizontal  
doesn't rise  
 $m = \frac{0}{\#} = 0$   
rise  
run  
not zero



undefined  
Vertical  
doesn't run  
 $m = \frac{\#}{0} \frac{\text{rise}}{\text{run}}$   
not allowed  
to divide  
by zero

Finding the slope:

Slope formula -  $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$

Given two points:

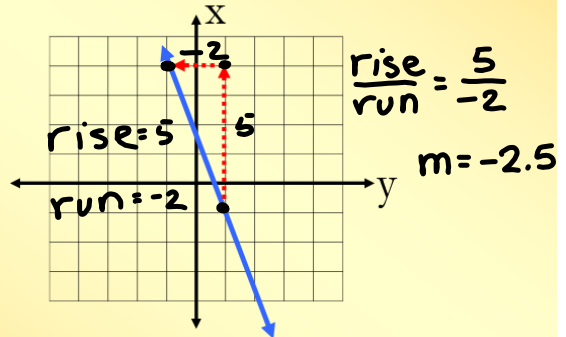
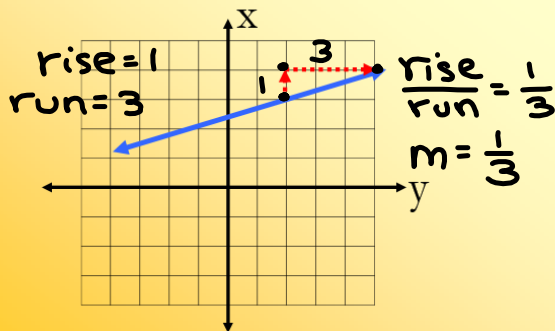
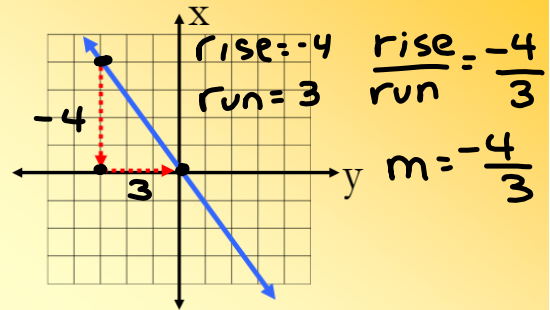
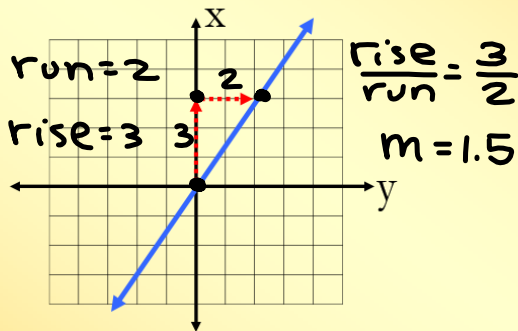
Ex 1)  $\begin{matrix} x_1, y_1 \\ (-2, 2) \\ \text{1st Point} \\ x_1, y_1 \end{matrix}$  &  $\begin{matrix} x_2, y_2 \\ (3, 4) \\ \text{2nd Point} \\ x_2, y_2 \end{matrix}$   $m = \frac{4-2}{3-(-2)} = \frac{2}{5}$  positive slope

Ex 2)  $\begin{matrix} x_1, y_1 \\ (-1, 2) \\ \text{1st Point} \\ x_1, y_1 \end{matrix}$  &  $\begin{matrix} x_2, y_2 \\ (3, 2) \\ \text{2nd Point} \\ x_2, y_2 \end{matrix}$   $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-2}{3-(-1)} = \frac{0}{4} = 0$  horizontal line

Ex 3)  $\begin{matrix} x_1, y_1 \\ (0, 0) \\ \text{1st Point} \\ x_1, y_1 \end{matrix}$  &  $\begin{matrix} x_2, y_2 \\ (3, -3) \\ \text{2nd Point} \\ x_2, y_2 \end{matrix}$   $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3-0}{3-0} = \frac{-3}{3} = -1$  neg. slope

Ex 4)  $\begin{matrix} x_1, y_1 \\ (2, 4) \\ \text{1st Point} \\ x_1, y_1 \end{matrix}$  &  $\begin{matrix} x_2, y_2 \\ (2, 1) \\ \text{2nd Point} \\ x_2, y_2 \end{matrix}$   $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-4}{2-2} = \frac{-3}{0}$  undefined vertical line

Find the slope of the following lines:  $\frac{\text{rise}}{\text{run}}$



## 3-5 SLOPE EXAMPLE PROBLEMS

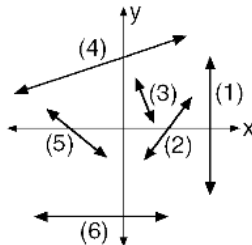
- 1) Determine whether each line in the coordinate system below has a positive, negative, zero, or no slope.

(undefined)

(1) undefined  
(vertical)

(2) positive

(3) negative



(4) positive

(5) negative

(6) zero  
(horizontal)

- 2) What is the slope of the line passing through  $(4,9)$  and  $(-1,12)$ ?

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{12 - 9}{-1 - 4} = \frac{3}{-5}$$

- 3) What is the slope of the line passing through  $(2,7)$  and  $(1,4)$ ?

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 7}{1 - 2} = \frac{-3}{-1} = 3 \text{ (positive slope)}$$

- 4) What is the slope of the line passing through  $(-2,5)$  and  $(-2,1)$ ?

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 5}{-2 - -2} = \frac{-4}{0} \text{ undefined slope}$$

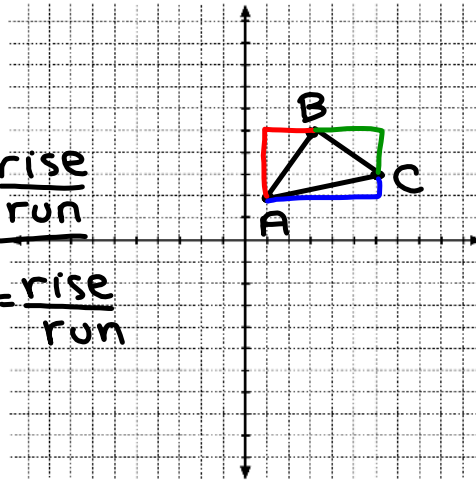
-2 + 2

9594 - 1 - Page 2

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

$$AB = \frac{5-2}{3-1} = \frac{3}{2} = \frac{\text{rise}}{\text{run}}$$

$$BC = \frac{5-3}{3-6} = \frac{2}{-3} = \frac{\text{rise}}{\text{run}}$$



$$CA = \frac{2-3}{1-6} = \frac{-1}{-5} = \frac{1}{5}$$

- 5) The vertices of a triangle are A(1,2), B(3,5), and C(6,3). Find the slope of each side of the triangle.

 $x_2, y_2$ 
 $x_1, y_1$