Name:_____
Date:_____

3-6 Lines in the Coordinate Plane

Notes:

The **slope** of a line is a measure of the *steepness* of a line and it can also be used to measure whether a line is increasing or decreasing as we move from left to right. Here is the precise definition of the slope of a line.

Given any two points on the line say, (x_1, y_1) and (x_2, y_2), the slope of the line is given by,

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

(x_1, y_1) and (x_2, y_2)

m = +

m = −

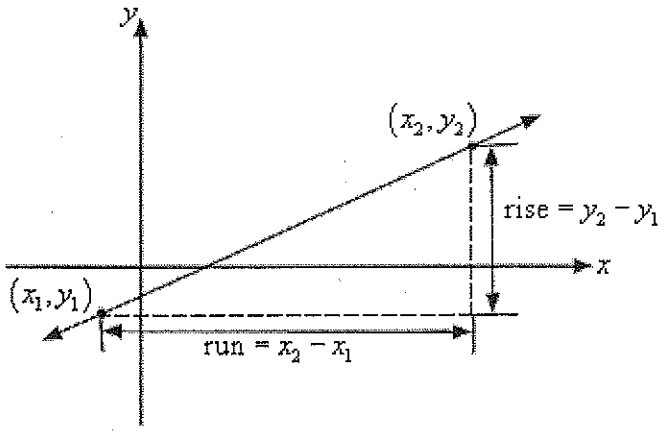
In other words, the slope is the difference in the y values divided by the difference in the x values.

When using this definition do not worry about which point should be the first point and which point should be the second point. You can choose either to be the first and/or second and we'll get exactly the same value for the slope.

There is also a geometric "definition" of the slope of the line as well. You will often hear the slope as being defined as follows,

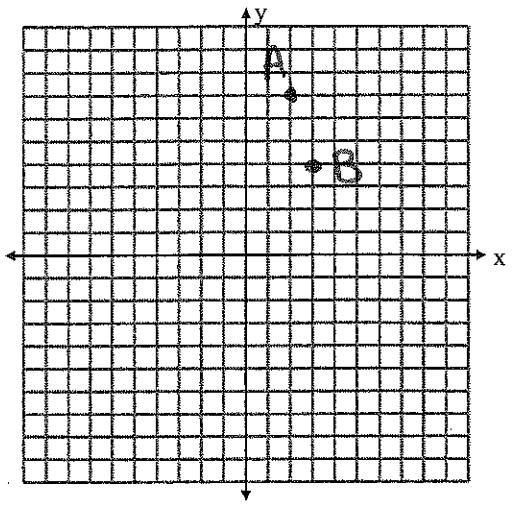
$$m = \frac{\text{rise}}{\text{run}}$$

The two definitions are identical as the following diagram illustrates. The numerators and denominators of both definitions are the same.



Ex. 1.) Given A (2,7) and B(3,4), find the slope of the line containing the two points.

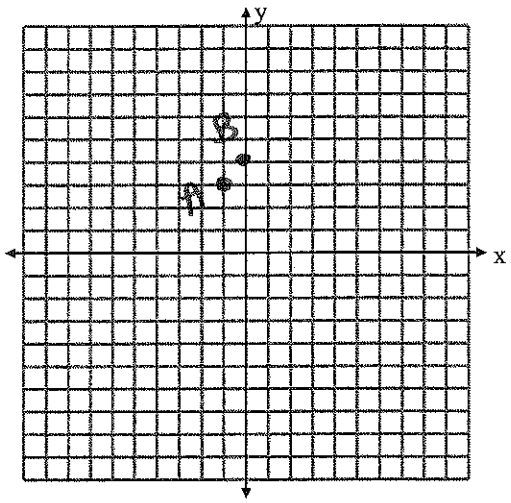
$m = \frac{-3}{1}$



Ex. 2.) Given A (-1,3) and B(0,4), find the slope of the line containing the two points.

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

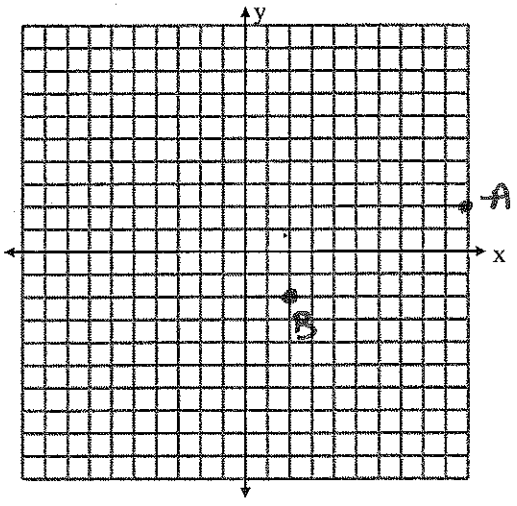
$m = 1$



Ex. 3.) Given A (10,2) and B(2,-2), find the slope of the line containing the two points.

$m = \frac{4}{8}$

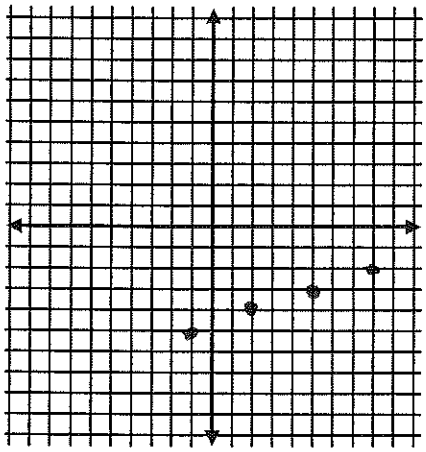
$m = \frac{1}{2}$



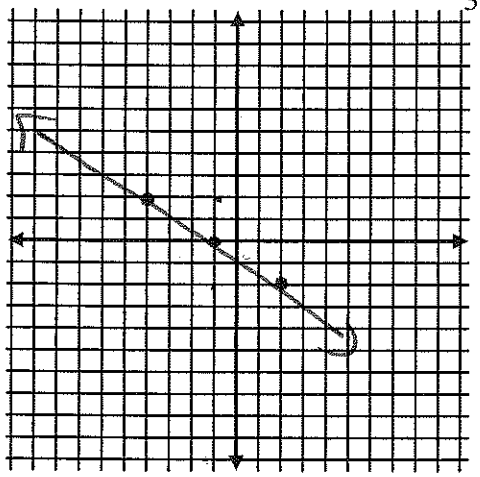
Cornell Notes Main Ideas/Questions	Name:_____ Date: _____ Title of Notes: **Graphing and Writing Equations of Lines (Point-Slope Form)**

Review:

1. Graph the line through(2,-4) with slope $\frac{1}{3}$



2. Graph the line that with a slope of $-\frac{2}{3}$ and passes through the point (-4,2)



Find the slope of the line that contains each pair of points

3. X(-1,4), P(3,-2)

$x_1 y_1 \quad x_2 y_2$

$m = \frac{-2-4}{3+1} = \frac{-6}{4} = -\frac{3}{2}$

4. R(-3,-4), S(5,-4)

$x_1 y_1 \quad x_2 y_2$

$m = \frac{-4+4}{5+3} = \frac{0}{8} = 0$

(horizontal)

5. K(-3,3), T(-3,1)

$x_2 y_2 \quad x_1 y_1$

$m = \frac{3-1}{-3+3} = \frac{2}{0}$

(vertical)

Cornell Notes Main Ideas/Questions	Title of Notes: **Cont'd**

I. Writing Equations

When given a point and the slope use the Point-Slope Form to write the equation.

Point-Slope Form: $(y-y_1)=m(x-x_1)$ m is slope and (x_1,y_1) is the point on the line.

Write the equation of line fitting each descriptions

Ex. 3

$m=\frac{1}{2}$, through the points (10, 5)

x_1, y_1

$y-5=\frac{1}{2}(x-10)$

Ex 4

$m=\frac{-4}{3}$, through the points (4, -3)

$y+3=\frac{-4}{3}(x-4)$

If given just two points find the slope first and then use the point slope form.

Ex. 5

Through points (-2,3) and (1,-1) $m=\frac{(y_2-y_1)}{(x_2-x_1)}$ $\frac{-1-3}{1+2}=\frac{-4}{3}$

x_1, y_1 $x_2 y_2$

$y+1=-\frac{4}{3}(x-1)$

Ex. 6

Through points (-3,2) and (3,2) $m=\frac{2-2}{3+3}=\frac{0}{6}=0$

x_1, y_1 $x_2 y_2$

Horizontal lines have a slope of 0 therefore the equation is always $y=$ # ← this # is the y-intercept

Vertical lines have a slope of undefined therefore the equation is always $x=$ # ← the x-int. $\frac{\#}{0}$