Algebra I Name ______________________________

Chapter 5 Notes

Sec 5.1 "Writing Linear Equations in Slope-Intercept Form"

***Recall that slope intercept form looks like y = mx + b, where m = slope and b = y=intercept**

1) <u>Writing an equation when given the slope and the y-intercept</u>:

Not too difficult … Just PLUG IN the values for m and b into the equation!

<u>Ex 1</u>: Write the equation of the line where slope is -2 and y-intercept is 4.

<u>Ex 2</u>: Write the equation of the line where slope is ½ and y-intercept is -1.

2) <u>Writing an equation when given a graph</u>:

a) Find the y-intercept
b) Find another exact point the line passes through
c) Use the two points to find the slope
d) Write the equation in slope-intercept form

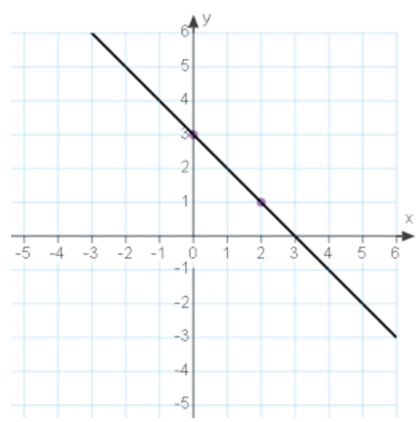
<u>Ex 3</u>:

a) y-intercept (b) =

b) Another point:

c) Slope (m) =

d) Equation:



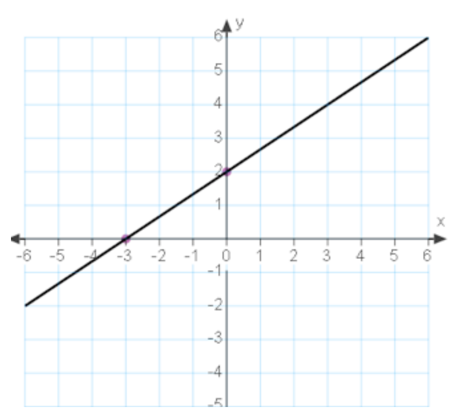
<u>Ex 4</u>:

a) y-intercept (b) =

b) Another point:

c) Slope (m) =

d) Equation:



3) <u>Writing Equations of CONSTANT FUNCTIONS</u>
*These are Horizontal and Vertical Lines!

Remember. . .
HORIZONTAL LINES cross the y-axis,
and the equation looks like y = #

VERTICAL LINES cross the x-axis,
and the equation looks like x = #

<u>Ex 5</u>: Write the equation of the horizontal line that passes through the point (-3,7)

<u>Ex 6</u>: Write the equation of the vertical line that passes through the point (-3, 7)

<u>Ex 7</u>: Write the equations of the Horizontal <u>and</u> Vertical lines that pass through the point (5, -1)

<u>Ex 8</u>:
You borrow $50 from your brother. To repay the loan, you pay him $10 per week. Write a linear equation to model the situation.

<u>Ex 9</u>:
John Deere rents out riding lawn mowers for a flat fee of $45 plus an additional $10 per day. Write an equation expressing the total cost.

Sec 5.2 "Writing Linear Equations Given the Slope and a Point"

To write linear equations when given the <u>slope</u> and a <u>point</u>, follow these steps:

1) Use the equation y = mx + b
2) Substitute in the values for y, m, and x.
3) Solve for b
4) Use m and b to write the linear equation

<u>Ex 1</u>:
Write an equation for the line that passes through (-1,4) and has a slope of 3.

Ex 2:
Write an equation for the line that passes through (2,5) and has a slope of -1.

Ex 3:
Write an equation for the line with an x-intercept of 5 and a slope of -3.

Writing Equations of Parallel Lines:
*Recall that *parallel* lines have the *same* slope!

Ex 4:
Write an equation of a line parallel to $y = -1/2x + 3$ and that passes through the point (-2,1).

Sec 5.3 "Writing Equations of Perpendicular Lines"

Writing Equations of Perpendicular Lines:
Non-vertical lines are PERPENDICULAR if and only if their slopes are **OPPOSITE RECIPROCALS**

Ex 1:
Given line 1 and line 2 are PERPENDICULAR:

SLOPE of Line 1	SLOPE of Line 2
-2/3	
2	
-1	
1/5	

Ex 2 & Ex 3: Are the following lines perpendicular? Explain why or why not.

Ex 2:
$y = -3x + 2$ and $y = 3x + 5$

Ex 3:
$y = -4/5\ x - 8$ and $y = 5/4\ x + 1$

Ex 4:
Write an equation of the line perpendicular to $y = -3x + 2$ and through the point (2,3).

Writing Equations of Parallel Lines:
*Remember that parallel lines have the SAME SLOPE!

Ex 5:
Write the equation of the line PARALLEL to $y = 2x - 8$ and through the point (-3,5)

Sec 5.5 "Point-Slope Form of a Linear Equation"

Point-Slope Form: $y - y_1 = m(x - x_1)$

When to use point-slope form:

1) When you are given the slope (m) and a point on the line (x_1, y_1)
   *(x_1, y_1) is the given point

2) When you are given two points on a line
   *First find the slope, then use either of the two points as (x_1, y_1)

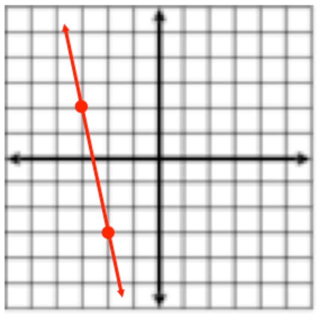
*Note:
Point-slope form is an INTERMEDIATE equation ONLY....
meaning you do not leave it in Point-Slope Form …ALWAYS rearrange the equation into $y = mx + b$

Steps:
1) **Find the slope if you are given 2 points (sometimes the slope will be given)**
2) **Plug in the values for x_1, y_1, and m into the equation**
3) **Rearrange into slope-intercept form**

Ex 1:
Find the point-slope form of the equation of the line passing through (2, -1) with slope of $m = 3$.

<u>Ex 2</u>:
Find the point-slope form of the equation passing through (-1, -2) and (3, 4).

<u>Ex 3</u>: Write the equation of the line using point-slope form



Sec 5.6 "The Standard Form of a Linear Equation"

<u>Standard Form of a Linear Equation</u>: Ax + By = C
*Variables are on the left, and the constant term is on the right
*A, B, and C are INTEGERS, and A and B cannot both be zero
(One or the other can be, but not both at the same time)
*A must be POSITIVE

<u>Ex 1</u>:

Write 4x + 7 = 3y in standard form.

<u>Ex 2:</u>

Write $y = \frac{4}{3}x - 2$ in standard form.

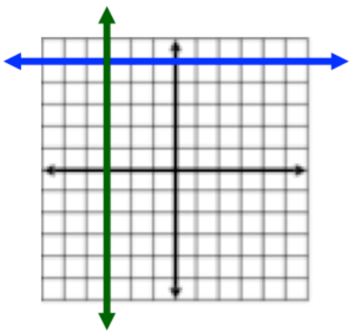
<u>Ex 3</u>:
Write an equation for the line in standard form that passes through (-8, 3) and has a slope of m = 2.

Use point-slope form first!

Change to standard form…

<u>Ex 4:</u> Write an equation for the line in standard form that passes through (-3, -3) and (7, 2).

<u>Ex 5</u>: Write an equation in standard form of the horizontal line and vertical line.



<u>Ex 6</u>: Write an equation in standard form of the horizontal line and vertical line that pass through the point (3, -5).

<u>Summary of Equations of Lines:</u>

Name of Equation:	**Equation Looks Like:**
Slope-Intercept Form	$y = mx + b$
Point-Slope Form	$y - y_1 = m(x - x_1)$
Standard Form	$Ax + By = C$ (A, B, and C are INTEGERS A is positive)
Vertical Line	$x = \#$ (slope is undefined)
Horizontal Line	$y = \#$ (slope = 0)

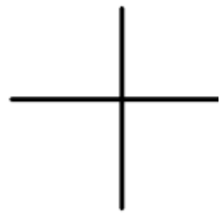
Sec 5.4 “Fitting a Line to Data”

Best-Fitting Line: The “best” line that fits all of the data

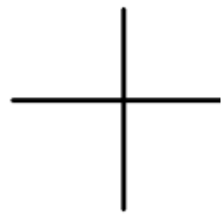
Correlation: Indicates how well a particular set of data can be approximated by a straight line

Three Types of Correlation

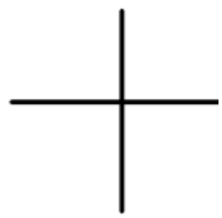
1) Positive Correlation
When the points on a scatter plot can be approximated by a line with _____________ slope



2) Negative Correlation
When the points on a scatter plot can be approximated by a line with a _____________ slope



3) Relatively No Correlation
When points on a scatter plot ______________ be well approximated by a straight line



Steps for finding a “Best-Fitting” Line:
1)Plot the data points on graph paper

2)Using a ____________, draw a best-fit __________ through the data points

3)Find _________ points on your line that you can identify the _________ coordinates of (not necessarily any of the data points you plotted)

4)Using the two coordinate points, do the 3-step process....
- Find ___________ $\mathbf{m = (y_1 - y_2)/(x_1 - x_2)}$
- Use __________ - ____________ form $\mathbf{y - y_1 = m(x - x_1)}$ to write an intermediate equation
- Rearrange into __________ - ____________________ form $\mathbf{y = mx + b}$

Example
Graph the following coordinates and draw a best-fit line.
Then write an equation that represents the data.

x	1	1.5	2	5	4	3	6	3	4
y	4	7	6	7	7	5	10	6	8