Chapter 6 Notes Name ______________________________

Section 6.1 "Solving One-Step Linear Inequalities"

<u>Graph of a linear Inequality</u>- the set of all points on a number line that represent all solutions of the inequality

$>$ or $<$	$\geq$ or $\leq$
__________ circle	___________ circle

<u>Phrase</u>	**<u>Expression</u>**	**<u>Graph</u>**
All real numbers less than 5	$x < 5$	
All real numbers greater than –3	$x > -3$	
All real numbers less than or equal to 0	$x \leq 0$	
All real numbers greater than or equal to –2	$x \geq -2$	

***<u>Solving Linear Equalities</u> is like solving linear equations. Your goal is to isolate the variable on one side by using transformations that produce equivalent inequalities!**

Ex 1: $x - 4 \leq 7$ Add 4 to both sides

Ex 2: $x + 5 > 9$ Subtract 5 from both sides

Ex 3: $\frac{2}{3}x > 4$ Multiply both sides by 3/2

***Special case:**
If you multiply or divide by a negative number you have to flip the inequality symbol!

Ex 4: $-x \leq 8$

Ex 5: $-2x > 8$

Ex 6: $\frac{-x}{2} \geq 15$

Ex 7: $\frac{-2x}{3} \leq 10$

When writing your inequality answer, have the variable on the left side.

Ex 8: $10 < x$

Ex 9: $-2 > 8 + x$

Section 6.2 "Solving Multi-Step Linear Inequalities"

***Solving multi-step inequalities is just like solving multi-step linear equations!**

Ex 1: $2x - 6 > 12$

Ex 2: $7 - 3x > 28$

Ex 3: $15 \leq 3x - 9$

Ex 4: $3x + 2 < 5x - 4$

Ex 5: $-2(x + 3) < 4x - 7$

Ex 6:
You have $20 to buy pizza for you and your friends. A large pizza is $17 plus $1.20 per topping. Write an inequality to find the number of toppings you can have on your pizza.

Section 6.3 "Solving Compound Inequalities"

<u>**Compound Inequality**</u>:
Consists of 2 inequalities combined together with "AND" or "OR"

Always written as a "sandwich" with **shading** in the **middle**

$\# < x < \#$
$\# \leq x \leq \#$

Always written as 2 separate pieces with **SHADING** on the **ENDS**

$x < \#$ OR $x > \#$
$x \leq \#$ OR $x \geq \#$

<u>**Writing Compound Inequalities**</u>

Ex 1: All real numbers greater than zero and less than five:

Ex 2: X is greater than 2 and less than or equal to 6:

Ex 3: A number less than 5 or greater than 7:

Ex 4: X is less than or equal to -3 or at least 10:

Solve the compound inequality and graph:

Ex 5: $-2 \leq 3x - 8 \leq 10$

Ex 6: $-3 < -6 - 2x < 6$

Ex 7: $2x + 4 < 7$ or $3x - 5 > 12$

Ex 8: $3x - 6 < 10$ or $-8 > -2x + 4$

Section 6.4 "Solving Absolute Value Equations and Inequalities"

*Recall that the symbol | | stands for Absolute Value. Absolute value means to take whatever is INSIDE the | | symbol and make it POSITIVE.

So if $|x| = 5$, then x could be either 5 or -5
Because … $|-5|$ = ____ and $|5|$ = ____

$|ax + b| = c$ means... $ax + b = c$ **or** $ax + b = -c$

Ex 1: Solve $|x - 2| = 5$

Ex 2: Solve $|2x - 5| - 4 = -2$

Absolute Value Equations and Inequalities are written as TWO equations or inequalities connected by an "AND" or "OR" statement.

$\lvert ax + b \rvert < c$	means	$ax + b < c$	**and**	$ax + b > -c$
$\lvert ax + b \rvert \le c$	means	$ax + b \le c$	**and**	$ax + b \ge -c$
$\lvert ax + b \rvert > c$	means	$ax + b > c$	**or**	$ax + b < -c$
$\lvert ax + b \rvert \ge c$	means	$ax = b \ge c$	**or**	$ax = b \le -c$

Helpful Hint: Over pronounciate:
"less thAND" ... **and** statement
"GreatOR than" ... **or** statement

Steps for Solving Absolute Value Equations and Inequalities:

1) Isolate the Absolute Value Term in the left side
2) Rewrite the inequality without the absolute value symbols
3) Check the symbol - write AND or OR after the inequality
4) Write the inequality again, but switch the inequality sign and change the sign of the constant term (+ to - *or* - to +)

Ex 3: Solve and Graph $|x - 3| \le 17$

<u>Ex 4</u>: Solve and Graph $|2x + 1| - 3 \geq 6$

<u>Ex 5</u>: Solve and Graph $|2x + 5| - 1 < 6$

Section 6.5 "Graphing Linear Inequalities in Two Variables"

A linear inequality in x and y looks like one of the following:

$ax + by < c$
$ax + by \leq c$
$ax + by > c$
$ax + by \geq c$

An ordered pair (x, y) is a solution to the inequality if the inequality is TRUE when you substitute in x and y and simplify…

<u>Ex 1</u>: $2x + 5y \geq 10$

Is (1, 2) a solution?

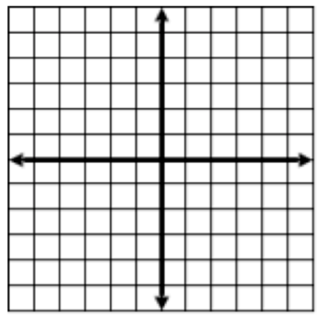
Is (6, 1) a solution?

Is (0, -1) a solution?

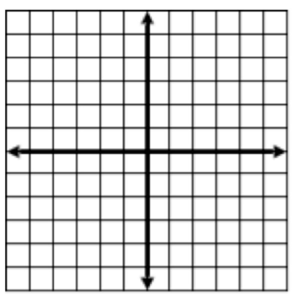
Steps for Graphing a Linear Inequality:

1) Graph the corresponding equation (change to slope-intercept form y = mx + b) using the slope and y-intercept
   a) Use a dashed line for inequalities with $<$ or $>$ to show that the points ON THE LINE are NOT solutions
   b) Use a solid line for inequalities with $\geq$ or $\leq$ to show that the points ON THE LINE ARE solutions
2) Test a point on either side of the line to determine if it is a solution or not by plugging it into the original inequality
   a) If the point IS a solution (TRUE), shade that section of the plane.
   b) If the point is NOT a solution (FALSE), shade the other section of the plane.

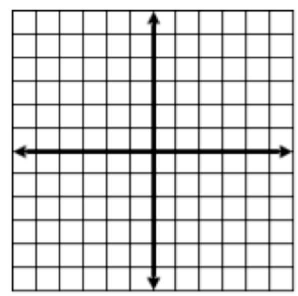
Ex 2: Graph $2x + 5y \geq 10$



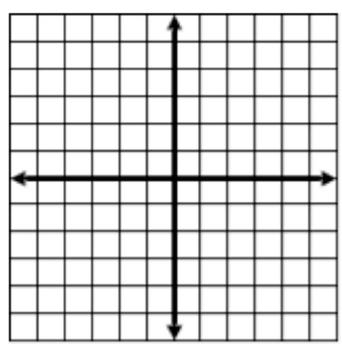
Ex 3: Graph $-2y < 8$



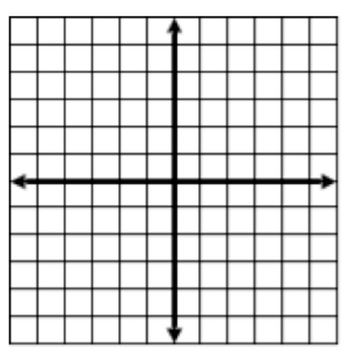
Ex 4: Graph $7x < 14$



Ex 5: Graph $2x - y \leq 0$



Ex 6: Graph $\frac{-3}{4}x + \frac{1}{2}y \leq -3$



6.6 "Mean, Median, and Mode" & 6.7 "Quartiles"

Measure of Central Tendency- a number that is used to represent a "typical" number in a data set (common measures of central tendencies are mean, median, and mode)

Mean- the sum of the numbers divided by the number of items; symbol for mean is x (also known as average)

Median- The middle number when the numbers are written in order (if there are an even number of data items, it is the average of the middle two)

Mode- the most frequently occurring number (a set of data can have more than one mode or no mode)

Ex 1: Find the mean, median, and mode of the data

4, 2, 10, 6, 10, 7, 10

Ex 2: Find the mean, median, and mode of the following test scores:

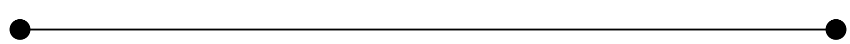
93, 91, 86, 47, 73, 82, 77, 64, 69, 55, 97, 88, 61, 59, 75, 97

QUARTILES

Second Quartile: (median) separates the data into two halves (numbers above the median and numbers below the median)

First Quartile: the median of the lower half of the data (also known as lower quartile)

Third Quartile: the median of the upper half of the data (also known as upper quartile)



Ex 3:
The number of patients at a hospital was logged over a period of 11 days:
50, 43, 66, 74, 29, 57, 60, 55, 66, 42, 71

A) Find the first, second, and third quartiles.

How to create a box-and-whisker plot:

1) Draw a number line with equal increments ranging from your ______________ data value to your _____________ data value
2) Plot below the number line with a _____________ the smallest value and the largest value
3) Plot the 1st, 2nd, and 3rd quartile; now draw a _______ from the 1st to 2nd quartile and from the 2nd to the 3rd quartile
4) Draw a _______________ from your 1st Q to the smallest value and a _________________ from the 3rd Q to the largest value
5) Label the ___ - _____________ summary (smallest, largest, 1st, 2nd, 3rd quartiles) on the box-and-whisker plot

Ex 3:

B) Create a box-plot given the hospital data

Number of patients: 29, 42, 43, 50, 55, 57, 60, 66, 66, 71, 74

1st Q = 43 2nd Q = 57 (median) 3rd Q = 66