Name______________ Date___________
8A; Algebra 1 Period_________

SOLVING INEQUALITIES

*An open sentence that contains <, >, ≤, or ≥ is an **inequality.**

For all numbers a,b,c

Addition Property of Inequalities

If $a < b$, Then $a + c < b + c$
If $a > b$, Then $a + c > b + c$

Subtraction Properties of Inequalities

If $a < b$, Then $a - c < b - c$
If $a > b$, Then $a - c > b - c$

*These inequality properties simply mean that you are able to add or subtract the same number to each side of the inequality and you will still get a true inequality

Multiplication Property of Inequalities

If $a > b$ and $c > 0$, then $ac > bc$
If $a < b$ and $c > 0$, then $ac < bc$
If $a > b$ and $c < 0$, then $ac < bc$
If $a < b$ and $c < 0$, then $ac > bc$

Division Property of Inequalities

If $a > b$ and $c > 0$, then $\frac{a}{c} > \frac{b}{c}$

If $a < b$ and $c > 0$, then $\frac{a}{c} < \frac{b}{c}$

If $a > b$ and $c < 0$, then $\frac{a}{c} < \frac{b}{c}$

If $a < b$ and $c < 0$, then $\frac{a}{c} > \frac{b}{c}$

*If you **multiply** (or **divide**) each side of an inequality by a **positive** number, the **order** of the inequality remains the same.

****If you **multiply** (or **divide**) each side of an inequality by a **negative** number, the **order** of the inequality is reversed.

*An open sentence that contains <, >, ≤, or ≥ is an **inequality**.

<	>	≤	≥
Less than	Greater than	Less than or equal to	Greater than or equal to

**If the same number is added (or subtracted) to each side of a true inequality, the resulting inequality is also true.

**You solve an inequality the same order you solve an equation (DCMS)

** If you multiply (or divide) each side of a true inequality by a positive number, then the inequality remains true, BUT if you multiply or divide by a **negative number**, you MUST reverse the directions of the inequality symbol to make it true!

Answers may also be written in **set-builder notation. Ex: $x \geq 20$, may also be written as $\{x \in \mathbb{R} \mid x \geq 20\}$ which is read x is an element of the real numbers, such that x is greater than or equal to 20 or **interval notation** $[20, \infty)$

**You must graph your solution set!

The following table will show you how to shade your circle depending on the given inequality. Remember to shade in the direction that will match your final answer.

<	>	≤	≥
○	○	●	●

Solving inequalities, like solving equations, consists of finding all values of the variable that make the inequality true.

***Exercise* #1:** Consider the linear inequality $2x+3>11$.

(a) Circle each of the following values of x that lie in the solution set of this inequality.

$x=-2$ $x=\pi$ $x=4$ $x=4.1$ $x=20$

(b) Solve the linear equation $2x+3=11$.

(c) What is the solution set of the linear inequality $2x+3>11$?

***Exercise* #2:** Which of the following represents the solution set of the inequality $11\geq 4x+3$?

(1) $x\leq 2$

(3) $x\geq 2$

(2) $x\leq -2$

(4) $x\geq -2$

Exercise #3: Solve the following inequalities, and graph your solution. Also, list the properties you used and write your answer in set-builder and interval notation.

(a) 2x - 4 > 12

(b) 12x - 14 ≤ 9x + 13

Exercise #4: Solve the following inequalities and <u>graph</u> your solution.. Write your answer in set-builder and interval notation.

(a) $-\frac{1}{2}x+5\geq -7$

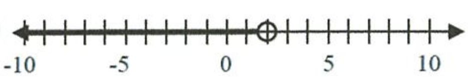
(b) $-7x + 3 < 31$

Exercise #5: Solve the following inequalities and <u>graph</u> your solution. Also, list the properties you used and write your answer in set-builder and interval notation.

(a) $5(2x + 11) \geq 3(x + 2)$

(b) $0.10x + 40 > 0.12x + 25$

Exercise #6: Which of the following represents the solution set of $16 > -3x + 10$?

(1)


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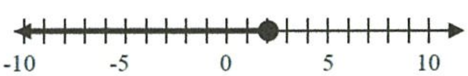

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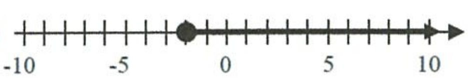

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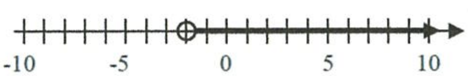

Exercise #7: Translate each verbal sentence into an algebraic inequality.

(a) Eight is less than four times a number added to ten.

(b) Twice the sum of x and 1 is greater than or equal to 18.