Name: _____   Date: _____

INEQUALITIES (JUST ANOTHER TRUE/FALSE QUESTION)
COMMON CORE ALGEBRA I

So far we have concentrated on solving equations. Remember, all solving an equation consisted of was finding values of the variable that made the two expressions equal (in other words made the equation **true**). We can also judge the **truth value** of a statement that is in the form of an inequality.

Exercise #1: For each inequality, state whether it is true or false.

(a) $7 > 3$

(b) $0 < 10$

(c) $9 > 12$

(d) $4 \leq 4$

(e) $2 \geq 7$

(f) $3.5 \leq 4.2$

(g) $256 > 312$

(h) $1,978 \leq 2,042$

It is quite easy for most students to judge an inequality when the numbers are positive. It becomes more difficult when negative numbers are involved.

Exercise #2: Consider the statement $-8 < 4$. Do you think this is true or false? Why? Which is the correct truth value and why?

There are lots of ways to formally define how to determine if one number is greater than another. We will use a graphical definition:

INEQUALITY DEFINITION

If we compare any two numbers, say a and b, we will say that $a > b$ is true if a lies to the **right** of b on a standard horizontal number line or **above** b on a standard vertical number line.

Exercise #3: Give the truth values for each of the following statements. Draw a number line to support your work.

(a) $3 > -4$

(b) $-5 > -3$

(c) $0 > -6$

So, since we can test the inequality of numbers now, we can also test the inequality of expressions for values of variables. This is identical to checking the truth value of an equation.

Exercise #4: Given the inequality $3(x-2) \geq 2x+1$ determine if it is true or false for the following values of x.

(a) $x = 10$

(b) $x = 5$

(c) $x = 1$

(d) $x = 7$

Notice that unlike equations, inequalities tend to have many values that make them true. We will eventually discuss that certain inequalities even have an **infinite** number of values for their variables that make them true.

Exercise #5: For each of the following inequalities, determine if it is true or false for the given value of the replacement variable.

(a) $2x+4 > 4x-1$ for $x = 1$

(b) $-3(x+5) \geq \dfrac{x+7}{2}$ for $x = -3$

(c) $x^2 - 10x + 1 < 20 + 5x$ for $x = -2$

(d) $\dfrac{2(x-5)+1}{3} \leq \dfrac{x-2}{9}$ for $x = 5$

Name: _____   Date: _____

INEQUALITIES
COMMON CORE ALGEBRA I HOMEWORK

FLUENCY

1. For each inequality, state whether it is true or false.

(a) $3 \le 8$ (b) $8 < 4$ (c) $9 > 9$ (d) $1,245 \le 1,245$

(e) $-12 \ge -6$ (f) $3^2 \le 5^2$ (g) $(-3)^2 \ge 3^2$ (h) $.99 \le .98$

2. For each of the following inequalities, determine if it is true or false for the given value of the replacement variable.

(a) $3x + 2 \le 2x - 5$ for $x = 8$ (b) $3x + 2 \le 2 - 3x$ for $x = -2$

(c) $(x-3)^2 > -3(x+2)$ for $x = 3$ (d) $\dfrac{2(3-2x)}{5} \le 2x - 3(x+1)$ for $x = -1$

(e) $\dfrac{x^2 - 4x + 9}{6} > \dfrac{3x+1}{5}$ for $x = 3$ (f) $\left| \dfrac{-2(5-x)}{3} \right| \ge \dfrac{3x-1}{2}$ for $x = -1$

APPLICATIONS

3. A pressure gage for a boiler allows the boiler to run as long as $\dfrac{3(x+5)-1}{2}+4(2x-3)\leq 125$ psi, where x is the pressure reading at the sensor. If the pressure gets too high the machine will shut down to prevent any injuries but it will also cost the company money. Test the following values to see what pressures will be safe for the machine to run at.

Pressure readings	Calculations	Safe?
$x = 12$		
$x = 13$		
$x = 14$		

(b) If the machine cannot run unless the has a pressure above 35 pounds per square inch, test to see if a reading of 5 would keep the machine functional.

REASONING

4. Write the appropriate inequality sign $(<$ or $>)$ in the box that will make each of the following true at the given point.

(a) $4x+2$ ☐ $1-3x$ for $x=-2$

(b) $\dfrac{2x+1}{-3}$ ☐ $4(2-3x)$ for $x=-2$

(c) $2x^2+5$ ☐ $|1-9x|$ for $x=4$

(d) $\dfrac{3(2x-5)}{3}+2$ ☐ $8(3x-6)$ for $x=5$