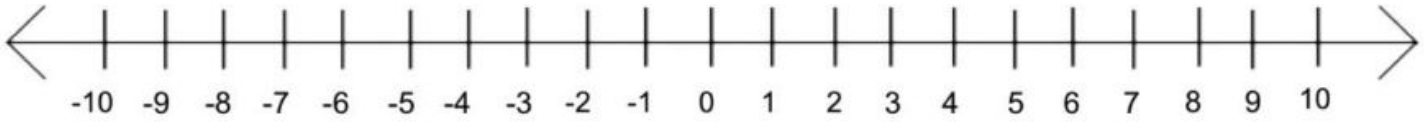
A. Bigger and Smaller:

This is a number line. Numbers that are BIGGER are farther to the RIGHT. Numbers that are SMALLER are farther to the LEFT. For example, **2 < 5** because 2 is to the left of 5. However, -5 < -2, because -5 is to the left of -2. You can think of the inequality symbol as an arrow.



1. Use the number line to put these numbers in order from smallest to biggest:

Outy of Order	In Order
-10, 4, 3, 0, 2, -4, -3, 2.5, -7	

2. Some of these inequalities are true and some are false. Sort them into true and false inequalities.

Unsorted Inequalities	True Inequalities	False Inequalities
-3<5 -3>5 4<6 -4<6 7>9 4<-6 7>-9 -1>0 3<5 -1<0		

B. Linear Inequalities

a. Consider the inequality $5x < 30$. I know that $x = 2$ is a solution, because $5(2) = 10 < 30$. I know that $x = 10$ is NOT a solution, because $5(10) > 30$. Find 2 other numbers that ARE solutions, and 2 other numbers that ARE NOT solutions.

Solutions	Reasoning	Not Solutions	Reasoning
$x = 2$	$5(2) = 10;\ 10 < 30$	$x = 10$	$5(10) = 50;\ 50 < 30$??

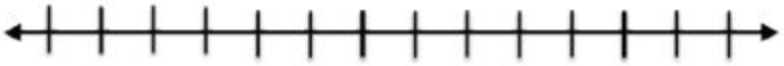
b. Consider the inequality $10x - 2 \leq 18$. Find 3 solutions to this inequality. In other words, find 3 values of x that make the inequality true. Then, find 3 values of x that ARE NOT solutions.

Solutions	Reasoning	Not Solutions	Reasoning

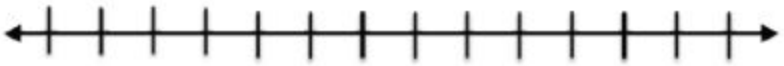
c. What is the largest value of x that solves the inequality $10x - 2 \leq 18$? How do you know it is the largest possible solution? Is there a smallest possible solution? Why or why not?

d. Solve the equation $10x - 2 = 18$. How does your solution relate to question (c)?

e. Now, let's solve and graph $10x - 2 \leq 18$ on a number line together:



f. **You try**: $4x - 1 \geq 19$



Notes

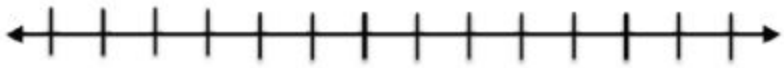
A **boundary point** is the smallest (or largest depending on whether it is a < or > problem) solution to an inequality. A **test point** can be used to check to see where solutions lie relative to the boundary point. See Solving Linear Inequalities for further guidance.

We use _____ if the inequality symbol is < or >.

We use _____ if the inequality symbol is $\leq$ or $\geq$.

g. Solve and graph the inequality $12 - 3x \leq 15$.

h. Solve and graph the inequality $-20 \geq -2 - 6x$



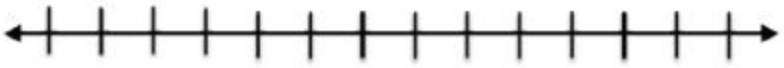
i. How are **problems g and h** above different from the other problems we solved?

j. Chris came up with her own rule when solving inequalities. She said, "The inequality symbol in the *original* problem always matches the inequality symbol in the solution." Is Chris right? If not, write your own rule.

Practice:

Solve each inequality below. Write your solution using inequality symbols ($<$, $>$, $\leq$, $\geq$) and graphically on a number line.

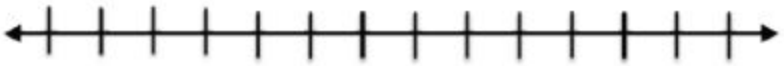
1. $5 + 2x \geq 1$ Solution: _____



2. $4x - 3 < 10x + 21$ Solution: _____

3. $2(x - 1) - 3 >- 11$ Solution: _____

4. $5 - (x - 3) \leq 18$ Solution: _____



5. $4x + 10 - 2x \leq- 18$

Solution: _____