

Lesson 5.1 Notes (Solving Inequalities by Addition and Subtraction)

Objectives:

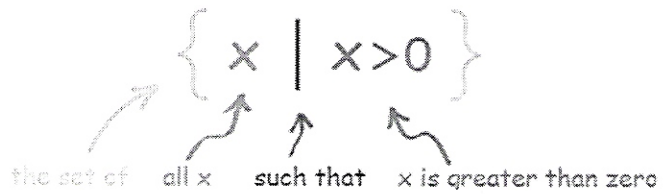
- Solve linear inequalities by using addition.
- Solve linear inequalities by using subtraction.

Inequality – an open sentence that contains $<$, $>$, \leq , or \geq .

Concept Summary Phrases for Inequalities			
$<$	$>$	\leq	\geq
less than fewer than	greater than more than	at most, no more than, less than or equal to	at least, no less than, greater than or equal to

Set-Builder Notation

- Example: $x \geq 20 \rightarrow \{x \mid x \geq 20\}$
 - “The set of all numbers x such that x is greater than or equal to 20”



- Practice: $y < 5 \rightarrow \{y \mid y < 5\}$

One-Step Inequalities (Addition and Subtraction)

- Basic inequalities involving addition and subtraction can be solved using the same method as equations.
- **Hint:** Put the variable on the left side before graphing.

Addition and Subtraction Properties of Inequalities

For any inequality, if the same quantity is added or subtracted to each side, the resulting inequality is true.

If $a > b$, then $a + c > b + c$. If $a < b$, then $a + c < b + c$.

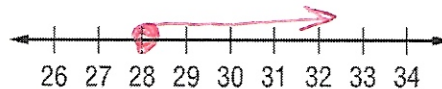
If $a > b$, then $a - c > b - c$. If $a < b$, then $a - c < b - c$.

- Examples: Solve each inequality. Then, graph the solution set on a number line.

1. $t - 12 \geq 16$

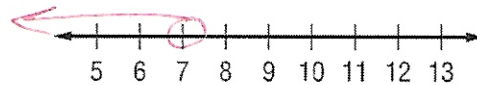
$$\begin{array}{r} +12 \quad +12 \\ \hline t \geq 28 \end{array}$$

$t \geq 28$



2. $16 > h + 9$

$$\begin{array}{r} -9 \quad -9 \\ \hline 7 > h \end{array} \Rightarrow \text{span style="border: 1px solid red; padding: 2px;"> $h < 7$$$



Inequalities with Variables on Each Side

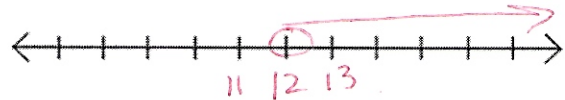
- Similar to equations, your goal is to isolate the variable on one side of the inequality.
- Examples: Solve each inequality. Then, graph the solution set on a number line.

3. $3a + 6 \leq 4a$

$$\begin{array}{l} 6 \leq a \\ \boxed{a \geq 6} \end{array}$$

4. $5h > 12 + 4h$

$$\boxed{h > 12}$$

**Writing and Solving Inequalities** – use key words to convert words into an inequality

- Examples: Define a variable, write an inequality, and solve each problem.

5. The sum of a number and 8 is
- at most*
- 12.

$$\boxed{x + 8 \leq 12}$$

$$\begin{array}{r} x + 8 \leq 12 \\ -8 \quad -8 \\ \hline \boxed{x \leq 4} \end{array}$$

6. The sum of a number and 6 is
- greater than or equal to*
- 4.

$$\boxed{x + 6 \geq -4}$$

$$\begin{array}{r} x + 6 \geq -4 \\ -6 \quad -6 \\ \hline \boxed{x \geq -10} \end{array}$$

7. A number decreased by 4 is less than 14.

$$\boxed{x - 4 < 14}$$

$$\begin{array}{r} x - 4 < 14 \\ +4 \quad +4 \\ \hline \boxed{x < 18} \end{array}$$

8. Felipe needs for the temperature of his gecko's basking spot to be at least 82°F. Currently, the basking spot is 62.5°F. How much warmer does it need to be?

$$62.5 + t \geq 82$$

$$t \geq 19.5^\circ\text{F}$$

It needs to be at least 19.5°F warmer.