

Algebra 1 5.1

* 8th grade standard

Solve linear inequalities by using addition*

Solve linear inequalities by using subtraction*

inequality

set builder notation

addition property

subtraction property

whiteboards

triangle puzzles

$$\begin{array}{r} 5 > 2 \\ -3 \quad -3 \\ \hline 2 > -1 \end{array}$$

$$\begin{array}{r} 5 > 2 \quad \text{true?} \\ +3 \quad +3 \\ \hline 8 > 5 \end{array}$$

KeyConcept Addition Property of Inequalities

Words If the same number is added to each side of a true inequality, the resulting inequality is also true.

Symbols For all numbers a , b , and c , the following are true.

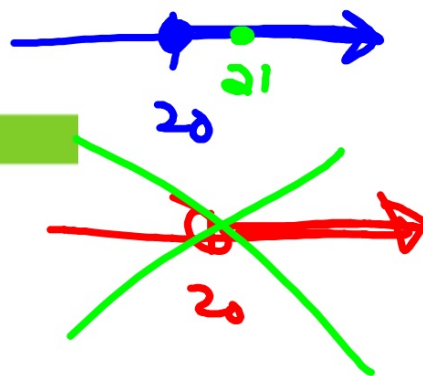
1. If $a > b$, then $a + c > b + c$.
2. If $a < b$, then $a + c < b + c$.

This property is also true for \geq and \leq .

How would you solve if =?

$$\begin{array}{r} x + 12 \geq 8 \\ +12 \quad +12 \\ \hline x \geq 20 \end{array}$$

$x > 20$



Example 1 Solve by Adding

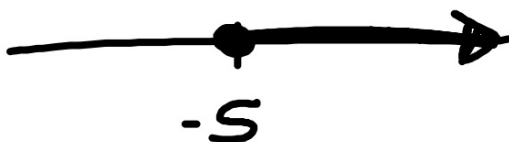
Solve $x - 12 \geq 8$. Check your solution.

$$\begin{array}{r} 21 - 12 \geq 8 \\ 9 \geq 8 \end{array} \quad \text{!}$$

$$1B. d + 14 \geq -19$$

$$\begin{array}{r} +14 \\ +14 \end{array}$$

$$d \geq -5$$



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Guided Practice

$$\begin{aligned} 22 &> 13 + -8 \\ 22 &> 5 \quad \text{☺} \end{aligned} \quad \approx$$

Solve each inequality. Check

$$\begin{array}{r} 1A. \quad 22 > m - 8 \\ \quad +8 \quad +8 \\ \hline \end{array}$$

$$\begin{aligned} 30 &> m \\ m &< 30 \end{aligned}$$



$$\{m \mid m < 30\}$$

set-builder notation.

ReadingMath

set-builder notation

$\{x \mid x \geq 20\}$ is read *the set of all numbers x such that x is greater than or equal to 20.*

$\{x \mid x \geq 20\}$.

$x =$
 $x >$

$\{x \mid x \geq 20\}$

The dot at 20 shows that 20 is included in the graph.

The heavy arrow pointing to the right shows that the graph includes all numbers greater than 20.



How would you solve if = ?

Standardized Test Example 2 Solve by Subtracting

Smato?

Solve $m + 19 > 56$.

$-19 \quad -19$

$$\underline{\hspace{10em}}$$
$$m > 37$$

$$\{m \mid m > 37\}$$



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Guided Practice

S.B.

2. Solve $p + 8 \leq 18$.

$$\begin{array}{r} + - 8 \quad + - 8 \\ \hline \end{array}$$

$$p \leq 10$$

$$\{ p \mid p \leq 10 \}$$

$$\begin{array}{r} 3a + 6 \leq 4a + 3 \\ -3a \qquad -3a \\ \hline \end{array}$$

$$\begin{array}{r} 6 \leq a + 3 \\ -3 \qquad -3 \\ \hline \end{array}$$

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$$\begin{array}{r} 3y + 6 \leq 2y \\ -2y \qquad -2y \\ \hline y + 6 \leq 0 \\ -6 \quad -6 \\ \hline y \leq -6 \end{array}$$

Example 3 Variables on Each Side

Solve $3a + 6 \leq 4a$. Then graph the solution set on a number line.

$$+3a + -3a$$

$$\rightarrow 6 \leq a$$

$$a \geq 6$$

$$4y + 8 \leq 3y$$

$$\begin{array}{r} -3y \\ \hline y + 8 \leq 0 \\ -8 \quad -8 \end{array}$$

$3a + 6 \leq 4a$
 $-4a$
 $-a$
 $-a + 6 \leq 0$

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GuidedPractice

Solve each inequality. Then graph it.

3A. $9n - 1 < 10n$

3B. $5h \leq 12 + 4h$

triangle puzzle (if time)

What are the 3 options?

| ConceptSummary 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 |

Real-World Example 4 Use an Inequality to Solve a Problem

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



Real-WorldLink

Leopard geckos are commonly yellow and white with black spots. They are nocturnal and easy to tame. They do not have toe pads like other geckos, so they do not climb.

Source: Exotic Pets