

Algebra 1

5.3

*7th grade standard

Solve multi-step linear inequalities*

Use the distributive property to solve linear inequalities*

order of operations

distributive property

inequality

empty set

all real numbers

Whiteboards

Triangle puzzle

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What are steps to solve a multi-step
EQUATION?

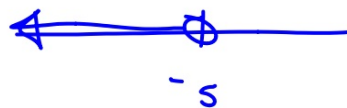
$$\begin{array}{rcl} 2(3x + 6) & < & 24 \\ 6x + -12 & < & 24 \\ \quad +12 \quad +12 & & \\ \hline \frac{6x}{6} & < & \frac{36}{6} \\ x & < & 6 \end{array}$$

What would you do to solve an equation?

Example 2 Inequality Involving a Negative Coefficient

Solve $-11y - 13 > 42$. Graph the solution on a number line.

$$\begin{array}{rcl} -11y - 13 & > & 42 \\ +13 & +13 & \\ \hline -11y & > & 55 \\ \hline -11 & & -11 \\ y & < & -5 \end{array}$$



$$2A. 23 \geq 10 - 2w$$

$$\begin{array}{r} -10 \quad -10 \\ \hline \end{array}$$

$$\frac{13}{-2} \geq \frac{-2w}{-2}$$

$$-\frac{13}{2} \leq w$$



2B. $43 > -4y + 11$

Triangle puzzle

Example 3 Write and Solve an Inequality



Define a variable, write an inequality, and solve the problem.

Five minus 6 times a number is more than four times the number plus 45.

n = a number

$$\begin{array}{rcl} 5 - 6n & > & 4n + 45 \\ -5 - 4n & & -4n - 5 \\ \hline -10n & > & 40 \\ -10 & & -10 \\ \boxed{n < -4} \end{array}$$

Guided Practice

3. Two more than half of a number is greater than twenty-seven.

$$\begin{array}{l} \frac{1}{2}n \quad (+2) > 27 \\ \quad \quad (-2) \quad \quad \quad -2 \\ \hline \frac{2}{1} \cdot \frac{1}{2}n > 25 \cdot \frac{2}{1} \\ n > 50 \end{array}$$

Example 4 Distributive Property

Solve $4(3t - 5) + 7 \geq 8t + 3$. Graph the solution on a number line.

4A. $6(5z - 3) \leq 36z$

4B. $2(h + 6) > -3(8 - h)$

What does it look like when there is no solution to an equation?

What does it look like when the solution is all real numbers?

$$2(n+3) > 2n-7$$

$$\begin{array}{r} 2n + 6 > 2n - 7 \\ -2n \quad -6 \quad -2n \quad -6 \\ \hline 0 > -13 \end{array}$$

all numbers

$$2(n-6) > 2n+15$$

$$\begin{array}{r} 2n - 12 > 2n + 15 \\ -2n \quad +12 \quad -2n \quad +12 \\ \hline 0 > 27 \quad \text{NS} \end{array}$$

Example 5 Empty Set and All Reals

Solve each inequality. Check your solution.

a. $9t - 5(t - 5) \leq 4(t - 3)$

b. $3(4m + 6) \leq 42 + 6(2m - 4)$

Solve each inequality. Check your solution.

5A. $18 - 3(8c + 4) \geq -6(4c - 1)$

5B. $46 \leq 8m - 4(2m + 5)$