

inequality - a mathematical sentence that states that two expressions are NOT equal or may NOT be equal

inequality symbol - symbol used to compare both sides of an inequality



solution set - a list of values that make an inequality true {x, y, z ...}

Translating inequality word phrases

Algebraic Phrase	Algebraic Inequality	Solutions
1. a number is less than 4.	$x < 4$	{3, 2, 1...}
2. a number is more than 4.	$x > 4$	{5, 6, 7...}
3. -4 is less than a number.	$-4 < x$	{-3, -4, -5...}
4. -4 is greater than a number.	$-4 > x$	{-5, -6, -7...}
5. Jason has at least five dollars.	$d \geq 5$	{5, 6, 7...}
6. The highest grade you can get is a ninety-five.	$g \leq 95$	{95, 94, 93...}

TOPIC:
Solving
Inequalities

Lesson Essential Question:

How can we model real life situations to solve an inequality?

**SOLVING
One-Step
Inequalities**
(REVIEW from
6th Grade)

- EXAMPLE:**
- 1) DRAW your RIVER (a line to separate left-side from the right-side)
 - 2) Box your variable
 - 3) Perform inverse (or opposite) operation.
 - 4) Box your final answer.

$$x + 8 < 21$$

$$\boxed{x} + 8 < 21$$

$$\boxed{x} + 8 < 21$$

$$\underline{-8} \quad \underline{-8}$$

$$\boxed{x} < 13$$

$$3x \leq 21$$

$$3x \leq 21$$

$$\underline{3x} \leq \underline{21}$$

$$\underline{3} \quad \underline{3}$$

$$\boxed{x} \leq 7$$

****ALWAYS CHECK****
Does my answer make sense?

DID MY ANSWER HAVE???

■ VARIABLE TERM ■ an INEQUALITY SIGN ■ CONSTANT

When multiplying or dividing by a negative,
switch the inequality symbol to its opposite.

EXAMPLE:

$$-3x \geq 21$$

$$\begin{array}{r} -3x \geq 21 \\ -3 \quad -3 \end{array}$$

$$x \leq -7$$

CHECK:

if $x = -5$

$$\begin{array}{l} -3(-5) \geq 21 \\ 15 \geq 21 \quad \times \end{array}$$

if $x = -9$

$$\begin{array}{l} -3(-9) \geq 21 \\ 27 \geq 21 \quad \checkmark \end{array}$$

EXAMPLE:

$$8 - x > 20$$

$$\begin{array}{r} 8 - x > 20 \\ -8 \quad -8 \\ \hline -x > 12 \\ -1 \quad -1 \end{array}$$

$$x < -12$$

Solution Set:

$$\{-7, -8, -9\dots\}$$

Solution Set:

$$\{-13, -14, -15\dots\}$$

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SOLVING
Two-Step
Inequalities

EXAMPLE:

1) DRAW your RIVER (a line to separate left-side from the right-side.)

2) Perform inverse (or opposite) operation.

3) Flip the symbol.

4) Box your final answer.

5) Check your answer.

$$-x + 8 > 21$$

$$\boxed{-x} + 8 > 21$$

$$\boxed{-x} + 8 > 21$$

$$\underline{-x} \quad \underline{-8} \quad \underline{-8}$$

$$\underline{-x} > \underline{13}$$

$$\underline{-1} \quad \underline{-1}$$

$$\boxed{x < -13}$$

CHECK

(choose a possible solution)

if $x = -12$

$$-(-12) + 8 > 21$$

$$12 + 8 > 21$$

$$20 > 21 \quad \times$$

if $x = -14$

$$-(-14) + 8 > 21$$

$$14 + 8 > 21$$

$$22 > 21 \quad \checkmark$$

****ALWAYS CHECK your answer. Does it make sense?**

DID MY ANSWER HAVE???

■ VARIABLE TERM ■ an INEQUALITY SIGN ■ CONSTANT

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SOLVING
Two-Step
Inequalities

EXAMPLE:

1) DRAW your RIVER (a line to separate left-side from the right-side.)

$$\frac{-3x}{5} \geq \frac{15}{5}$$

$$\frac{-3x}{5} \geq 3$$

2) Perform inverse operations.

$$5 \cdot \frac{-3x}{5} \geq \frac{15}{5} \cdot 5$$

$$-3x \geq 15$$

3) Flip the symbol.

$$\frac{-3x}{-3} > \frac{15}{-3}$$

$$x > -5$$

4) Box your final answer.

$$x \leq -25$$

5) Check your answer.

CHECK

(choose a possible solution)

if $x = -24$

$$\frac{-3(-24)}{5} \geq 15$$

$$14.4 \geq 15 \quad \text{X}$$

if $x = -26$

$$\frac{-3(-26)}{5} \geq 15$$

$$15.6 \geq 15 \quad \checkmark$$

DID MY ANSWER HAVE???

■ VARIABLE TERM ■ an INEQUALITY SIGN ■ CONSTANT

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SOLVING
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EXAMPLE: $\frac{x - 3}{4} \geq 1$

1) **DRAW** your river. $4 \frac{x - 3}{4} \geq 1 \quad 4$

2) Perform inverse operations. $x - 3 \geq 4$
 $+3 \quad +3$

3) **Box** your final answer. $x \geq 7$

4) Check your answer.

CHECK:

Solution Set:

DID MY ANSWER HAVE???

■ VARIABLE TERM ■ an INEQUALITY SIGN ■ CONSTANT

graph of an inequality - a number line that shows the solution to an inequality, since there are infinite solutions

Two steps:

1. choose open or closed circle at first point of solution



2. choose to shade left or right



$$X < \#$$

OR

$$\# > X$$



$$X > \#$$

OR

$$\# < X$$

Solve and Graph each Inequality

Ex 1) $4x + 6 < 12$



Solve and Graph each Inequality

Ex 2) $2x - 3 - 8x \geq 21$

Solve and Graph each Inequality

Ex 3) $7(2x - 4) - 12x > -12$



Word Problems with Inequalities

Don't panic! Remember to:

- Read the questions carefully.
- Define the variable.
- Write an inequality.
- Solve the inequality.
- Check that your answer is reasonable.
- Answer in a complete sentence.

Key Concepts

Symbol	Description	Example	
$>$	greater than, more than, over, above	$x > 3$	
\geq	greater than or equal to, at least, no less than, minimum	$x \geq 3$	
$<$	less than, fewer than, below, under	$x < 3$	
\leq	less than or equal to, no more than, at most, maximum	$x \leq 3$	