

8th Grade Math
Lesson: April 6, 2020

Objective:

Students will solve and graph inequalities with variables on one side.

Let's Get Started:

Watch [this video](#).

You can follow along with the video using the next slide.

Priority Standards Review: Inequalities Lesson

- used for $< > \neq$
- used for $\leq \geq =$

Negative Values



When we multiply or divide by a **negative number** we must **reverse** the inequality.

Example:

$$-3x + 5 \leq -16$$

$$\begin{array}{r} -5 \\ -5 \end{array} \quad \text{Subtract}$$

$$-3x \leq -21$$

$$\begin{array}{r} -3x \\ -3 \end{array} \geq \begin{array}{r} -21 \\ -3 \end{array} \quad \text{Divide by } -3, \text{ reverse inequality}$$

$$x \geq 7$$

$$\frac{b}{-3} + 4 < 13$$

$$\begin{array}{r} -4 \\ -4 \end{array}$$

$$\frac{b}{-3} < 9 \cdot -3$$

$$b > -27$$



Lesson Extra Practice Resources:

Video:

[Khan Academy: One Step Inequalities Video](#)

More Explanation:

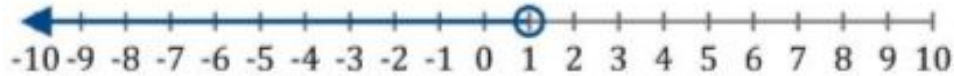
[Khan Academy: Multi Step Inequalities Video](#)

Warm Up:

Fill in the box with the inequality sign for each number line.

**Answers on the next page.

$x \square 1$



$x \square -6$



$x \square 1$



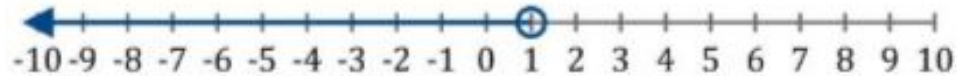
○ *used for* $<$ $>$ \neq

● *used for* \leq \geq $=$

Warm Up: **Answers**

Fill in the inequality sign for the number line.

$$x < 1$$



$$x \geq -6$$



$$x \leq 1$$



Lesson: Part 1

Solving Two-Step Inequalities

1. Add or subtract to isolate the variable term.
2. Multiply or divide to solve for the variable. If **multiply or divide** by a **negative number** then **reverse the inequality symbol**.

Example

$$\cancel{-8} - 10a \leq 72$$

$$+8 \quad \quad \quad \underline{+8} \quad \text{Add}$$

$$\underline{-10a} \leq 80$$

$$\underline{-10} \quad \underline{-10} \quad \text{Divide the } -10$$

$$a \geq -8 \quad \text{Reverse the inequality sign}$$

Negative Values



When we multiply or divide by a **negative number** we must **reverse** the inequality.

Practice: Part 1

Solve the two-step inequalities on piece of paper. Then, graph your solution on a number line.

**Answers on the next page.

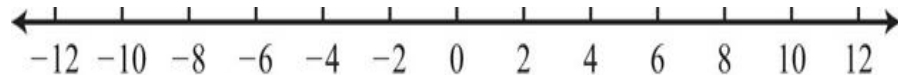
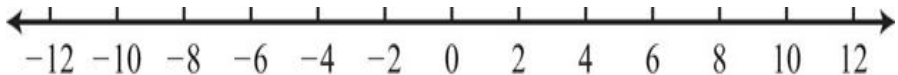
Negative Values



When we multiply or divide by a **negative number** we must **reverse** the inequality.

$$-2n - 7 \leq 15$$

$$4x + 1 > 13$$



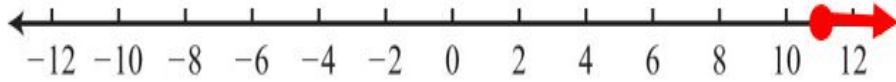
Practice: Part 1 Answer Key

Solve the two-step inequalities.

$$\begin{array}{r} -2n - 7 \leq 15 \\ +7 \quad +7 \\ \hline -2n \leq 22 \\ -2 \quad -2 \\ \hline n \geq 11 \end{array}$$

$$4x + 1 > 13$$

$$\begin{array}{r} 4x + 1 > 13 \\ \underline{-1 \quad -1} \\ 4x > 12 \\ \frac{4x}{4} > \frac{12}{4} \\ x > 3 \end{array}$$



Lesson: Part 2

Solving Multi-Step Inequalities

These steps are very similar to solving equations.

1. Distribute into the parenthesis
2. Combine any like terms.
3. Add or subtract to isolate the variable term.
4. Multiply or divide to solve for the variable. If **multiply or divide** by a **negative number** then **reverse the inequality symbol**.

Example

$$4(8 - 2b) - b \leq 50$$

Distribute

$$32 - 8b - b \leq 50$$

Combine like terms

$$32 - 9b \leq 50$$

Isolate variable term (In this case this is b)

$$\begin{array}{r} -32 \\ \hline -9b \leq 18 \end{array}$$

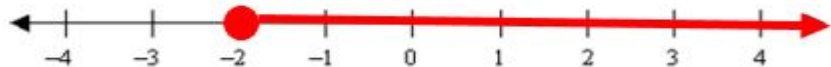
$$\begin{array}{r} -9b \leq 18 \\ \hline -9 \quad -9 \end{array}$$

Divide the coefficient to solve for variable.

$$\begin{array}{r} -9b \leq 18 \\ \hline -9 \quad -9 \end{array}$$

$$b \geq -2$$

Graph on a number line.



Practice: Part 2

Solve the multi-step inequalities on piece of paper. Then, graph your solution on a number line.

**Answers on the next page.

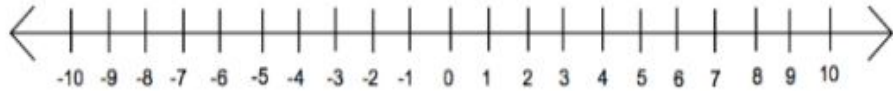
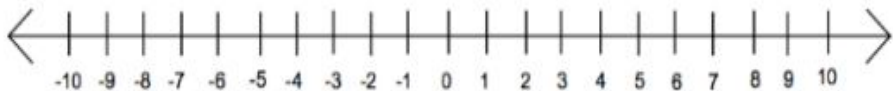
Negative Values



When we multiply or divide by a **negative number** we must **reverse** the inequality.

$$5x + 2(x + 1) \geq 23$$

$$-2(y + 4) - 2y > 8$$



Practice: Part 2 **Answer Key**

Solve the multi-step inequalities on piece of paper. Then, graph your solution on a number line.

Negative Values



When we multiply or divide by a **negative number** we must **reverse** the inequality.

$$5x + 2(x + 1) \geq 23$$

$$x \geq 3$$



$$-2(y + 4) - 2y > 8$$

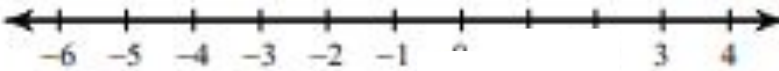
$$y < -4$$



Final Practice

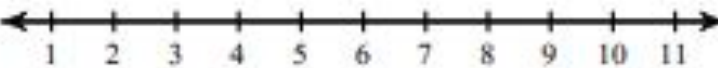
Solve the multi-step inequalities on piece of paper. Then, graph your solution on a number line.

1. $6x + 2 + 6x < 14$




A number line with arrows at both ends, ranging from -6 to 4. Tick marks are labeled at -6, -5, -4, -3, -2, -1, 3, and 4. There is a small mark between -1 and 0.

2. $5(6 + 3r) + 7 \geq 127$



A number line with arrows at both ends, ranging from 1 to 11. Tick marks are labeled at 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11.

3. $-3 - 6(4x + 6) > -111$

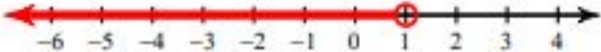


A number line with arrows at both ends, ranging from -4 to 6. Tick marks are labeled at -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, and 6.

Final Practice: Answer Key


Solve the multi-step inequalities on piece of paper. Then, graph your solution on a number line.

1. $6x + 2 + 6x < 14$




$x < 1$

2. $5(6 + 3r) + 7 \geq 127$



$r \geq 6$

3. $-3 - 6(4x + 6) > -111$



$x < 3$

Additional Practice:

Click on the link below to get additional practice and to check your understanding!

[Graph Solutions to Multi-Step Inequalities IXL](#)