One-Step and Two-Step Inequalities

Inequalities are often grouped with equations because they are very similar in terms of solving and graphing them. There is 1 special rule that only applies to inequalities that will be discussed later in this lesson but otherwise follow the same methods you would when solving equations.

Before diving into actual inequalities, let's quickly go over the 4 inequality signs and what they mean:

$\leq$ - *Represents less than or equal to*

$\geq$ - *Represents greater than or equal to*

$<$ - *Represents less than*

$>$ - *Represents greater than*

One-Step Inequalities:

Solving one-step inequalities is very similar to solving one-step equations since we are trying to do the opposite operation of what is being shown in the equation.

There is 1 special rule though:

When you divide or multiply by the SAME NEGATIVE number on both sides of the inequality, flip the sign so that it faces the opposite direction.

1) x - 5 ≤ 8

To solve this inequality, we have to do the opposite operation of what is being shown here. Since this inequality is showing subtraction, we have to add 5 to solve for x.

$$x - 5 \leq 8$$
$$\underline{+5 \quad +5}$$
$$x \leq 13$$

Read this inequality as x is LESS than or EQUAL to 13.

2) -5x > 55

Since the inequality is showing multiplication, we have to divide in order to get x by itself.

Remember we are dividing by a NEGATIVE number, so do not forget to FLIP the inequality sign after dividing.

$$\frac{-5x}{-5} > \frac{55}{-5}$$

$$x < -11$$

(x is LESS than -11)

Two-Step Inequalities:

For two-step inequalities, do what we did in one-step inequalities twice.

Make sure to ADD/SUBTRACT first before MULTIPLYING/DIVIDING to solve for x.

1) $2x - 5 \geq 27$

Remember to add 5 first before dividing by 2 to get x by itself.

Step 1:
$$2x - 5 \geq 27$$
$$+ 5 \quad + 5$$

Step 2:
$$\frac{2x}{2} \geq \frac{32}{2}$$
$$x \geq 16$$

Read this inequality as x is GREATER than or EQUAL to 16.

2) $\dfrac{-x}{6} + 8 > -1$

Remember to subtract 8 first before multiplying by -6 and flipping the inequality sign.

Step 1:
$$\frac{-x}{6} + 8 > -1$$
$$- 8 \quad - 8$$

Step 2: $-6 \cdot \dfrac{(-x)}{(6)} > (-9) \, 6$
$$x < 54$$

Read this inequality as x is LESS than 54.

Keep practicing and you will become better with these inequalities!

Tips for Solving Problems:

1. Remember that outside of the 1 special rule of flipping the inequality sign when dividing or multiplying by a negative number, solving inequalities is very close to solving equations.

2. Remember to ADD/SUBTRACT first to isolate the term with the variable before MULTIPLYING/DIVIDING to get the variable by itself. Following the operations in this order will make solving inequalities easier.

3. Just like one-step and two-step equations, it is imperative that you are able to do one-step and two-step inequalities well. Use the problems in the lesson and quiz to ensure that you have concept down.