## **Multi-Step Inequalities**

Multi-step inequalities are very similar to multi-step equations in that they have more than 2 steps and follow the same steps as one-step and two-step equations/inequalities.

Remember the 1 special rule of switching the inequality sign when multiplying or dividing by the SAME NEGATIVE number.

## **Examples:**

1) 
$$8(x-10) < 48$$

## Similar to multi-step equations, it is important to think outside the box!

Yes, if you distribute 8 on the left side of the inequality to both terms and solve, you will still get the right answer.

However, let's DIVIDE both sides by 8 first to leave us with a one-step inequality before adding 10 to both sides.

It is okay to divide first here because we cannot add or subtract first.

Step 1: 
$$\frac{8(x-10) < 48}{8}$$
Step 2: 
$$\frac{x-10 < 6}{+10+10}$$

$$x < 16$$

x < 16 can be read as x is LESS than 16.

2) 
$$2x + 15 \ge 4x - 24$$

When solving these kinds of multi-step inequalities, move the variables to one side (preferably the side where they are positive) and the constants to the other side.

$$2x + 15 \ge 4x - 24$$

$$-2x + 24 - 2x + 24$$

$$39 \ge 2x$$

It is important to rewrite your inequality so the variable is on the left side (helps with graphing inequalities).

$$39 \ge 2x$$
 becomes  $2x \le 39$ 

This does not mean you should not follow the strategy of moving the variables to the side of the inequality where they will be positive. Just remember to do this before dividing.

$$\frac{2x \le 39}{2}$$

$$x \le \frac{39}{2}$$

Read this as x is LESS than or EQUAL to 39/2.

## **Tips for Solving Problems:**

- 1. Always remember to think outside the box when solving these kinds of inequalities! We want to solve for the variable in the easiest way possible!
- 2. Remember to have your variables on one side and constants on the other side of the inequality. If the variables end up on the right side of the inequality and the constants end up on the left side of the inequality, flip the positions of the variables and constants as well as the inequality sign.
- 3. These inequalities are very important for you to know! Make sure you use the examples in the lesson and quiz to help you master this concept.