

Unit 6 Study Guide—Multi-Step Equations and Inequalities

Name _____

Period _____

Section 6-1: Solving 2-Step Equations

Recall that in solving equations:

- The variable must end up by itself on one side of the equal sign and the numbers must all be moved to the other side of the equal sign.
- What you do to one side of the equal sign you must do to the other side of the equal sign.

Steps to solving a 2-step equation

1. First, undo the addition or subtraction by doing the opposite /inverse operation.
2. Then undo the multiplication or division by doing the opposite/inverse operation.
3. Simplify
4. Check your answer by plugging it back into the original problem.

Examples:

1.

$$\begin{array}{r|l} 4x - 3 & = 9 \\ + 3 & + 3 \\ \hline 4x & = 12 \\ \div 4 & \div 4 \\ \hline x & = 3 \end{array}$$

2.

$$\begin{array}{r|l} -3m + 4 & = -2 \\ - 4 & - 4 \\ \hline -3m & = -6 \\ \div -3 & \div -3 \\ \hline m & = 2 \end{array}$$

3.

$$\begin{array}{r|l} \frac{y}{5} + 1 & = 26 \\ - 1 & - 1 \\ \hline 5 \cdot \frac{y}{5} & = 25 \cdot 5 \\ \hline y & = 125 \end{array}$$

4.

$$\begin{array}{r|l} \frac{c}{-8} - 7 & = -5 \\ + 7 & + 7 \\ \hline -8 \cdot \frac{c}{-8} & = 2 \cdot -8 \\ \hline c & = -16 \end{array}$$

Section 6-2: Solving Multi-Step Equations

$$3n + 10 - 3 = 7n - 13$$

Steps:

1. Simplify each side of the equation (if necessary).

-Do the distributive property

There wasn't any

-Then combine like terms

$$3n + 7 = 7n - 13$$

2. Get the variable alone by adding or subtracting on both sides of the equation.

$$\begin{array}{r} 3n + 7 = 7n - 13 \\ -7 \quad -7 \\ \hline 3n = 7n - 20 \end{array}$$

$$\begin{array}{r} 3n = 7n - 20 \\ -7n \quad -7n \\ \hline -4n = -20 \end{array}$$

3. Multiply or Divide both sides to solve for the variable.

$$\begin{array}{r} -4n = -20 \\ -4 \quad -4 \\ \hline n = 5 \end{array}$$

4. Check your work by substituting the solution for the variable into the original equation.

$$3(5) + 10 - 3 = 7(5) - 13$$

$$15 + 10 - 3 = 35 - 13$$

$$22 = 22$$

Examples

$$\begin{array}{r} 6n - 42 = 4n \\ +42 \quad +42 \\ \hline 6n = 4n + 42 \\ -4n \quad -4n \\ \hline 2n = 42 \\ \underline{2} \quad \underline{2} \\ n = 21 \end{array}$$

Check:

$$6(21) - 42 = 4(21)$$

$$84 = 84$$

$$\begin{array}{r} 3(k + 2) = 12 \\ 3k + 6 = 12 \\ -6 \quad -6 \\ \hline 3k = 6 \\ \underline{3} \quad \underline{3} \\ k = 2 \end{array}$$

Check:

$$3((2) + 2) = 12$$

$$12 = 12$$

Section 6-4 and 6-5: Solving and Graphing Multi-Step Inequalities

Solving Multi-Step Inequalities:

Steps to solving a multi-step inequality: (Just like solving an equation!)

1. Simplify each side of the inequality (if necessary)
 - a. This means do the distributive property and combine like terms!
2. Get the variable by itself by adding or subtracting on both sides of the inequality
3. Multiply or divide on both sides of the inequality to get the variable by itself.
 - a. **REMEMBER...If you multiply or divide by a negative, you must flip the inequality sign**
4. Check your answer by plugging it back into the original problem.

Examples:

$$\begin{array}{r|l} 4n - 30 & \geq 6n \\ -6n & -6n \\ \hline -2n - 30 & \geq 0 \\ +30 & +30 \\ \hline -2n & \geq 30 \\ \div -2 & \div -2 \\ \hline n & \leq -15 \end{array}$$



Notice that the sign flipped because we divided by a negative!

$$\begin{array}{r|l} 3(x + 4) & < 21 \\ \hline 3x + 12 & < 21 \\ -12 & -12 \\ \hline 3x & < 9 \\ \div 3 & \div 3 \\ \hline x & < 3 \end{array}$$

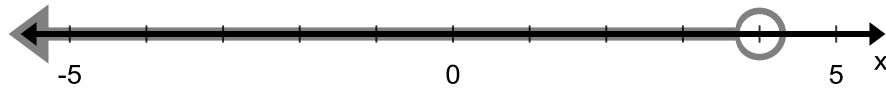
Please see the next page to learn how to graph inequalities...

Graphing Multi-Step Inequalities:

- An open circle is placed on the number line to show that the number denoted at the circle is *not* included in the solution set.
- A circle that is filled in is placed on the number line to show that the number denoted at the circle is *is* included in the solution set.

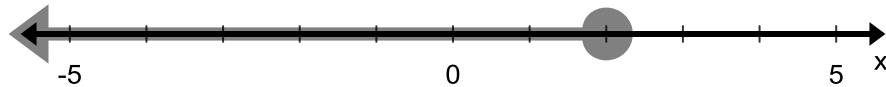
Examples-

Graph: $x < 4$



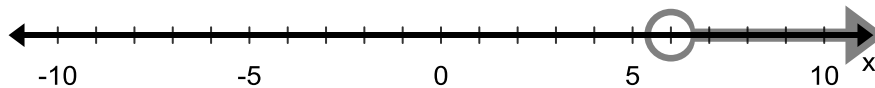
Solution: The problem asks you to graph all numbers that are less than 4.

Graph: $x \leq 2$



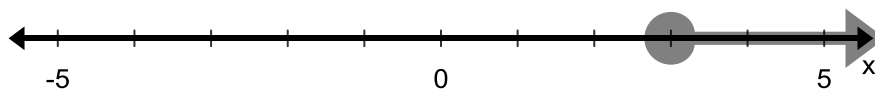
Solution: The problem asks you to graph all numbers that are less than or equal to 2.

Graph $x > 6$



Solution: The problem asks you to graph all numbers that are greater than 6.

Graph $x \geq 3$



Solution: The problem asks you to graph all numbers that are greater than or equal to 3.