Multi-Step Equations

Multi-Step equations are more challenging than one and two step equations, but are still fundamental concepts that you need to know in Algebra 1.

Multi-Step equations are equations that take more than 2 steps to solve and they can require you to think outside the box in terms of solving equations. As always, practice makes perfect, so let's do some problems of Multi-Step equations!

Example:

1)5 (2x - 2) = 30

Think outside the box for this problem!

Yes, we can distribute the 5 on the left side of the equation and solve for x from there, but there is an easier way to solve this problem with smaller numbers and less errors.

Wouldn't it be better to divide 5 first so we are left with a two-step equation that has smaller numbers? Let's divide first!

$$\frac{5\,(2x\,-\,2)}{5} = \frac{30}{5}$$

2x - 2 = 6

Now, it is a much simpler two-step equation. Add 2 to both sides before dividing 2 from both sides and we will get x.

1) Add first!

2x – 2 = 6

+2 +2

2x = 8

2) Then divide to get x by itself!

$$\frac{2x}{2} = \frac{8}{2}$$

x = 4

2) $3x + 12 = 8x - 8$

Whenever you see equations like this, you have to automatically think about putting the variables to one side of the equation and constants on the other side of the equation.

Here, for the sake of keeping my numbers positive, let's subtract 3x from both sides and add 8 to both sides.

$$\begin{array}{l} 3x + 12 = 8x - 8 \\ -3x + \ \ 8 \quad -3x + 8 \\ \hline \qquad\quad 20 = 5x \end{array}$$

Then, divide by 5 to get x by itself.

$$\frac{20}{5} = \frac{5x}{5}$$

$$x = 4$$

Keep practicing and you will get better at this!

Tips for Solving Problems:

1. Try to find smart, outside the box ways to solving these multi-step equations. Like the first example said, doing it the regular way still gets you the correct answer, but it helps you as a mathematician to recognize these outside the box strategies and in turn, it will help improve your ability to solve complex equations.

2. Make sure when solving these types of equations to move the constants and variables to opposite sides of the equation, preferably the side where the variables are positive, so if you need to divide by the coefficient attached to the variable, division by negative numbers is not needed.

3. These kinds of equations are extensions of one-step and two-step equations, so make sure to master those first!