General Equation - Part II

Objective A: to solve unknown number (x) from equation of the form \( ax + b = cx + d \). Note: In this form, a, b, c, and d represent known numbers.

Steps to solve for x in the equation \( 2x + 3 = 5x - 9 \)

First step: Removing 5x to left hand side by **subtracting 5x from each side of the equation** because your ultimate goal is to get an answer for x (ultimate form of solution is variable \( x = \) one specific number).

\[
\text{Ex: } 2x + 3 - 5x = 5x - 9 - 5x
\]

Second step: simplifying equation in first step. You get:

\[-3x + 3 = -9\]

Third step: Isolating the variable term by subtracting 3 from each side of the equation. You get:

\[-3x + 3 - 3 = -9 - 3\]

Fourth step: Simplifying the equation in the third step. You get:

\[-3x = -12\]

Fifth step: As you have seen in fourth step, you need to end with \( x \) rather than \( -3x \) (note: \( 1x = x \)). To do this divide the coefficient of \( x \) (in this example, \(-3\)) from each side of equation:
\[
\frac{-3x}{-3} = \frac{-12}{-3}
\]

Sixth step: Simplify the equation in the fifth step. Your final answer:

\[x = 4\]

Checking: The solution is 4. You should verify this by checking this solution.

Objective B: To solve for \(x\) in an equation containing groupings.

Steps for example: \(4 + 5(2x – 3) = 3(4x – 1)\)

First step: Use the Distribution Property to expand the equation. Then simply. You get:

\[4 + 10x – 15 = 12x – 3 \text{ (distribution)}\]
\[10x – 11 = 12x – 3 \text{ (simply)}\]

Second step: Remove 12x by subtracting 12x from each side of the equation. Your ultimate goal is to get an answer for \(x\) in the form of \(x = \text{one specific number}\).

\[10x – 11 – 12x = 12x – 12x -3\]

Third step: Simplifying the equation in the second step, you get:

\[-2x – 11 = -3\]
Fourth step: Remove the constant - 11 to the right hand side by adding +11 to each side of the equation. You get:

\[-2x -11 +11 = -3 +11\]

Fifth step: Simplifying the equation in fourth step, you get:

\[-2x = 8\]

Sixth step: Divide the coefficient of x (in this example, -2) from each side of equation:

\[
\frac{-2x}{-2} = \frac{8}{-2}
\]

Seventh step: Simplify the equation in the sixth step. You get your final answer:

\[x = -4\]

Checking: The solution is -4. You should verify this by checking this solution.