Solving Equations Part III

Steps for solving equations

1. **Simplify each side of the equation.**
This may require the distributive property, collecting like terms, clearing the fractions or a combination of these.

2. **Isolate the variable term on one side of the equal sign.**
This step is done by using the addition property of equality. Our goal is to get all the variable terms on one side of the equal sign and everything else on the other side.

3. **Isolate the variable.**
This step is done using the multiplication property of equality

4. **Check your answer.**
Once you have solved for the variable, plug in its value into the original equation to verify that you get a **TRUE** statement.

Example 1:

$$4(x-8)+2=2(x-4)$$

Step 1: Simplify each side of the equation. $4(x)-4(8)+2=2(x)-2(4)$

$$4x-32+2=2x-8$$

Step 2: Isolate the variable term.

$$\begin{array}{r} 4x-30=2x-8 \\ +30 \qquad +30 \\ \hline 4x \quad =2x+22 \\ -2x \quad -2x \\ \hline 2x=22 \end{array}$$

Step 3: Isolate the variable

$$\frac{2x}{2}=\frac{22}{2}$$

$$\boxed{x=11}$$

Step 4: Check your answer

$$4(11-8)+2=2(11-4)$$
$$4(3)+2=2(7)$$
$$12+2=14$$
$$14=14 \checkmark$$

Since $14=14$ is a TRUE statement our solution $x=11$ is correct.

Example 2:

$$\frac{3}{5}t - 2 = \frac{11}{10}t - \frac{7}{2}$$

Find the LCD:_____

Multiply both sides of the equation by the LCD.

$$10\left[\frac{3}{5}t - 2\right] = 10\left[\frac{11}{10}t - \frac{7}{2}\right]$$

$$10\left(\frac{3}{5}t\right) - 10(2) = 10\left(\frac{11}{10}t\right) - 10\left(\frac{7}{2}\right)$$

$$6t - 20 = 11t - 35$$

$$+20 \qquad +20$$

$$6t = 11t - 15$$

$$-11t \qquad -11t$$

$$\frac{-5t}{-5} = \frac{-15}{-5}$$

$$\boxed{t = 3}$$

Checking $t = 3$:

$$\frac{3}{5}(3) - 2 = \frac{11}{10}(3) - \frac{7}{2}$$

$$10\left(\frac{9}{5} - 2\right) = 10\left(\frac{33}{10} - \frac{7}{2}\right)$$

$$10\left(\frac{9}{5}\right) - 10(2) = 10\left(\frac{33}{10}\right) - 10\left(\frac{7}{2}\right)$$

$$18 - 20 = 33 - 35$$

$$-2 = -2 \checkmark \quad \text{TRUE!}$$

Therefore $t = 3$ is the solution.

Solving Equations Part III — Practice Problems

Solve each equation:

1. $\mathbf{3(5-x)-3=4(x+2)-10}$

2. $\mathbf{-\frac{1}{3}d-\frac{1}{4}=\frac{1}{12}d+\frac{1}{3}}$