

Review #3

Friday, June 3, 2022 9:46 AM

Math 9 Review – Part 3

Solving Equations

Solving Equations

When we solve an equation, we are trying to find the value of a variable that makes a mathematical sentence (equation) true.

In order to solve an equation, we must isolate the variable.

Example 1: Solve the following equations.

$$\begin{aligned} \text{a) } 5x - 4 + 3 &= 4 \\ 5x - 1 &= 4 \\ +1 \quad +1 & \\ \hline 5x &= 5 \\ \frac{5x}{5} &= \frac{5}{5} \\ x &= 1 \end{aligned}$$

$$\begin{aligned} \text{b) } 6x - 10 &= 56 \\ +10 \quad +10 & \\ \hline 6x &= 66 \\ \frac{6x}{6} &= \frac{66}{6} \\ x &= 11 \end{aligned}$$

$$\begin{aligned} \text{c) } 2 &= 4x - 5x \\ \frac{2}{-1} &= \frac{-1x}{-1} \\ -2 &= x \\ x &= -2 \end{aligned}$$

$$\begin{aligned} \text{d) } 9a &= 3a - 36 \\ -3a \quad -3a & \\ \hline 6a &= -36 \\ \frac{6a}{6} &= \frac{-36}{6} \\ a &= -6 \end{aligned}$$

Solving Equations with Parentheses

- Expand the parentheses
- Simplify like terms (if possible)
- Isolate the variable

Example 2: Solve the following equations:

$$\begin{aligned} \text{a) } 2(y-4) &= 16 \\ 2(y) - 2(4) &= 16 \\ 2y - 8 &= 16 \\ +8 \quad +8 & \\ \hline 2y &= 24 \\ \frac{2y}{2} &= \frac{24}{2} \\ y &= 12 \end{aligned}$$

$$\begin{aligned} \text{b) } 10 + 2x &= -4(x-1) \\ 10 + 2x &= (-4)x - (-4)(1) \\ 10 + 2x &= -4x + 4 \\ +4x \quad +4x & \\ \hline 10 + 6x &= 4 \\ -10 \quad -10 & \\ \hline 6x &= -6 \\ \frac{6x}{6} &= \frac{-6}{6} \\ x &= -1 \end{aligned}$$

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$$\begin{aligned}
 \text{c) } 4(x-3) + 9x &= -38 \\
 4(x) - 4(3) + 9x &= -38 \\
 4x - 12 + 9x &= -38 \\
 13x - 12 &= -38 \\
 +12 & \quad +12 \\
 13x &= -26 \\
 \frac{13x}{13} &= \frac{-26}{13} \\
 x &= -2
 \end{aligned}$$

$$\begin{aligned}
 \text{d) } 3 - (2 + 4x) &= 4 + 2(3x + 1) \\
 3 + (-1)(2) + (-1)(4x) &= 4 + 2(3x) + 2(1) \\
 3 - 2 - 4x &= 4 + 6x + 2 \\
 1 - 4x &= 6 + 6x \\
 -6x & \quad -6x \\
 1 - 10x &= 6 \\
 -1 & \quad -1 \\
 -10x &= 5 \\
 \frac{-10x}{-10} &= \frac{5}{-10} \quad x = \frac{-5}{10} = -\frac{1}{2}
 \end{aligned}$$

Verify (check) Your Solution

Once a solution is found, we must verify that it is correct. This is done by substituting the solution back into the original equation.

Example 3: Verify that $x = 7$ is a solution to the following equation:

$$2(3x - 5) = 32$$

solve

$$\begin{aligned}
 2(3x) - 2(5) &= 32 \\
 6x - 10 &= 32 \\
 +10 & \quad +10 \\
 6x &= 42 \\
 \frac{6x}{6} &= \frac{42}{6} \\
 x &= 7
 \end{aligned}$$

verify

$$\begin{aligned}
 2(3(7) - 5) &= 32 \\
 2(21 - 5) &= 32 \\
 2(16) &= 32 \\
 32 &= 32 \\
 \text{left} &= \text{right}
 \end{aligned}$$