

Solving Multi-Step Equations

Objectives:

- ...to solve multi-step equations involving integers, decimals, and fractions
- ...to solve equations with variable terms on both sides

Assessment Anchor: Not Applicable



NOTES

To solve a multi-step equation:

1. Perform any distributive property shown in the equation.
2. Combine any like terms in the equation (do not cross the = sign)
3. Now you should see a two step equation remaining, please follow the steps for solving two step equations.

EXAMPLES

- 1) $2(x + 5) = -11$ original problem
- $$\begin{array}{r} 2x + 10 = -11 \\ -10 \quad -10 \\ \hline 2x = -21 \\ 2 \quad 2 \end{array}$$
-perform distributive property
.....subtract 10 from both sides
.....simplify the equation
.....divide both sides by 2
- $x = -10.5$ final answer!
- 2) $-13 = 5 + 4x - 6x$ original problem
- $$\begin{array}{r} -13 = 5 - 2x \\ -5 \quad -5 \\ \hline -18 = -2x \\ -2 \quad -2 \end{array}$$
-combine like terms
.....subtract 5 from both sides
.....simplify the equation
.....divide both sides by -2
- $9 = x$ final answer!

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MORE EXAMPLES

3) $-2(4x - 3) = 10$

4) $3x + 7x - 8 = -19$

5) $-35 = -3x + 8 + 5x$

6) $14 = \frac{1}{2}(8x + 12)$

EVEN MORE EXAMPLES – *Careful Here!!*

7) $4(2x - 11) - 6x = -3$

8) $-32 = -3 + 7x + 3(x - 2)$

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MORE NOTES (variables on both sides)

To solve an equation with variables on both sides:

1. Perform any distributive property shown in the equation.
2. Combine any like terms in the equation (do not cross the =).
3. Move variable terms to one side of the equation, and constants to the other side of the equation.
 - a. It doesn't matter to which side you choose to move things.
 - b. Continue using inverse operations to move things properly.

EXAMPLES

9) $3x + 20 = x - 8$ original problem

$$\begin{array}{r} 3x + 20 = x - 8 \\ -x \quad -x \\ \hline 2x + 20 = -8 \\ -20 \quad -20 \\ \hline 2x = -28 \\ 2 \quad 2 \end{array}$$

.....pick something to move!
.....subtract "x" from both sides
.....simplify the equation
.....subtract 20 from both sides
.....simplify the equation
.....divide both sides by 2

.....final answer!

$x = -14$

Show alternate steps that lead to same answer.

10) $-13 + 7x = -3x - 33$ original problem

$$\begin{array}{r} -13 + 7x = -3x - 33 \\ +3x \quad +3x \\ \hline -13 + 10x = -33 \\ +13 \quad +13 \\ \hline 10x = -20 \\ 10 \quad 10 \end{array}$$

.....pick something to move!
.....add "3x" to both sides
.....simplify the equation
.....add 13 to both sides
.....simplify the equation
.....divide both sides by 10

.....final answer!

$x = -2$

Show alternate steps that lead to same answer.

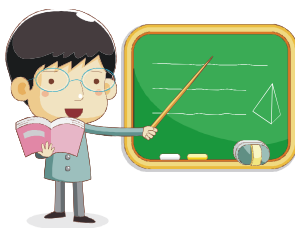
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MORE EXAMPLES

11) $-7x + 11 = 19 - x$

12) $18 - 12y = -22 - 7y$

13) $2(x + 7) - 34 = 4x - 11x + 4(x - 1)$



“Simplify each side separately...as far as you can. Then, put the *girls* on one side and the *boys* on the other side.”