Solving Multistep equations with variables on both sides

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Algebra 1

Steps

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.

Example 1

$3x + 20 = x - 8$ ......original problem

$3x + 20 = x - 8$ ......pick something to move!

$\underline{-x \qquad -x}$ ......subtract "x" from both sides

$2x + 20 = -8$ ......simplify the equation

$\underline{-20 - 20}$ ......subtract 20 from both sides

$\dfrac{2x}{2} = \dfrac{-28}{2}$ ......simplify the equation

......divide both sides by 2

$x = -14$ ......final answer!

Example 2

$$-13 + 7x = -3x - 33 \qquad \text{......original problem}$$

$$-13 + 7x = -3x - 33 \qquad \text{......pick something to move!}$$
$$\underline{ + 3x \quad + 3x} \qquad \text{......add "3x" to both sides}$$
$$-13 + 10x = -33 \qquad \text{......simplify the equation}$$
$$\underline{+\,13 +\,13} \qquad \text{......add 13 to both sides}$$
$$\frac{10x}{10} = \frac{-20}{10} \qquad \text{......simplify the equation}$$
$$\qquad\qquad\qquad \text{......divide both sides by 10}$$

$$x = -2 \qquad \text{......final answer!}$$

Example 3

$-7x + 11 = 19 - x$

Example 4

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

Example 5

$$p - 1 = 5p + 3p - 8$$

Example 6

$$2(4x - 3) - 8 = 4 + 2x$$

Example 7

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