

3.2 Solving Equations Having Like Terms and Parentheses

Goal: Solve equations using the distributive property.

Example 1 Writing and Solving an Equation

Baseball Game A group of five friends are going to a baseball game. Tickets for the game cost \$12 each, or \$60 for the group. The group also wants to eat at the game. Hot dogs cost \$2.75 each and bottled water costs \$1.25 each. The group has a total budget of \$76. If the group buys the same number of hot dogs and bottles of water, how many can they afford to buy?

Solution

Let n represent the number of hot dogs and the number of bottles of water. Then $2.75n$ represents the cost of n hot dogs and $1.25n$ represents the cost of n bottles of water. Write a verbal model.

$$\square + \square + \square = \square$$

$$\square + \square + \square = \square$$

Substitute.

$$\square + \square = \square$$

Combine like terms.

$$\square + \square - \square = \square - \square$$

Subtract \square from each side.

$$\square = \square$$

Simplify.

$$\frac{\square}{\square} = \frac{\square}{\square}$$

Divide each side

by \square .

$$\square = \square$$

$$n = \square$$

Simplify.

Answer: The group can afford to buy \square hot dogs and \square bottles of water.

Example 3 Combining Like Terms After DistributingSolve $6x - 4(x - 1) = 14$.

$$6x - 4(x - 1) = 14$$

Write original equation.

$$6x - 4x + 4 = 14$$

Distributive property

$$2x + 4 = 14$$

Combine like terms.

$$\square - 4 = 14 - 4$$

Subtract 4 from each side.

$$2x = 10$$

Simplify.

$$1x = \frac{10}{2}$$

Divide each side by 2 .

$$x = 5$$

Simplify.

Checkpoint Solve the equation. Check your solution.

1. $-20 = 5(3 - x)$

$$-20 = 15 - 5x$$

$$\begin{array}{r} +35 \\ +15 \end{array} = \begin{array}{r} -5x \\ -5 \end{array}$$

$$7 = x$$

2. $4y - 14 + 3y = 28$

$$7y - 14 = 28$$

$$7y = 42$$

$$y = 6$$

3. $-3(6 - 2x) = 12$

$$-18 + 6x = 12$$

$$\begin{array}{r} 4x \\ 6 \end{array} = \begin{array}{r} 30 \\ 6 \end{array}$$

$$x = 5$$

4. $5x - 2(x - 3) = 30$

$$5x - 2x + 6 = 30$$

$$3x + 6 = 30$$

$$\begin{array}{r} 3x \\ 3 \end{array} = \begin{array}{r} 24 \\ 3 \end{array}$$

$$x = 8$$

check

$$\begin{aligned} -20 &= 5(3-7) \\ -20 &= 5(-4) \\ -20 &= -20 \checkmark \end{aligned}$$

check

$$\begin{aligned} -3(6-2(5)) &= 12 \\ -3(6-10) &= 12 \\ -3 \cdot -4 &= 12 \\ 12 &= 12 \checkmark \end{aligned}$$

check

$$\begin{aligned} 4(6) - 14 + 3(6) &= 28 \\ 24 - 14 + 18 &= 28 \\ 10 + 8 &= 28 \\ 28 &= 28 \checkmark \end{aligned}$$

check

$$\begin{aligned} 5x - 2(x-3) &= 30 \\ 5(8) - 2(8-3) &= 30 \\ 5 \cdot 8 - 2 \cdot 5 &= 30 \\ 40 - 10 &= 30 \\ 30 &= 30 \checkmark \end{aligned}$$