# 3.2 <br> 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 $\$ 85$. 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 $2.75 n$ represents the cost of $n$ hot dogs and $1.25 n$ represents the cost of $n$ bottles of water. Write a verbal model.


Answer: The answer must be a whole number. Round down so the budget is not exceeded. The group can afford to buy $\square$ hot dogs and $\square$ bottles of water.

Solve the equation.
a. $-24=6(2-x)$
b. $-2(7-4 x)=10$

## Solution

a.

b.


Write original equation.
Distributive property
Add $\square$ to each side.
Simplify.

$x=\square$
Divide each side by $\qquad$

Simplify.

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

$$
6 x-4(x-1)=14 \quad \text { Write original equation. }
$$



Distributive property
Combine like terms.


Subtract $\square$ from each side. Simplify.


Divide each side by $\qquad$ $x=\square \quad$ Simplify.

Checkpoint Solve the equation. Check your solution.

| 1. $-20=5(3-x)$ | 2. $4 y-14+3 y=28$ |
| :--- | :--- |
| 3. $-3(6-2 x)=12$ | 4. $5 x-2(x-3)=30$ |

# Focus On <br> <br> Solving a Problem Arithmetically <br> <br> Solving a Problem Arithmetically and Algebraically 

 and Algebraically}

Goal: Solve the same problem arithmetically and algebraically.

## Example 1 Solving a Problem Arithmetically

The perimeter of the figure is 42 inches. Find $x$, the length of 4 of the hexagon's sides.


## Solution

The perimeter is the sum of the four sides $x$ plus twice the $\qquad$ of the rectangle.

1. Multiply the length of the rectangle by $\square$
$\square$ $\times$ $\square$ $=$ $\square$
2. Subtract twice the length of the rectangle from the $\qquad$
$\square$
3. The difference found in Step 2 represents the sum of the four sides $x$, so divide this difference by 4 to find $\square$
$\square$
Answer The length of each side $x$ is $\square$

Example 2 Solving a Problem Algebraically
The perimeter of the figure is 42 inches. Find $x$, the length of 4 of the hexagon's sides.
 Solution

$$
\begin{aligned}
& P=2 I+4 x \quad \text { Write a formula for the } \\
& 42=2(\square)+4 x \quad \text { Substitute } 42 \text { for } P \text { and } \square \text { for } I \text {. } \\
& 42=\square+4 x \quad \text { Multiply. } \\
& \square=4 x \quad \text { Subtract } \\
& \text { from each side and simplify. } \\
& \frac{\square}{\square}=\frac{4 x}{\square} \\
& \square=x \\
& \text { Write a formula for the } \\
& \text { Substitute } 42 \text { for } P \text { and } \\
& \text { for } I . \\
& \text { Subtract } \\
& \text { Divide each side by } \\
& \text { Simplify. } \\
& \text { Answer: The length of each side } x \text { is }
\end{aligned}
$$

