🔑 Key Idea

Solving Multi-Step Equations

To solve multi-step equations, use inverse operations to isolate the variable.

EXAMPLE 1   **Solving a Two-Step Equation**

Solve $3x + 15 = 24$.

$3x + 15 = 24$	Write the equation.
Undo the addition. → $\underline{-15 \quad -15}$	Subtraction Property of Equality
$3x = 9$	Simplify.
Undo the multiplication. → $\dfrac{3x}{3} = \dfrac{9}{3}$	Division Property of Equality
$x = 3$	Simplify.

▶ The solution is $x = 3$.

Check

$$3x + 15 = 24$$
$$3(3) + 15 \stackrel{?}{=} 24$$
$$24 = 24 \checkmark$$

Try It   Solve the equation. Check your solution.

1. $2z - 1 = -5$ **2.** $-3z + 1 = 7$ **3.** $\dfrac{1}{2}x - 9 = -25$

EXAMPLE 2   **Solving a Multi-Step Equation**

Solve $8x - 6x - 25 = -35$.

$8x - 6x - 25 = -35$	Write the equation.
$2x - 25 = -35$	Combine like terms.
Undo the subtraction. → $\underline{+25 \quad +25}$	Addition Property of Equality
$2x = -10$	Simplify.
Undo the multiplication. → $\dfrac{2x}{2} = \dfrac{-10}{2}$	Division Property of Equality
$x = -5$	Simplify.

▶ The solution is $x = -5$.

Try It   Solve the equation. Check your solution.

4. $-4n - 8n + 17 = 23$ **5.** $10 = 3n + 20 - n$

Using the Distributive Property to Solve an Equation

Solve $2(1 - 5x) + 4 = -8$.

$2(1 - 5x) + 4 = -8$	Write the equation.
$2(1) - 2(5x) + 4 = -8$	Distributive Property
$2 - 10x + 4 = -8$	Multiply.
$-10x + 6 = -8$	Combine like terms.
$\underline{-6 \quad -6}$	Subtraction Property of Equality
$-10x = -14$	Simplify.
$\dfrac{-10x}{-10} = \dfrac{-14}{-10}$	Division Property of Equality
$x = 1.4$	Simplify.

> ▶ The solution is $x = 1.4$.

Math Practice

Look for Structure
Show how to solve the equation without using the Distributive Property.

Try It **Solve the equation. Check your solution.**

6. $-3(x + 2) + 5x = -9$
7. $5 + 1.5(2d - 1) = 0.5$

Self-Assessment *for Concepts & Skills*

Solve each exercise. Then rate your understanding of the success criteria in your journal.

SOLVING AN EQUATION **Solve the equation. Check your solution.**

8. $-5x + 1 = 31$
9. $\frac{1}{3}x - 9 = -12$

10. $-n - 6n + 4 = 53$
11. $14 = 6n + 6 - 2n$

12. $-8(x + 1) + 2x = -32$
13. $3 + 4.5(2d - 3) = 7.5$

14. WRITING Write the sentence as an equation, then solve.

> 2 more than 3 times a number x is 17.

15. OPEN-ENDED Explain how to solve the equation $2(4x - 11) + 9 = 19$.

16. CRITICAL THINKING How can you solve $3(x + 2) = 9$ without distributing the 3?