7.4 Lesson

Check It Out
Lesson Tutorials
BigIdeasMath.com

Key Vocabulary
two-step equation, *p. 298*
terms, *p. 300*
like terms, *p. 300*

Key Idea

Solving Two-Step Equations

A **two-step equation** is an equation that contains two different operations. To solve a two-step equation, use inverse operations to isolate the variable.

EXAMPLE 1 Solving Two-Step Equations

a. Solve $2x - 5 = 13$.

	$2x - 5 = 13$	Write the equation.
Step 1: Undo the subtraction.	$\underline{+5} \quad \underline{+5}$	Add 5 to each side.
	$2x = 18$	Simplify.
Step 2: Undo the multiplication.	$\frac{2x}{2} = \frac{18}{2}$	Divide each side by 2.
	$x = 9$	Simplify.

The solution is $x = 9$.

Check

$2x - 5 = 13$

$2(9) - 5 \stackrel{?}{=} 13$

$18 - 5 \stackrel{?}{=} 13$

$13 = 13$ ✓

Common Error

Do not get confused when the variable is on the right side of the equation. The equation $4 = \frac{y}{8} + 1$ is solved the same way as the equation $\frac{y}{8} + 1 = 4$.

b. Solve $4 = \frac{y}{8} + 1$.

$4 = \frac{y}{8} + 1$	Write the equation.
$\underline{-1} \quad \underline{-1}$	Subtract 1 from each side.
$3 = \frac{y}{8}$	Simplify.
$3 \cdot 8 = \frac{y}{8} \cdot 8$	Multiply each side by 8.
$24 = y$	Simplify.

The solution is $y = 24$.

Check

$4 = \frac{y}{8} + 1$

$4 \stackrel{?}{=} \frac{24}{8} + 1$

$4 \stackrel{?}{=} 3 + 1$

$4 = 4$ ✓

On Your Own

Now You're Ready
Exercises 5–16

Solve the equation. Check your solution.

1. $5c - 1 = 14$ **2.** $\frac{h}{4} + 9 = 20$ **3.** $3(x - 1) = 9$

Multi-Language Glossary at BigIdeasMath.com.

EXAMPLE 2 Standardized Test Practice

You pay \$80 for a game system. The monthly rental fee for games is m dollars. Your cost for the year is \$188. Using the equation $12m + 80 = 188$, how much is your monthly fee?

(A) \$8 (B) \$9 (C) \$12 (D) \$22

$12m + 80 = 188$	Write the equation.
$-80 \quad -80$	Subtract 80 from each side.
$12m = 108$	Simplify.
$\frac{12m}{12} = \frac{108}{12}$	Divide each side by 12.
$m = 9$	Simplify.

Your monthly fee is \$9. The correct answer is (B).

EXAMPLE 3 Real-Life Application

You and your friend rent a tandem bike. Your total cost is \$42. Write and solve an equation to find the number of extra hours you rented the bike.

Words The cost for three hours plus the cost for each extra hour times the number of extra hours is the total cost.

Variable Let h be the number of extra hours.

Equation $24 + 4.5 \cdot h = 42$

$24 + 4.5h = 42$	Write the equation.
$-24 \quad -24$	Subtract 24 from each side.
$4.5h = 18$	Simplify.
$\frac{4.5h}{4.5} = \frac{18}{4.5}$	Divide each side by 4.5.
$h = 4$	Simplify.

You rented the bike for 4 extra hours.

On Your Own

Now You're Ready
Exercises 19 and 20

4. You and your friend rent a kayak. It costs \$40 for the first 4 hours and \$7.50 for each extra hour. Your total cost is \$62.50. Write and solve an equation to find the number of extra hours you rented the kayak.

Key Idea

Terms and Like Terms

In the equation $5x + 2x = 16 - 2$, $5x$, $2x$, 16, and 2 are called **terms**. $5x$ and $2x$ are called **like terms**. 16 and 2 are also like terms.

Like terms Like terms

$$5x + 2x = 16 - 2$$

To solve, use the Distributive Property to *combine* like terms.

EXAMPLE 4 Solving Equations by Combining Like Terms

a. Solve the equation $3x + 6x = 45$.

$3x + 6x = 45$	Write the equation.
$(3 + 6)x = 45$	Use the Distributive Property to combine like terms.
$9x = 45$	Simplify.
$\frac{9x}{9} = \frac{45}{9}$	Divide each side by 9.
$x = 5$	Simplify.

The solution is $x = 5$.

Check

$3x + 6x = 45$

$3(5) + 6(5) \stackrel{?}{=} 45$

$15 + 30 \stackrel{?}{=} 45$

$45 = 45$ ✓

b. Solve the equation $5a - 2a = 6$.

$5a - 2a = 6$	Write the equation.
$(5 - 2)a = 6$	Use the Distributive Property to combine like terms.
$3a = 6$	Simplify.
$\frac{3a}{3} = \frac{6}{3}$	Divide each side by 3.
$a = 2$	Simplify.

The solution is $a = 2$.

Check

$5a - 2a = 6$

$5(2) - 2(2) \stackrel{?}{=} 6$

$10 - 4 \stackrel{?}{=} 6$

$6 = 6$ ✓

On Your Own

Now You're Ready
Exercises 21–29

Solve the equation. Check your solution.

5. $2x + 5x = 7$ **6.** $7c + 4c = 22$ **7.** $3w - 2w = 9$