1.1 Lesson

Key Ideas

Addition Property of Equality

Words Adding the same number to each side of an equation produces an equivalent equation.

Algebra If $a = b$, then $a + c = b + c$.

Remember

Addition and subtraction are inverse operations.

Subtraction Property of Equality

Words Subtracting the same number from each side of an equation produces an equivalent equation.

Algebra If $a = b$, then $a - c = b - c$.

EXAMPLE 1 Solving Equations Using Addition or Subtraction

a. Solve $x - 7 = -6$.

$x - 7 = -6$ Write the equation.

Undo the subtraction. → $+7 \quad +7$ Addition Property of Equality

$x = 1$ Simplify.

The solution is $x = 1$.

Check

$x - 7 = -6$

$1 - 7 \stackrel{?}{=} -6$

$-6 = -6$ ✓

b. Solve $1 = w + 6$.

$1 = w + 6$ Write the equation.

Undo the addition. → $-6 \quad -6$ Subtraction Property of Equality

$-5 = w$ Simplify.

The solution is $w = -5$.

Check

$1 = w + 6$

$1 \stackrel{?}{=} -5 + 6$

$1 = 1$ ✓

c. Solve $y + 3.4 = 0.5$.

$y + 3.4 = 0.5$ Write the equation.

Undo the addition. → $-3.4 \quad -3.4$ Subtraction Property of Equality

$y = -2.9$ Simplify.

The solution is $y = -2.9$.

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

1. $b + 2 = -5$
2. $-3 = k + 3$
3. $t - \frac{1}{4} = -\frac{3}{4}$

Key Ideas

Multiplication Property of Equality

Words Multiplying each side of an equation by the same number produces an equivalent equation.

Algebra If $a = b$, then $a \cdot c = b \cdot c$.

Division Property of Equality

Words Dividing each side of an equation by the same number produces an equivalent equation.

Algebra If $a = b$, then $a \div c = b \div c$, $c \neq 0$.

Remember

Multiplication and division are inverse operations.

EXAMPLE 2 Solving Equations Using Multiplication or Division

a. Solve $-\frac{3}{4}n = -2$.

$-\frac{3}{4}n = -2$ Write the equation.

$-\frac{4}{3} \cdot \left(-\frac{3}{4}n\right) = -\frac{4}{3} \cdot (-2)$ Multiplication Property of Equality

$n = \frac{8}{3}$ Simplify.

▶ The solution is $n = \frac{8}{3}$.

Math Practice

Maintain Oversight

Describe the relationship between $-\frac{4}{3}$ and $-\frac{3}{4}$. Then explain why it makes sense to multiply each side of the equation by $-\frac{4}{3}$.

b. Solve $\pi x = 3\pi$.

$\pi x = 3\pi$ Write the equation.

Undo the multiplication. → $\frac{\pi x}{\pi} = \frac{3\pi}{\pi}$ Division Property of Equality

$x = 3$ Simplify.

▶ The solution is $x = 3$.

Check

$\pi x = 3\pi$

$\pi(3) \stackrel{?}{=} 3\pi$

$3\pi = 3\pi$ ✓

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

4. $\frac{y}{4} = -7$

5. $-\frac{2z}{3} = 6$

6. $0.09w = 1.8$

7. $6\pi = \pi x$

EXAMPLE 3 Identifying the Solution of an Equation

What value of k makes the equation $k + 4 \div 0.2 = 5$ true?

A. -15 **B.** -5 **C.** -3 **D.** 1.5

$$k + 4 \div 0.2 = 5 \quad \text{Write the equation.}$$
$$k + 20 = 5 \quad \text{Divide 4 by 0.2.}$$
$$-20 \quad -20 \quad \text{Subtraction Property of Equality}$$
$$k = -15 \quad \text{Simplify.}$$

The correct answer is **A**.

Check

$$k + 4 \div 0.2 = 5$$
$$-15 + 4 \div 0.2 \stackrel{?}{=} 5$$
$$-15 + 20 \stackrel{?}{=} 5$$
$$5 = 5 \checkmark$$

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

8. $p - 8 \div \frac{1}{2} = -3$

9. $q + |-10| = 2$

Self-Assessment for Concepts & Skills

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

WRITING **Are the equations equivalent? Explain.**

10. $x + 3 = 4$ and $x = 1$

11. $-\frac{y}{5} = 2$ and $y = 10$

12. **OPEN-ENDED** Write an equation that you can use the Division Property of Equality to solve.

SOLVING EQUATIONS **Solve the equation. Check your solution.**

13. $-5 = w - 3$

14. $-\frac{2}{3}n = 8$

15. $p - 9 \div \frac{1}{3} = 6$

16. $q + |3| = -5$

17. **WHICH ONE DOESN'T BELONG?** Which equation does *not* belong with the other three? Explain your reasoning.

$x - 2 = 4$ $x - 3 = 9$ $x - 5 = 1$ $x - 6 = 0$