LESSON 2.2
Notes

GOAL
Solve one-step equations using algebra. addition and subtraction.

Vocabulary
Inverse operations are two operations that undo each other, such as addition and subtraction.

Equivalent equations are equations that have the same solution(s).

Properties of Equality

Addition Property of Equality Adding the same number to each side of an equation produces an equivalent equation.

Subtraction Property of Equality Subtracting the same number from each side of an equation produces an equivalent equation.

Multiplication Property of Equality Multiplying each side of an equation by the same nonzero number produces an equivalent equation.

Division Property of Equality Dividing each side of an equation by the same nonzero number produces an equivalent equation.

EXAMPLE 1
Solve an equation using subtraction

Solve $x + 11 = 15$.
Solution

$x + 11 = 15$	Write original equation.
$x + 11 - 11 = 15 - 11$	Use subtraction property of equality: Subtract 11 from each side.
$x = 4$	Simplify.

The solution is 4. Check by substituting 4 for x in the original equation.

CHECK

$$x + 11 = 15 \qquad \text{Write original equation.}$$
$$4 + 11 = 15 \qquad \text{Substitute 4 for } x.$$
$$15 = 15. \checkmark \qquad \text{Solution checks.}$$

EXAMPLE 2
Solve an equation using addition

Solve $x - 8 = 17$.
Solution

Horizontal format   **Vertical format**

Horizontal format		Vertical format
$x - 8 = 17$	Write original equation.	$x - 8 = 17$
$x - 8 + 8 = 17 + 8$	Add 8 to each side.	$+ 8 \qquad + 8$
$x = 25$	Simplify.	$x = 25$

The solution is 25.

Exercises for Examples 1 and 2

Solve the equation. Check your solution.

1. $x + 9 = 5$
2. $y + 2 = -5$
3. $19 = w + 13$
4. $8 = z - 11$
5. $m - 3 = 7$
6. $n - 4 = -12$

EXAMPLE 3
Solve an equation using division

Solve $7x = -63$.

$$7x = -63 \qquad\qquad \text{Write original equation.}$$
$$\frac{7x}{7} = \frac{-63}{7} \qquad\qquad \text{Divide each side by 7.}$$
$$x = -9 \qquad\qquad \text{Simplify.}$$

EXAMPLE 4
Solve an equation using multiplication
Solve $\dfrac{x}{12} = 4$

$$\dfrac{x}{12} = 4 \qquad\qquad \text{Write original equation.}$$

$$12 \cdot \dfrac{x}{12} = 12 \cdot 4 \qquad\qquad \text{Multiply each side by 12.}$$

$$x = 48 \qquad\qquad \text{Simplify.}$$

EXAMPLE 5

Solve an equation by multiplying by a reciprocal

The coefficient of x is $\dfrac{3}{5}$ .The reciprocal of $\dfrac{3}{5}$ is $\dfrac{5}{3}$.

$$\frac{3}{5}x = 6 \qquad \text{Write original equation.}$$

$$\frac{3}{5}\left(\frac{3}{5}x\right)=\frac{5}{3}(6) \qquad \text{Multiply each side by the reciprocal, } \frac{5}{3}$$

$$x = 10 \qquad \text{Simplify.}$$

Exercises for Examples 3, 4, and 5

Solve the equation. Check your solution.

7. $-9x = -36$

8. $7y = 21$

9. $\dfrac{x}{3} = -24$

10. $18 = \dfrac{y}{-2}$

11. $-\dfrac{2}{5}z = 8$

12. $16 = \dfrac{4}{7}m$

Answer Key

Lesson 2.2

Study Guide
  1. $x = -4$
  2. $y = -7$
  3. $w = 6$
  4. $z = 19$
  5. $m = 10$
  6. $n = -8$
  7. $x = 4$
  8. $y = 3$
  9. $x = -72$
  10. $y = -36$
  11. $z = -20$
  12. $m = 28$