


Solving One-Step Equations

FOR USE WITH LESSON 2-1

 **Prepares for 5.0** Solve multi-step problems involving linear equations in one variable.

A **solution of an equation** is the value (or values) of the variable that makes the equation true. To find a solution, you can use properties of equality to form equivalent equations. **Equivalent equations** are equations that have the same solution (or solutions).

Addition Property of Equality

For all real numbers a , b , and c ,
if $a = b$, then $a + c = b + c$.

Example $8 = 5 + 3$
 $8 = 5 + 3$

Multiplication Property of Equality

For all real numbers a , b , and c ,
if $a = b$, then $a \cdot c = b \cdot c$.

Example $\frac{6}{2} = 3$
 $\frac{6}{2} = 3$

Subtraction Property of Equality

For all real numbers a , b , and c ,
if $a = b$ then $a - c = b - c$.

Example $8 = 5 + 3$
 $8 = 5 + 3$

Division Property of Equality

For all real numbers a , b , and c ,
with $c \neq 0$, if $a = b$ then $\frac{a}{c} = \frac{b}{c}$.

Example $3 + 1 = 4$
 $3 + 1 = 4$

One way to find the solution of an equation is to get the variable alone on one side of the equal sign. You can do this using **inverse operations**, which are operations that undo one another. Addition and subtraction are inverse operations. Multiplication and division are also inverse operations.

EXAMPLE Solving Using Inverse Operations

a. Solve $x - 3 = -8$.

$$x - 3 + 3 = -8 + 3 \quad \text{Add 3 to each side of the equation.}$$

$$x = -5 \quad \text{Simplify.}$$

c. Solve $\frac{3}{4}x = 9$.

$$\frac{4}{3}\left(\frac{3}{4}x\right) = \frac{4}{3}(9) \quad \text{Multiply each side by } \frac{4}{3}, \text{ the reciprocal of } \frac{3}{4}.$$

$$x = 12 \quad \text{Simplify.}$$

b. Solve $g + 7 = 11$.

$$g + 7 - 7 = 11 - 7 \quad \text{Subtract 7 from each side of the equation.}$$

$$g = 4 \quad \text{Simplify.}$$

d. Solve $-96 = 4c$.

$$\frac{-96}{4} = \frac{4c}{4} \quad \text{Divide each side by 4.}$$

$$-24 = c \quad \text{Simplify.}$$

Solve each equation.

1. $x - 8 = 0$

2. $c - 4 = 9$

3. $-4 = \frac{2}{5}a$

4. $-8n = -64$

5. $b + 5 = -13$

6. $6 = x + 2$

7. $-7y = 28$

8. $-101 = -\frac{r}{3}$

9. $67 = w - 65$

10. $5b = 145$

11. $\frac{m}{7} = 12$

12. $-4 = k + 19$