1.1 Lesson





Addition and subtraction are inverse operations.

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.

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.

$$\rightarrow$$
 $+7$ $+7$

Addition Property of Equality

$$x = 1$$

Simplify.

Check

$$x - 7 = -6$$

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

$$-6 = -6$$



Undo the subtraction.

Undo the addition.

The solution is x = 1.

b. Solve
$$1 = w + 6$$
.

$$1 = w + 6$$

Write the equation.

Subtraction Property of Equality



Simplify.



The solution is w = -5.

Check

$$1 = w + 6$$

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

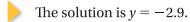
c. Solve y + 3.4 = 0.5.

$$y + 3.4 = 0.5$$
 Write the equation.

Undo the addition.
$$\longrightarrow$$
 $\underline{-3.4}$ $\underline{-3.4}$

Subtraction Property of Equality

$$y = -2.9$$
 Simplify.



Try It Solve the equation. Check your solution.

1.
$$b + 2 = -5$$

2.
$$-3 = k + 3$$

3.
$$t - \frac{1}{4} = -\frac{3}{4}$$



Remember

Multiplication and division are inverse operations.

Math Practice

relationship between

 $-\frac{4}{3}$ and $-\frac{3}{4}$. Then explain why it makes sense to multiply each

side of the equation

Maintain

Oversight Describe the

Multiplication Property of Equality

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

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

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

EXAMPLE 2 Solving Equations Using Multiplication or Division

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

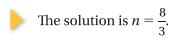
$$-\frac{3}{4}n = -2$$
 Write the equation.

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

Multiplication Property of Equality

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

Simplify.



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

$$\pi x = 3\pi$$

Write the equation.

$$\frac{\pi x}{\pi} = \frac{3\pi}{\pi}$$

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.
$$6\pi = \pi x$$

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

B.
$$-5$$

$$k + 4 \div 0.2 = 5$$

The correct answer is **A**.

Write the equation.

$$k + 20 = 5$$

Divide 4 by 0.2.

Subtraction Property of Equality

$$k = -15$$

Simplify.

Check

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

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.

$$x - 2 = 4$$

$$x - 2 = 4$$
 $x - 3 = 9$

$$x - 5 = 1$$

$$x - 6 = 0$$

6