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2-2 Study Guide and Intervention

Solving Equations by Using Addition and Subtraction

Solve Using Addition If the same number is added to each side of an equation, the resulting equation is equivalent to the original one. In general if the original equation involves subtraction, this property will help you solve the equation.

Addition Property of Equality	For any numbers a, b, and c, if $a = b$, then $a + c = b + c$.

Example 1 **Solve $m - 32 = 18$.**

$m - 32 = 18$	Original equation
$m - 32 + 32 = 18 + 32$	Add 32 to each side.
$m = 50$	Simplify.

The solution is 50.

Example 2 **Solve $-18 = p - 12$.**

$-18 = p - 12$	Original equation
$-18 + 12 = p - 12 + 12$	Add 12 to each side.
$p = -6$	Simplify.

The solution is -6.

Exercises

Solve each equation. Then check your solution.

1. $h - 3 = -2$

2. $m - 8 = -12$

3. $p - 5 = 15$

4. $20 = y - 8$

5. $k - 0.5 = 2.3$

6. $w - \frac{1}{2} = \frac{5}{8}$

7. $h - 18 = -17$

8. $-12 = -24 + k$

9. $j - 0.2 = 1.8$

10. $b - 40 = -40$

11. $m - (-12) = 10$

12. $w - \frac{3}{2} = \frac{1}{4}$

Write an equation for each problem. Then solve the equation and check the solution.

13. Twelve subtracted from a number equals 25. Find the number.

14. What number decreased by 52 equals -12?

15. Fifty subtracted from a number equals eighty. Find the number.

16. What number minus one-half is equal to negative one-half?

17. The difference of a number and eight is equal to 14. What is the number?

18. A number decreased by fourteen is equal to eighteen. What is the number?

Lesson 2-2

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2-2 Study Guide and Intervention *(continued)*

Solving Equations by Using Addition and Subtraction

Solve Using Subtraction If the same number is subtracted from each side of an equation, the resulting equation is equivalent to the original one. In general if the original equation involves addition, this property will help you solve the equation.

Subtraction Property of Equality	For any numbers a, b, and c, if $a = b$, then $a - c = b - c$.

Example **Solve $22 + p = -12$.**

$22 + p = -12$	Original equation
$22 + p - 22 = -12 - 22$	Subtract 22 from each side.
$p = -34$	Simplify.

The solution is -34.

Exercises

Solve each equation. Then check your solution.

1. $x + 12 = 6$

2. $z + 2 = -13$

3. $-17 = b + 4$

4. $s + (-9) = 7$

5. $-3.2 = \ell + (-0.2)$

6. $-\frac{3}{8} + x = \frac{5}{8}$

7. $19 + h = -4$

8. $-12 = k + 24$

9. $j + 1.2 = 2.8$

10. $b + 80 = -80$

11. $m + (-8) = 2$

12. $w + \frac{3}{2} = \frac{5}{8}$

Write an equation for each problem. Then solve the equation and check the solution.

13. Twelve added to a number equals 18. Find the number.

14. What number increased by 20 equals -10?

15. The sum of a number and fifty equals eighty. Find the number.

16. What number plus one-half is equal to four?

17. The sum of a number and 3 is equal to -15. What is the number?

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2-3 Study Guide and Intervention

Solving Equations by using Multiplication and Division

Solve Using Multiplication If each side of an equation is multiplied by the same number, the resulting equation is equivalent to the given one. You can use the property to solve equations involving multiplication and division.

Multiplication Property of Equality	For any numbers a, b, and c, if $a = b$, then $ac = bc$.

Example 1 **Solve $3\frac{1}{2}p = 1\frac{1}{2}$.**

$3\frac{1}{2}p = 1\frac{1}{2}$	Original equation
$\frac{7}{2}p = \frac{3}{2}$	Rewrite each mixed number as an improper fraction.
$\frac{2}{7}\left(\frac{7}{2}p\right) = \frac{2}{7}\left(\frac{3}{2}\right)$	Multiply each side by $\frac{2}{7}$.
$p = \frac{3}{7}$	Simplify.

The solution is $\frac{3}{7}$.

Example 2 **Solve $-\frac{1}{4}n = 16$.**

$-\frac{1}{4}n = 16$	Original equation
$-4\left(-\frac{1}{4}n\right) = -4(16)$	Multiply each side by -4.
$n = -64$	Simplify.

The solution is -64.

Exercises

Solve each equation. Then check your solution.

1. $\frac{h}{3} = -2$ **2.** $\frac{1}{8}m = 6$ **3.** $\frac{1}{5}p = \frac{3}{5}$

4. $5 = \frac{y}{12}$ **5.** $-\frac{1}{4}k = -2.5$ **6.** $-\frac{m}{8} = \frac{5}{8}$

7. $-1\frac{1}{2}h = 4$ **8.** $-12 = -\frac{3}{2}k$ **9.** $\frac{j}{3} = \frac{2}{5}$

10. $-3\frac{1}{3}b = 5$ **11.** $\frac{7}{10}m = 10$ **12.** $\frac{p}{5} = -\frac{1}{4}$

Write an equation for each problem. Then solve the equation.

13. One-fifth of a number equals 25. Find the number.

14. What number divided by 2 equals -18?

15. A number divided by eight equals 3. Find the number.

16. One and a half times a number equals 6. Find the number.

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2-3 Study Guide and Intervention *(continued)*

Solving Equations by Using Multiplication and Division

Solve Using Division To solve equations with multiplication and division, you can also use the Division Property of Equality. If each side of an equation is divided by the same number, the resulting equation is true.

Division Property of Equality	For any numbers a, b, and c, with $c \neq 0$, if $a = b$, then $\frac{a}{c} = \frac{b}{c}$.

Example 1 **Solve $8n = 64$.**

$8n = 64$	Original equation
$\frac{8n}{8} = \frac{64}{8}$	Divide each side by 8.
$n = 8$	Simplify.

The solution is 8.

Example 2 **Solve $-5n = 60$.**

$-5n = 60$	Original equation
$\frac{-5n}{-5} = \frac{60}{-5}$	Divide each side by -5.
$n = -12$	Simplify.

The solution is -12.

Exercises

Solve each equation. Then check your solution.

1. $3h = -42$

2. $8m = 16$

3. $-3t = 51$

4. $-3r = -24$

5. $8k = -64$

6. $-2m = 16$

7. $12h = 4$

8. $-2.4p = 7.2$

9. $0.5j = 5$

10. $-25 = 5m$

11. $6m = 15$

12. $-1.5p = -75$

Write an equation for each problem. Then solve the equation.

13. Four times a number equals 64. Find the number.

14. What number multiplied by -4 equals -16?

15. A number times eight equals -36. Find the number.

Lesson 2-3