

2-4 Study Guide and Intervention**Solving Equations with the Variable on Each Side**

Variables on Each Side To solve an equation with the same variable on each side, first use the Addition or the Subtraction Property of Equality to write an equivalent equation that has the variable on just one side of the equation. Then solve the equation.

Example 1 Solve $5y - 8 = 3y + 12$.

$$\begin{aligned}
 5y - 8 &= 3y + 12 \\
 5y - 8 - 3y &= 3y + 12 - 3y \\
 2y - 8 &= 12 \\
 2y - 8 + 8 &= 12 + 8 \\
 2y &= 20 \\
 \frac{2y}{2} &= \frac{20}{2} \\
 y &= 10
 \end{aligned}$$

The solution is 10.

Example 2 Solve $-11 - 3y = 8y + 1$.

$$\begin{aligned}
 -11 - 3y &= 8y + 1 \\
 -11 - 3y + 3y &= 8y + 1 + 3y \\
 -11 &= 11y + 1 \\
 -11 - 1 &= 11y + 1 - 1 \\
 -12 &= 11y \\
 \frac{-12}{11} &= \frac{11y}{11} \\
 -1\frac{1}{11} &= y
 \end{aligned}$$

The solution is $-1\frac{1}{11}$.

Exercises

Solve each equation. Check your solution.

1. $6 - b = 5b + 30$

2. $5y - 2y = 3y + 2$

3. $5x + 2 = 2x - 10$

4. $4n - 8 = 3n + 2$

5. $1.2x + 4.3 = 2.1 - x$

6. $4.4m + 6.2 = 8.8m - 1.8$

7. $\frac{1}{2}b + 4 = \frac{1}{8}b + 88$

8. $\frac{3}{4}k - 5 = \frac{1}{4}k - 1$

9. $8 - 5p = 4p - 1$

10. $4b - 8 = 10 - 2b$

11. $0.2x - 8 = -2 - x$

12. $3y - 1.8 = 3y - 1.8$

13. $-4 - 3x = 7x - 6$

14. $8 + 4k = -10 + k$

15. $20 - a = 10a - 2$

16. $\frac{2}{3}n + 8 = \frac{1}{2}n + 2$

17. $\frac{2}{5}y - 8 = 9 - \frac{3}{5}y$

18. $-4r + 5 = 5 - 4r$

19. $-4 - 3x = 6x - 6$

20. $18 - 4k = -10 - 4k$

21. $12 + 2y = 10y - 12$

2-4 Study Guide and Intervention *(continued)***Solving Equations with the Variable on Each Side**

Grouping Symbols When solving equations that contain grouping symbols, first use the Distributive Property to eliminate grouping symbols. Then solve.

Example Solve $4(2a - 1) = -10(a - 5)$.

$$4(2a - 1) = -10(a - 5) \quad \text{Original equation}$$

$$8a - 4 = -10a + 50 \quad \text{Distributive Property}$$

$$8a - 4 + 10a = -10a + 50 + 10a \quad \text{Add } 10a \text{ to each side.}$$

$$18a - 4 = 50 \quad \text{Simplify.}$$

$$18a - 4 + 4 = 50 + 4 \quad \text{Add 4 to each side.}$$

$$18a = 54 \quad \text{Simplify.}$$

$$\frac{18a}{18} = \frac{54}{18} \quad \text{Divide each side by 18.}$$

$$a = 3 \quad \text{Simplify.}$$

The solution is 3.

Exercises

Solve each equation. Check your solution.

1. $-3(x + 5) = 3(x - 1)$

2. $2(7 + 3t) = -t$

3. $3(a + 1) - 5 = 3a - 2$

4. $75 - 9g = 5(-4 + 2g)$

5. $5(f + 2) = 2(3 - f)$

6. $4(p + 3) = 36$

7. $18 = 3(2t + 2)$

8. $3(d - 8) = 3d$

9. $5(p + 3) + 9 = 3(p - 2) + 6$

10. $4(b - 2) = 2(5 - b)$

11. $1.2(x - 2) = 2 - x$

12. $\frac{3 + y}{4} = \frac{-y}{8}$

13. $\frac{a - 8}{12} = \frac{2a + 5}{3}$

14. $2(4 + 2k) + 10 = k$

15. $2(w - 1) + 4 = 4(w + 1)$

16. $6(n - 1) = 2(2n + 4)$

17. $2[2 + 3(y - 1)] = 22$

18. $-4(r + 2) = 4(2 - 4r)$

19. $-3(x - 8) = 24$

20. $4(4 - 4k) = -10 - 16k$

21. $6(2 - 2y) = 5(2y - 2)$