3-5

Study Guide

Solving Equations with the Variable on Both Sides

When an equation contains parentheses or other grouping symbols, first use the distributive property to remove the grouping symbols. If the equation has variables on each side, use addition and subtraction property of equality to write an equivalent equation that has all the variables on one side. Then solve the equation.

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

$$4(2a - 1) = -10(a - 5)$$

$8a - 4 = -10a + 50$	**Use the distributive property.**
$8a + 10a - 4 = -10a + 10a + 50$	**Add 10a to each side.**
$18a - 4 = 50$	
$18a - 4 + 4 = 50 + 4$	**Add 4 to each side.**
$18a = 54$	
$\dfrac{18a}{18} = \dfrac{54}{18}$	**Divide each side by 18.**
$a = 3$	

Check:

$$4(2a - 1) = -10(a - 5)$$
$$4(2 \cdot 3 - 1) = -10(3 - 5)$$
$$4(6 - 1) = -10(-2)$$
$$4(5) = -10(-2)$$
$$20 = 20 \ ✔$$

Some equations may have *no solution,* and some equations may have *every number* in their solution set. An equation that is true for every value of the variable is called an **identity.**

Solve each equation. Then check your solution.

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

2. $6 - b = 5b + 30$

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

4. $2(7 + 3t) = -t$

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

6. $75 - 9g = 5(-4 + 2g)$

7. $1.2x + 4.3 = 2.1 - x$

8. $4.4s + 6.2 = 8.8s - 1.8$

9. $5(f + 2) = 2(3 - f)$

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

11. $\frac{2}{5}w - w = -\frac{1}{5}(3w + 2)$

12. $5(p + 3) + 9 = 3(p - 2) + 6$

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

14. $0.03g - (2g + 3) = 1.8$

15. $-5(2r + 3) = 3(11 - 4r) - 58$

Algebra 1