

5-2 Study Guide and Intervention**Solving Equations with Variables on Each Side**

To solve equations with variables on each side, use the Addition or Subtraction Property of Equality to write an equivalent equation with the variable on one side. Then solve the equation.

Example Solve the equation $12x - 3 = 4x + 13$. Then check your solution.

$$12x - 3 = 4x + 13$$

Write the equation.

$$12x - 4x - 3 = 4x - 4x + 13$$

Subtract $4x$ from each side.

$$8x - 3 = 13$$

Simplify.

$$8x - 3 + 3 = 13 + 3$$

Add 3 to each side.

$$8x = 16$$

Simplify.

$$x = 2$$

Mentally divide each side by 8.

To check your solution, replace x with 2 in the original equation.

CHECK $12x - 3 = 4x + 13$ Write the equation.

$$12(2) - 3 \stackrel{?}{=} 4(2) + 13$$
 Replace x with 2.

$$24 - 3 \stackrel{?}{=} 8 + 13$$
 Simplify.

$$21 = 21 \checkmark$$
 The statement is true.

Exercises

Solve each equation. Check your solution.

1. $2x + 1 = x + 11$

2. $a + 2 = 5 + 4a$

3. $7y + 25 = 2y$

4. $n + 11 = 2n$

5. $7 - 4c = 3c - 7$

6. $4 - 3b = 6b - 5$

7. $9d - 9 = 3d - 3$

8. $f - 4 = 6f + 26$

9. $-2s + 3 = 5s + 24$

10. $5a - 3 = 8a + 6$

11. $8n - 12 = -12n + 8$

12. $7y + 8 = -2y - 64$

13. $1 + 3x = 7x - 7$

14. $6a - 3 = 4 + 7a$

15. $3b - 1 = 14 + 2b$

16. $12c + 18 = 4 + 5c$

17. $9y + 3 = 5y - 13$

18. $3n - 2 = 5n + 12$

5-2 Study Guide and Intervention *(continued)*

Solving Equations with Variables on Each Side

Write Equations with Variables On Each Side You can write equations with variables on each side to solve word problems.

Example SHOPPING Maya bought a pair of boots for \$32 and then bought 3 T-shirts. Paul bought a cap for \$12 and then bought 5 T-shirts. If all the T-shirts cost the same amount, and Maya and Paul spent the same amount in all, write and solve an equation to find the cost of one T-shirt.

Words	cost of + number of × cost per = cost of + number of × cost per boots T-shirts T-shirt cap T-shirts T-shirt
Variable	Let t = the cost of one T-shirt
Equation	$32 + 3t = 12 + 5t$

$32 + 3t = 12 + 5t$	Write the equation.
$32 + 3t - 3t = 12 + 5t - 3t$	Subtraction Property of Equality
$32 = 12 + 2t$	Simplify.
$32 - 12 = 12 - 12 + 2t$	Subtraction Property of Equality
$20 = 2t$	Simplify.
$10 = t$	Mentally divide each side by 2.

The cost for one T-shirt is \$10.

Exercises

- 1. PHONES** Acme Phone Company charges \$21 a month plus \$0.05 a minute. Belltone Phones charges \$15 a month plus \$0.11 a minute. Write and solve an equation to determine how many minutes a month you must use for the costs of using either company to be equal.
- 2. PARTIES** Mrs. Lin is planning her daughter's birthday party. At Parties R Us, the fee is \$80 plus \$10 per child. At the Birthday Palace, the fee is \$150 plus \$5 per child. Write and solve an equation to determine how many children must be invited for the costs to be equal.
- 3. POOLS** A town pool has two individual membership rates. You can pay a \$75 membership fee and then \$2 each time you use the pool or you can pay a \$15 membership fee and \$5 each time you use the pool. Write and solve an equation to determine how many times you must visit the pool for the costs to be equal.
- 4. TAXI** Speedy Cab has an initial charge of \$2.50 plus \$3.50 for each additional mile. Friendly Cab has an initial charge of \$5.50 plus an additional \$2.00 per mile. Write and solve an equation to determine how many miles you must go for the costs to be equal.