

Lesson 6

Solving Equations with Variables on Both Sides

Lesson

Sometimes the variable appears on both sides of the equation. Strategy:

1. Simplify each side (distribute and combine like terms if needed).
2. Move all variable terms to one side by adding or subtracting.
3. Move all constant terms to the other side.
4. Solve the resulting one- or two-step equation.

Example: Solve $5x + 3 = 2x + 18$

Step 1: Subtract $2x$ from both sides

$$3x + 3 = 18$$

Step 2: Subtract 3 from both sides

$$3x = 15$$

Step 3: Divide by 3

$$x = 5$$

Check: $5(5) + 3 = 28$ and $2(5) + 18 = 28$ [correct]

Practice Problems

1) Solve: $4x + 7 = 2x + 19$

2) Solve: $6y - 5 = 3y + 10$

3) Solve: $8m + 1 = 5m + 16$

4) Solve: $3(n + 2) = n + 14$

5) Solve: $7a - 4 = 3a + 12$

6) Solve: $2(x + 5) = 3(x - 2)$

7) Solve: $5(w - 1) = 2(w + 5)$

8) Solve: $9x - 3 = 6x + 9$

9) Solve: $4(y + 1) = 2y + 14$

10) Solve: $3m + 8 = m + 20$

11) Solve: $6(n - 2) = 2(n + 6)$

12) Solve: $10x - 7 = 4x + 11$

13) Solve: $3(2a + 1) = 5a + 7$

14) Solve: $8p - 5 = 3p + 20$

15) Solve: $2(4x - 3) = 3(2x + 4)$

16) Solve: $7(y + 2) = 4(y + 5)$

- 17) Solve and identify the type of solution: $5x + 3 = 5x + 7$

- 18) Solve and identify the type of solution: $4(2x - 1) = 2(4x - 2)$

- 19) Alice has $(3x + 10)$ dollars; Bob has $(5x - 2)$ dollars.

Find x if they have equal amounts.

- 20) A plumber charges $\$40 + \$25/\text{hr}$; an electrician charges $\$10 + \$35/\text{hr}$.

After how many hours h will their total charges be equal?
