

Multi-Step Equations

A **multi-step equation** requires **more than one operation** to solve. To find the value of the variable, use **inverse operations** to undo each operation in the correct order.

Steps for Solving Multi-Step Equations

1. **Simplify each side** of the equation if needed (combine like terms or use the distributive property).
2. **Move variable terms** to one side of the equation.
3. **Move constant numbers** to the other side.
4. **Divide or multiply** to isolate the variable.
5. **Check your answer** by substituting it back into the original equation.

Example 1 – Two-Step Equation

Solve:

$$3x + 5 = 20$$

Step 1: Subtract 5 from both sides.

$$3x = 15$$

Step 2: Divide both sides by 3.

$$x = 5$$

Check:

$$3(5) + 5 = 15 + 5 = 20 \quad \checkmark$$

Example 2 – Variables on Both Sides

Solve:

$$4x + 6 = 2x + 18$$

Subtract $2x$ from both sides.

$$2x + 6 = 18$$

Subtract 6.

$$2x = 12$$

Divide by 2.

$$x = 6$$

Example 3 – Distributive Property

Solve:

$$2(x + 4) = 18$$

Distribute.

$$2x + 8 = 18$$

Subtract 8.

$$2x = 10$$

Divide by 2.

$$x = 5$$

Part A – Solve Two-Step Equations

1. $2x + 7 = 19$
 $x = \boxed{}$

4. $6a - 12 = 24$
 $a = \boxed{}$

7. $9q + 18 = 63$
 $q = \boxed{}$

2. $5y - 10 = 20$
 $y = \boxed{}$

5. $4n + 16 = 36$
 $n = \boxed{}$

8. $7r - 14 = 28$
 $r = \boxed{}$

3. $3m + 9 = 30$
 $m = \boxed{}$

6. $8p - 24 = 40$
 $p = \boxed{}$

Part B – Variables on Both Sides

9. $5x + 4 = 2x + 19$
 $x = \boxed{}$

12. $9a - 7 = 6a + 11$
 $a = \boxed{}$

15. $4d + 20 = d + 35$
 $d = \boxed{}$

10. $6y - 3 = 4y + 11$
 $y = \boxed{}$

13. $7b + 12 = 3b + 28$
 $b = \boxed{}$

16. $12e - 9 = 8e + 11$
 $e = \boxed{}$

11. $8m + 6 = 5m + 24$
 $m = \boxed{}$

14. $10c - 15 = 6c + 13$
 $c = \boxed{}$

Part C – Use the Distributive Property

17. $2(x + 5) = 24$
 $x = 7$

20. $5(a - 2) = 35$
 $a = \square$

23. $8(q + 2) = 48$
 $q = \square$

18. $3(y - 4) = 18$
 $y = \square$

21. $6(n + 3) = 42$
 $n = \square$

24. $9(r - 1) = 54$
 $r = \square$

19. $4(m + 6) = 40$
 $m = \square$

22. $7(p - 5) = 28$
 $p = \square$