

Solving Multi-Step Equations

Algebra 1 • Section 2.3

Name: _____

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Quick Review and Helpful Hints

Solving means undoing operations in a sensible order while keeping both sides balanced. Show one clean move at a time, and substitute the answer back when the equation is easy to check.

▷ **Example:** Solve $4x - 9 = 23$.

Work: Add 9 to both sides: $4x = 32$. Divide by 4, so $x = 8$.

★ **Answer:** $x = 8$

◆ Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Solve $2(x + 5) = 34$. _____

6. Solve $2(4y - 3) = 5y + 15$. _____

2. Solve $3(a - 4) + 7 = 22$. _____

7. Solve $9 - 3(2r + 1) = 0$. _____

3. Solve $5 - 2(3p - 1) = -17$. _____

8. Solve $6 + \frac{m-2}{4} = 10$. _____

4. Solve $4(2n + 1) - 3n = 29$. _____

9. Solve $7(2q - 1) - 4q = 23$. _____

5. Solve $\frac{x+6}{3} = 8$. _____

10. Solve $18 = 3(2z + 4)$. _____

◆ Word Problems

11. A gym charges \$25 plus \$8 per class. After a \$5 coupon, the total is \$84. How many classes? _____

12. Three times the sum of a number and 4 is 45. Find the number. _____



Answer Keys

1. $x = 12$

2. $a = 9$

3. $p = 4$

4. $n = 5$

5. $x = 18$

6. $y = 7$

7. $r = 1$

8. $m = 18$

9. $q = 3$

10. $z = 1$

11. 8 classes

12. 11

Step-by-Step Explanations

- Either distribute or just divide by 2 — both lead to $x + 5 = 17$, so $x = 12$.
- Spread the 3 inside, tidy up to $3a - 5 = 22$, then add 5 and divide by 3 for $a = 9$.
- Distribute carefully to $5 - 6p + 2 = -17$, combine to $7 - 6p = -17$, and finish with $p = 4$.
- Open the parentheses, then merge like terms into $5n + 4 = 29$ — much friendlier to solve, giving $n = 5$.
- The whole top is divided by 3, so multiply both sides by 3 first, then subtract 6.
- Distribute the left into $8y - 6$, gather y terms and constants, and $3y = 21$ gives $y = 7$.

- Distribute the -3 , simplify to $6 - 6r = 0$, and balancing both sides shows $r = 1$.
- Clear the $+6$ so the fraction equals 4, multiply by 4 to undo it, then add the 2 back.
- After distributing and collecting terms you get $10q - 7 = 23$, a clean two-step finish to $q = 3$.
- Dividing both sides by 3 early makes things lighter: $6 = 2z + 4$ quickly gives $z = 1$.
- Write $25 + 8c - 5 = 84$, fold the constants into $20 + 8c = 84$, and $8c = 64$ means 8 classes.
- 'Three times the sum' becomes $3(n + 4) = 45$; divide by 3 for $n + 4 = 15$, then subtract 4.



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