

Solving Two-Step Equations

Name: _____

Date: _____

Score: _____ / 17

Two-step equations are just one-step equations with one extra move—you can totally handle this! The trick is to undo the operations in the right order: peel away addition or subtraction first, *then* tackle the multiplication or division that is closest to the variable. Working step by step keeps the equation balanced and prevents the most common mistakes. Think of it as unwrapping a present: take off the outer layer first, then the inner one!

Key Concepts & Quick Review

Solve $ax + b = c$: Step 1 — subtract b from both sides: $ax = c - b$. Step 2 — divide both sides by a :
 $x = \frac{c - b}{a}$.

Solve $\frac{x}{a} + b = c$: Step 1 — subtract b : $\frac{x}{a} = c - b$. Step 2 — multiply by a : $x = a(c - b)$. Always check by substituting back.

Examples

① Solve: $3x - 7 = 14$.

Think It Through: Solve in reverse order of operations. First undo the subtraction by adding 7 to both sides, which gives $3x = 21$. Then undo the multiplication by dividing both sides by 3, so $x = 7$. A quick check in the original equation confirms the answer: $3(7) - 7 = 14$.

Answer: $x = 7$

② A rideshare app charges a \$2.50 booking fee plus \$1.50 per mile. Jada's total ride cost was \$14.50. Write and solve a two-step equation to find the number of miles she traveled.

Think It Through: Let m be the number of miles. The cost equation is $1.50m + 2.50 = 14.50$. First subtract the booking fee from both sides to get $1.50m = 12$. Then divide both sides by 1.50: $m = 12 \div 1.50 = 8$ mi. Check: $1.50(8) + 2.50 = 12 + 2.50 = 14.50$ ✓.

Answer: $m = 8$ mi

Practice Problems

Solve each two-step equation.

1. $2x + 3 = 11$ _____

6. $-2k + 5 = 11$ _____

2. $5n - 4 = 16$ _____

7. $6p + 1 = -17$ _____

3. $3y + 9 = 0$ _____

8. $\frac{t}{3} - 4 = 2$ _____

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

9. $-3x + 8 = 20$ _____

5. $4a - 7 = -3$ _____

10. $7n - 14 = 0$ _____



11. $2 + 5y = 27$ _____




13. $9 - 2m = 1$ _____

12. $\frac{x}{4} + 3 = -1$ _____

14. $3t + \frac{1}{2} = \frac{7}{2}$ _____

15. $-6x - 3 = -33$ _____

Study Tips

-  **Undo in reverse order of operations:** if the expression was “multiply then add,” undo it by “subtract then divide.”
-  Write each step on a new line and show both sides — this makes checking much easier and prevents arithmetic slips.
-  If the answer is a fraction or decimal, **check by substituting exactly:** fractions are less error-prone than rounded decimals.

Word Problems

16. A video game starts you with 50 bonus points. Each level you complete adds 15 points to your score. You finish the game with 320 points. Write and solve a two-step equation to find how many levels you completed. If each level takes about 12 *min*, how long did you play? _____
17. At a winter craft fair, Priya sells handmade candles for \$8.50 each. She spent \$34 on supplies before the fair. At the end of the day her profit (earnings minus costs) was \$93.50. Write and solve a two-step equation to find how many candles she sold. If she wants to reach a profit of \$200 at the next fair with the same supply cost, how many candles does she need to sell? _____



Answer Keys

- | | |
|-------|---|
| 1) 4 | 10) 2 |
| 2) 4 | 11) 5 |
| 3) -3 | 12) -16 |
| 4) 8 | 13) 4 |
| 5) 1 | 14) 1 |
| 6) -3 | 15) 5 |
| 7) -3 | 16) $n = 18$ levels; 216 <i>min</i> ; 3.6 <i>hr</i> |
| 8) 18 | 17) 15 candles; 28 candles for \$200 profit |
| 9) -4 | |

Step-by-Step Explanations

Strategy: For Discounts, Markups, and Sales Tax, apply changes in the correct order: discount or markup first, then tax when the problem asks for a final price. The order of discount, markup, and tax matters because each step changes the next base amount.

Practice 1: An item costs \$60 and is discounted 25%. Find the sale price. **Answer:** \$45.00

In the opening example, subtract the discount from the original price rather than from the sale price.

Practice 15: An item costs \$90, is discounted 20%, and then has 8% sales tax added. Find the final total.

Answer: \$77.76

For the end-of-set item, apply the discount first, then add tax to the discounted price.

Word-problem notes:

16. Answer: Retail: \$88.80; sale: \$62.16; total with tax: \approx \$67.29.

Start with the markup. An 85% markup means multiply the wholesale price by 1.85: $48 \times 1.85 = 88.80$, so the retail price is \$88.80. Next apply the 30% discount by multiplying by 0.70: $88.80 \times 0.70 = 62.16$. Finally apply the sales tax by multiplying by 1.0825: $62.16 \times 1.0825 \approx 67.29$. The order matters because tax is charged on the sale price, not on the wholesale price.

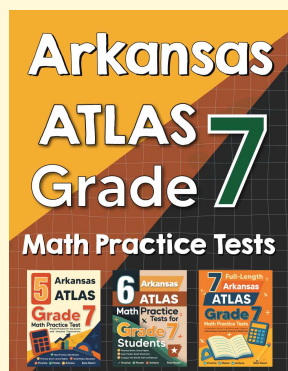
17. Answer: Deal A: \$561.60; Deal B: \$561.60; yes, they are the same.

Deal A: \$561.60; Deal B: \$561.60; same final price.



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