Writing Two-Step Equations from Word Problems

Explore ideas and representations

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

Define the unknown with units, distinguish a once-only amount from a repeated amount, then write the total. A 4 dollar entry fee plus 3 dollars per game totaling 19 dollars gives $3g + 4 = 19$, so $g = 5$ games. The fee is not charged five times.

Worked example

Game model: a signed model gives $3x + 4 = 19$. Recover the input and use substitution to verify it.

1. Subtract (4) from both sides: $3x + 4 - (4) = 19 - (4)$, so $3x = 15$.
2. Divide by (3): $x = 15 \div (3) = 5$.
3. Check: $3(5) + (4) = 19$.
Answer: $x = 5$.

Practice Problems

Show your thinking.

1. A museum charges \$5.00 once plus \$3.00 per ticket. The total is \$26.00. Define x, write a two-step equation, and solve.

2. A taxi charges \$4.00 once plus \$2.00 per km. The total is \$20.00. Define x, write a two-step equation, and solve.

3. A delivery costs 4.50 dollars plus 3.50 per box. The bill is 22 dollars. Define the unknown, write an equation, and find the number of boxes.

4. A tank starts with 8 L and fills at 2.5 L/min. It reaches 23 L. Write an equation for the time t, then find the time and label its unit.

5. Five teams each brought the same number x of tickets. Six tickets were unusable, leaving 39 valid tickets. Write and solve an equation for x.

6. A group starts with 54 dollars. It buys items for 7 dollars each and has 12 dollars left. Write an equation for the number n of items. Solve it and check the amount left.

7. Bowling visit: a once-only fee is \$12.00 and each activity costs \$3.00. The total is \$42.00. Define x, write a two-step equation, and find the activity count.

8. Craft workshop: a once-only fee is \$8.00 and each activity costs \$5.00. The total is \$43.00. Define x, write a two-step equation, and find the activity count.

Answer Key

1. Let x count tickets; $3x + 5 = 26$; $x = 7$.
2. Let x count km; $2x + 4 = 20$; $x = 8$.
3. $3.50b + 4.50 = 22$; $b = 5$ boxes.
4. $8 + 2.5t = 23$; $t = 6$ minutes.
5. $5x - 6 = 39$; $x = 9$ tickets per team.
6. $54 - 7n = 12$; $n = 6$ items.
7. $3x + 12 = 42$; $x = 10$.
8. $5x + 8 = 43$; $x = 7$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The fixed amount is 5 and the repeated charge is $3x$: $3x + 5 = 26$.
2. Subtract 5: $3x = 21$; divide by 3: $x = 7$.
3. Check $3(7) + 5 = 26$ dollars.

Problem 2

1. The fixed amount is 4 and the repeated charge is $2x$: $2x + 4 = 20$.
2. Subtract 4: $2x = 16$; divide by 2: $x = 8$.
3. Check $2(8) + 4 = 20$ dollars.

Problem 3

1. Let b count boxes. The box charge is $3.50b$, plus one 4.50 dollar fee.
2. Set $3.50b + 4.50 = 22$. Subtract 4.50: $3.50b = 17.50$.
3. Divide: $b = 17.50/3.50 = 5$. Check $3.50(5) + 4.50 = 22$.

Problem 4

1. Added liters are rate times minutes: $2.5t$. The 8 starting liters give $8 + 2.5t = 23$.
2. Subtract 8: $2.5t = 15$. Divide by 2.5: $t = 6$ minutes.
3. Check: $8 + 2.5(6) = 23$ L.

Problem 5

1. Five equal groups brought $5x$ tickets. Removing 6 gives $5x - 6 = 39$.
2. Add 6: $5x = 45$. Divide by 5: $x = 9$.
3. Check $5(9) - 6 = 39$.

Problem 6

1. The purchase removes $7n$ dollars, so the remaining balance is $54 - 7n = 12$.
2. The total spent was $54 - 12 = 42$ dollars; $7n = 42$. Divide: $n = 6$.
3. Check $54 - 7(6) = 12$ dollars.

Problem 7

1. Let x count activities; total rule $C = 3x + 12$.
2. Set $3x + 12 = 42$: $x = (42 - 12)/3 = 10$.
3. Check $3(10) + 12 = 42$ dollars.

Problem 8

1. Let x count activities; total rule $C = 5x + 8$.
2. Set $5x + 8 = 43$: $x = (43 - 8)/5 = 7$.
3. Check $5(7) + 8 = 43$ dollars.

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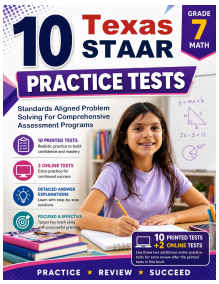

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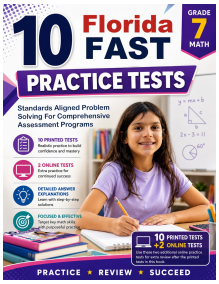

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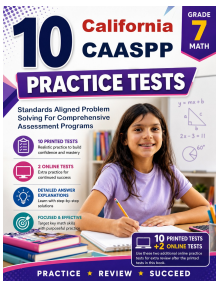

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