Writing Two-Step Equations from Word Problems

Apply the skill to decisions and designs

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 booth costs 4 dollars to enter and 3 dollars per activity. A student has 29 dollars. First solve an equation for spending exactly the budget. Then decide the greatest whole number of activities that actually fits.

2. A studio receipt lists 34 dollars for four sessions, including one 6 dollar fee. Find the price per session. Would three sessions there cost more or less than a competing 28 dollar total?

3. A two-day event charges the same unknown base price plus a 3 dollar fee each day. The two-day total is 18 dollars. Is the model $2(x + 3) = 18$ or $2x + 3 = 18$? Find the daily base price.

4. A jug starts with 2 L. Each cup takes 0.25 L. How many whole cups can be filled while leaving exactly 0.75 L? Write an equation and check what would happen with one more cup.

5. Two helpers have the same hourly rate r. One works 3 hours and gets a 5 dollar bonus. The other works 5 hours with no bonus. Write an equation for equal earnings and find the rate that makes them match.

6. A bill is 26 dollars, with 3 dollars per item and a one-time whole-dollar fee from 2 through 5 dollars. Write an equation and find two possible item counts with their corresponding fees.

7. Bowling visit: choose a maximum whole number of activities with $42.00, a once-only $12.00 fee, and $3.00 per activity. Write the budget inequality and check one extra activity.

8. Craft workshop: choose a maximum whole number of activities with $43.00, a once-only $8.00 fee, and $5.00 per activity. Write the budget inequality and check one extra activity.

Answer Key

1. $4 + 3x = 29$ gives $x = 25/3$; at most 8 activities.
2. 7 dollars per session. Three cost 27, which is 1 less.
3. $2(x + 3) = 18$; base 6 dollars per day.
4. $2 - 0.25c = 0.75$; $c = 5$ cups. Six leave 0.50 L.
5. $3r + 5 = 5r$; $r = 2.50$ dollars per hour.
6. $3n + f = 26$; $n = 8, f = 2$ or $n = 7, f = 5$.
7. $3x + 12 \leq 42$; at most 10 activities.
8. $5x + 8 \leq 43$; at most 7 activities.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Exact spending would satisfy $4 + 3x = 29$. Subtract 4: $3x = 25$, so $x = 25/3$.

2. The exact answer is between 8 and 9; activities must be whole.

3. 8 activities cost $4 + 3(8) = 28$; 9 cost 31. The largest affordable count is 8.

Problem 2

1. Let x be dollars per session. Write $4x + 6 = 34$, so $4x = 28$ and $x = 7$.

2. Three sessions would cost $3(7) + 6 = 27$ dollars.

3. $28 - 27 = 1$ dollar, so the studio is cheaper for three.

Problem 3

1. Each day includes its own fee, so the entire $x + 3$ is paid twice.

2. Divide 18 by 2: $x + 3 = 9$. Subtract 3: $x = 6$.

3. Check $2(6 + 3) = 18$. The other model charges only one fee.

Problem 4

1. Taking c cups removes $0.25c$ L, so $2 - 0.25c = 0.75$.

2. Removal is $2 - 0.75 = 1.25$ L. Divide by 0.25: $c = 5$.

3. One more leaves $2 - 0.25(6) = 0.50$ L, below the target.

Problem 5

1. Equal pay gives $3r + 5 = 5r$.

2. Subtract $3r$ from both sides: $5 = 2r$. Divide: $r = 5/2 = 2.50$.

3. Check: $3(2.50) + 5 = 12.50$, and $5(2.50) = 12.50$ dollars.

Problem 6

1. Let n be the whole item count and f the fee. Use $3n + f = 26$.

2. At $f = 2$, $3n = 24$, so $n = 8$. At $f = 5$, $3n = 21$, so $n = 7$.

3. Fees 3 and 4 leave 23 and 22, which are not multiples of 3. Only the two whole counts fit.

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. One more costs $45 > 42$, so the maximum is 10.

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. One more costs $48 > 43$, so the maximum is 7.

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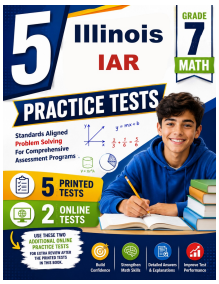

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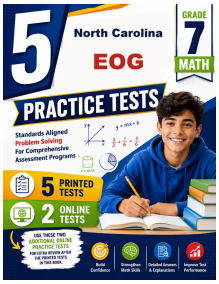

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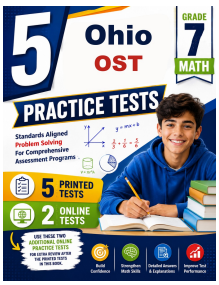

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