Solving One-Step Equations

Solving one-step equations: Applications and decisions

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

QUICK REVIEW

An equation is a balance. Undo an operation on both sides. From $x + 7 = 19$, subtract 7 to get $x = 12$ and check $12 + 7 = 19$. From $4x = 28$, divide by 4 to get $x = 7$ and check $4(7) = 28$. Multiplication/division and addition/subtraction are inverse pairs.

Worked example

Show an inverse operation and check. Solve $x + 5 = 13$.

1. Apply -5 to both sides: $x + 5 - 5 = 13 - 5$.
2. Simplify: $x = 13 - 5 = 8$.
3. Substitute: $(8) + (5) = 13$, so both sides match.
Answer: $x = 8$.

Practice Problems

Show your thinking.

1. A club has 20 members after 9 new members join. Let m be the starting membership. Write and solve a one-step equation. Could the club have started with at least 12 members?

2. A tank holds 16 L after 12 L is drained. Kai writes $x + 12 = 16$ for the starting liters. Is this equation right? Correct and solve it, then explain why the original amount is larger.

3. Five equal kits normally cost 60 dollars. Five of the same kits with a discount cost 55 dollars. Write a one-step equation for each unit price. How much does the discount save per kit?

4. Six students each receive 7 cards from one deck. What equation models equal sharing of the original deck? Solve it. If a seventh student needs the same share, how many extra cards must be found?

5. Adding 3.5 m to a ribbon makes it 10 m. Jo says removing 1.5 m from the original ribbon instead would leave exactly 5 m. Write an equation for the starting length and check the claim.

6. A crate label says $b/4 = 6$ for four equal groups of bolts. A second label says $b - 7 = 17$ for a test that removes seven bolts. Can both labels be true of the same starting count?

7. Design two different one-step equations with $x = 13$ as their only solution. One must use addition and the other multiplication. Use 20 on the right of the addition equation and 52 on the right of the multiplication equation.

8. A baker puts an unknown whole number of cookies into each of four bags. The order sheet requires 34 cookies with no extras. Write an equation. Explain whether it can be filled exactly using the bags.

Answer Key

1. $m + 9 = 20$; $m = 11$. No, that is less than 12.
2. $x - 12 = 16$; $x = 28$ L.
3. $5p = 60$, $5d = 55$; $p = 12$, $d = 11$ dollars per kit. Save 1 dollar per kit.
4. $c/6 = 7$; original 42 cards. Another equal share needs 7 extra cards.
5. $r + 3.5 = 10$; start 6.5 m. Jo is correct.
6. Yes. Both imply $b = 24$ bolts.
7. $x + 7 = 20$ and $4x = 52$.
8. $4c = 34$ implies $c = 8.5$; no whole-cookie solution.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Starting members plus new members give $m + 9 = 20$.
2. Subtract 9 on both sides: $m = 20 - 9 = 11$ members.
3. Check $11 + 9 = 20$. Since $11 < 12$, it did not reach the earlier target.

Problem 2

1. Draining decreases the starting amount, so use $x - 12 = 16$.
2. Add 12 to both sides: $x = 16 + 12 = 28$ L.
3. The original amount included the removed 12 L. Check $28 - 12 = 16$.

Problem 3

1. Five copies of the normal price give $5p = 60$, so $p = 60/5 = 12$.
2. Five copies of the discount price give $5d = 55$, so $d = 55/5 = 11$.
3. Savings per kit are $12 - 11 = 1$ dollar; five kits save 5 dollars in all.

Problem 4

1. The original number c divided into 6 groups gives 7 per group: $c/6 = 7$.
2. Multiply both sides by 6: $c = 6(7) = 42$ cards.
3. Seven equal shares would require $7(7) = 49$ cards, so $49 - 42 = 7$ more are needed.

Problem 5

1. The first change gives $r + 3.5 = 10$. Subtract 3.5 on both sides: $r = 6.5$ m.
2. Test the other change on that same starting ribbon: $6.5 - 1.5 = 5$ m. Both statements fit the one starting length.

Problem 6

1. From $b/4 = 6$, multiply both sides by 4: $b = 24$.
2. From $b - 7 = 17$, add 7 to both sides: $b = 24$.
3. Check both with 24: $24/4 = 6$ and $24 - 7 = 17$.

Problem 7

1. The addend is $20 - 13 = 7$. This gives $x + 7 = 20$, whose only solution is 13.
2. The multiplier is $52/13 = 4$. This gives $4x = 52$, whose only solution is 13.
3. Check $13 + 7 = 20$ and $4(13) = 52$.

Problem 8

1. Four bags with the same count c contain $4c = 34$ cookies.
2. Dividing both sides by 4 gives $c = 34/4 = 8.5$.
3. Each bag needs a whole count. Eight per bag gives 32 and nine gives 36, so neither gives exactly 34.

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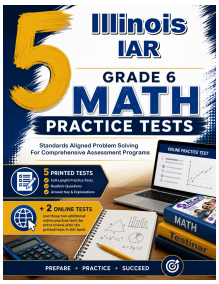

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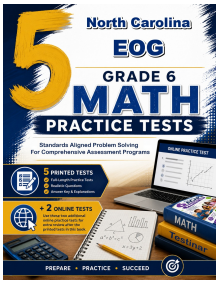

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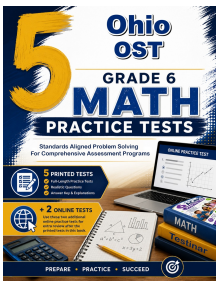

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