Unknown Number in Equations

Spot mistakes, reason, and work backward

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

QUICK REVIEW

Test a proposed number in the original box position, keeping the original operation. For $18 \div \square = 3$, 6 works because $18 \div 6 = 3$; 3 fails because $18 \div 3 = 6$. Within one question, a repeated shape keeps one value. Not every equation has a unique answer: $0 \times 2 = 0$ and $0 \times 5 = 0$.

Worked example

Lee proposes 3 for $24 \div \square = 6$, but checks $24 \div 6 = 4$. Test the proposed 3 in its original position, then correct it.

1. Put the proposed value in the box: $24 \div 3 = 8$. Since $8 \neq 6$, the proposed 3 fails.

2. The divisor must be 4, because $6 \times 4 = 24$. Substitute again: $24 \div 4 = 6$, now a true equation.

Answer: 3 fails; the box must be 4.

Practice Problems

Show your thinking.

1. Sam tests 7 in $6 \times \square = 42$ by calculating $6 + 7 = 13$, then rejects 7. Is the number wrong or the test wrong? Show the actual substitution.

2. Can one whole number fill the box in BOTH equations: $24 \div \square = 6$ and $\square \div 6 = 4$? Find what each box would need and explain.

3. Every input is multiplied by the same unknown factor. Find that factor using both completed rows, then fill the missing output marked $?$.

Input	Output
2	10
4	20
6	$?$

4. A shape keeps the same value wherever it appears. Find BOTH shapes: $\square \times 4 = 28$ and $28 \div \square = \triangle$.

5. Find the whole number in the box. $4 \times \square$ is greater than 20 but less than 30. The box can also be shared equally into 3 groups with nothing left over.

6. Ben says every box equation has exactly one answer. Give two DIFFERENT whole numbers that work in $0 \times \square = 0$ to test his claim.

7. Compare $\square \times 5 = 0$ with $\triangle \times 5 = 5$. Find both shapes and explain why their values differ.

8. Fill $\square \times \triangle = 12$ in two different ways. Do not use 0 or 1, and do not merely switch the order of one pair.

Answer Key

1. The test is wrong; 7 works because $6 \times 7 = 42$.
2. No. The first needs 4; the second needs 24.
3. Factor 5; missing output 30.
4. $\square = 7$ and $\triangle = 4$.
5. $\square = 6$.
6. For example 2 and 5; the claim is false.
7. $\square = 0$; $\triangle = 1$.
8. For example $(\square, \triangle) = (2, 6)$ and $(3, 4)$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The original operation is multiplication. Substituting 7 gives $6 \times 7 = 42$, exactly the required right side.

2. The calculation $6 + 7 = 13$ tests addition instead. Its result does not disprove the multiplication answer.

Problem 2

1. In $24 \div \square = 6$, the box is the number we divide by. It must be 4, since $24 \div 4 = 6$.

2. In $\square \div 6 = 4$, the box is the total. It must be $6 \times 4 = 24$.

3. These required values differ. Putting 24 in the first equation gives $24 \div 24 = 1$, not 6, so one shared value cannot work.

Problem 3

1. The first row requires $2 \times \square = 10$, so the factor is 5. The second row confirms $4 \times 5 = 20$.

2. Apply that same factor to the last input: $6 \times 5 = 30$. Thus the missing output is 30, not the factor 5.

Problem 4

1. The first equation gives $\square = 7$, because $7 \times 4 = 28$.

2. Use that same 7 in the second equation: $28 \div 7 = 4$, so $\triangle = 4$. The two shapes have different roles.

Problem 5

1. The only multiples of 4 strictly between 20 and 30 are 24 and 28. They give box values 6 and 7.

2. Only 6 makes three equal whole-number shares: $6 \div 3 = 2$. The number 7 is between multiples 6 and 9 of 3.

3. Check the product condition: $4 \times 6 = 24$, and $20 < 24 < 30$. Both clues are satisfied.

Problem 6

1. Try 2: $0 \times 2 = 0$, so 2 is a valid box value.

2. Try 5: $0 \times 5 = 0$ too. Since $2 \neq 5$, this one equation has more than one valid answer.

Problem 7

1. Zero groups of 5 make zero objects: $0 \times 5 = 0$. Any positive number of such groups would give at least 5.

2. One group of 5 makes 5: $1 \times 5 = 5$. Thus 0 and 1 play different roles in these equations.

Problem 8

1. One pair is 2 and 6, since $2 \times 6 = 12$. Both factors are greater than 1.

2. Another pair is 3 and 4, since $3 \times 4 = 12$. This uses different factors, not just 6×2.

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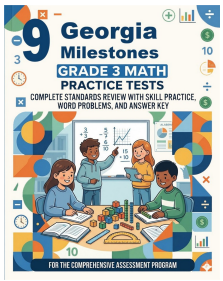

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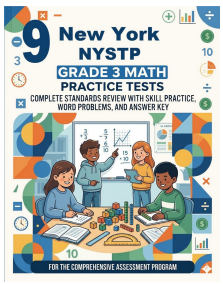

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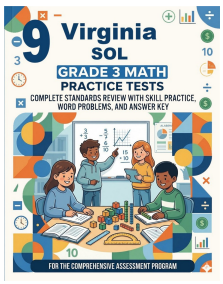

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