In The Expression (21 3) X (7 + 2) = (12 - 4), What Operation Should You Perform Last? Why? Please Help

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When encountering complex mathematical expressions, understanding the order of operations is crucial to arriving at the correct result. The expression (21 3) X (7 + 2) = (12 - 4) presents an intriguing scenario where the sequence of operations significantly impacts the outcome. Determining which operation to perform last—and why—is essential for solving the problem accurately. This article aims to dissect the expression step-by-step, clarify the order of operations, and explain the reasoning behind performing specific calculations last.

Understanding the Expression and Its Components

Before delving into the order of operations, it is important to interpret the given expression correctly. The expression provided is:

(21 3) X (7 + 2) = (12 - 4)

At first glance, it appears to contain some ambiguity, particularly with the segment (21 3), which seems to lack an explicit operation between 21 and 3. Common operations include addition (+), subtraction (−), multiplication (×), or division (÷). Since the expression is incomplete or possibly miswritten, we need to clarify or assume the intended operations.

Possible interpretations include:

- (21 + 3): Addition of 21 and 3
- (21 - 3): Subtraction
- (21 × 3): Multiplication
- (21 ÷ 3): Division

Similarly, the expression could be a typo or a formatting issue, and perhaps it was meant to be:

(21 + 3) × (7 + 2) = (12 - 4)

or another variation.

Clarifying the Correct Expression

To proceed, we need a clear and logical expression. For the sake of this discussion, and based on common mathematical structures, let's assume the intended expression is:

(21 + 3) × (7 + 2) = (12 - 4)

which simplifies to:

(24) × (9) = (8)

Now, the question becomes: which operation should you perform last?

Alternatively, suppose the original expression was:

(21 − 3) × (7 + 2) = (12 − 4)

which simplifies to:

(18) × (9) = (8)

Again, the right side does not match the left, indicating inconsistency.

Therefore, for practical purposes, let's consider the expression as:

(21 + 3) × (7 + 2) = (12 − 4)

and analyze it accordingly.

Order of Operations (PEMDAS/BODMAS)

To determine which operation to perform last, it's vital to understand the standard rules of order of operations. The most widely accepted convention is PEMDAS (Parentheses, Exponents, Multiplication and Division, Addition and Subtraction). Some regions refer to it as BODMAS.

Key points:

- Parentheses/Brackets: Perform calculations inside parentheses first.
- Exponents/Orders: Handle any exponents or roots after parentheses.
- Multiplication and Division: These are of equal priority; perform from left

to right.
- Addition and Subtraction: Also of equal priority; perform from left to right.

Applying PEMDAS ensures consistent and correct results across mathematical calculations.

Step-by-Step Evaluation of the Expression

Let's analyze the expression:

(21 + 3) × (7 + 2) = (12 − 4)

Step 1: Simplify expressions inside parentheses

- Left side: (21 + 3) = 24
- Next part: (7 + 2) = 9
- Right side: (12 − 4) = 8

Now, the expression reduces to:

24 × 9 = 8

Step 2: Evaluate multiplication

- 24 × 9 = 216

So, the left side simplifies to 216.

Step 3: Check the equality

- Is 216 = 8? No, it's not.

Thus, the original expression as simplified does not hold true; perhaps the expression was intended to demonstrate the order of operations rather than an equality.

Determining Which Operation Should Be Performed Last

Given the initial question: "In the expression (21 3) X (7 + 2) = (12 - 4), what operation should you perform last? Why?", the core is understanding the

order in which operations are executed.

Key points:

- The last operation performed in the calculation depends on the structure of the expression.
- According to PEMDAS, addition and subtraction are performed last among the basic operations.
- Multiplication and division are performed before addition and subtraction.

In the context of the expression:

- The operations inside parentheses are performed first.
- The multiplication is performed after parentheses.
- The subtraction on the right side is performed after the parentheses.

Therefore:

- The last operation to perform in evaluating the left side before confirming the equality would be the multiplication.
- On the right side, the subtraction is performed last.

However, since the question asks explicitly about "the operation" that should be performed last, the focus is on the entire expression's evaluation process.

Why Is Multiplication Performed Before Addition and Subtraction?

Understanding the hierarchy of operations clarifies why certain operations are performed before others.

Reasons include:

- Mathematical Convention: Over centuries, mathematicians have agreed upon PEMDAS/BODMAS to standardize calculations.
- Operational Priority: Multiplication is considered a higher-level operation than addition because it is repeated addition.
- Consistency: Performing multiplication before addition ensures consistent results regardless of the problem.

In our example, the multiplication (24 × 9) is performed after evaluating the parentheses, but before comparison with the right side.

Implications for the Last Operation in the Expression

Given the structure of the expression and the standard order of operations, the last operation performed in evaluating an expression is typically the one that resolves the final calculation to arrive at the answer.

In the example:

- The last operation on the left side is multiplication.
- The last operation on the right side is subtraction.

If the goal is to evaluate the expression completely, the last operation performed would be:

- Multiplication on the left side, since parentheses are evaluated first, then multiplication is performed.

Alternatively, if the expression is part of an equation, the last operation to verify the equality would be the comparison step.

Conclusion: Which Operation Should You Perform Last? Why?

Summarizing the key points:

- The operation performed last depends on the structure of the expression and the order of operations.
- According to PEMDAS/BODMAS, addition and subtraction are performed last among the basic operations.
- In the context of evaluating the entire expression, the last operation performed before arriving at the final simplified form is usually multiplication (after parentheses are evaluated), but the final step in confirming the equation's correctness involves the last arithmetic operation needed to simplify the expression entirely.

Therefore:

- The operation you should perform last when evaluating the expression is the one that simplifies the final step of the calculation, which, in most cases, is either addition/subtraction or multiplication/division, depending on the structure.
- In the specific case of the example, assuming standard order of operations, the last operation performed when evaluating the left side is multiplication,

because it comes after parentheses.

Why?

- Because parentheses are evaluated first.
- Then, multiplication/division are performed before addition/subtraction.
- The last operation to be performed in evaluating the left side is multiplication.

In conclusion, if you are asked explicitly which operation to perform last in the process of solving the expression, the answer is:

Multiplication (or addition/subtraction depending on the expression structure), because according to standard order of operations, these are performed after parentheses and exponents.

Final Thoughts

Understanding the hierarchy of operations is essential for solving complex mathematical expressions accurately. Remember that:

- Always evaluate parentheses first.
- Handle exponents next.
- Perform multiplication and division from left to right.
- Perform addition and subtraction from left to right.

By following these principles, you can determine which operation should be performed last in any given expression and understand the reasoning behind this sequence.

Frequently Asked Questions

In the expression (21 ÷ 3) × (7 + 2) = (12 - 4), which operation should be performed last and why?

The subtraction (12 - 4) should be performed last because, according to the order of operations (PEMDAS/BODMAS), multiplication and division are performed before addition and subtraction, and parentheses indicate the first operations to evaluate. Since the subtraction is outside the parentheses and not part of any nested operation, it should be performed last after simplifying the other parts.

Why is it important to follow the order of operations in this expression?

Following the order of operations ensures that calculations are consistent and accurate. It prevents ambiguity, so everyone arrives at the same result when evaluating the expression.

What is the step-by-step calculation of the expression (21 ÷ 3) × (7 + 2) = (12 - 4)?

First, evaluate parentheses: (21 ÷ 3) = 7 and (7 + 2) = 9, and (12 - 4) = 8. Then multiply: 7 × 9 = 63. Since the right side is 8, the expression balances as 63 ≠ 8, indicating the original expression is an equation to solve. The last operation performed in the original expression is the subtraction (12 - 4), which is performed after simplifying the other parts.

Can the subtraction (12 - 4) be performed before the multiplication and addition in this expression?

No, because according to the order of operations, subtraction outside parentheses is performed after evaluating the expressions inside parentheses and multiplication/division, unless parentheses specify otherwise.

What operation should you perform first in the expression, and what is the reason?

The first operations to perform are the calculations inside parentheses: (21 ÷ 3), (7 + 2), and (12 - 4). Parentheses take priority, allowing you to simplify parts of the expression before applying multiplication or subtraction.

How does understanding the order of operations help when solving complex expressions like this?

Understanding the order of operations helps ensure that calculations are performed correctly and systematically, reducing errors and making complex expressions manageable and easier to evaluate.

Is the operation to be performed last always the same in all similar expressions?

Not necessarily. The last operation depends on the specific expression and the placement of parentheses. Generally, operations inside parentheses are performed first, and then multiplication/division, followed by addition/subtraction, but parentheses can change the order.

How would the answer change if the subtraction (12 - 4) was inside parentheses with the other operations?

If (12 - 4) was inside parentheses, it would be evaluated first, and the entire expression's order would change accordingly. The last operation in that case might be different, depending on the new parentheses placement.

Additional Resources

In The Expression (21 3) X (7 + 2) = (12 - 4), What Operation Should You Perform Last? Why? Please Help

Mathematics is a universal language that relies heavily on the correct order of operations to produce accurate results. When faced with complex expressions, understanding which operation to perform last is crucial to solving problems correctly. The expression (21 3) X (7 + 2) = (12 - 4) presents an intriguing case where the sequence of calculations can significantly alter the outcome. This article aims to dissect this expression, clarify the correct sequence of operations, and explain the reasoning behind performing specific calculations last, all while maintaining clarity for readers from various backgrounds.

Understanding the Expression: Breaking Down the Components

Before delving into the sequence of operations, it’s essential to interpret the expression accurately. The provided expression is:

(21 3) X (7 + 2) = (12 - 4)

At first glance, the notation (21 3) may seem ambiguous because standard mathematical expressions usually include explicit operators like addition (+), subtraction (−), multiplication (×), or division (÷). Since the expression lacks an operator between 21 and 3, it’s necessary to interpret or clarify what this notation might represent.

Interpreting the Notation

Possible interpretations include:

1. A typographical omission: The expression might have intended to include an operator between 21 and 3, such as addition or subtraction:
- (21 + 3) or (21 - 3)
2. A placeholder or shorthand: The notation (21 3) could imply a specific operation, such as concatenation or a known operation in a particular context.
3. A typo or formatting error: The expression might have been miswritten, perhaps intending (21 ÷ 3) or (21 × 3).

Given the context and the structure of the rest of the expression, the most logical assumption is that (21 3) represents (21 ÷ 3), as division often appears in such contexts and fits with the overall pattern.

Confirmed Interpretation

Thus, the expression can be rewritten as:

(21 ÷ 3) × (7 + 2) = (12 - 4)

which simplifies to:

(7) × (9) = (8)

Since:

- (21 ÷ 3) = 7
- (7 + 2) = 9
- (12 - 4) = 8

And the left side is 7 × 9 = 63, which does not equal 8, indicating that the original statement is either a puzzle or a test of operation sequencing.

The Core Question: Which Operation Should You Perform Last?

The central question posed is: "In the expression (21 ÷ 3) × (7 + 2) = (12 - 4), what operation should you perform last, and why?"

This involves understanding the hierarchy of operations—commonly known as the order of operations or PEMDAS/BODMAS rules:

- Parentheses/Brackets
- Exponents/Orders
- Multiplication and Division (left to right)
- Addition and Subtraction (left to right)

Applying these principles ensures consistent and correct results.

Step-by-Step Analysis of the Expression

1. Simplify Inside the Parentheses

The expression includes three parentheses:

- (21 ÷ 3)
- (7 + 2)
- (12 - 4)

Each should be simplified first:

- (21 ÷ 3) = 7
- (7 + 2) = 9
- (12 - 4) = 8

Substituting these back into the original expression yields:

7 × 9 = 8

which simplifies to:

63 = 8

This is false, indicating the original expression as written is not an equality, or perhaps is meant as a puzzle.

2. Interpreting as a Puzzle

Given that 63 ≠ 8, it suggests that the question is more about the operation sequence rather than the equality itself. The core focus is: "Which operation should be performed last in such an expression?"

3. The Operational Hierarchy

In the simplified form:

- The multiplication is between 7 and 9.
- The right side is the number 8.

The key is to identify which operation within the original expression is performed last when evaluating.

Determining the Last Operation: Multiplication or Subtraction?

Given the expression, and according to the order of operations, the last operation performed in evaluating the left side is multiplication, after resolving the parentheses.

Why is Multiplication Performed After Parentheses?

- Parentheses are evaluated first as per PEMDAS.
- Inside parentheses, addition and division are performed.
- Once parentheses are simplified to single numbers, multiplication and division are performed from left to right.
- Addition and subtraction are performed last, also from left to right.

Thus, in the expression (21 ÷ 3) × (7 + 2):

- (21 ÷ 3) is evaluated first: 7
- (7 + 2) is evaluated next: 9
- Then, 7 × 9 is performed: 63

This indicates that multiplication is the last operation performed on the simplified components.

Why Is the Multiplication the Last Operation in This Expression?

In standard mathematical operations, multiplication within an expression, after evaluating parentheses, is typically performed after addition or subtraction inside those parentheses. Because multiplication is of higher precedence than addition, the order is:

1. Evaluate all parentheses.
2. Perform multiplication and division from left to right.
3. Finally, perform addition and subtraction from left to right.

In our case:

- The parentheses (21 ÷ 3) and (7 + 2) are evaluated first.
- The multiplication (7 × 9) follows immediately after.
- The right side (12 - 4), which equals 8, is a separate expression and does not affect the sequence of operations within the left side.

The Importance of the Last Operation: Clarifying the Reasoning

Understanding which operation to perform last is not just an academic exercise; it ensures the accuracy of calculations in various contexts:

1. Preventing Miscalculations

Misordering operations can lead to incorrect answers, especially in complex expressions. Knowing that multiplication or division should be performed after parentheses and before addition/subtraction helps maintain correctness.

2. Consistency Across Calculations

Standard rules like PEMDAS ensure that everyone interprets and evaluates expressions similarly. This consistency is vital in fields like engineering, finance, and computer programming.

3. Application in Real-World Problems

In practical scenarios, such as calculating areas, volumes, or financial figures, performing operations in the wrong order can lead to significant errors.

Common Pitfalls and How to Avoid Them

Even with clear rules, learners often make mistakes. Here are some common pitfalls and tips to avoid them:

Pitfall 1: Ignoring Parentheses

- Tip: Always evaluate parentheses first, regardless of their position.

Pitfall 2: Performing Addition/Subtraction Before Multiplication/Division

- Tip: Remember that multiplication and division take precedence over addition and subtraction.

Pitfall 3: Performing Operations from Left to Right Without Considering Hierarchy

- Tip: Use PEMDAS as a guide, not just a sequence. Recognize that multiplication/division are of equal precedence and are performed left to right.

Practical Examples to Reinforce the Concept

Example 1: Simple Expression

Evaluate: (8 + 4) × 3

- Evaluate parentheses: 8 + 4 = 12
- Multiply: 12 × 3 = 36

Last operation performed: Multiplication.

Example 2: More Complex Expression

Evaluate: (16 ÷ 4) + (2 × 5)

- Evaluate parentheses:
- 16 ÷ 4 = 4
- 2 × 5 = 10
- Add: 4 + 10 = 14

Order of operations:

- First, the divisions and multiplications inside parentheses.
- Last, addition.

Summary: Which Operation Should You Perform Last and Why?

In the expression (21 ÷ 3) × (7 + 2) = (12 - 4), the operations inside parentheses are evaluated first. Once simplified, the multiplication (7 × 9) is performed, making multiplication the last operation performed on the left side.

Why perform multiplication last in this context?

Because, according to standard mathematical conventions:

- Parentheses are evaluated first.
- Multiplication and division are performed next, from left to right.
- Addition and subtraction are performed last.

In the sequence, after resolving all parentheses, the multiplication between the resulting numbers is the final operation before arriving at the result.

In conclusion:

- The last operation to perform in the simplified form of the expression is multiplication.
- This order ensures clarity, consistency, and correctness, aligning with universally accepted mathematical standards.

Final Thoughts: Applying the Knowledge

Understanding the hierarchy of operations isn't just about solving a specific problem—it's about developing a disciplined approach to mathematical reasoning. Whether you're

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