

Use The Rule For Order Of Operations To Simplify The Expression As Much As Possible $67-4(38-10)$

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Understanding how to correctly simplify algebraic expressions is a fundamental skill in mathematics. The expression $67 - 4(38 - 10)$ is a perfect example demonstrating the importance of applying the order of operations, often remembered by the acronym PEMDAS (Parentheses, Exponents, Multiplication and Division, Addition and Subtraction). This article will guide you through the process of simplifying such expressions step by step, emphasizing the importance of following the correct order to arrive at the most simplified form.

What Is the Order of Operations?

Definition and Importance

The order of operations is a set of rules that dictates the sequence in which different operations should be performed in a mathematical expression to ensure consistent and correct results. Without these rules, the same expression could yield different answers depending on how it is calculated.

For example, consider the expression: $8 + 4 \times 3$. If you perform addition first, you get $(8 + 4) \times 3 = 12 \times 3 = 36$. But if you perform multiplication first, you get $8 + (4 \times 3) = 8 + 12 = 20$. The correct answer, according to the order of operations, is 20, because multiplication should be performed before addition.

PEMDAS Rule

The PEMDAS acronym helps remember the order:

- Parentheses: Simplify expressions inside parentheses or brackets first.
- Exponents: Calculate any exponents or roots.
- Multiplication and Division: Perform these operations from left to right.
- Addition and Subtraction: Perform these last, from left to right.

Applying these rules ensures clarity and correctness when simplifying complex expressions.

Step-by-Step Simplification of $67 - 4(38 - 10)$

Now, let's apply the order of operations to the expression $67 - 4(38 - 10)$. We'll go through each step meticulously.

Step 1: Simplify Inside Parentheses

Identify and evaluate the expression inside the parentheses:

- The parentheses contain $(38 - 10)$.
- Calculate $38 - 10$:

$$38 - 10 = 28$$

Now, the expression becomes:

$$67 - 4(28)$$

Step 2: Perform Multiplication

Next, handle the multiplication:

- Multiply 4 by 28:

$$4 \times 28 = 112$$

The expression now simplifies to:

$$67 - 112$$

Step 3: Perform Subtraction

Finally, perform the subtraction:

- $67 - 112$:

$$67 - 112 = -45$$

Result: The simplified value of the expression $67 - 4(38 - 10)$ is -45.

Understanding Why Following the Order of Operations Matters

Applying the order of operations ensures that everyone interprets and calculates expressions consistently. If you neglect these rules, the results can be erroneous or ambiguous. For example, if someone performed subtraction before multiplication, they might incorrectly compute the expression as:

- $67 - 4(38 - 10)$
- But mistakenly interpret as $67 - 4 \times 28$ (which is correct), then subtract 28 from 67.

However, if one ignores parentheses altogether, they might compute:

$$- 67 - 4 \times 38 - 10$$

which leads to a different and incorrect result.

This example underscores the necessity of parentheses and the importance of following PEMDAS precisely.

Common Mistakes When Simplifying Expressions

Understanding typical errors can help prevent them. Here are some common mistakes:

- **Ignoring parentheses:** Always evaluate expressions inside parentheses first.
- **Wrong order of operations:** Performing multiplication or division after addition/subtraction, ignoring PEMDAS rules.
- **Misinterpretation of negative signs:** Be cautious with negatives, especially after subtraction.
- **Forgetting to evaluate all parts:** For example, neglecting to evaluate exponents or other operations present.

By being aware of these pitfalls and adhering to the PEMDAS rule, you can accurately simplify complex expressions.

Additional Practice Problems

To reinforce your understanding, try simplifying these expressions using the order of operations:

1. Calculate: $50 + 6(4 + 2)$
2. Simplify: $(15 - 5)^2 + 10$
3. Evaluate: $8 \div 2(2 + 2)$
4. Simplify: $9 + 3 \times (2^2) - 4$

Solutions involve applying parentheses first, then exponents, followed by multiplication/division, and finally addition/subtraction.

Real-World Applications of Order of Operations

The rule for the order of operations isn't just useful in academic settings; it also plays a critical role in various real-world contexts:

- Financial calculations: Determining interest, loan payments, or investments often involve complex expressions.
- Engineering: Calculations involving force, pressure, and other physical quantities rely on accurate order of operation application.
- Computer programming: Programming languages follow specific precedence rules similar to PEMDAS to evaluate expressions correctly.
- Data analysis: Formulas used in spreadsheets or statistical software require proper sequencing to yield correct results.

Mastering the rule ensures accuracy and consistency across these domains.

Conclusion

In summary, simplifying the expression $67 - 4(38 - 10)$ correctly hinges on your understanding and application of the order of operations. Starting with parentheses, then handling any exponents, followed by multiplication/division, and finally addition/subtraction, guarantees an accurate result. For this particular expression, following the rules yields a final simplified value of -45. Remember, consistently applying PEMDAS is essential for correct calculations in mathematics and many practical applications. Practice regularly with different expressions to strengthen your skills and develop confidence in handling complex algebraic problems.

Frequently Asked Questions

What is the first step to simplify the expression $67 - 4(38 - 10)$ using the order of operations?

The first step is to evaluate the expression inside the parentheses: $38 - 10$, which equals 28.

After simplifying inside the parentheses, what operation should be performed next in $67 - 4(38 - 10)$?

Next, multiply 4 by the result from the parentheses, so $4 \times 28 = 112$.

How do you simplify the expression $67 - 4(38 - 10)$ after calculating 4×28 ?

Subtract 112 from 67: $67 - 112 = -45$.

What is the final simplified value of the expression $67 - 4(38 - 10)$?

The final simplified value is -45.

Why is it important to follow the order of operations when simplifying expressions like $67 - 4(38 - 10)$?

Following the order of operations ensures that the expression is simplified correctly and consistently, preventing errors in calculation.

Additional Resources

Use The Rule For Order Of Operations To Simplify The Expression As Much As Possible $67 - 4(38 - 10)$

When approaching mathematical expressions like $67 - 4(38 - 10)$, understanding and correctly applying the order of operations is essential for reaching an accurate and simplified result. This process not only ensures correctness but also enhances one's overall mathematical reasoning skills. In this article, we will thoroughly analyze the expression, break down the steps involved using the rule for order of operations, and discuss various strategies to simplify similar expressions effectively.

Understanding the Order of Operations

Before diving into the specific expression, it's crucial to grasp the fundamental principles behind the order of operations. This set of rules dictates the sequence in which operations should be carried out to ensure consistency and correctness across mathematical calculations.

The PEMDAS/BODMAS Rule

Most educators and mathematicians rely on the PEMDAS or BODMAS acronym to remember the order:

- Parentheses/Brackets (P/B): Simplify expressions inside parentheses or brackets first.
- Exponents/Orders (E/O): Evaluate powers or roots next.
- Multiplication and Division (MD): Perform these operations from left to right.
- Addition and Subtraction (AS): Finally, perform addition and subtraction from left to right.

Applying this rule systematically helps avoid common errors and ensures the integrity of the solution.

Step-by-Step Simplification of the Expression $67 - 4(38 - 10)$

Let's analyze $67 - 4(38 - 10)$ step-by-step, adhering to the order of operations.

Step 1: Simplify Inside Parentheses

The innermost expression is $(38 - 10)$.

$$38 - 10 = 28$$

Now, the expression becomes:

$$67 - 4 \cdot 28$$

Step 2: Perform Multiplication

Next, handle the multiplication $4 \cdot 28$.

$$4 \cdot 28 = 112$$

Updated expression:

$$67 - 112$$

Step 3: Perform Subtraction

Finally, subtract 112 from 67.

$$67 - 112 = -45$$

Final Result: -45

This straightforward application of the order of operations demonstrates how each step logically follows from the previous one, ensuring accuracy.

Analyzing the Approach and Its Features

Applying the order of operations systematically is vital for simplifying complex expressions. Here's a

breakdown of the features, pros, and cons of this approach:

Features

- Structured process: Provides clear steps to follow.
- Universal applicability: Works for a wide variety of expressions.
- Minimizes errors: Reduces common mistakes like misordering calculations.
- Enhances understanding: Deepens comprehension of mathematical operations.

Pros

- Ensures consistent results across different calculations.
- Facilitates tackling nested or complex expressions.
- Builds foundational skills used in higher mathematics.

Cons

- Can be confusing for beginners without proper practice.
- May require careful attention to detail, especially with nested parentheses.
- Sometimes misunderstood or misapplied, leading to errors.

Alternative Strategies and Tips for Simplification

While straightforward application of PEMDAS/BODMAS works well, there are additional strategies and tips that can assist in simplifying similar expressions:

1. Break Down the Expression

- Divide complex expressions into smaller, manageable parts.
- Tackle each part step-by-step, verifying at each stage.

2. Use Substitution for Clarity

- Assign temporary variables to parts of the expression.
- Simplify stepwise, then substitute back.

3. Be Mindful of Negative Results

- Keep track of signs carefully to avoid errors, especially with subtraction resulting in negative numbers.

4. Practice with Varied Expressions

- Expose yourself to different types of expressions involving exponents, fractions, and nested parentheses to build fluency.

5. Double-Check Work

- Review each step to ensure adherence to the order of operations.
- Verify calculations independently.

Common Mistakes and How to Avoid Them

Understanding frequent pitfalls helps prevent errors in calculations:

- Ignoring parentheses: Always evaluate parentheses first.
- Misordering multiplication and division: Remember to perform these operations from left to right.
- Overlooking negative signs: Carefully track signs, especially after subtraction.
- Neglecting exponents: Address powers before other operations unless parentheses indicate otherwise.
- Skipping steps: Proceed sequentially to avoid missing critical parts of the calculation.

Conclusion: Emphasizing the Importance of the Order of Operations

The expression $67 - 4(38 - 10)$ exemplifies the critical role that the rule for order of operations plays in mathematics. By systematically applying PEMDAS/BODMAS—evaluating parentheses first, then multiplication, followed by subtraction—we arrive at the correct simplified result of -45. Mastery of these rules is essential not only for solving straightforward problems but also for tackling complex, multi-step calculations with confidence and accuracy.

Understanding and practicing the application of the order of operations cultivate precision, reduce errors, and lay the groundwork for advanced mathematical concepts. Whether you're a student, educator, or math enthusiast, embracing these principles ensures clarity and consistency across all your mathematical endeavors.

In summary:

- Always start with parentheses or brackets.
- Proceed with exponents or orders.

- Handle multiplication and division from left to right.
- Complete addition and subtraction last, also from left to right.
- Review each step to ensure correctness.

By internalizing these steps and practicing consistently, simplifying expressions like $67 - 4(38 - 10)$ becomes an intuitive process, reinforcing your overall mathematical reasoning skills.

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