

Solve: $12^2(89+9)-78+398/12=$

Solve: $12^2(89+9)-78+398/12=$

When encountering a complex mathematical expression like $12^2(89+9)-78+398/12=$, the key is to methodically apply the order of operations—commonly remembered by the acronym PEMDAS (Parentheses, Exponents, Multiplication and Division, Addition and Subtraction). Breaking down the expression step-by-step ensures accuracy and clarity, especially when the calculation involves multiple operations such as exponents, parentheses, division, and subtraction. This comprehensive guide will walk you through the process of solving this problem, enhancing your understanding of algebraic and arithmetic principles along the way.

Understanding the Components of the Expression

Before diving into the calculations, it's crucial to understand each part of the expression:

- 12^2 : This is an exponentiation operation, meaning 12 raised to the power of 2.
- $(89+9)$: A parentheses expression that must be calculated first.
- -78 : A subtraction operation.
- $398/12$: A division operation.

The expression can be written as:

$$12^2 (89+9) - 78 + 398/12$$

Applying the correct order of operations will lead to the accurate solution.

Step-by-Step Solution Process

Step 1: Simplify Parentheses

The first step according to PEMDAS is to evaluate expressions within parentheses:

$$- (89+9)$$

Calculate:

$$89 + 9 = 98$$

Now, the expression becomes:

$$12^2 \cdot 98 - 78 + 398/12$$

Step 2: Calculate Exponents

Next, evaluate the exponent:

$$- 12^2$$

Calculate:

$$12 \cdot 12 = 144$$

Now, the expression becomes:

$$144 \cdot 98 - 78 + 398/12$$

Step 3: Perform Multiplication and Division from Left to Right

Following PEMDAS, perform multiplication and division as they appear from left to right:

$$- \text{Multiplication: } 144 \cdot 98$$

Calculate:

$$144 \cdot 98$$

Break it down:

$$- 144 \cdot 100 = 14,400$$

$$- 144 \cdot 2 = 288$$

Subtract the extra:

$$14,400 - (144 \cdot 2) = 14,400 - 288 = 14,112$$

Alternatively, directly:

$$144 \cdot 98:$$

$$- 144 \cdot 100 = 14,400$$

$$- 144 \cdot 2 = 288$$

$$- \text{Since } 98 = 100 - 2, \text{ then:}$$

$$14,400 - 288 = 14,112$$

So,

$$144\ 98 = 14,112$$

Next, handle division:

$$- 398 / 12$$

Calculate:

Divide 398 by 12:

$$- 12\ 33 = 396$$

$$- 398 - 396 = 2$$

So,

$$398 / 12 \approx 33.1667 \text{ (repeating 6)}$$

Expressed as a decimal:

$$398 / 12 \approx 33.1667$$

Now the expression is:

$$14,112 - 78 + 33.1667$$

Step 4: Perform Addition and Subtraction

Finally, perform addition and subtraction from left to right:

- First, subtract 78:

$$14,112 - 78 = 14,034$$

- Then, add 33.1667:

$$14,034 + 33.1667 \approx 14,067.1667$$

Final Result:

$$\approx 14,067.1667$$

Interpreting the Result and Its Significance

The calculated value, approximately 14,067.17, provides the solution to the original expression. Recognizing how to approach such problems systematically is vital for students, educators, and professionals dealing with complex calculations. This method emphasizes the importance of following the order of operations precisely to avoid mistakes.

Common Mistakes to Avoid When Solving Similar Expressions

When tackling multi-operation expressions, be mindful of the following pitfalls:

1. **Ignoring Parentheses:** Always evaluate parentheses first, regardless of other operations.
2. **Misapplying the Order of Operations:** Remember PEMDAS and perform exponents before multiplication/division, and those before addition/subtraction.
3. **Incorrect Division or Multiplication Order:** Always proceed from left to right for multiplication and division at the same precedence level.
4. **Rounding Errors:** When dealing with division resulting in repeating decimals, decide whether to round or keep precise fractions.
5. **Overlooking Negative Signs:** Pay close attention to subtraction and negative numbers to avoid sign errors.

Additional Tips for Solving Complex Mathematical Expressions

To enhance your problem-solving skills, consider the following tips:

- **Write Down Each Step:** This helps prevent mistakes and keeps track of calculations.
- **Use Parentheses Liberally:** When in doubt, enclose parts of the expression to clarify the order.

- **Double-Check Your Calculations:** Review each step, especially multiplications and divisions.
- **Utilize a Calculator for Complex Divisions:** Confirm decimal approximations to ensure accuracy.
- **Practice Regularly:** The more you practice solving multi-step expressions, the more intuitive it becomes.

Conclusion: Mastering the Art of Simplifying Expressions

Solving the expression $12^2(89+9)-78+398/12=$ reveals the importance of understanding and applying the order of operations meticulously. By breaking down complex calculations into manageable steps—evaluating parentheses first, then exponents, followed by multiplication/division, and finally addition/subtraction—you ensure accurate results. Whether you're a student preparing for exams, a professional handling technical calculations, or a math enthusiast, mastering these systematic approaches will significantly improve your problem-solving skills.

Remember, precision and patience are key. Practice with various expressions to build confidence and develop an intuitive sense of mathematical operations. With consistent effort, you'll find that even the most complex expressions become approachable and solvable, unlocking new levels of mathematical proficiency.

Frequently Asked Questions

What is the first step to solve the expression $12^2(89+9)-78+398/12$?

The first step is to evaluate the parentheses $(89+9)$.

How do you compute 12^2 in the expression?

Calculate 12^2 by squaring 12, which equals 144.

What is the value of $12^2(89+9)$?

First, evaluate $(89+9) = 98$, then multiply by 144: $144 \times 98 = 14,112$.

How do you handle the division 398/12 in the expression?

Divide 398 by 12, which equals approximately 33.17.

What is the next step after computing the multiplication and division parts?

Substitute the computed values back into the expression: $14,112 - 78 + 33.17$.

How do you perform the subtraction and addition in the expression?

Subtract 78 from 14,112 to get 14,034, then add 33.17 for a total of 14,067.17.

What is the final result of the expression $12^2(89+9)-78+398/12$?

The approximate value is 14,067.17.

Can the expression be simplified further?

Yes, if rounding is not required, the division $398/12$ can be left as a fraction or decimal, but the main calculation is complete.

Is this type of problem common in math exams?

Yes, it involves applying PEMDAS/BODMAS rules to evaluate complex expressions.

What tools can help verify the solution to this expression?

A calculator or algebraic software can be used to double-check the calculations for accuracy.

Additional Resources

Solve: $12^2(89+9)-78+398/12=$

When faced with complex mathematical expressions like Solve: $12^2(89+9)-78+398/12=$, it's essential to approach the problem systematically. The process of solving such expressions not only tests one's understanding of basic arithmetic operations and the order of operations but also enhances problem-solving skills that are vital in various fields, from engineering to finance. This article provides a comprehensive review of how to approach and solve this particular expression, breaking down each step, clarifying concepts, and highlighting common pitfalls and best practices.

Understanding the Components of the Expression

Before diving into calculations, it's important to understand the individual components of the expression:

- Exponents: 12^2 signifies 12 raised to the power of 2.
- Parentheses: $(89+9)$ indicates that addition inside the parentheses should be performed first.
- Multiplication: The expression involves multiplication between 12^2 and the sum inside parentheses.
- Addition and subtraction: The expression contains both addition (+) and subtraction (-) operations.
- Division: $398/12$ is a division operation, which may result in a decimal or fractional value.

Understanding these components ensures clarity and helps prevent mistakes during calculation.

Order of Operations: The Key to Correct Solution

The PEMDAS/BODMAS Rule

To correctly evaluate the expression, the standard order of operations must be followed: Parentheses, Exponents, Multiplication and Division (from left to right), Addition and Subtraction (from left to right). This hierarchy ensures consistency and accuracy.

- Parentheses/Brackets: Perform calculations inside parentheses first.
- Exponents/Orders: Calculate powers and roots.
- Multiplication and Division: Handle from left to right.
- Addition and Subtraction: Handle from left to right.

Applying these rules step-by-step is vital for an accurate solution.

Step-by-Step Solution

Let's analyze the expression:

$$12^2(89+9)-78+398/12=$$

Step 1: Simplify inside parentheses

$$(89+9) = 98$$

Now, the expression becomes:

$$12^2 \cdot 98 - 78 + 398/12$$

Step 2: Calculate the exponent

$$12^2 = 144$$

Now, the expression is:

$$144 \cdot 98 - 78 + 398/12$$

Step 3: Handle multiplication and division from left to right

First, multiply:

$$144 \cdot 98$$

Calculating:

$$144 \cdot 98 = (144 \cdot 100) - (144 \cdot 2) = 14,400 - 288 = 14,112$$

Next, handle division:

$$398 / 12$$

Calculating:

$$398 / 12 \approx 33.1667 \text{ (rounded to four decimal places)}$$

Now, the expression becomes:

$$14,112 - 78 + 33.1667$$

Step 4: Final addition and subtraction

Calculate:

$$14,112 - 78 = 14,034$$

Then:

$$14,034 + 33.1667 = 14,067.1667$$

Final Result

The value of the expression $12^2(89+9)-78+398/12=$ is approximately 14,067.17 when rounded to two decimal places.

Analysis and Insights

This problem demonstrates the importance of meticulous order of operations and careful handling of each component.

Key Takeaways:

- Always perform calculations inside parentheses first.
- Handle exponents immediately after parentheses.
- Be cautious with division, especially when it results in decimal approximations.
- Keep track of intermediate results to avoid mistakes.

Common Mistakes to Avoid:

- Ignoring the order of operations.
- Forgetting to perform the division before addition/subtraction.
- Miscalculating exponents or parentheses.
- Rounding too early, which can lead to inaccuracies.

Features and Pros of Systematic Approach

- Clarity: Breaking down each step helps in understanding the process.
- Accuracy: Following the order minimizes errors.
- Efficiency: Systematic steps prevent re-calculation and confusion.
- Applicability: The method can be applied to similar algebraic expressions.

Potential Challenges and How to Overcome Them

Challenge	Solution
Handling large numbers	Use calculator or stepwise multiplication to avoid errors
Decimal approximations	Keep calculations in fractional form until the end
Multiple operations in sequence	Write each step clearly and verify intermediate results

Extensions and Related Problems

Once comfortable with evaluating this expression, you can explore more complex problems involving:

- Nested parentheses
- Multiple exponents
- Variables and algebraic expressions
- Real-world applications such as financial calculations, physics formulas, etc.

Practicing these will deepen your understanding of mathematical principles and improve problem-solving skills.

Conclusion

In conclusion, solving the expression $12^2(89+9)-78+398/12=$ illustrates the importance of understanding the order of operations and applying systematic methods. The final approximate value, 14,067.17, is obtained by carefully simplifying each component step-by-step. This approach not only yields correct results but also builds confidence in handling complex mathematical expressions. Whether in academic settings or practical applications, mastering such evaluations enhances analytical thinking and mathematical literacy. Remember, patience and attention to detail are key to success in solving any mathematical problem.

[Solve 12 2 89 9 78 398 12](#)

Solve 12 2 89 9 78 398 12

Related Articles

- [HELP PLEASE 10 POINTS](#)
- [Questions by brock76 - Page 11](#)
- [-12 -9 \(t-3\) = 78 T=?](#)

[Back to Home](#)