

$4(-2) + 8(-2) + 3(-2) + 6 = ?$ Can You Break Down How You Solved It

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Mathematics often appears challenging at first glance, especially when expressions involve multiple terms and negative numbers. The expression $4(-2) + 8(-2) + 3(-2) + 6$ might look complicated, but with a clear step-by-step approach, it becomes straightforward to solve. In this article, we'll explore how to evaluate this expression precisely, breaking down each step to ensure understanding. Whether you're a student brushing up on basic algebra or someone who wants to strengthen their mental math skills, understanding the process involved can boost your confidence.

Understanding the Components of the Expression

Before diving into calculations, it's essential to understand what each part of the expression represents.

Breaking Down the Terms

- $4(-2)$: Multiplying 4 by -2.
- $8(-2)$: Multiplying 8 by -2.
- $3(-2)$: Multiplying 3 by -2.
- $+6$: A positive number added to the total.

Recognizing these components helps us see that the expression involves multiple products of numbers and a constant addition.

Why Are Negative Numbers Important?

Negative numbers are vital in mathematics as they represent values less than zero, often indicating loss, decrease, or movement in the opposite direction. When multiplying a positive number by a negative one, the result is negative, which is key to solving this expression correctly.

Step-by-Step Solution Breakdown

Let's analyze the expression step-by-step.

Step 1: Simplify Each Product

- $4(-2) = -8$
- $8(-2) = -16$
- $3(-2) = -6$

This simplifies our expression to:

$$-8 + (-16) + (-6) + 6$$

Step 2: Combine Like Terms

Now, combine the negative numbers first:

$$-8 + (-16) + (-6) = (-8 - 16 - 6)$$

Adding these:

$$-8 - 16 = -24$$

$$-24 - 6 = -30$$

Now, include the remaining +6:

$$-30 + 6$$

Step 3: Final Addition

$$-30 + 6 = -24$$

Final answer: -24

Understanding the Rules Used in the Solution

To ensure clarity, let's revisit the mathematical rules applied during the calculation.

Multiplication of a Positive and a Negative Number

When multiplying a positive number by a negative number:

- The result is negative.
- Example: $4(-2) = -8$.

Addition of Negative Numbers

Adding negative numbers is equivalent to subtracting their absolute values:

- Example: $-8 + (-16) = -(8 + 16) = -24$.

Combining Multiple Terms

When combining multiple numbers, follow the order of operations (PEMDAS/BODMAS):

- Parentheses
- Exponents
- Multiplication and Division
- Addition and Subtraction

In this case, multiplication comes first, then addition.

Practical Tips for Solving Similar Expressions

To efficiently evaluate expressions involving multiple negative terms, consider these tips:

1. Break Down Complex Terms

Split the expression into manageable parts, simplifying each before combining.

2. Use the Distributive Property

When dealing with expressions like $a(b + c)$, distribute the multiplication to each term.

3. Keep Track of Signs

Pay close attention to positive and negative signs to avoid errors.

4. Simplify Step-by-Step

Avoid rushing; perform calculations one at a time, verifying each step.

5. Practice Mental Math

Strengthen your ability to perform these calculations mentally by practicing similar problems regularly.

Real-World Applications of Such Calculations

Understanding how to evaluate such expressions isn't just an academic exercise; it has practical applications in various fields:

Financial Calculations

- Calculating net gains or losses by combining positive and negative cash flows.

Engineering and Physics

- Analyzing forces acting in opposite directions.

Computer Programming

- Implementing algorithms that involve calculations with signed integers.

Data Analysis

- Summing datasets with positive and negative values to determine overall trends.

Conclusion: Summing It All Up

Evaluating the expression $4(-2) + 8(-2) + 3(-2) + 6$ involves understanding multiplication with negative numbers, combining like terms, and performing careful addition. The key steps include:

1. Multiplying each term involving negative numbers.
2. Simplifying these products to their negative equivalents.
3. Combining all negative terms first to avoid confusion.
4. Adding the remaining positive constant at the end.

The final answer is -24. By breaking down complex expressions into manageable parts and applying basic math rules, you can confidently solve similar problems. Practice makes perfect, and over time, such calculations become quick and intuitive. Armed with this understanding, you're now better equipped to handle a variety of algebraic expressions involving negatives, paving the way for success in more advanced mathematics.

Remember: Always take your time to understand each component of a math problem. Breaking down the steps ensures accuracy and deepens your mathematical understanding.

Frequently Asked Questions

What is the value of $4(-2) + 8(-2) + 3(-2) + 6$?

The value is -15. By calculating each term: $4(-2) = -8$, $8(-2) = -16$, $3(-2) = -6$. Adding these: $-8 + (-16) + (-6) + 6 = -8 - 16 - 6 + 6 = -24$.

How do you approach solving the expression $4(-2) + 8(-2) + 3(-2) + 6$?

First, evaluate each multiplication: $4 \times (-2) = -8$, $8 \times (-2) = -16$, $3 \times (-2) = -6$. Then, sum all the results along with the constant 6: $-8 + (-16) + (-6) + 6$.

What is the step-by-step breakdown of solving $4(-2) + 8(-2) + 3(-2) + 6$?

Step 1: Calculate each term: $4 \times (-2) = -8$, $8 \times (-2) = -16$, $3 \times (-2) = -6$. Step 2: Add all: $-8 + (-16) + (-6) + 6$. Step 3: Sum the negatives: $-8 - 16 - 6 = -30$. Step 4: Add the 6: $-30 + 6 = -24$.

Why do we multiply the numbers before adding in this expression?

Because the expression involves multiplication of each number by -2, and the standard order of operations (PEMDAS/BODMAS) requires performing multiplication before addition.

Can you verify the result of the expression $4(-2) + 8(-2) + 3(-2) + 6$?

Yes. Calculating each term: $4 \times (-2) = -8$, $8 \times (-2) = -16$, $3 \times (-2) = -6$. Summing: $-8 - 16 - 6 + 6 = -24$. So, the final answer is -24.

What is the significance of breaking down the expression into smaller parts?

Breaking down makes complex calculations manageable, reduces errors, and clarifies each step, especially when dealing with multiple operations like multiplication and addition.

Is there an alternative way to solve $4(-2) + 8(-2) + 3(-2) + 6$?

Yes. You can factor out the common factor of -2 from the first three terms: $(-2)(4 + 8 + 3) + 6$. Then, sum inside the parentheses: $4 + 8 + 3 = 15$. Multiply: $-2 \times 15 = -30$. Add 6: $-30 + 6 = -24$.

How does understanding order of operations help in solving this problem?

It ensures that multiplication is performed before addition, leading to the correct result. Knowing this prevents common mistakes and promotes accurate calculations.

What concept of mathematics does this problem demonstrate?

It demonstrates basic arithmetic operations, the distributive property, and the importance of following the order of operations in algebraic expressions.

Additional Resources

Mathematical Expression Analysis: Breaking Down $4(-2) + 8(-2) + 3(-2) + 6 = ?$

When approaching a mathematical expression, especially one involving multiple terms and operations, the key is to methodically evaluate each component and understand how they combine. The expression $4(-2) + 8(-2) + 3(-2) + 6$ may seem straightforward at first glance, but a detailed breakdown reveals the importance of understanding multiplication, addition, and the order of operations.

In this comprehensive review, we'll explore each aspect of the problem, providing clarity on how to interpret and solve the expression step by step.

Understanding the Components of the Expression

Before diving into calculations, let's analyze each part of the expression:

- Numerical coefficients: 4, 8, 3, and 6
- Multiplicative factors: -2 (applied to 4, 8, and 3)
- Operators: Multiplication and addition

The expression contains both multiplication (indicated by the parentheses with -2) and addition operators. Recognizing the operations involved is crucial for correct evaluation.

Interpreting the Expression

The expression is written as:

$$4(-2) + 8(-2) + 3(-2) + 6$$

This indicates:

- Multiply 4 by -2
- Multiply 8 by -2
- Multiply 3 by -2
- Then add the results of these multiplications to 6

It's essential to confirm whether parentheses are used solely for grouping or to denote multiplication. Here, parentheses around numbers with a sign typically denote multiplication, so:

- $4(-2)$ means 4 multiplied by -2
- Similarly for $8(-2)$ and $3(-2)$

Note: In algebra, when a number is immediately followed by parentheses with a number, it usually implies multiplication. So, this expression involves multiplying each of 4, 8, and 3 by -2, then adding all the results along with the 6.

Step-by-Step Calculation Process

Let's now systematically evaluate each term:

Step 1: Calculate each multiplication

$$\begin{aligned} 1. \quad & 4(-2): \\ & 4 \text{ multiplied by } -2 \\ & = 4 \times -2 \\ & = -8 \end{aligned}$$

$$\begin{aligned} 2. \quad & 8(-2): \\ & 8 \text{ multiplied by } -2 \\ & = 8 \times -2 \\ & = -16 \end{aligned}$$

$$\begin{aligned} 3. \quad & 3(-2): \\ & 3 \text{ multiplied by } -2 \\ & = 3 \times -2 \\ & = -6 \end{aligned}$$

Step 2: Sum the products

Now, sum the results of the three multiplications:

$$-8 + (-16) + (-6) = ?$$

Let's evaluate step-by-step:

$$\begin{aligned} - \text{ First, add } -8 \text{ and } -16: \\ -8 + (-16) &= -8 - 16 = -24 \\ \\ - \text{ Then, add } -6: \\ -24 + (-6) &= -24 - 6 = -30 \end{aligned}$$

Step 3: Add the remaining number

Finally, add the constant 6 to the sum:

$$-30 + 6 = ?$$

Calculating:

$$-30 + 6 = -24$$

Final Answer and Explanation

Therefore, the value of the expression $4(-2) + 8(-2) + 3(-2) + 6$ is:

$$\underline{-24}$$

Deeper Insights into the Problem

Understanding the problem in detail involves more than just plugging in numbers; it involves mastering the concepts of multiplication, the order of operations, and negative numbers.

The Role of Negative Numbers

- Negative numbers are crucial in this calculation. Each multiplication involving -2 flips the sign of the involved number.
- Multiplying by -2 essentially scales the number by 2 and then inverts its sign.

The Importance of Parentheses

- Parentheses clarify the operation's scope. Here, the parentheses indicate that the multiplication applies to the numbers immediately before them.
- Misinterpreting parentheses can lead to errors, especially in more complex expressions.

Order of Operations (PEMDAS/BODMAS)

- Parentheses first: Already identified.
- Multiplication before addition: The multiplication is straightforward here.
- Addition last: Summing all intermediate results.

Alternative Interpretation: Could It Be a Different Expression?

- If parentheses were meant differently, such as grouping all terms as $4(-2 + 8(-2) + 3(-2) + 6)$, then the calculation would differ.
- However, based on standard notation and the structure given, the straightforward interpretation is multiplying each number by -2 separately.

Common Mistakes and Clarifications

While this problem appears simple, some common pitfalls include:

- Confusing the placement of parentheses:
Assuming parentheses apply to the entire sum instead of individual terms.
- Misinterpreting signs:
Forgetting that multiplying by -2 results in sign inversion.

- Order of operations errors:

Performing addition before multiplication can lead to incorrect results.

Always perform multiplication first when there are no parentheses indicating otherwise.

- Neglecting the constant term:

Remember to add the 6 after calculating the sum of the products.

Extending the Concept: Variations and Practice

To deepen understanding, consider applying similar steps to related problems:

1. Change the coefficients:

Evaluate $5(-3) + 7(-3) + 2(-3) + 4$

2. Change the multiplicative factor:

Evaluate $6(4) + 9(4) + 2(4) + 3$

3. Introduce parentheses for grouping:

Evaluate $(4 + 8 + 3) \times (-2) + 6$

Sample solutions:

- For the grouped problem:

$$(4 + 8 + 3) \times (-2) + 6 = (15) \times (-2) + 6 = -30 + 6 = -24$$

This variation emphasizes the importance of parentheses in changing the order of operations.

Conclusion: Summing Up the Solution Process

To recap, solving $4(-2) + 8(-2) + 3(-2) + 6$ involves:

- Recognizing that parentheses imply multiplication, so multiply each number by -2.

- Carefully performing each multiplication:

- $4 \times -2 = -8$

- $8 \times -2 = -16$

- $3 \times -2 = -6$

- Summing these results: $-8 + (-16) + (-6) = -30$
- Adding the remaining constant, 6: $-30 + 6 = -24$

The final answer is -24.

This exercise highlights essential mathematical principles:

- Respect for the order of operations
- Proper interpretation of parentheses
- Accurate handling of negative numbers

By breaking down the problem and understanding each step, you not only arrive at the correct answer but also reinforce foundational mathematical skills that are invaluable for tackling more complex problems.

In summary, the expression $4(-2) + 8(-2) + 3(-2) + 6$ evaluates to -24 through a systematic process of multiplication, addition, and careful interpretation of notation. This detailed analysis emphasizes the importance of understanding basic operations and their interplay, forming a solid foundation for further mathematical learning.

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