

Evaluate. $[1\frac{2}{50.7}(1.8)]^{\frac{2}{3}}$ What Is The Value Of The Expression? Enter Your Answer As A Simplified Mixed

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Understanding how to evaluate complex mathematical expressions is a fundamental skill in mathematics that enhances problem-solving and critical thinking abilities. The expression provided, $[1\frac{2}{50.7}(1.8)]^{\frac{2}{3}}$, appears intricate at first glance, but with systematic steps, it can be simplified to a clear and precise value. This article aims to guide you through the process of evaluating this expression, explaining each step with clarity, and offering insights into the principles of order of operations, fractions, and mixed numbers.

Breaking Down the Expression

Before diving into calculations, it is essential to understand the components of the given expression:

- $[1\frac{2}{50.7}(1.8)]$: This appears to be a complex term involving a mixed number, a decimal, and a multiplication operation.
- $\frac{2}{3}$: A simple fraction that multiplies the entire previous term.
- The entire expression seems to involve evaluating the bracketed term first, then multiplying by $\frac{2}{3}$.

To clarify, let's restate the expression with proper notation:

$$\left[1\frac{2}{50.7} \times (1.8) \right] \times \frac{2}{3}$$

This interpretation presumes that $1\frac{2}{50.7}(1.8)$ is a mixed number $(1\frac{2}{50.7})$, multiplied by 1.8, all within brackets, and then multiplied by $\frac{2}{3}$.

Understanding the Components

Mixed Numbers and Their Conversion

A mixed number combines a whole number with a fractional part. For example:

- $1\frac{2}{50.7}$: This represents 1 plus 2 over 50.7, which is a fractional expression with a decimal denominator.

Handling the Fraction $(\frac{2}{50.7})$

Since 50.7 is a decimal, it's advisable to convert the fractional part into a decimal for easier computation.

$$-(\frac{2}{50.7} \approx \frac{2}{50.7})$$

Calculating this:

$$(\frac{2}{50.7} \approx 0.0394)$$
 (rounded to four decimal places)

Thus, the mixed number:

$$1\frac{2}{50.7} \approx 1 + 0.0394 = 1.0394$$

Step-by-Step Evaluation

Now, let's proceed step by step:

Step 1: Convert the mixed number to an improper decimal

As established:

$$1\frac{2}{50.7} \approx 1.0394$$

Step 2: Multiply by 1.8

Next, multiply this result by 1.8:

$$1.0394 \times 1.8$$

Calculating:

$$1.0394 \times 1.8 = 1.87092$$

Step 3: Apply the bracketed term

The previous result, 1.87092, is the value inside the brackets.

Step 4: Multiply by $(\frac{2}{3})$

Now, multiply 1.87092 by $(\frac{2}{3})$:

$$\left[1.87092 \times \frac{2}{3} \right]$$

This can be written as:

$$\left[\frac{2}{3} \times 1.87092 \right]$$

Calculating:

$$\left[\frac{2}{3} \times 1.87092 = \frac{2 \times 1.87092}{3} \approx \frac{3.74184}{3} \approx 1.24728 \right]$$

Final Result and Simplification

The approximate value of the entire expression is 1.24728. However, since the instruction specifies to provide the answer as a simplified mixed number, let's convert this decimal result into a mixed number.

Step 1: Convert decimal to mixed number

- The integer part: 1
- The fractional part: 0.24728

Step 2: Convert fractional part to a fraction

To convert 0.24728 to a fraction:

- Recognize that 0.24728 is approximately $\left(\frac{24728}{100000} \right)$.

Simplify this fraction:

- Find the greatest common divisor (GCD) of numerator and denominator.
- GCD of 24728 and 100000:

Using Euclidean algorithm, $\text{GCD} \approx 8$.

Dividing numerator and denominator by 8:

$$\left[\frac{24728 \div 8}{100000 \div 8} = \frac{3085.5}{12500} \right]$$

But since 24728 is divisible by 8:

$$\left[24728 \div 8 = 3085.5 \right]$$

which is not an integer. So, let's refine the approach:

Alternatively, approximate 0.24728 as a fraction with small denominators.

Using a calculator or fraction approximation:

$$- 0.24728 \approx \left(\frac{24728}{100000} \right)$$

Dividing numerator and denominator by 4:

$$\left(\frac{6182}{25000} \right)$$

Further simplifying:

- Divide numerator and denominator by 2:

$$\left(\frac{3091}{12500} \right)$$

Since 3091 is prime, and 12500 factors into powers of 2 and 5, the fraction cannot be simplified further.

Step 3: Express as a mixed number

Thus, the fractional part is approximately $\left(\frac{3091}{12500} \right)$.

Final answer as a mixed number:

$$\left[1 \frac{3091}{12500} \right]$$

This is the simplified mixed number notation that accurately reflects the approximate value obtained.

Conclusion and Practical Implications

Evaluating complex expressions like $[1 \frac{2}{50.7(1.8)}]^{2/3}$ involves understanding mixed numbers, fractional conversions, multiplication, and order of operations. The key steps include:

- Converting mixed numbers to improper fractions or decimals.
- Handling decimal denominators carefully.
- Performing sequential calculations in accordance with PEMDAS (Parentheses, Exponents, Multiplication and Division, Addition and Subtraction).
- Converting decimal results back into simplified mixed numbers or fractions for clarity.

This process underscores the importance of precision and systematic calculation in mathematics, especially when dealing with mixed numbers and decimals.

Additional Tips for Evaluating Complex Expressions

- Use parentheses to clarify and organize calculations.
- Convert all components to decimals or fractions early to simplify calculations.
- Perform operations in the correct order: brackets first, then multiplication/division, then addition/subtraction.
- Round appropriately but be mindful of maintaining accuracy, especially in intermediate steps.
- Practice with similar problems to build confidence and proficiency.

Summary

In summary, the value of the expression $[1 \frac{2}{50.7(1.8)}] \frac{2}{3}$ is approximately 1.24728, which can be expressed as the mixed number:

$$\boxed{1 \frac{3091}{12500}}$$

This detailed explanation demonstrates how to approach and evaluate complex mathematical expressions systematically, ensuring accuracy and clarity. Mastery of these skills is essential for students, educators, and professionals who regularly engage with advanced mathematical problems.

Frequently Asked Questions

What is the value of the expression $1 \frac{2}{50.7(1.8)}$ multiplied by $\frac{2}{3}$, simplified as a mixed number?

The value of the expression is approximately $1 \frac{1}{3}$.

How do I evaluate the expression $1 \frac{2}{50.7(1.8)} \frac{2}{3}$ and express it as a simplified mixed number?

First, convert the mixed number and decimals to improper fractions, perform the multiplication, and simplify the result to a mixed number.

Is the expression $1 \frac{2}{50.7(1.8)} \frac{2}{3}$ a standard mathematical problem, and what steps should I follow

to solve it?

Yes, it involves fractions and decimals. Convert all parts to improper fractions or decimals, perform the multiplication, then simplify to a mixed number.

What is the first step in evaluating $1\frac{2}{50.7(1.8)\frac{2}{3}}$?

Convert mixed numbers and decimals to improper fractions for easier multiplication.

Can I use a calculator to evaluate the expression $1\frac{2}{50.7(1.8)\frac{2}{3}}$?

Yes, using a calculator can help accurately compute the values, especially for decimal conversions and multiplication.

How do I convert the mixed number $1\frac{2}{50.7}$ into an improper fraction?

Convert $1\frac{2}{50.7}$ to an improper fraction by multiplying the whole number by the denominator, adding the numerator, and placing over the original denominator.

What is the simplified form of the expression $1\frac{2}{50.7(1.8)\frac{2}{3}}$?

After proper conversion and multiplication, the simplified mixed number is approximately $1\frac{1}{3}$.

Are there common mistakes to avoid when evaluating such an expression?

Yes, common mistakes include misconverting mixed numbers, incorrect decimal handling, and errors in fraction multiplication. Always convert carefully and simplify thoroughly.

What is the significance of expressing the answer as a simplified mixed number?

Expressing as a simplified mixed number makes the result easier to interpret and more understandable, especially in practical contexts.

Can the expression be approximated, or should it always be simplified exactly?

For precise results, always simplify exactly. Approximate values can be used if an approximate answer suffices, but exact form is preferred for accuracy.

Additional Resources

Mathematical Evaluation of the Expression: A Comprehensive Breakdown

Understanding complex mathematical expressions can sometimes feel daunting, especially when they involve multiple layers of operations such as fractions, exponents, and mixed numbers. Today, we will delve into evaluating the expression:

$$\boxed{\text{Evaluate } [1\frac{2}{50.7}(1.8)]^{\frac{2}{3}} \text{. What is the value of the expression? Enter your answer as a simplified mixed number}}$$

This detailed analysis aims to clarify each step involved in solving this expression, ensuring that even those new to advanced algebra can follow along with confidence.

Deciphering the Expression: An Initial Breakdown

Before jumping into calculations, it's crucial to interpret the notation correctly. The expression appears to be:

$$[1\frac{2}{50.7}(1.8)]^{\frac{2}{3}}$$

with the instruction to evaluate and express the answer as a simplified mixed number.

Key points to clarify:

- The segment "1 2/50.7" seems to be a mixed number, possibly "1 and 2/50.7," but that doesn't align with standard notation because 50.7 is a decimal.
- The parentheses around 1.8 indicate multiplication.
- The entire expression is raised to the power $\frac{2}{3}$.

Possible interpretation:

Given standard mathematical notation, it's reasonable to interpret the expression as:

$$\left[1 \frac{2}{50.7} \times 1.8 \right]^{\frac{2}{3}}$$

which reads as:

- The mixed number "1 and $\frac{2}{50.7}$ " (or 1 plus 2 divided by 50.7).
- Multiply that by 1.8.
- Then, raise the result to the power $\frac{2}{3}$.

Step 1: Converting the Mixed Number to an Improper Fraction

The first step involves converting the mixed number $(1 \frac{2}{50.7})$ into an improper fraction.

Understanding $(1 \frac{2}{50.7})$:

- The whole number part: 1
- The fractional part: $(\frac{2}{50.7})$

Since 50.7 is a decimal, converting the fractional part into a decimal is straightforward:

$$\frac{2}{50.7} \approx \frac{2}{50.7}$$

Calculating:

$$\frac{2}{50.7} \approx 0.03937$$

Therefore:

$$1 \frac{2}{50.7} = 1 + 0.03937 \approx 1.03937$$

Alternatively, if we prefer to stay in fractional form, we can write:

$$1 + \frac{2}{50.7}$$

but since 50.7 is decimal, better to work with decimal approximations for now.

Step 2: Multiplying by 1.8

Now, multiply the value obtained with 1.8:

$$\backslash[1.03937 \times 1.8 \backslash]$$

Calculating:

$$\backslash[1.03937 \times 1.8 \approx 1.87086 \backslash]$$

Result:

$$\backslash[\boxed{\approx 1.87086} \backslash]$$

This is the base inside the brackets before raising to the power $\backslash(\frac{2}{3}\backslash)$.

Step 3: Raising to the Power $\backslash(\frac{2}{3}\backslash)$

The next step involves evaluating:

$$\backslash[(1.87086)^{\frac{2}{3}} \backslash]$$

which is equivalent to:

$$\backslash[\left[(1.87086)^{\frac{1}{3}} \right]^2 \backslash]$$

or

$$\backslash[\left((1.87086)^2 \right)^{\frac{1}{3}} \backslash]$$

Both approaches are valid, but the common approach is to take the cube root first, then square.

Calculating the Cube Root of 1.87086

Using a calculator or estimation:

$$\sqrt[3]{1.87086} \approx 1.220$$

(approximated)

Now, square this result:

$$(1.220)^2 \approx 1.488$$

Therefore:

$$(1.87086)^{\frac{2}{3}} \approx 1.488$$

Step 4: Expressing as a Simplified Mixed Number

The approximate value obtained is:

$$\boxed{1.488}$$

To express this as a simplified mixed number:

- The whole number part: 1
- The fractional part: 0.488

Now, convert 0.488 into a fraction:

$$\begin{aligned} 0.488 \times 1000 &= 488 \\ \frac{488}{1000} &= \frac{122}{250} \end{aligned}$$

Simplify the fraction:

$$\frac{122}{250} = \frac{61}{125}$$

since 122 and 250 share no common factors other than 1.

Final answer as a mixed number:

$$1 \frac{61}{125}$$

Summary of the Evaluation Process

Step	Description	Result
1	Convert mixed number $(1 \frac{2}{50.7})$ to decimal	approximately 1.03937
2	Multiply by 1.8	approximately 1.87086
3	Raise to the power $(2/3)$	approximately 1.488
4	Convert to mixed number	$(1 \frac{61}{125})$

Final answer:

$$1 \frac{61}{125}$$

Additional Insights and Considerations

Accuracy and Approximation

While we've used decimal approximations at each step, the process can be refined with more precise calculations or algebraic manipulation if needed. The key takeaway is understanding the sequence of operations—conversion, multiplication, and exponentiation.

Handling Variations in Notation

Mathematical expressions often come with ambiguous notation. When encountering such cases, always:

- Clarify the expression's structure.

- Convert mixed numbers and decimals carefully.
- Break down complex operations into manageable steps.

Practical Applications

Evaluating expressions like this is common in fields such as engineering, physics, and computer science, where precision is critical. Understanding how to convert mixed numbers, perform exponentiation, and simplify results into mixed numbers enhances problem-solving skills and mathematical literacy.

Conclusion

Evaluating the given expression involves a systematic approach:

1. Interpreting and converting mixed numbers into decimal or fractional form.
2. Performing multiplication accurately.
3. Applying exponentiation carefully, utilizing root and power rules.
4. Converting the final decimal into a simplified mixed number.

The approximate value of the expression is $1 \frac{61}{125}$. This step-by-step approach ensures clarity, precision, and confidence in tackling similar mathematical challenges in various contexts.

Remember: When in doubt, break down the problem into smaller parts, verify each step, and convert between forms as needed. Mastery of these techniques leads to more efficient and accurate problem-solving in advanced mathematics.

Evaluate $1 \frac{2}{5} \cdot 0.7 \cdot 1 \frac{8}{25}$ what Is The Value Of The Expression Enter Your Answer As A Simplified Mixed

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