Evaluate. (5/6+2/3)(3/4+1/12) Enter Your Answer As A Fraction In Simplest Form By Filling In The Boxes.

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Mathematics often involves simplifying complex expressions to their most straightforward form. One such example is evaluating the expression **(5/6 + 2/3)(3/4 + 1/12)**. This problem not only tests your understanding of fractions and their operations but also emphasizes the importance of simplifying answers to their lowest terms. In this article, we will walk through the step-by-step process of solving this expression, ensuring you understand each stage to confidently approach similar problems in the future.

Understanding the Expression

Breaking Down the Components

The expression involves two sums being multiplied:

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(5/6 + 2/3) × (3/4 + 1/12)
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To evaluate this expression, follow these steps:

1. Simplify each sum separately.
2. Multiply the simplified sums.
3. Simplify the resulting fraction to its lowest terms.

Step 1: Simplify the First Sum (5/6 + 2/3)

Finding a Common Denominator

To add fractions, they must have a common denominator. The denominators here are 6 and 3.

- Least common denominator (LCD) of 6 and 3 is 6.

Converting Fractions

- 5/6 remains the same.
- 2/3 can be written as 4/6 (since 2/3 = (2×2)/(3×2) = 4/6).

Adding the Fractions

$$5/6 + 4/6 = (5 + 4)/6 = 9/6$$

Simplifying the Sum

- 9/6 can be simplified by dividing numerator and denominator by 3.

$$9/6 = (9 \div 3)/(6 \div 3) = 3/2$$

Step 2: Simplify the Second Sum (3/4 + 1/12)

Finding a Common Denominator

- Denominators are 4 and 12.
- LCD of 4 and 12 is 12.

Converting Fractions

- 3/4 can be converted to twelfths: (3×3)/(4×3) = 9/12.
- 1/12 remains as is.

Adding the Fractions

$$9/12 + 1/12 = (9 + 1)/12 = 10/12$$

Simplifying the Sum

- Divide numerator and denominator by 2.

$$10/12 = (10 \div 2)/(12 \div 2) = 5/6$$

Step 3: Multiply the Two Simplified Sums

Expression After Simplification

$$(3/2) \times (5/6)$$

Multiplying Fractions

Multiply numerators and denominators directly:

$$(3 \times 5)/(2 \times 6) = 15/12$$

Step 4: Simplify the Product to Its Lowest Terms

Reduce the Fraction

- 15/12 can be simplified by dividing numerator and denominator by 3.

$$15/12 = (15 \div 3)/(12 \div 3) = 5/4$$

Final Answer

The simplified form of the original expression is **5/4**. This is an improper fraction, but it is already in its simplest form because numerator and denominator share no common factors other than 1.

How To Enter Your Answer As A Fraction In Simplest Form

If you're filling out boxes or input fields for this problem, make sure to:

1. Write the numerator as 5.
2. Write the denominator as 4.
3. Ensure the fraction is in its simplest form, which it is in this case.

Key Tips for Simplifying Fractions and Expressions

- Always find the least common denominator (LCD) when adding fractions.
- Reduce fractions to their lowest terms by dividing numerator and denominator by their greatest common divisor (GCD).
- When multiplying fractions, multiply straight across, then simplify if possible.
- Double-check your work by verifying that the fraction cannot be reduced further.

Practice Problems to Master Fraction Evaluation

1. Evaluate (3/8 + 5/16) and express your answer as a simplified fraction.
2. Simplify (7/9 × 3/4) to its lowest terms.
3. Calculate (2/5 + 3/10) and provide the answer in simplest form.
4. Evaluate (4/7 + 2/7) and write the result as a simplified fraction.
5. Find the product of (5/6) and (2/3), then simplify.

Conclusion

Evaluating complex fractions involves systematic steps: finding common denominators, converting fractions, performing addition or multiplication, and simplifying the result. Mastery of these skills enables you to handle a wide range of mathematical problems with confidence. Remember, always aim to simplify your final answer to its lowest terms to demonstrate a clear understanding of fraction operations. The example we examined—evaluating **(5/6 + 2/3)(3/4 + 1/12)**—illustrates these principles effectively, culminating in the final answer of **5/4**.

Frequently Asked Questions

What is the first step to evaluate (5/6 + 2/3)(3/4 + 1/12)?

Find a common denominator for each sum: for 5/6 + 2/3, and for 3/4 + 1/12.

How do you simplify the expression (5/6 + 2/3)?

Convert 2/3 to 4/6 and add: 5/6 + 4/6 = 9/6, which simplifies to 3/2.

How do you simplify the expression (3/4 + 1/12)?

Convert 3/4 to 9/12 and add: 9/12 + 1/12 = 10/12, which simplifies to 5/6.

What is the next step after simplifying both sums in the expression?

Multiply the simplified results: (3/2) (5/6).

How do you multiply two fractions like (3/2) (5/6)?

Multiply numerators and denominators: 3 5 = 15 and 2 6 = 12, so the product is 15/12.

How do you simplify the fraction 15/12?

Divide numerator and denominator by their greatest common divisor, 3: 15 ÷ 3 = 5, 12 ÷ 3 = 4, so the simplified fraction is 5/4.

What is the final answer to evaluate (5/6 + 2/3)(3/4 + 1/12) in simplest form?

The answer is 5/4.

Additional Resources

Evaluate. (5/6 + 2/3)(3/4 + 1/12) Enter Your Answer As A Fraction In Simplest Form By Filling In The Boxes.

This problem is a classic example of evaluating a product of two binomial sums, each involving fractions. It offers a practical exercise in simplifying algebraic expressions, working with fractions, and understanding the importance of finding common denominators to facilitate addition and multiplication. In this comprehensive review, we will analyze the problem step-by-step, discuss the key concepts involved, examine common pitfalls, and provide insight into best practices for solving similar problems efficiently and accurately.

Understanding the Problem

The problem asks us to evaluate the expression:

(5/6 + 2/3) (3/4 + 1/12)

and then to present the final answer as a simplified fraction. The instruction emphasizes that the answer should be entered in its simplest form, which requires understanding how to reduce fractions after performing the calculations.

Key points:
- The expression involves the addition of two fractions in each binomial.
- The multiplication of the resulting sums.
- The final step requires simplifying the resulting fraction to its lowest terms.

Step-by-Step Breakdown of the Evaluation Process

To accurately evaluate the expression, it's best to follow a systematic approach:

1. Simplify each binomial separately:
- Simplify (5/6 + 2/3)
- Simplify (3/4 + 1/12)

2. Multiply the simplified sums.

3. Simplify the resulting fraction.

Let's analyze each step in detail.

Simplifying the First Binomial: (5/6 + 2/3)

Step 1: Find a common denominator for 5/6 and 2/3.

- The denominators are 6 and 3.
- The least common denominator (LCD) is 6.

Step 2: Rewrite 2/3 with denominator 6:

2/3 = (2 2) / (3 2) = 4/6

Step 3: Add the fractions:

5/6 + 4/6 = (5 + 4) / 6 = 9/6

Step 4: Simplify the fraction:

9/6 = (3 3) / (2 3) = 3/2

Result: The simplified sum of the first binomial is 3/2.

Simplifying the Second Binomial: (3/4 + 1/12)

Step 1: Find a common denominator for 3/4 and 1/12.

- The denominators are 4 and 12.
- The LCD is 12.

Step 2: Rewrite 3/4 with denominator 12:

3/4 = (3 3) / (4 3) = 9/12

Step 3: Add the fractions:

9/12 + 1/12 = (9 + 1) / 12 = 10/12

Step 4: Simplify the fraction:

10/12 = (2 5) / (2 6) = 5/6

Result: The simplified sum of the second binomial is 5/6.

Multiplying the Simplified Sums

Now, the expression reduces to:

(3/2) (5/6)

To multiply fractions:

- Multiply the numerators: 3 5 = 15
- Multiply the denominators: 2 6 = 12

Resulting fraction:

15/12

Simplifying the Final Result

- The fraction 15/12 can be simplified:

15/12 = (3 5) / (3 4) = 5/4

- Since 5/4 is in lowest terms (numerator and denominator share no common factors other than 1), this is our final simplified answer.

Conclusion and Final Answer

The evaluated and simplified form of the expression (5/6 + 2/3)(3/4 + 1/12) is 5/4.

Answer: 5/4

Discussion of Key Concepts and Best Practices

Evaluating expressions involving fractions can seem straightforward but requires attention to detail. Here are some features, pros, and cons associated with such problems:

Features:
- Fraction addition requires common denominators.
- Simplification is essential at every step to avoid errors.

- Multiplying fractions involves straightforward numerator and denominator multiplication.
- Final simplification ensures the answer is in its simplest form, which is critical for clarity and correctness.

Pros:
- Reinforces fundamental fraction operations.
- Develops skills in finding common denominators and simplifying.
- Enhances algebraic problem-solving skills.

Cons:
- Mistakes often occur when finding common denominators or simplifying.
- Overlooking simplification steps may lead to incorrect or non-reduced answers.
- Some may forget to simplify before or after multiplication, leading to unnecessarily complicated fractions.

Tips:
- Always identify the least common denominator before addition.
- Simplify intermediate fractions to reduce errors.
- Double-check multiplication steps to ensure correct numerator and denominator calculations.
- Simplify the final answer to its lowest terms.

Common Pitfalls and How to Avoid Them

- Forgetting to find common denominators: Always check if fractions can be combined directly or need rewriting.
- Incorrect numerator or denominator multiplication: Carefully perform each multiplication step, perhaps cross-checking.
- Neglecting to simplify: Always look for the greatest common divisor (GCD) after multiplication to reduce the fraction.
- Overcomplicating the process: Break down the problem into manageable steps to avoid confusion.

Final Thoughts

Evaluating expressions like (5/6 + 2/3)(3/4 + 1/12) provides an excellent opportunity to practice multiple core mathematical skills—adding fractions with different denominators, multiplying fractions, and simplifying to lowest terms. Mastery of these skills not only helps in solving similar algebraic expressions but also builds a solid foundation for more advanced topics in mathematics. This problem underscores the importance of methodical work, attention to detail, and the habit of simplification, which are invaluable in both academic settings and real-world applications.

In summary: after careful calculation and simplification, the answer to the expression is 5/4.

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