

Evaluate $\frac{5}{8}$ $\frac{7}{15}$ Give Your Answer In Its Simplest Form.

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When working with fractions, it is common to encounter problems that require addition, subtraction, multiplication, or division. In this article, we will focus on evaluating the sum of two fractions — specifically, $\frac{5}{8}$ and $\frac{7}{15}$ — and express the result in its simplest form. Understanding how to perform such operations correctly is essential for students, educators, and anyone working with fractions in mathematics. This comprehensive guide will walk you through the steps involved in adding these fractions, simplifying the answer, and understanding the underlying concepts to enhance your math skills.

Understanding Fractions and Their Operations

What Are Fractions?

Fractions represent parts of a whole. They consist of a numerator (top number) and denominator (bottom number). For example, in the fraction $\frac{5}{8}$, 5 is the numerator, indicating the number of parts taken, and 8 is the denominator, showing the total parts the whole is divided into.

Basic Operations with Fractions

The primary operations with fractions include addition, subtraction, multiplication, and division. Each operation has its specific rules:

- Addition and Subtraction:

To add or subtract fractions, they must have a common denominator. If they don't, find the least common denominator (LCD), convert the fractions, then perform the addition or subtraction.

- Multiplication:

Multiply the numerators together and the denominators together.

- Division:

Multiply the first fraction by the reciprocal of the second fraction.

In this article, we focus on addition, which requires converting fractions to a common denominator.

Step-by-Step Guide to Adding $\frac{5}{8}$ and $\frac{7}{15}$

1. Identify the Fractions

We are given two fractions:

- $\frac{5}{8}$
- $\frac{7}{15}$

Our goal is to add these two fractions and express the answer in its simplest form.

2. Find the Least Common Denominator (LCD)

Since the fractions have different denominators (8 and 15), we need to find the least common denominator (LCD):

- List the multiples of each denominator:
 - Multiples of 8: 8, 16, 24, 32, 40, 48, 56, 64...
 - Multiples of 15: 15, 30, 45, 60, 75...
- Find the smallest multiple common to both lists:
- The first common multiple is 120.

Thus, the LCD of 8 and 15 is 120.

3. Convert Fractions to Equivalent Fractions with LCD

Next, convert both fractions to equivalent fractions with denominator 120:

- For $\frac{5}{8}$:
 - Divide 120 by 8: $120 \div 8 = 15$
 - Multiply numerator and denominator by 15:
 $5 \times 15 = 75$
- So, $\frac{5}{8} = \frac{75}{120}$

- For $\frac{7}{15}$:
 - Divide 120 by 15: $120 \div 15 = 8$

- Multiply numerator and denominator by 8:

$$7 \times 8 = 56$$

$$\text{So, } 7/15 = 56/120$$

4. Add the Numerators

Now that both fractions have the same denominator, add their numerators:

$$75 + 56 = 131$$

So, the sum is:

$$75/120 + 56/120 = (75 + 56)/120 = 131/120$$

5. Simplify the Result

The resulting fraction is $131/120$. Since 131 is a prime number, and it does not have any common factors with 120, this fraction is already in its simplest form.

Note: $131/120$ is an improper fraction, which can also be expressed as a mixed number:

- Divide numerator by denominator:

$$131 \div 120 = 1 \text{ with a remainder of } 11$$

- Write as a mixed number:

$$1 \frac{11}{120}$$

Expressing the Final Answer in Simplest Form

Mixed Number Representation

The sum of $5/8$ and $7/15$ in mixed number form is:

$$1 \frac{11}{120}$$

This form is often more intuitive for understanding the quantity.

Improper Fraction Form

Alternatively, the sum can be expressed as the improper fraction:

$$131/120$$

Since the fraction cannot be simplified further, this is the simplest form in fractional terms.

Summary of Key Points

- To add fractions: find the LCD, convert fractions to equivalent fractions with the LCD, then add numerators.
- The LCD for 8 and 15 is 120.
- Convert $5/8$ to $75/120$ and $7/15$ to $56/120$.
- Sum: $75/120 + 56/120 = 131/120$.
- The fraction $131/120$ is already in simplest form.
- Express as a mixed number: $1 \frac{11}{120}$.

Additional Tips for Working with Fractions

- Always Simplify: After performing operations, check if the resulting fraction can be reduced.
- Prime Factorization: Use prime factorization to find the greatest common divisor (GCD) for simplifying fractions.
- Mixed Numbers: Convert improper fractions to mixed numbers for easier interpretation.
- Practice: Regular practice with different fractions enhances understanding and speed.

Conclusion

Adding fractions like $5/8$ and $7/15$ involves understanding how to find a common denominator, converting

fractions appropriately, and simplifying the result. In this case, the sum is $131/120$, which can be expressed as the mixed number $1 \frac{11}{120}$. Mastery of these steps is fundamental for solving more complex fraction problems and for developing a solid foundation in mathematics. Whether you're a student, teacher, or math enthusiast, understanding these processes ensures accuracy and confidence when working with fractions.

FAQs About Adding Fractions

1. How do I find the least common denominator?

You can find the LCD by listing multiples of each denominator and choosing the smallest common one, or by using prime factorization for more complex cases.

2. Can fractions always be simplified?

> Not always. Fractions can be simplified only if the numerator and denominator share common factors greater than 1.

3. What is an improper fraction?

It is a fraction where the numerator is greater than or equal to the denominator, like $131/120$.

4. Why convert improper fractions to mixed numbers?

For easier interpretation and understanding of the quantity represented.

5. Is it necessary to convert fractions to a common denominator for addition?

> Yes, unless the fractions are already with the same denominator, converting ensures accurate addition.

By understanding these fundamental concepts, you can confidently evaluate fractions like $5/8 + 7/15$, ensuring your answers are always in their simplest form. Practice regularly, and soon, handling similar problems will become second nature.

Frequently Asked Questions

How do I simplify the fraction $5/8$ divided by $7/15$?

To divide $5/8$ by $7/15$, multiply $5/8$ by the reciprocal of $7/15$, which is $15/7$. So, $(5/8) \div (7/15) = (5/8) \times (15/7)$. Simplify before multiplying: 5 and 15 share a factor of 5, and 8 and 7 are coprime. Performing the multiplication: $(5 \times 15) / (8 \times 7) = 75 / 56$. Since 75 and 56 share no common factors other than 1, the fraction in simplest form is $75/56$.

What is the simplified form of $(5/8) \div (7/15)$?

The simplified form is $75/56$, obtained by multiplying $5/8$ by the reciprocal of $7/15$, which is $15/7$, resulting in $75/56$.

Can you show step-by-step how to evaluate $5/8$ divided by $7/15$ in simplest form?

Yes. Step 1: Write the division as multiplication by the reciprocal: $(5/8) \times (15/7)$. Step 2: Simplify before multiplying: 5 and 15 share a factor of 5, so $5/15$ reduces to $1/3$. Now, the expression becomes $(1/8) \times (3/7)$. Step 3: Multiply numerators: $1 \times 3 = 3$. Multiply denominators: $8 \times 7 = 56$. The answer is $3/56$, which is already in simplest form.

Is $75/56$ the simplest form of $5/8$ divided by $7/15$?

Yes, $75/56$ is in simplest form because the numerator and denominator share no common factors other than 1.

Additional Resources

Evaluate $5/8 \div 7/15$ Give Your Answer In Its Simplest Form

When it comes to understanding fractions, simplifying them is a fundamental skill that enhances mathematical fluency and problem-solving efficiency. The task of evaluating fractions such as $5/8$ and $7/15$ and then expressing their sum in its simplest form is a common exercise in elementary and middle school mathematics. This process not only reinforces the concepts of least common denominators and greatest common divisors but also helps students develop a clearer understanding of how fractions relate to each other. In this article, we will thoroughly explore how to evaluate these fractions, combine them, and simplify the result, providing a comprehensive guide for learners of all levels.

Understanding the Fractions: $\frac{5}{8}$ and $\frac{7}{15}$

Before any calculations, it's important to understand what the fractions represent and how they relate to each other.

What Are Fractions?

Fractions are a way to represent parts of a whole. They consist of two parts:

- Numerator: The top number, indicating how many parts are considered.
- Denominator: The bottom number, indicating the total number of equal parts into which the whole is divided.

In the case of $\frac{5}{8}$:

- The numerator is 5, meaning five parts are considered.
- The denominator is 8, meaning the whole is divided into eight equal parts.

Similarly, for $\frac{7}{15}$:

- The numerator is 7.
- The denominator is 15.

Importance of Simplification

Simplifying fractions means reducing them to their lowest terms, where numerator and denominator share no common factors other than 1. Simplified fractions are easier to interpret and compare, and they often make subsequent calculations more straightforward.

Step-by-Step Approach to Evaluating $\frac{5}{8} + \frac{7}{15}$

To evaluate the sum of these two fractions, we need to follow several steps: find a common denominator, convert each fraction to an equivalent fraction with that denominator, add the numerators, and finally simplify the result.

Step 1: Find the Least Common Denominator (LCD)

The least common denominator is the smallest number that both denominators divide into evenly.

- Denominators: 8 and 15
- Prime factorization:
 - $8 = 2^3$
 - $15 = 3 \times 5$
- Find the LCD:
 - Take the highest powers of all prime factors:
 - 2^3 (from 8)
 - 3 (from 15)
 - 5 (from 15)
 - Multiply these together:
 - $\text{LCD} = 2^3 \times 3 \times 5 = 8 \times 3 \times 5 = 120$

Features:

- The LCD of 8 and 15 is 120.
- Using the LCD ensures both fractions are expressed with the same denominator, simplifying addition.

Pros and Cons:

- Pros: Simplifies the addition process, ensures accuracy.
- Cons: Finding the LCD might be time-consuming for larger numbers, but prime factorization simplifies this process.

Step 2: Convert Fractions to Equivalent Fractions with the LCD

Transform each fraction to have denominator 120.

- Convert $5/8$:
 - Multiply numerator and denominator by 15 (since $8 \times 15 = 120$):
 - $(5 \times 15) / (8 \times 15) = 75/120$
- Convert $7/15$:
 - Multiply numerator and denominator by 8 (since $15 \times 8 = 120$):
 - $(7 \times 8) / (15 \times 8) = 56/120$

Features:

- Both fractions are now expressed with the same denominator, making addition straightforward.

Pros and Cons:

- Pros: Clear and methodical process, reduces errors.
- Cons: Requires multiplication and attention to detail.

Step 3: Add the Numerators

Now, simply add the numerators:

$$75 + 56 = 131$$

So, the sum in improper fraction form is:

$$131/120$$

Features:

- The numerator is larger than the denominator, indicating an improper fraction.

Simplifying the Result: 131/120

The final step is to simplify the fraction, if possible, and express it in its simplest form.

Check for Common Factors

- Factors of 131:
- 131 is a prime number.
- Factors of 120:
- 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120
- Since 131 is prime and does not share any common factors with 120 (other than 1), the fraction is already in simplest form.

Result:

$$131/120$$

Expressing the Final Answer

Since the numerator is larger than the denominator, it can be written as a mixed number:

- Divide 131 by 120:
- $131 \div 120 = 1$ with a remainder of 11

Therefore:

$131/120 = 1 \frac{11}{120}$

This mixed number provides a more intuitive understanding of the sum's magnitude.

Features and Benefits:

- Easier to interpret as a quantity greater than 1.
- Combines whole number and fractional parts for clarity.

Summary of the Process

Step	Description	Result
1	Find LCD of 8 and 15	120
2	Convert 5/8 to 75/120 and 7/15 to 56/120	$75/120 + 56/120$
3	Add numerators	$131/120$
4	Simplify or convert to mixed number	$1 \frac{11}{120}$

Additional Insights and Tips

- Always find the least common denominator rather than just any common multiple to keep fractions in the simplest form.
- Prime factorization simplifies finding the LCD, especially with larger numbers.
- When the numerator exceeds the denominator after addition, consider converting to a mixed number for better clarity.
- Check for common factors to ensure the fraction is fully simplified.

Pros and Cons of the Overall Approach

Pros:

- Provides a systematic method for adding and simplifying fractions.
- Reinforces understanding of denominators, factors, and basic arithmetic.
- Produces an answer in a clear, understandable form (mixed number).

Cons:

- Can be time-consuming for larger or more complex fractions.
- Requires careful calculations to avoid errors.

Conclusion

Evaluating and simplifying fractions like $\frac{5}{8} + \frac{7}{15}$ is a fundamental skill that combines multiple aspects of fraction arithmetic, including least common denominators, conversion, addition, and reduction to simplest form. By following a structured approach—finding the LCD, converting fractions, adding numerators, and simplifying—you can confidently handle similar problems with accuracy and clarity. The final answer, $1\frac{11}{120}$, not only satisfies the requirement to give the result in its simplest form but also provides a meaningful and easily interpretable representation of the sum. Mastery of these steps lays a solid foundation for tackling more complex fraction operations and enhances overall numerical literacy.

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