

Divide. Write The Quotient In Lowest Terms. $3\frac{3}{4} \div \frac{5}{7} = 3\frac{43}{75} = 3, \text{ Start Fraction,}$

Divide. Write The Quotient In Lowest Terms. $3\frac{3}{4} \div \frac{5}{7} = 3\frac{43}{75} = 3, \text{ Start Fraction,}$ in the first paragraph sets the tone for this comprehensive guide on dividing mixed numbers and fractions, simplifying the quotient to its lowest terms. Whether you're a student learning fractions for the first time or an educator looking for a clear explanation, understanding how to divide fractions and mixed numbers is essential. This article will walk you through the process step-by-step, with practical examples, tips, and strategies to master this fundamental math skill.

Understanding the Basics of Fraction Division

What Is Division of Fractions?

Division of fractions involves splitting a quantity into equal parts. When dividing fractions, the goal is to determine how many times one fraction fits into another. The key principle is that dividing by a fraction is equivalent to multiplying by its reciprocal.

Key concept:

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

This means that to divide fractions, you flip the second fraction (take its reciprocal) and multiply.

Why Convert Mixed Numbers to Improper Fractions?

Mixed numbers like $3\frac{3}{4}$ are often easier to work with when converted into improper fractions. This simplifies the division process since multiplication rules are more straightforward with improper fractions.

Conversion example:

$$3\frac{3}{4} = \frac{(3 \times 4) + 3}{4} = \frac{12 + 3}{4} = \frac{15}{4}$$

Once converted, the division becomes a matter of multiplying by the reciprocal.

Step-by-Step Guide to Dividing Mixed Numbers and Fractions

1. Convert Mixed Numbers to Improper Fractions

Start by changing all mixed numbers into improper fractions. For example:

$$3\frac{3}{4} = \frac{15}{4}$$

2. Find the Reciprocal of the Divisor

Identify the divisor (the second fraction) and find its reciprocal by swapping numerator and denominator.

Example:

$$\frac{5}{7} \rightarrow \frac{7}{5}$$

3. Multiply the First Fraction by the Reciprocal of the Second

Perform multiplication of the improper fractions:

$$\frac{15}{4} \times \frac{7}{5}$$

4. Simplify the Resulting Fraction

Before multiplying, check if any cross-simplification is possible to make calculations easier. After multiplying, reduce the resulting fraction to its lowest terms.

Multiplication steps:

$$\frac{15}{4} \times \frac{7}{5} = \frac{15 \times 7}{4 \times 5} = \frac{105}{20}$$

Reducing Fractions to Lowest Terms

How to Simplify Fractions

Simplifying fractions involves dividing numerator and denominator by their greatest common divisor (GCD).

Example:

$$\frac{105}{20}$$

Find GCD of 105 and 20:

- 105 factors: 1, 3, 5, 7, 15, 21, 35, 105

- 20 factors: 1, 2, 4, 5, 10, 20

Common factors: 1, 5

Greatest common divisor: 5

Divide numerator and denominator by 5:

$$\frac{105 \div 5}{20 \div 5} = \frac{21}{4}$$

The simplified fraction is $\frac{21}{4}$.

Expressing the Result as a Mixed Number

Since the result is an improper fraction, convert it back to a mixed number if desired:

$$\frac{21}{4} = 5 \frac{1}{4}$$

Practical Example: Dividing $3 \frac{3}{4}$ by $\frac{5}{7}$

Let's apply these steps to the initial problem:

1. Convert mixed number to improper fraction:

$$\frac{15}{4}$$

$$3 \div \frac{3}{4} = \frac{15}{4}$$

\]

2. Find reciprocal of divisor:

\[

$$\frac{5}{7} \rightarrow \frac{7}{5}$$

\]

3. Multiply:

\[

$$\frac{15}{4} \times \frac{7}{5} = \frac{15 \times 7}{4 \times 5} = \frac{105}{20}$$

\]

4. Simplify:

GCD of 105 and 20 is 5:

\[

$$\frac{105 \div 5}{20 \div 5} = \frac{21}{4}$$

\]

5. Convert to mixed number:

\[

$$\frac{21}{4} = 5 \frac{1}{4}$$

\]

Final answer:

\[

$$3 \div \frac{3}{4} \div \frac{5}{7} = 5 \frac{1}{4}$$

\]

Additional Tips for Dividing Fractions

- **Always convert mixed numbers to improper fractions first:** It simplifies calculations and reduces errors.
- **Use cross-simplification:** Before multiplying, see if any numerator and denominator can be simplified to make calculations easier.
- **Check your work:** Always reduce your final answer to the lowest terms for clarity and correctness.
- **Practice with different problems:** The more you practice, the more intuitive division of fractions becomes.

Common Mistakes to Avoid

1. Forgetting to Convert Mixed Numbers

Converting mixed numbers to improper fractions is crucial. Forgetting this step can lead to incorrect answers.

2. Not Reciprocal of the Divisor

Remember, dividing by a fraction is the same as multiplying by its reciprocal. Omitting this step results in incorrect calculations.

3. Failing to Simplify

Always reduce your answer to its lowest terms to ensure clarity and correctness. Skipping simplification may make the answer unnecessarily complicated.

Conclusion: Mastering Fraction Division

Dividing fractions and mixed numbers is a fundamental skill that enhances your overall mathematical proficiency. By converting mixed numbers into improper fractions, finding reciprocals, multiplying, and simplifying, you can confidently solve any division problem involving fractions. Remember to practice regularly, check your work, and always reduce your fractions to their lowest terms for the clearest, most accurate results.

Whether working through academic assignments or real-world problems, mastering these steps will make you more comfortable with fractions and improve your overall math fluency. The key is understanding the process and applying it consistently. With practice, dividing fractions will become second nature.

Keywords for SEO:

Divide fractions, write quotient in lowest terms, mixed number division, improper fractions, reciprocal, simplifying fractions, dividing mixed numbers, fraction division steps, math tips, fraction problems, how to divide fractions

Frequently Asked Questions

How do you convert a mixed number like $3\frac{3}{4}$ into an improper fraction?

To convert $3\frac{3}{4}$ into an improper fraction, multiply the whole number 3 by the denominator 4 ($3 \times 4 = 12$), then add the numerator 3 ($12 + 3 = 15$). So, $3\frac{3}{4}$ equals $\frac{15}{4}$.

What is the process to divide mixed numbers, such as $3\frac{3}{4} \div \frac{5}{7}$?

First, convert the mixed number to an improper fraction ($\frac{15}{4}$). Then, multiply by the reciprocal of the divisor: $\frac{15}{4} \div \frac{5}{7}$ becomes $\frac{15}{4} \times \frac{7}{5}$. Simplify before multiplying if possible, then multiply the numerators and denominators to find the quotient.

How do you simplify the quotient of $\frac{15}{4}$ divided by $\frac{5}{7}$ into lowest terms?

After multiplying $\frac{15}{4}$ by $\frac{7}{5}$, you get 15×7 over 4×5 , which is $\frac{105}{20}$. Simplify by dividing numerator and denominator by their greatest common divisor, 5, resulting in $\frac{21}{4}$.

What is the final answer when dividing $3\frac{3}{4}$ by $\frac{5}{7}$ and writing it in lowest terms?

Convert $3\frac{3}{4}$ to $\frac{15}{4}$, then multiply by reciprocal of $\frac{5}{7}$: $\frac{15}{4} \times \frac{7}{5} = \frac{105}{20}$, which simplifies to $\frac{21}{4}$. As a mixed number, this is $5\frac{1}{4}$.

Why is it important to write the quotient in lowest terms after division?

Writing the quotient in lowest terms simplifies the fraction, making it easier to understand, compare, and work with in further calculations, ensuring clarity and accuracy.

Can you provide a step-by-step example of dividing mixed numbers and simplifying the result?

Yes. For example, divide $3\frac{3}{4}$ by $\frac{5}{7}$:

1. Convert $3\frac{3}{4}$ to $\frac{15}{4}$.
2. Multiply by reciprocal of $\frac{5}{7}$: $\frac{15}{4} \times \frac{7}{5}$.
3. Multiply numerators: $15 \times 7 = 105$.
4. Multiply denominators: $4 \times 5 = 20$.
5. Simplify $\frac{105}{20}$ by dividing numerator and denominator by 5: $\frac{21}{4}$.
6. Convert to mixed number: $5\frac{1}{4}$.

What common mistakes should be avoided when dividing mixed numbers?

Common mistakes include forgetting to convert mixed numbers to improper fractions

before dividing, not multiplying by the reciprocal, or failing to simplify the final fraction to its lowest terms. Always double-check conversions and simplifications.

Additional Resources

Divide. Write The Quotient In Lowest Terms. $3\frac{3}{8} \div \frac{5}{7} = 3\frac{43}{75} = 3$, Start Fraction,

In the realm of mathematics, division is a fundamental operation that underpins countless concepts, calculations, and real-world applications. Whether it's splitting a sum of money, distributing resources, or solving algebraic equations, understanding how to perform division accurately and efficiently is essential. This article delves deeply into the process of dividing mixed numbers by fractions, specifically illustrating how to express the quotient in its simplest form. We will analyze the example $3\frac{3}{8} \div \frac{5}{7}$, interpret what it means to write the result in lowest terms, and explore related concepts such as converting mixed numbers, simplifying fractions, and the importance of clarity in mathematical communication.

Understanding the Basics of Division and Fractions

The Concept of Division

Division is one of the four basic arithmetic operations, representing the process of partitioning a quantity into equal parts or determining how many times one number fits into another. When we write an expression like $a \div b$, we are asking how many times b fits into a . It is the inverse operation of multiplication.

Fractions as Divisions

Fractions are inherently linked to division. A fraction like $\frac{3}{4}$ can be viewed as dividing 3 by 4. Similarly, when dividing one fraction by another, the operation involves multiplying by the reciprocal of the divisor. This is a key principle that simplifies complex division problems involving fractions.

Mixed Numbers and Improper Fractions

Mixed numbers combine whole numbers and fractions, such as $3\frac{3}{8}$, which is 3 plus $\frac{3}{8}$. To perform division involving mixed numbers, it is often easiest to convert them into improper fractions. For example:

- $3\frac{3}{8}$ becomes $(3 \times 8 + 3)/8 = (24 + 3)/8 = 27/8$.

Converting mixed numbers to improper fractions simplifies the process of division and ensures uniformity in calculations.

Step-by-Step Process of Dividing $3\frac{3}{8}$ by $5/7$

1. Convert Mixed Number to Improper Fraction

Begin by converting $3\frac{3}{8}$ into an improper fraction:

- $3\frac{3}{8} = (3 \times 8 + 3)/8 = (24 + 3)/8 = 27/8$.

2. Write the Division Problem as a Multiplication

Division of fractions is performed by multiplying the first fraction by the reciprocal of the second:

- $27/8 \div 5/7 = 27/8 \times 7/5$.

This step leverages the reciprocal rule: dividing by a fraction is equivalent to multiplying by its reciprocal.

3. Simplify the Expression

Multiply the numerators and denominators:

- $(27 \times 7) / (8 \times 5) = 189 / 40$.

4. Reduce the Result to Lowest Terms

Simplify $189/40$ by dividing numerator and denominator by their greatest common divisor (GCD):

- GCD of 189 and 40 is 1.

- Divide numerator and denominator by 1:

- $189 \div 1 = 189$.

- $20 \div 5 = 4$.

- The simplified fraction is $21/4$.

5. Convert Back to Mixed Number (Optional)

Divide 21 by 4:

- $21 \div 4 = 5$ with a remainder of 1.

- The mixed number is $5 \frac{1}{4}$.

Final Answer: The quotient of $3\frac{3}{8} \div 5/7$ is $21/4$ or $5 \frac{1}{4}$ when expressed as a mixed number.

Understanding "Write the Quotient in Lowest Terms"

What Does "Lowest Terms" Mean?

Writing a fraction in lowest terms (also called simplest form) means reducing it so that the numerator and denominator share no common factors other than 1. This process makes the fraction easier to interpret and compare with other fractions.

Key Points:

- The numerator and denominator should be coprime (no common divisors other than 1).
- Simplification involves dividing both parts by their GCD.

Why is Simplification Important?

- Clarity: Simplified fractions are easier to understand and communicate.
- Comparison: Easier to compare simplified fractions.
- Efficiency: Simplifies further calculations and reduces potential errors.
- Standard Practice: It is the convention in mathematics to express fractions in lowest terms.

How to Simplify Fractions

- Find the GCD of numerator and denominator.
- Divide both numerator and denominator by the GCD.
- Confirm that the resulting fraction cannot be simplified further.

Interpreting the Notation and Examples in the Article

The Expression $3 \frac{43}{75} = 3$, Start Fraction,

This appears to be an illustrative or typographical representation of a mixed number or fractional expression, possibly indicating a conversion or an example of writing fractions correctly.

- $3 \frac{43}{75}$ is a mixed number: 3 plus $\frac{43}{75}$.
- In decimal form, this is approximately 3.5733.
- In improper fraction form, it becomes: $(3 \times 75 + 43)/75 = (225 + 43)/75 = 268/75$.

The phrase "Start Fraction," likely indicates the beginning of a formal fraction representation or an instruction to start writing fractions in a specific format.

The Significance of Proper Fraction Notation

Mathematically, clarity in notation is paramount, especially when dealing with complex expressions involving mixed numbers and improper fractions. Proper notation ensures precise communication of the problem, solution steps, and final results.

Additional Concepts: Converting and Simplifying Fractions and Mixed Numbers

Converting Mixed Numbers to Improper Fractions

To convert a mixed number $a \frac{b}{c}$ to an improper fraction:

- Multiply the whole number a by the denominator c .
- Add the numerator b .
- Write the sum over the original denominator c .

Example: $4\frac{2}{5}$

- $4 \times 5 + 2 = 20 + 2 = 22$.
- Improper fraction: $\frac{22}{5}$.

Simplifying Complex Fractions

When dealing with complex fractions or nested fractions, simplifying involves:

- Converting all mixed numbers to improper fractions.
- Performing operations (addition, subtraction, multiplication, division).
- Simplifying the resulting fraction to lowest terms.

Common Pitfalls and How to Avoid Them

- Forgetting to convert mixed numbers before performing division or multiplication.
- Not simplifying fractions fully after calculation.
- Misinterpreting the reciprocal in division problems.
- Overlooking the importance of GCD in reduction.

Applications and Real-World Significance

Division involving mixed numbers and fractions is not just a theoretical exercise; it has practical implications:

- Cooking and Recipes: Adjusting ingredient quantities based on servings.
- Construction and Engineering: Precise measurements involving fractional dimensions.
- Financial Calculations: Distributing funds or calculating ratios.
- Education: Building foundational skills for advanced mathematics, including algebra and calculus.

Understanding how to accurately perform these operations and express results clearly enhances problem-solving skills and confidence in mathematics.

Conclusion: The Art and Science of Proper Division

Mastering the division of mixed numbers and fractions, and expressing the quotient in lowest terms, is a critical skill in mathematics. The process involves converting mixed numbers to improper fractions, applying the reciprocal for division, simplifying the resulting fraction, and optionally converting back into mixed numbers for clarity. Such procedures foster a deeper understanding of the relationships between numbers and promote precision in mathematical communication.

The example of dividing $3\frac{3}{8}$ by $\frac{5}{7}$ exemplifies the process:

- Conversion of mixed to improper fractions.
- Use of reciprocal multiplication.
- Simplification to lowest terms.
- Interpretation of the final result as an improper fraction or mixed number.

By adhering to these principles, learners and practitioners ensure their calculations are accurate, clear, and universally comprehensible. As mathematics continues to underpin technological advancement, scientific discovery, and everyday life, these foundational skills remain essential for effective problem-solving and analytical thinking.

In essence, dividing mixed numbers by fractions requires a systematic approach rooted in conversion, reciprocal multiplication, and simplification. Recognizing the importance of expressing the quotient in lowest terms enhances clarity and efficiency. This process exemplifies the elegance of mathematical operations—simple in concept but profound in application—forming the backbone of quantitative reasoning across countless domains.

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