Use The Distributive Property To Find The Product.3 Over 4 2 1/3

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Understanding how to apply the distributive property is a fundamental skill in mathematics, especially when dealing with complex expressions involving fractions and mixed numbers. In this article, we will explore how to use the distributive property to find the product of a specific expression involving fractions: $\frac{3}{4} \times 2 \frac{1}{3}$. By breaking down the process into manageable steps, providing clear explanations, and illustrating with examples, you'll gain confidence in applying the distributive property to similar problems.

What Is The Distributive Property?

The distributive property, also known as the distributive law of multiplication over addition, is a key algebraic principle that states:

$$a \times (b + c) = a \times b + a \times c$$

This property allows us to distribute a multiplication across terms inside parentheses. It is particularly useful when multiplying a single term by a sum or difference, especially in algebraic expressions involving variables or multiple numbers.

In the context of fractions and mixed numbers, the distributive property helps us break down complex products into simpler parts that are easier to compute.

Understanding the Expression: $\frac{3}{4} \times 2 \frac{1}{3}$

Before we can apply the distributive property, it's important to interpret the given expression correctly.

2.1 Converting Mixed Numbers to Improper Fractions

The mixed number $2 \frac{1}{3}$ can be converted to an improper fraction:

$$2 \frac{1}{3} = \frac{(2 \times 3) + 1}{3} = \frac{6 + 1}{3} = \frac{7}{3}$$

2.2 Restating the Expression

Now, the expression becomes:

$$
\frac{3}{4} \times \frac{7}{3}
$$

While this looks straightforward, applying the distributive property can be more insightful when dealing with sums or differences. To illustrate this, we can decompose the mixed number $2 \frac{1}{3}$ into a sum:

$$
2 \frac{1}{3} = 2 + \frac{1}{3}
$$

Therefore, the original product can be rewritten as:

$$
\frac{3}{4} \times \left(2 + \frac{1}{3} \right)
$$

This setup is ideal for applying the distributive property.

Applying The Distributive Property

Using the distributive property, we can expand the product:

$$
\frac{3}{4} \times \left(2 + \frac{1}{3} \right) = \left(\frac{3}{4} \times 2 \right) + \left(\frac{3}{4} \times \frac{1}{3} \right)
$$

Let's explore each term separately.

2.1 Calculating $\frac{3}{4} \times 2$

Since 2 can be written as $\frac{2}{1}$:

$$
\frac{3}{4} \times 2 = \frac{3}{4} \times \frac{2}{1} = \frac{3 \times 2}{4 \times 1} = \frac{6}{4}
$$

Simplify the fraction:

\[

$$
\frac{6}{4} = \frac{3}{2}
$$

2.2 Calculating $\frac{3}{4} \times \frac{1}{3}$

Multiply the numerators and denominators:

$$
\frac{3}{4} \times \frac{1}{3} = \frac{3 \times 1}{4 \times 3} = \frac{3}{12}
$$

Simplify:

$$
\frac{3}{12} = \frac{1}{4}
$$

Finding the Final Product

Now, sum the two results obtained:

$$
\frac{3}{2} + \frac{1}{4}
$$

To add these fractions, find a common denominator:

- The least common denominator (LCD) of 2 and 4 is 4.

Convert $\frac{3}{2}$ to quarters:

$$
\frac{3}{2} = \frac{3 \times 2}{2 \times 2} = \frac{6}{4}
$$

Now, sum:

$$
\frac{6}{4} + \frac{1}{4} = \frac{7}{4}
$$

Expressed as a mixed number:

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

Therefore, the product of $2 \frac{1}{3}$ and $\frac{3}{4}$ is $1 \frac{3}{4}$.

Summary of Steps to Use The Distributive Property for Similar Problems

Applying the distributive property to multiply fractions and mixed numbers involves systematic steps:

1. **Convert mixed numbers to improper fractions:** Simplify the expression and make calculations straightforward.

2. **Express sums inside parentheses:** Break down mixed numbers into sums (e.g., $2 + \frac{1}{3}$).

3. **Apply the distributive property:** Multiply the term outside the parentheses by each term inside separately.

4. **Compute each product:** Handle fractions and whole numbers carefully, simplifying at each step.

5. **Combine results:** Add the partial products, making common denominators when necessary.

6. **Express the final answer:** Convert back to mixed numbers if desired, and simplify.

Additional Examples and Practice Problems

To solidify your understanding, here are some additional problems that utilize the distributive property with fractions and mixed numbers.

3.1 Example 1

Find $\frac{2}{3} \times 3 \frac{1}{2}$.

Solution:

- Convert $3 \frac{1}{2}$ to an improper fraction:

$$
3 \frac{1}{2} = \frac{7}{2}
$$

- Express as sum:

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

- Apply distributive property:

$$
\frac{2}{3} \times \left(3 + \frac{1}{2} \right) = \left(\frac{2}{3} \times 3 \right) + \left(\frac{2}{3} \times \frac{1}{2} \right)
$$

- Calculate:

$$
\frac{2}{3} \times 3 = \frac{2}{3} \times \frac{3}{1} = 2
$$

$$
\frac{2}{3} \times \frac{1}{2} = \frac{2 \times 1}{3 \times 2} = \frac{2}{6} = \frac{1}{3}
$$

- Sum:

$$
2 + \frac{1}{3} = \frac{6}{3} + \frac{1}{3} = \frac{7}{3} = 2 \frac{1}{3}
$$

Answer: $2 \frac{1}{3}$

3.2 Practice Problem

Use the distributive property to find:

$$
\frac{4}{5} \times 3 \frac{2}{5}
$$

Hint: Convert to sums and then multiply term-by-term.

Benefits of Using The Distributive Property

Applying the distributive property offers several advantages:

- Simplifies complex calculations: Breaking down problems into manageable parts makes calculations easier.
- Enhances understanding: Deepens comprehension of how multiplication interacts with addition.
- Prepares for algebra: Serves as a foundation for solving algebraic equations involving variables.
- Builds flexibility: Enables students to approach problems from multiple angles, fostering problem-solving skills.

Conclusion

Using the distributive property to find the product of mixed numbers and fractions is an essential skill in mathematics. By converting mixed numbers to improper fractions, expressing them as sums, and then distributing the multiplication across each term, students can simplify complex expressions systematically. Remember to perform each multiplication carefully, simplify as needed, and combine results with common denominators.

Mastering this approach not only aids in solving specific problems like $\frac{3}{4} \times 2 \frac{1}{3}$ but also lays a strong foundation for tackling more advanced mathematical concepts. Practice with various problems to develop confidence and proficiency in applying the distributive property in different contexts.

Keywords: distributive property, fractions, mixed numbers, algebra, multiplication, simplification, improper fractions, mathematical skills

Frequently Asked Questions

How can I use the distributive property to multiply fractions like 3/4 by 2 1/3?

First, convert the mixed number 2 1/3 into an improper fraction (which is 7/3). Then, distribute 3/4 across 7/3 by multiplying: (3/4) × (7/3). Simplify if possible to find the product.

What is the first step when applying the distributive property to multiply 3/4 by 2 1/3?

Convert the mixed number 2 1/3 into an improper fraction, which is 7/3, to make the multiplication straightforward.

How do I simplify the product after applying the distributive

property to 3/4 × 2 1/3?

Multiply the numerators and denominators: (3 × 7) over (4 × 3), resulting in 21/12. Then, simplify the fraction to lowest terms, which is 7/4 or 1 3/4.

Can the distributive property be used directly with mixed numbers, or should I convert them first?

It's best to convert mixed numbers to improper fractions first before applying the distributive property to ensure accurate multiplication.

What is the final answer when using the distributive property to multiply 3/4 by 2 1/3?

The product is 7/4, which simplifies to 1 3/4 as a mixed number.

Additional Resources

Use The Distributive Property To Find The Product: 3/4 × 2 1/3

Understanding how to efficiently multiply fractions and mixed numbers is a vital skill in mathematics, especially when dealing with real-world problems, algebraic expressions, or advanced arithmetic. The distributive property offers a powerful strategy for simplifying complex multiplication problems, including those involving mixed numbers like 2 1/3. This detailed guide will explore the process step-by-step, providing clarity, examples, and tips to master the skill.

Introduction to the Distributive Property

What Is The Distributive Property?

The distributive property is a fundamental principle in algebra that describes how multiplication interacts with addition. It states that:

- For any numbers a, b, and c,

a × (b + c) = (a × b) + (a × c)

This property allows you to distribute a multiplication over addition or subtraction inside parentheses, simplifying complex expressions by breaking them down into manageable parts.

In the context of fractions and mixed numbers, the distributive property is particularly useful because it enables us to split a complicated multiplication into smaller, easier multiplications.

Understanding the Problem: 3/4 × 2 1/3

Before applying the distributive property, it's essential to understand what the problem entails.

- Given expression: 3/4 × 2 1/3

- Goal: Find the product of these two numbers.

This involves multiplying a fraction (3/4) by a mixed number (2 1/3). The mixed number can be converted into an improper fraction for easier multiplication.

Converting Mixed Numbers to Improper Fractions

To work efficiently with mixed numbers, convert them into improper fractions:

- Step 1: Multiply the whole number by the denominator.

- Step 2: Add the numerator to this product.

- Step 3: Write the result over the original denominator.

Applying this to 2 1/3:

- Whole number: 2

- Numerator: 1

- Denominator: 3

- Calculation:

- 2 × 3 = 6

- 6 + 1 = 7

- Improper fraction: 7/3

Now, the problem becomes:

3/4 × 7/3

Applying the Distributive Property to the Problem

While the problem appears straightforward after conversion, the distributive property can be employed to simplify the multiplication further, especially when dealing with more complex expressions or additional terms.

In this case, since we have a single fraction and an improper fraction, the distributive property can be conceptualized by breaking one of the fractions into parts to make the multiplication more manageable.

Potential approach:

- Recognize that the improper fraction 7/3 can be expressed as a sum of two fractions, which corresponds to the whole number and fractional parts of the original mixed number.

- Recall that:

2 1/3 = 2 + 1/3

- Therefore:

3/4 × (2 + 1/3)

This allows us to use the distributive property explicitly:

- Multiply 3/4 by 2

- Multiply 3/4 by 1/3

- Add the results

This approach simplifies the process and aligns with the distributive property.

Step-by-Step Solution Using the Distributive Property

Let's now proceed step-by-step:

Step 1: Express the mixed number as a sum

$$
3/4 \times (2 + 1/3)
$$

Step 2: Apply the distributive property

$$
(3/4 \times 2) + (3/4 \times 1/3)
$$

Step 3: Calculate each term separately

Term 1: $3/4 \times 2$

- Rewrite 2 as a fraction: $2/1$

- Multiply numerators and denominators:

$$
(3 \times 2) / (4 \times 1) = 6/4
$$

- Simplify:

$$
6/4 = 3/2
$$

Term 2: $3/4 \times 1/3$

- Multiply numerators and denominators:

$$
(3 \times 1) / (4 \times 3) = 3/12
$$

- Simplify:

$$
3/12 = 1/4
$$

Step 4: Add the two results

$$
3/2 + 1/4
$$

- Find a common denominator:

$$
\text{LCD of 2 and 4 is 4}
$$

- Convert $3/2$ to quarters:

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

- Now add:

$$
6/4 + 1/4 = 7/4
$$

Final result:

$$
\boxed{\frac{7}{4}}
$$

which can be expressed as a mixed number:

$$
1\frac{3}{4}
$$

Key Takeaways and Tips for Using the Distributive Property with Fractions and Mixed Numbers

- Always convert mixed numbers to improper fractions before performing multiplication. This simplifies the process and reduces errors.

- Express mixed numbers as sums of their whole number and fractional parts to utilize the distributive property explicitly.

- Break down complex products into smaller parts, multiplying each component separately.

- Simplify fractions at every step to keep calculations manageable and avoid errors.

- Find common denominators when adding fractions, and always simplify your answers.

Additional Examples to Reinforce the Concept

Example 1: Multiply 2 1/4 by 3/5 using the distributive property

Step 1: Convert 2 1/4 to an improper fraction:

$$
2 \times 4 + 1 = 8 + 1 = 9 \Rightarrow 9/4
$$

Step 2: Write as sum:

$$
(2 + 1/4) \Rightarrow 2 + 1/4
$$

Step 3: Apply the distributive property:

$$
(2 \times 3/5) + (1/4 \times 3/5)
$$

Step 4: Calculate each:

- $2 \times 3/5 = (2/1) \times (3/5) = 6/5$

- $1/4 \times 3/5 = (1 \times 3)/(4 \times 5) = 3/20$

Step 5: Add:

$$
6/5 + 3/20
$$

- Convert 6/5 to denominator 20:

$$
6/5 = 24/20
$$

- Sum:

$$
24/20 + 3/20 = 27/20
$$

Result: 27/20 or 1 7/20.

Example 2: Multiply 3/8 by 1 2/3

Step 1: Convert 1 2/3 to an improper fraction:

$$
1 \times 3 + 2 = 3 + 2 = 5 \Rightarrow 5/3
$$

Step 2: Express as sum:

\[
1 + 2/3
\]

Step 3: Use distributive property:

\[
(3/8 \times 1) + (3/8 \times 2/3)
\]

Step 4: Compute:

- \(3/8 \times 1 = 3/8 \)

- \(3/8 \times 2/3 = (3 \times 2)/(8 \times 3) = 6/24 = 1/4 \)

Step 5: Add:

\[
3/8 + 1/4
\]

- Convert 1/4 to eighths:

\[
1/4 = 2/8
\]

- Sum:

\[
3/8 + 2/8 = 5/8
\]

Final answer: 5/8

Common Challenges and How to Overcome Them

- Misconverting mixed numbers: Always double-check your conversion to improper fractions.

- Forgetting to distribute both terms: When dealing with sums, ensure you multiply each term separately.

- Handling fractions with different denominators: Always find the least common denominator before adding or subtracting.

- Simplifying fractions: Don’t skip reduction steps; simplifying after each operation keeps calculations straightforward.

- Mistakes in multiplication: Remember to multiply numerators together and denominators together; cross-multiplied errors are common.

Summary and Final Thoughts

Using the distributive property to find the product of a fraction and a mixed number is a strategic approach that simplifies complex calculations. The key is to express the mixed number as a sum of its whole number and fractional parts, then multiply each separately by the fraction, and finally combine the results.

This method not only makes calculations more manageable but also deepens understanding

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