Rewrite The Equation Below So That It Does Not Have Fractions.2/3x-2=3/7Do Not Use Decimals In Your Answer.

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Understanding how to manipulate equations to eliminate fractions is an essential skill in algebra. Fractions often complicate calculations and can make solving equations seem more daunting than necessary. By learning effective strategies to clear fractions, students and math enthusiasts can simplify their problem-solving process, improve accuracy, and develop a stronger grasp of algebraic principles. In this comprehensive guide, we will explore step-by-step methods to rewrite the given equation, 2/3x - 2 = 3/7, so that it contains no fractions, all while avoiding decimals. This approach not only streamlines the equation but also reinforces fundamental concepts in algebra, such as multiplication, least common multiples, and equation balancing.

Understanding the Equation and Its Components

Before diving into the methods for eliminating fractions, it's crucial to understand the structure of the given equation:

- The term (2/3)x is a fractional coefficient multiplied by a variable.
- The constant -2 is an integer.
- The right side of the equation (3/7) is a fractional constant.

Our goal is to rewrite this equation so that it contains only integers (whole numbers) and variables, eliminating any fractions altogether.

Why Is It Important to Remove Fractions?

Removing fractions from equations offers several benefits:

- Simplifies calculations: Working with whole numbers reduces computational errors.
- Facilitates easier solving: It's often more straightforward to solve equations with integers.
- Enhances understanding: It reinforces algebraic manipulation skills.
- Prepares for advanced topics: Many higher-level algebra and calculus problems prefer equations without fractions.

Step-by-Step Method to Eliminate Fractions

The most systematic way to remove fractions from an equation involves multiplying both sides by the least common denominator (LCD) of all the fractional terms. Let's examine how to apply this method to our specific equation.

Step 1: Identify the Fractions

In the equation:

$$ \frac{2}{3}x - 2 = \frac{3}{7} $$

the fractional parts are:

- $\frac{2}{3}x$
- $\frac{3}{7}$

Step 2: Find the Least Common Denominator (LCD)

The denominators are 3 and 7. To clear fractions, find the least common multiple (LCM) of these denominators:

- Factors of 3: 3
- Factors of 7: 7

Since 3 and 7 are coprime, their LCM is:

$$ \text{LCD} = 3 \times 7 = 21 $$

Step 3: Multiply Both Sides of the Equation by the LCD

To eliminate fractions, multiply every term on both sides of the equation by 21:

$$
21 \times \left(\frac{2}{3}x - 2 \right) = 21 \times \frac{3}{7}
$$

Applying the distributive property:

$$
(21 \times \frac{2}{3}x) - (21 \times 2) = 21 \times \frac{3}{7}
$$

Calculate each term:

- $21 \times \frac{2}{3}x = (21 \div 3) \times 2x = 7 \times 2x = 14x$
- $21 \times 2 = 42$
- $21 \times \frac{3}{7} = (21 \div 7) \times 3 = 3 \times 3 = 9$

Thus, the equation becomes:

$$
14x - 42 = 9
$$

Step 4: Write the Equation Without Fractions

The transformed equation:

$$
14x - 42 = 9
$$

contains no fractions, making it easier to solve.

Additional Clarifications and Tips

While the above method is straightforward and effective, here are some additional tips and considerations:

Tip 1: Always find the LCD of all fractional terms

In equations with multiple fractions, ensure you identify all denominators and compute their LCM. This guarantees that multiplying by the LCD clears all fractions simultaneously.

Tip 2: Perform the multiplication on both sides equally

This maintains the equality of the equation. Remember, whatever operation you perform on one side must be performed on the other.

Tip 3: Simplify after multiplication

Always simplify the resulting equation to make solving for the variable straightforward.

Tip 4: Avoid introducing fractions during intermediate steps

By multiplying through by the LCD early, you prevent the accumulation of fractional terms, simplifying the entire process.

Solving the Equation After Removing Fractions

Once the fractions are eliminated, you can proceed with solving for the variable x:

$$
14x - 42 = 9
$$

Follow these steps:

1. Add 42 to both sides:

$$
14x = 9 + 42
$$

$$
14x = 51
$$

2. Divide both sides by 14:

$$
x = \frac{51}{14}
$$

Note that the solution contains a fraction because the original equation's solution naturally involves fractions unless further steps are taken to approximate or convert.

However, if the goal is to express the solution without fractions, or if the problem asks for an exact answer in fractional form, this is acceptable.

Alternative Approach: Cross-Multiplication (For Equations with Two Fractions)

In equations involving only fractions, cross-multiplication is another useful technique. For the given equation, it's more straightforward to use the LCD method, but understanding cross-multiplication is valuable for more complex equations.

Example:

Suppose the equation were:

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

Cross-multiplied as:

$$
2 \times 7 x = 3 \times 3
$$

$$
14x = 9
$$

$$
x = \frac{9}{14}
$$

This method is quick and effective for equations with two fractions.

Summary of Key Steps to Remove Fractions:

- Identify all denominators in the equation.
- Find the LCD of these denominators.
- Multiply both sides of the equation by the LCD.
- Simplify each term after multiplication.
- Solve the resulting equation for the variable.

Applying These Concepts to Similar Equations

The method demonstrated for the specific case of $\frac{2}{3}x - 2 = \frac{3}{7}$ can be generalized to any algebraic equation involving fractions. Here's a quick guide:

For equations of the form:

$$
\frac{a}{b}x + c = \frac{d}{e}
$$

Steps:

1. Find the LCD of all denominators b and e.
2. Multiply both sides by this LCD.
3. Simplify each term.
4. Solve the resulting linear equation.

Practice Problems:

To reinforce understanding, consider practicing with the following problems:

1. Rewrite and solve: $\frac{3}{4}x + 5 = \frac{2}{3}$
2. Eliminate fractions: $\frac{5}{6}x - 3 = \frac{7}{9}$
3. Solve after clearing fractions: $\frac{2}{5}x + \frac{3}{10} = \frac{1}{2}$

Conclusion

Removing fractions from equations is a fundamental skill that simplifies the process of solving algebraic problems. By identifying all fractional components, finding the least common denominator, and multiplying through by this value, you can convert complex fractional equations into simpler, equivalent forms with only integers and variables. This not only makes calculations more manageable but also strengthens your understanding of algebraic principles. The specific example of transforming $\frac{2}{3}x - 2 = \frac{3}{7}$ into a fraction-free equation demonstrates the power and utility of this technique. Mastering these steps will enhance your problem-solving efficiency and prepare you for tackling more advanced mathematical challenges with confidence.

Frequently Asked Questions

How can I rewrite the equation 2/3x - 2 = 3/7 without fractions?

Multiply both sides of the equation by the least common denominator, which is 21, to eliminate fractions: (21)(2/3x - 2) = (21)(3/7). Simplifying, we get 14x - 42 = 9.

What is the first step to clear fractions from the equation 2/3x - 2 = 3/7?

Multiply both sides of the equation by 21, the least common denominator, to eliminate the fractions.

How do I eliminate fractions from the equation 2/3x - 2 = 3/7 without using decimals?

Multiply both sides by 21: 21(2/3x - 2) = 21(3/7). This simplifies to 14x - 42 = 9.

What is the simplified form of the equation after clearing fractions in 2/3x - 2 = 3/7?

The simplified equation is 14x - 42 = 9.

How do I solve for x after rewriting the equation 2/3x - 2 = 3/7 without fractions?

Add 42 to both sides to get 14x = 51, then divide both sides by 14 to find x = 51/14.

Can I solve the equation 2/3x - 2 = 3/7 without converting to decimals?

Yes, by multiplying through by 21 to clear fractions, then solving the resulting linear equation.

What does multiplying both sides by 21 accomplish in the equation 2/3x - 2 = 3/7?

It eliminates the fractions, converting the equation into a linear form that is easier to solve.

Is there an alternative way to eliminate fractions in the equation without multiplying by the least common denominator?

The most straightforward method is to multiply both sides by the least common denominator; other methods are more complex and less efficient.

After clearing fractions, how do I express the solution for x?

Solve the linear equation for x, which after simplification is x = (14x - 42 + 42) / 14, leading to x = 51/14.

What is the final answer for x in the original equation after removing fractions?

x = 51/14.

Additional Resources

Mastering the Technique of Clearing Fractions in Equations: A Step-by-Step Guide

When dealing with algebraic equations, one of the most common obstacles students face is managing fractions. Fractions can complicate calculations, obscure the underlying structure of an equation, and make solving more cumbersome. Therefore, learning how to rewrite equations to eliminate fractions is an essential skill in algebra. In this comprehensive guide, we will delve into the process of transforming the equation (2/3)x - 2 = 3/7 into an equivalent form without fractions, explore the underlying principles, and provide detailed strategies to ensure clarity and accuracy in your solutions.

Understanding the Importance of Eliminating Fractions

Before diving into the steps, it's crucial to understand why removing fractions from an equation is beneficial:

- Simplification of calculations: Equations without fractions are generally easier to manipulate, especially when performing operations like addition, subtraction, multiplication, or division.
- Reducing potential errors: Fractions can sometimes lead to mistakes in arithmetic, especially when dealing with multiple fractions or complex denominators.
- Facilitating clearer understanding: An equation without fractions often presents a more straightforward view of the relationships involved, helping in problem-solving and comprehension.

Analyzing the Given Equation

Let's take a close look at the original equation:

$$
\frac{2}{3}x - 2 = \frac{3}{7}
$$

Key components include:

- A fractional coefficient multiplying the variable x.
- A constant term -2.
- A fractional constant on the right side.

Our goal is to rewrite this equation so that it contains no fractions, making it more manageable and easier to solve.

Core Principles for Eliminating Fractions

Before performing any operations, grasp the foundational principles:

1. Identify the denominators: In this case, the denominators are 3 and 7.
2. Find the Least Common Denominator (LCD): This is the smallest number divisible by all denominators involved.
3. Multiply through the entire equation by the LCD: This step clears all fractions simultaneously.
4. Simplify the resulting equation: Perform the multiplications and combine like terms to arrive at an equivalent, fraction-free equation.

Step-by-Step Process to Remove Fractions

Step 1: Determine the Least Common Denominator (LCD)

- The denominators are 3 and 7.
- Find the LCD:

$$
\text{LCD of } 3 \text{ and } 7 = 3 \times 7 = 21
$$

- Since 3 and 7 are coprime, their least common multiple is simply their product, 21.

Step 2: Multiply the Entire Equation by the LCD

- Multiply both sides of the equation by 21 to eliminate the fractions:

$$
21 \times \left(\frac{2}{3}x - 2 \right) = 21 \times \frac{3}{7}
$$

- Distribute the multiplication across all terms:

$$
21 \times \frac{2}{3}x - 21 \times 2 = 21 \times \frac{3}{7}
$$

Step 3: Simplify Each Term

- Simplify each multiplication:

1. $21 \times \frac{2}{3}x = (21 \div 3) \times 2x = 7 \times 2x = 14x$
2. $21 \times 2 = 42$
3. $21 \times \frac{3}{7} = (21 \div 7) \times 3 = 3 \times 3 = 9$

- The new equation becomes:

$$
14x - 42 = 9
$$

Step 4: Write the Fraction-Free Equation

- The resulting equation, free of fractions, is:

$$
14x - 42 = 9
$$

This is the desired form, making subsequent solving steps more straightforward.

Additional Tips and Considerations

While the process above is straightforward, there are several nuances and tips to consider:

- Always check for the greatest common factor (GCF): After simplifying, if all terms are divisible by a common factor, consider dividing through to simplify further.
- Be attentive to signs: Negative signs can sometimes be overlooked; ensure they are correctly applied during multiplication and simplification.
- Verify your steps: Always recheck the multiplication to confirm that you've correctly eliminated

denominators, especially in more complex equations.
- Practice with different denominators: Try equations with larger or more complex denominators to build confidence.

Applying the Method to More Complex Equations

The same principles apply when equations involve multiple fractions or more complex denominators. For example:

$$
\frac{3}{4}x + \frac{5}{6} = \frac{7}{8}
$$

Follow similar steps:

1. Find the LCD of 4, 6, and 8:
- Prime factors:
- $4 = 2^2$
- $6 = 2 \times 3$
- $8 = 2^3$
- LCD = $2^3 \times 3 = 8 \times 3 = 24$

2. Multiply through by 24:

$$
24 \times \left(\frac{3}{4}x + \frac{5}{6} \right) = 24 \times \frac{7}{8}
$$

3. Simplify each term:

- $24 \times \frac{3}{4}x = (24 \div 4) \times 3x = 6 \times 3x = 18x$
- $24 \times \frac{5}{6} = (24 \div 6) \times 5 = 4 \times 5 = 20$
- $24 \times \frac{7}{8} = (24 \div 8) \times 7 = 3 \times 7 = 21$

4. Write the simplified equation:

$$
18x + 20 = 21
$$

This method scales well with complexity, reinforcing the importance of mastering LCD calculation and multiplication.

Common Mistakes to Avoid

When eliminating fractions, be cautious of the following pitfalls:

- Neglecting to multiply every term: Omitting any term can lead to incorrect solutions.
- Incorrect LCD calculation: Always verify the LCD, especially with multiple fractions.
- Misapplication of multiplication: Remember to distribute the LCD to all terms, including constants.

- Forgetting to simplify after multiplication: After clearing fractions, always simplify the resulting equation for clarity.

Summary and Final Thoughts

Mastering the technique of rewriting equations to eliminate fractions is a vital skill in algebra that simplifies problem-solving and minimizes errors. The process hinges on:

- Identifying all fractions involved.
- Calculating the least common denominator.
- Multiplying the entire equation by this LCD.
- Performing straightforward algebraic manipulations to arrive at an equivalent, fraction-free equation.

Applying this method to the specific example:

$$
\frac{2}{3}x - 2 = \frac{3}{7}
$$

we multiply through by 21 and obtain:

$$
14x - 42 = 9
$$

This form is much easier to solve, allowing for straightforward isolation of x:

$$
14x = 9 + 42 \implies 14x = 51 \implies x = \frac{51}{14}
$$

Though the question emphasizes not using decimals, leaving the answer as a fraction preserves exactness.

Final Tips for Practice and Mastery

- Practice with various equations: The more you practice, the more intuitive the process becomes.
- Check your work: After solving, substitute your answer back into the original equation to verify correctness.
- Understand the rationale: Knowing why you multiply through by the LCD helps reinforce your understanding and prevents rote memorization.
- Use visual aids: Drawing number lines or factor trees can help visualize the process of finding LCDs and simplifying.

In conclusion, rewriting equations to eliminate fractions is an essential algebraic skill that enhances clarity, reduces errors, and simplifies calculations. By systematically identifying the denominators, calculating the LCD, and multiplying through the entire equation, you can convert any fractional equation into an equivalent, easier-to-solve form—paving the way for more efficient and accurate problem-solving in algebra.

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