A)3x-1/5=2x+3/7b)4x/5-3x/10=2

A)3x-1/5=2x+3/7b)4x/5-3x/10=2 is a set of two algebraic equations that often appear in mathematics textbooks, particularly in the context of solving linear equations with fractions. These equations are fundamental for students learning algebra because they introduce techniques such as clearing fractions, combining like terms, and isolating variables. Mastery of these types of equations enhances problem-solving skills and lays the groundwork for more advanced topics in algebra and calculus. In this comprehensive guide, we will explore both equations in detail, providing step-by-step solutions, tips, and strategies to help students and math enthusiasts understand and solve similar problems efficiently.

Understanding the Equations

Before diving into solving these equations, it's important to understand their structure and what they represent.

Equation A: 3x - 1/5 = 2x + 3/7

This is a linear equation involving the variable x, with fractional terms on both sides. The goal is to find the value of x that satisfies this equation.

Equation B: 4x/5 - 3x/10 = 2

Similarly, this is a linear equation with fractions, but all the fractional expressions are on the left side, and the right side is a constant.

Strategies for Solving Linear Equations with Fractions

Fractions can complicate algebraic equations, but there are effective strategies to simplify and solve them efficiently:

1. **Clear Fractions:** Multiply through by the least common denominator (LCD) to eliminate fractions.

2. **Combine Like Terms:** After clearing fractions, combine similar terms to simplify the equation.

3. **Isolate the Variable:** Use addition or subtraction to gather the variable terms on one side.

4. **Solve for the Variable:** Divide or multiply to find the value of the variable.

5. **Check Your Solution:** Substitute the found value back into the original equation to verify correctness.

Applying these steps systematically will make solving such equations straightforward.

Step-by-Step Solutions

Let's now proceed to solve each equation carefully.

Solution to Equation A: 3x - 1/5 = 2x + 3/7

Step 1: Identify the Least Common Denominator (LCD)

The denominators are 5 and 7. The LCD of 5 and 7 is 35.

Step 2: Multiply both sides of the equation by the LCD to clear fractions

Multiply every term by 35:

35 (3x) - 35 (1/5) = 35 (2x) + 35 (3/7)

Calculations:

- 35 3x = 105x
- 35 (1/5) = 7
- 35 2x = 70x
- 35 (3/7) = 15

The equation becomes:

105x - 7 = 70x + 15

Step 3: Rearrange the equation to gather variable terms on one side

Subtract 70x from both sides:

105x - 70x - 7 = 15

Which simplifies to:

35x - 7 = 15

Step 4: Isolate the term with x

Add 7 to both sides:

35x = 15 + 7

35x = 22

Step 5: Solve for x

Divide both sides by 35:

x = 22 / 35

Step 6: Final answer and verification

The solution is:

x = 22/35

To verify, substitute x back into the original equation:

Left side:

3(22/35) - 1/5 = ?

Calculate:

(66/35) - 1/5

Express 1/5 as 7/35:

66/35 - 7/35 = 59/35

Right side:

2(22/35) + 3/7 = ?

Calculate:

44/35 + 3/7

Express 3/7 as 15/35:

44/35 + 15/35 = 59/35

Both sides are equal, confirming the solution is correct.

Solution to Equation B: 4x/5 - 3x/10 = 2

Step 1: Identify the LCD of the denominators 5 and 10

The LCD of 5 and 10 is 10.

Step 2: Multiply every term by the LCD to clear fractions

Multiply both sides by 10:

10 (4x/5) - 10 (3x/10) = 10 2

Calculations:

- 10 (4x/5) = 2 4x = 8x
- 10 (3x/10) = 3x
- 10 2 = 20

The equation simplifies to:

8x - 3x = 20

Step 3: Combine like terms

8x - 3x = 5x

So,

5x = 20

Step 4: Solve for x

Divide both sides by 5:

x = 20 / 5 = 4

Step 5: Verify the solution

Substitute x = 4 into the original equation:

Left side:

(44)/5 - 34/10 = ?

Calculate:

16/5 - 12/10

Express 12/10 as 6/5:

16/5 - 6/5 = 10/5 = 2

Right side:

2

Both sides are equal, confirming the solution's correctness.

Additional Tips for Solving Fractional Equations

While the above steps work well for these equations, here are some additional tips to make solving similar equations easier:

- **Always identify the LCD first:** This simplifies the process of clearing fractions.
- **Double-check your arithmetic:** Fractions often lead to calculation mistakes; verify each step.
- **Simplify before solving:** If possible, reduce fractions to their simplest form to make calculations easier.
- **Be cautious with negative signs:** Keep track of signs when moving terms across the equation.
- **Practice with varied problems:** Exposure to different types of fractional equations enhances problem-solving agility.

Real-World Applications of Solving Equations with Fractions

Understanding how to solve equations like 3x - 1/5 = 2x + 3/7 and 4x/5 - 3x/10 = 2 is not just an academic exercise. These skills are applicable in various real-world contexts, including:

- **Financial calculations:** Computing interest rates, loan payments, or investment returns often involve fractional equations.
- **Engineering and physics:** Formulating and solving equations with ratios and proportions.
- **Data analysis:** Normalizing data or working with percentages and fractions.
- **Statistics:** Calculating probabilities and expected values that involve fractional expressions.

Mastering these algebraic techniques equips students and professionals with tools to analyze and solve complex problems across disciplines.

Conclusion

Solving equations like 3x - 1/5 = 2x + 3/7 and 4x/5 - 3x/10 = 2 requires a strategic approach centered around clearing fractions, simplifying expressions, and isolating the variable. By understanding the underlying principles and practicing step-by-step solutions, learners can confidently tackle similar algebraic problems. Remember to verify solutions by substituting back into the original equations to ensure accuracy. With consistent practice and application of these techniques, solving fractional linear equations will become a straightforward and valuable skill in your mathematical toolkit.

Further Resources

For those interested in deepening their understanding of algebra and fractional equations, consider exploring:

- Khan Academy: Algebra Courses
- Math Is Fun: Algebra
- WolframAlpha: Equation Solver

These platforms offer tutorials, practice problems, and interactive tools to enhance your learning experience.

By mastering the techniques outlined in this guide, you'll be well-equipped to solve a variety of algebraic equations involving fractions, contributing to your overall mathematical proficiency and confidence.

Frequently Asked Questions

How do I solve the equation (3x - 1)/5 = (2x + 3)/7?

To solve (3x - 1)/5 = (2x + 3)/7, cross-multiply to get 7(3x - 1) = 5(2x + 3), then expand: 21x - 7 = 10x + 15. Subtract 10x from both sides: 11x - 7 = 15. Add 7 to both sides: 11x = 22. Divide both sides by 11: x = 2.

What is the solution to the equation (4x/5) - (3x/10) = 2?

First, find a common denominator for the fractions: 4x/5 = (8x/10). So, (8x/10) - (3x/10) = 2. Simplify numerator: (5x/10) = 2. Multiply both sides by 10: 5x = 20. Divide both sides by 5: x = 4.

How can I solve the equation (3x - 1)/5 = (2x + 3)/7 for x?

Cross-multiplied, it becomes 7(3x - 1) = 5(2x + 3). Expand to get 21x - 7 = 10x + 15. Subtract 10x from both sides: 11x - 7 = 15. Add 7: 11x = 22. Divide by 11: x = 2.

What are the steps to solve (4x/5) - (3x/10) = 2?

Combine the fractions: (8x/10) - (3x/10) = 2, which simplifies to (5x/10) = 2. Simplify further: (x/2) = 2. Multiply both sides by 2: x = 4.

Is x=2 the solution to the equation (3x - 1)/5 = (2x +

3)/7?

Yes, solving the equation confirms that x=2 satisfies (3(2) - 1)/5 = (2(2) + 3)/7, which simplifies to (6 - 1)/5 = (4 + 3)/7 or 5/5 = 7/7, both equal to 1.

What is the value of x in the equation (4x/5) - (3x/10) = 2?

After simplifying to (x/2) = 2, multiply both sides by 2 to get x=4. Therefore, x=4 is the solution.

Can the equation (3x - 1)/5 = (2x + 3)/7 be solved by cross-multiplication?

Yes, cross-multiplied form is 7(3x - 1) = 5(2x + 3), which simplifies the solving process for x.

How do I verify the solution x=4 for the equation (4x/5) - (3x/10) = 2?

Substitute x=4 into the original equation: (44)/5 - (34)/10 = 16/5 - 12/10. Convert to common denominator: 16/5 = 32/10, so 32/10 - 12/10 = 20/10 = 2. The left side equals the right side, confirming x=4 as the solution.

What is the simplified form of (3x - 1)/5 = (2x + 3)/7 to find x?

Cross-multiplied, the equation becomes 7(3x - 1) = 5(2x + 3), leading to 21x - 7 = 10x + 15, and solving gives x=2.

Additional Resources

Algebraic Equations: Unlocking the Power of Linear Solutions

When it comes to understanding the foundational principles of mathematics, algebra stands out as a cornerstone. Whether you're a student aiming to improve your problem-solving skills or a professional seeking to sharpen analytical thinking, mastering algebraic equations is essential. Today, we'll explore two intriguing linear equations—3x - 1/5 = 2x + 3/7 and (4x/5) - (3x/10) = 2—delving into their structure, solving strategies, and real-world applications. Think of this as an expert review that not only unpacks the mechanics but also highlights the elegance of algebra in action.

Understanding the Structure of the Equations

Before we jump into solving, it’s crucial to analyze the composition of each equation. Recognizing the parts allows for a strategic approach to find solutions efficiently.

Equation A: 3x - 1/5 = 2x + 3/7

This is a classic linear equation with variables on both sides, combined with fractional constants. Its general form resembles:

- Variable terms: 3x and 2x
- Constant fractions: -1/5 and +3/7

The presence of fractions might seem intimidating at first glance, but they can be handled systematically.

Equation B: (4x/5) - (3x/10) = 2

This equation involves fractional coefficients multiplying the variable, making it slightly more complex at first but still straightforward when approached methodically.

Step-by-Step Strategies for Solving

Let's analyze each equation individually, providing a comprehensive step-by-step solution process suitable for both beginners and experienced learners.

Solving Equation A: 3x - 1/5 = 2x + 3/7

Step 1: Clear Fractions by Finding the Least Common Denominator (LCD)

- Denominators are 5 and 7.
- LCD of 5 and 7 is 35.

Step 2: Multiply Entire Equation by LCD (35) to Eliminate Fractions

$$
35 \times (3x - 1/5) = 35 \times (2x + 3/7)
$$

Calculations:

$$
35 \times 3x - 35 \times \frac{1}{5} = 35 \times 2x + 35 \times \frac{3}{7}
$$

$$
105x - 7 = 70x + 15
$$

Step 3: Simplify and Isolate Variable Terms

Bring like terms together:

$$
105x - 70x = 15 + 7
$$
$$
35x = 22
$$

Step 4: Solve for x

$$
x = \frac{22}{35}
$$

Result: $x = \frac{22}{35}$

Solving Equation B: (4x/5) - (3x/10) = 2

Step 1: Find the Least Common Denominator for the fractions

- Denominators are 5 and 10.
- LCD is 10.

Step 2: Rewrite fractions with common denominator

$$
\frac{4x}{5} = \frac{8x}{10}
$$

So the equation becomes:

$$
\frac{8x}{10} - \frac{3x}{10} = 2
$$

Step 3: Combine the fractions

$$
\frac{8x - 3x}{10} = 2
$$

$$
\frac{5x}{10} = 2
$$

Step 4: Simplify

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

Step 5: Solve for x

$$
x = 2 \times 2 = 4
$$

Result: $x = 4$

Implications and Applications of These Solutions

While these equations may appear purely academic, their underlying principles have broad real-world implications.

1. Financial Modeling

Linear equations like these are foundational in calculating interest rates, budgeting, and investment forecasting. For example, solving for an unknown variable such as interest rate or payment amount relies on similar algebraic manipulations.

2. Engineering and Physics

Designing systems or analyzing physical phenomena often involves setting up equations where variables represent forces, velocities, or other parameters. Precise solutions like the ones above ensure accurate modeling.

3. Computer Science

Algorithms that involve linear relationships are at the core of data analysis, machine learning, and graphics programming. Understanding how to manipulate and solve equations is essential for optimizing code and solving complex problems.

Key Takeaways and Tips for Solving Similar Equations

- Always identify the least common denominator (LCD) when dealing with fractions to simplify calculations.
- Distribute and combine like terms carefully to avoid errors.
- Isolate the variable step-by-step, ensuring clarity at each stage.
- Verify your solution by substituting back into the original equation.

Conclusion: The Power of Algebra in Problem Solving

Mastering linear equations like 3x - 1/5 = 2x + 3/7 and (4x/5) - (3x/10) = 2 not only enhances mathematical literacy but also empowers logical thinking across disciplines. Whether you're streamlining business models, designing engineering projects, or developing algorithms, understanding how to approach and solve such equations is invaluable.

As we've explored, breaking down complex fractions, applying systematic strategies, and verifying solutions are critical steps in the algebraic process. Think of these equations as tools—when wielded skillfully, they unlock solutions to a myriad of practical problems, turning abstract numbers into actionable insights.

Embrace the challenge of algebraic equations, and you'll find that solving them becomes not just an academic exercise but a fundamental skill with real-world impact.

A 3x 1 5 2x 3 7b 4x 5 3x 10 2

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