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Solving algebraic equations can sometimes feel challenging, especially when fractions are involved. One such equation that often appears in math homework and practice tests is:

$$\frac{2}{3}x + \frac{1}{6} = \frac{4}{3}x$$

Understanding how to find the value of x in this equation is essential for mastering algebraic concepts. In this comprehensive guide, we will explore step-by-step solutions, explain key algebraic principles, and provide tips to solve similar equations efficiently. Whether you're a student preparing for exams or someone looking to strengthen your algebra skills, this article will serve as a helpful resource.

Understanding the Equation: $\frac{2}{3}x + \frac{1}{6} = \frac{4}{3}x$

Before diving into solving, it's important to understand the structure of the equation.

Components of the Equation

- $\frac{2}{3}x$: A fractional coefficient multiplied by the variable x .
- $\frac{1}{6}$: A constant term.
- $\frac{4}{3}x$: Another fractional term involving x .

This is a linear equation involving fractions, which means the goal is to isolate x on one side of the equation to determine its value.

Why Is It Important to Learn How to Solve Such Equations?

- Fractions are common in many real-world problems, including measurements, ratios, and proportions.
- Mastering these equations improves problem-solving skills and prepares you for more advanced math topics.
- Being comfortable with algebraic manipulation makes future math topics such as calculus and statistics more accessible.

Step-by-Step Solution to $\left(\frac{2}{3}x + \frac{1}{6}\right) = \frac{4}{3}x$

Let's walk through solving this equation systematically.

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

The denominators are 3 and 6. The LCD of 3 and 6 is 6.

- Multiply every term in the equation by 6 to eliminate fractions:

$$6 \left(\frac{2}{3}x + \frac{1}{6} \right) = 6 \times \frac{4}{3}x$$

- Simplify each term:

$$\begin{aligned} 6 \times \frac{2}{3}x &= (6 \div 3) \times 2x = 2 \times 2x = 4x \\ 6 \times \frac{1}{6} &= 1 \\ 6 \times \frac{4}{3}x &= (6 \div 3) \times 4x = 2 \times 4x = 8x \end{aligned}$$

- The new equation becomes:

$$4x + 1 = 8x$$

Step 2: Rearrange the Equation to Isolate x

- Subtract $(4x)$ from both sides:

$$4x + 1 - 4x = 8x - 4x$$

$$1 = 4x$$

Step 3: Solve for x

- Divide both sides by 4:

$$x = \frac{1}{4}$$

Final answer: $\boxed{x = \frac{1}{4}}$

Verifying the Solution

Always verify your solution by substituting $(x = \frac{1}{4})$ back into the original equation.

Original equation:

$$\left[\frac{2}{3}x + \frac{1}{6} = \frac{4}{3}x \right]$$

Substitute $(x = \frac{1}{4})$:

$$\begin{aligned} &\left[\begin{aligned} &\frac{2}{3} \times \frac{1}{4} + \frac{1}{6} \quad \&= \quad \frac{4}{3} \times \frac{1}{4} \\ &\frac{2}{3} \times 1 \times \frac{1}{3} \times 4 + \frac{1}{6} \quad \&= \quad \frac{4}{3} \times 1 \times \frac{1}{3} \times 4 \\ &\frac{2}{3} \times \frac{1}{4} + \frac{1}{6} \quad \&= \quad \frac{4}{3} \times \frac{1}{4} \\ &\frac{1}{6} + \frac{1}{6} \quad \&= \quad \frac{1}{3} \\ &\frac{2}{6} \quad \&= \quad \frac{1}{3} \\ &\frac{1}{3} \quad \&= \quad \frac{1}{3} \end{aligned} \right] \end{aligned}$$

Since both sides are equal, the solution $(x = \frac{1}{4})$ is verified.

Common Mistakes to Avoid When Solving Fractional Equations

- Forgetting to multiply every term by the LCD: Failing to do this leaves fractions in the equation, which can cause errors.
- Incorrectly simplifying fractions: Always simplify fractions correctly to avoid propagation of errors.
- Neglecting to check the solution: Always substitute back into the original equation to verify your answer.
- Mixing steps: Keep the process organized to avoid mixing terms or losing track of the variable.

Additional Tips for Solving Similar Equations

1. Always clear fractions early

Multiplying through by the LCD simplifies the equation and makes it easier to manipulate.

2. Simplify step-by-step

Work carefully through each step, especially when dealing with multiple fractions.

3. Isolate the variable

Use addition or subtraction to gather all (x) terms on one side.

4. Use inverse operations

Divide or multiply to solve for (x) once the variable is isolated.

5. Practice with varied problems

Solve different types of fractional equations to build confidence and skill.

Practice Problems for Mastery

Try solving these equations to reinforce your understanding:

1. $\left(\frac{3}{4}x - \frac{1}{2}\right) = \frac{1}{4}x$

2. $\left(\frac{5}{6}x + \frac{2}{3}\right) = \frac{7}{6}x$

3. $\left(\frac{2}{5}x + \frac{1}{10}\right) = \frac{3}{5}x$

Remember to apply the same principles: clear fractions, simplify, isolate, and verify.

Conclusion: Mastering Fractional Equations

The equation $\left(\frac{2}{3}x + \frac{1}{6}\right) = \frac{4}{3}x$ demonstrates the importance of understanding how to manipulate fractions in algebra. By following a systematic approach—finding the LCD, multiplying through to clear fractions, rearranging terms, and solving—you can confidently tackle similar problems.

Mastering these techniques will enhance your problem-solving skills and prepare you for more complex algebraic challenges. Practice regularly, verify

your answers, and don't be afraid to revisit foundational concepts whenever needed.

If you want to improve your algebra skills further, consider exploring more advanced topics like quadratic equations, inequalities, and functions. Remember, patience and practice are key to becoming proficient in solving equations involving fractions.

Keywords for SEO Optimization:

- Solving fractional equations
- Algebraic equations with fractions
- How to solve $\frac{2}{3}x + \frac{1}{6} = \frac{4}{3}x$
- Step-by-step algebra solutions
- Simplifying equations with fractions
- Algebra tips and tricks
- Solving for x in fractional equations
- Basic algebra practice problems

Additional Resources:

- Algebra tutorials for beginners
- Fraction exercises and worksheets
- Video lessons on solving equations with fractions
- Math practice apps and tools

By mastering the solution process for equations like $\frac{2}{3}x + \frac{1}{6} = \frac{4}{3}x$, you build a strong foundation for more advanced math topics and real-world problem-solving. Keep practicing, stay patient, and you'll become confident in handling even complex algebraic equations involving fractions.

Frequently Asked Questions

How do I solve the equation $\frac{2}{3}x + \frac{1}{6} = \frac{4}{3}x$?

To solve $\frac{2}{3}x + \frac{1}{6} = \frac{4}{3}x$, first subtract $\frac{2}{3}x$ from both sides to get $\frac{1}{6} = \frac{4}{3}x - \frac{2}{3}x$. Simplify the right side to $\frac{2}{3}x$, so the equation becomes $\frac{1}{6} = \frac{2}{3}x$. Then, multiply both sides by 3 to clear the denominator: $3 \cdot \frac{1}{6} = 3 \cdot \frac{2}{3}x$, which simplifies to $\frac{1}{2} = 2x$. Finally, divide both sides by 2 to find x : $x = \frac{1}{2} \div 2 = \frac{1}{4}$.

What is the value of x in the equation $\frac{2}{3}x + \frac{1}{6} = \frac{4}{3}x$?

The value of x is $\frac{1}{4}$.

Can you explain step-by-step how to solve $\frac{2}{3}x + \frac{1}{6}$

$$= 4/3x?$$

Certainly! First, subtract $2/3x$ from both sides: $1/6 = (4/3x) - (2/3x)$. Simplify the right side: $1/6 = 2/3x$. Next, multiply both sides by 3 to eliminate the denominator: $3 \cdot 1/6 = 3 \cdot 2/3x$, giving $1/2 = 2x$. Then, divide both sides by 2: $x = (1/2) / 2 = 1/4$.

Is the solution to $2/3x + 1/6 = 4/3x$ equal to $1/4$?

Yes, after solving the equation, the value of x is $1/4$.

What common mistake should I avoid when solving $2/3x + 1/6 = 4/3x$?

A common mistake is to forget to subtract $2/3x$ from both sides or to incorrectly combine the fractions. Always ensure you perform the same operation on both sides and carefully simplify fractions.

How can I verify that $x = 1/4$ is the correct solution?

You can substitute $x = 1/4$ back into the original equation: $2/3(1/4) + 1/6 = 4/3(1/4)$. Simplify both sides: $(2/3)(1/4) = 2/12 = 1/6$, so left side is $1/6 + 1/6 = 2/6 = 1/3$. Right side: $(4/3)(1/4) = 4/12 = 1/3$. Both sides equal $1/3$, confirming $x = 1/4$ is correct.

What is the main concept involved in solving the equation $2/3x + 1/6 = 4/3x$?

The main concept is isolating the variable x by combining like terms and eliminating fractions through multiplication, subtraction, and division.

Additional Resources

$2/3x + 1/6 = 4/3x$ What Is The Answer To This

Mathematics often presents us with equations that seem complex at first glance but unfold into simple solutions upon closer examination. One such equation that piques curiosity is:

$$\left[\frac{2}{3}x + \frac{1}{6} = \frac{4}{3}x \right]$$

Despite its appearance, solving this algebraic expression is a straightforward process that reveals a clear value for x . Understanding how to approach such equations not only enhances problem-solving skills but also deepens comprehension of fundamental algebraic principles. In this article, we will explore step-by-step how to find the value of x in this equation, dissecting the process with clarity and precision.

Understanding the Equation: Breaking Down the Components

Before diving into the solution, it's essential to understand the structure

of the equation:

$$\left[\frac{2}{3}x + \frac{1}{6} = \frac{4}{3}x \right]$$

Key Elements:

- Variables: (x) is the unknown we need to solve for.
- Fractions: The coefficients and constants are expressed as fractions, which require careful handling during operations.
- Equality: The equation states that the expression on the left equals the expression on the right.

Why Fractions Matter:

Fractions can sometimes complicate calculations, but they are integral to precise algebraic manipulation. The core challenge is to eliminate or combine these fractions to isolate (x) .

Step-by-Step Solution: From Equation to Answer

Step 1: Identify Like Terms and Simplify

The initial step is to recognize that the terms involving (x) are on both sides:

$$\left[\frac{2}{3}x \quad \text{and} \quad \frac{4}{3}x \right]$$

To simplify, aim to gather all (x) terms on one side of the equation and constants on the other.

Step 2: Eliminate Fractions by Finding a Common Denominator

Working directly with fractions can be cumbersome. To streamline calculations, multiply every term by the least common denominator (LCD) of all fractions involved.

Determine LCD:

- Denominators are 3 and 6.
- The LCD of 3 and 6 is 6.

Multiply through by 6:

$$\left[6 \times \left(\frac{2}{3}x + \frac{1}{6} \right) = 6 \times \frac{4}{3}x \right]$$

Perform each multiplication:

$$\left[6 \times \frac{2}{3}x = 6 \times \frac{2}{3} \times x = 2 \times 2 \times x = 4x \right]$$

$$\left[6 \times \frac{1}{6} = 1 \right]$$

$$\frac{6}{4} \times \frac{4}{3}x = 2 \times 4 \times x = 8x$$

Now, the equation becomes:

$$4x + 1 = 8x$$

Step 3: Solve the Simplified Equation

With fractions eliminated, the equation is straightforward:

$$4x + 1 = 8x$$

Subtract $(4x)$ from both sides:

$$1 = 8x - 4x$$

$$1 = 4x$$

Divide both sides by 4:

$$x = \frac{1}{4}$$

Result:

$$\boxed{\frac{1}{4}}$$

Summary of the Solution:

- By multiplying through by the LCD, we simplified the fractions.
- Isolated (x) through basic algebraic operations.
- Found the exact value of (x) to be $(\frac{1}{4})$.

Confirming the Solution: Verification

Verifying the solution is a crucial step in algebra. Substitute $(x = \frac{1}{4})$ back into the original equation:

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

Calculate each side:

Left Side:

$$\left[\frac{2}{3} \times \frac{1}{4} = \frac{2 \times 1}{3 \times 4} = \frac{2}{12} = \frac{1}{6} \right]$$

Add $\left(\frac{1}{6}\right)$:

$$\left[\frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3} \right]$$

Right Side:

$$\left[\frac{4}{3} \times \frac{1}{4} = \frac{4 \times 1}{3 \times 4} = \frac{4}{12} = \frac{1}{3} \right]$$

Both sides equal $\left(\frac{1}{3}\right)$, confirming that $\left(x = \frac{1}{4}\right)$ satisfies the original equation.

Broader Insights: Why Understanding Such Equations Matters

While the specific equation discussed may seem simple, the techniques applied are foundational for tackling more complex algebraic problems. These principles include:

- Handling Fractions: Recognizing when to clear denominators simplifies the process.
- Isolating Variables: Moving all variable terms to one side enables straightforward solutions.
- Verification: Always substitute solutions back into the original to verify correctness.

Mastering these steps builds confidence and competence in algebra, paving the way for success in advanced mathematics, science, engineering, and everyday problem-solving.

Common Pitfalls and Tips for Success

When working with equations involving fractions, students and learners should watch out for:

- Incorrect denominator handling: Always identify the LCD to clear fractions effectively.
- Sign errors: Maintain careful attention to signs during addition, subtraction, and distribution.
- Forgetting to verify solutions: Always substitute back to confirm accuracy.
- Overlooking equivalent forms: Recognize that multiplying through by the LCD is a strategic step, not just a mechanical one.

Tips:

- Write down the LCD explicitly before multiplying.
- Simplify fractions at each step to avoid confusion.
- Practice similar problems to develop fluency.

Conclusion: Deciphering the Equation and Finding the Answer

The equation $\left(\frac{2}{3}x + \frac{1}{6} = \frac{4}{3}x\right)$ offers a window into the systematic approach required for algebraic problem-solving. By strategically multiplying through by the least common denominator, isolating the variable, and verifying the solution, we find that:

$$x = \frac{1}{4}$$

This solution not only resolves the specific problem but also reinforces essential algebraic techniques applicable across a range of mathematical challenges. Whether in academic settings or real-world applications, understanding how to manipulate fractions and solve for unknowns remains a vital skill. As you continue exploring equations and algebraic concepts, remember that a methodical approach and careful verification are your best tools for success.

2 3x 1 6 4 3x What Is The Answer To This

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