If 2x+1/4 = 12/20 What Is The Value Of X

If 2x+1/4 = 12/20 What Is The Value Of X is a question that delves into the fundamental concepts of algebra, specifically solving for an unknown variable. Understanding how to isolate and solve for X in such equations is essential for mastering algebraic manipulations. Whether you're a student preparing for exams or someone looking to strengthen your problem-solving skills, this article provides a comprehensive guide to solving this type of algebraic equation step by step, including tips and common mistakes to avoid.

Understanding the Equation: 2x + 1/4 = 12/20

Before jumping into the solution, it’s crucial to understand the components of the equation. The equation contains a variable term, a fraction, and a constant. Let's analyze each part:

- 2x: The term involving the variable X, multiplied by 2.
- 1/4: A constant fractional term added to 2x.
- 12/20: The right side of the equation, also a fraction.

The goal is to find the value of X that makes the equation true. To do this, you'll need to manipulate the equation to isolate X on one side.

Step-by-Step Solution Process

Step 1: Simplify the Fractions

The first step is to simplify the fractions on both sides of the equation if possible. Simplifying fractions makes calculations easier and reduces errors.

- 12/20 can be simplified by dividing numerator and denominator by their greatest common divisor (GCD), which is 4:

$$
\frac{12}{20} = \frac{12 \div 4}{20 \div 4} = \frac{3}{5}
$$

Now, the equation becomes:

$$
2x + \frac{1}{4} = \frac{3}{5}
$$

$$

Step 2: Isolate the Variable Term

To solve for X, first move the constant term (1/4) to the other side of the equation:

$$
2x = \frac{3}{5} - \frac{1}{4}
$$

Step 3: Find a Common Denominator and Subtract

Subtracting fractions requires a common denominator. The denominators are 5 and 4, so the least common denominator (LCD) is 20.

Express both fractions with denominator 20:

$$
\frac{3}{5} = \frac{3 \times 4}{5 \times 4} = \frac{12}{20}
$$
$$
\frac{1}{4} = \frac{1 \times 5}{4 \times 5} = \frac{5}{20}
$$

Now, subtract:

$$
2x = \frac{12}{20} - \frac{5}{20} = \frac{12 - 5}{20} = \frac{7}{20}
$$

Step 4: Solve for X

Since the equation now is:

$$
2x = \frac{7}{20}
$$

Divide both sides by 2 to isolate X:

$$
x = \frac{\frac{7}{20}}{2}
$$

Dividing a fraction by a number is equivalent to multiplying the fraction by the reciprocal of that number:

$$
x = \frac{7}{20} \times \frac{1}{2} = \frac{7}{20} \times \frac{1}{2} = \frac{7 \times 1}{20 \times 2} = \frac{7}{40}
$$

Therefore, the value of X is $\frac{7}{40}$.

Summary of the Solution

To summarize, the key steps involved:

1. Simplify fractions for easier calculations.
2. Move constants to one side to isolate the term with X.
3. Find common denominators to perform fractional subtraction.
4. Divide both sides by the coefficient of X to solve for X.

The final answer is:

$$
\boxed{
x = \frac{7}{40}
}
$$

Additional Tips for Solving Similar Equations

Tip 1: Always Simplify Fractions Early

Simplifying fractions at the beginning reduces complexity and minimizes errors during calculations.

Tip 2: Find Common Denominators Carefully

When subtracting or adding fractions, always identify the least common denominator to ensure accuracy.

Tip 3: Remember to Perform Inverse Operations

To isolate variables, perform inverse operations in reverse order: addition <-> subtraction, multiplication <-> division.

Tip 4: Check Your Solution

Substitute your found value of X back into the original equation to verify correctness:

$$
2 \times \frac{7}{40} + \frac{1}{4} = ?
$$

Calculate:

$$
2 \times \frac{7}{40} = \frac{14}{40} = \frac{7}{20}
$$
$$
\frac{1}{4} = \frac{5}{20}
$$

Sum:

$$
\frac{7}{20} + \frac{5}{20} = \frac{12}{20} = \frac{3}{5}
$$

which matches the simplified right side, confirming the solution's correctness.

Common Mistakes to Avoid

- Not Simplifying Fractions: Failing to reduce fractions can complicate calculations.
- Miscalculating Common Denominators: Incorrect LCDs lead to wrong results.
- Forgetting to Perform Inverse Operations in Correct Order: Always perform addition/subtraction before division/multiplication when isolating variables.
- Neglecting to Check the Solution: Always verify your answer by substituting back into the original equation.

Conclusion

Solving equations like 2x + 1/4 = 12/20 involves understanding fractional operations, simplifying expressions, and systematically isolating the variable. The key is to work carefully through each step, ensuring accuracy with fractions and inverse operations. The final value of X, which in this case is \(\frac{7}{40}\), demonstrates how algebraic principles are applied to find unknown quantities efficiently. With practice, these steps become second nature, empowering you to tackle increasingly complex algebraic problems confidently.

Whether you're practicing for exams or just brushing up your algebra skills, mastering these techniques will serve as a solid foundation for all future mathematical challenges.

Frequently Asked Questions

How do I solve for x in the equation (2x + 1)/4 = 12/20?

First, simplify the right side to 3/5, then cross-multiply to solve for x: (2x + 1) 5 = 3 4, which simplifies to 5(2x + 1) = 12. Then expand and solve for x.

What is the first step to find the value of x in (2x + 1)/4 = 12/20?

The first step is to simplify the fraction 12/20 to 3/5 and then cross-multiply to eliminate the denominators.

After simplifying the equation (2x + 1)/4 = 3/5, what is the next step?

Next, cross-multiply: (2x + 1) 5 = 3 4, leading to 5(2x + 1) = 12.

How do I isolate x after setting up the equation 5(2x + 1) = 12?

Expand: 10x + 5 = 12, then subtract 5 from both sides: 10x = 7, and finally divide both sides by 10 to find x = 7/10.

What is the value of x in the equation (2x + 1)/4 =

12/20?

The value of x is 7/10 or 0.7.

Can I verify my solution for x in (2x + 1)/4 = 12/20?

Yes, substitute x = 7/10 back into the original equation to check if both sides are equal, confirming your solution is correct.

Additional Resources

Mathematics Problem Solving: Deciphering the Equation 2x + 1/4 = 12/20

When it comes to solving algebraic equations, understanding the fundamental principles of algebra is essential. The problem "If 2x + 1/4 = 12/20, what is the value of x?" might seem straightforward at first glance, but it offers an excellent opportunity to delve into the process of isolating variables, simplifying fractions, and systematically approaching algebraic equations. Think of this as a guided tour through the essential steps of algebra, much like a detailed product review that examines each feature comprehensively.

Understanding the Equation and Its Components

The given equation:

$$ 2x + \frac{1}{4} = \frac{12}{20} $$

contains several elements that require unpacking to solve for x. Let's examine each part carefully.

Breaking Down the Equation

- Term 1: $2x$
This is the variable term, which contains x multiplied by 2. Our goal is to isolate this term to determine the value of x.

- Term 2: $\frac{1}{4}$
A constant fraction added to the variable term.

- Term 3: $\frac{12}{20}$
The constant on the right side, a simplified fraction representing a fixed numeric value.

Why Is Simplification Important?

Simplifying fractions makes the equation easier to work with, reducing potential errors and clarifying the calculations. For example, recognizing that $\frac{12}{20}$ can be simplified to a lower terms fraction helps streamline the solving process.

Step-by-Step Solution Process

To find the value of x, we need to follow a logical sequence of algebraic manipulations. Think of this as the recipe for a perfect dish: precise steps ensure the correct outcome.

Step 1: Simplify Fractions

The first step is to simplify $\frac{12}{20}$. Both numerator and denominator are divisible by 4:

$$\frac{12 \div 4}{20 \div 4} = \frac{3}{5}$$

Now, the equation becomes:

$$2x + \frac{1}{4} = \frac{3}{5}$$

Step 2: Eliminate the Constant Term on the Left

To isolate the term with x, subtract $\frac{1}{4}$ from both sides:

$$2x + \frac{1}{4} - \frac{1}{4} = \frac{3}{5} - \frac{1}{4}$$

Simplifies to:

$$2x = \frac{3}{5} - \frac{1}{4}$$

Step 3: Find a Common Denominator

Subtracting fractions requires a common denominator. The denominators are 5 and 4, so the least common denominator (LCD) is 20.

Express both fractions with denominator 20:

$$\frac{3}{5} = \frac{3 \times 4}{5 \times 4} = \frac{12}{20}$$
$$\frac{1}{4} = \frac{1 \times 5}{4 \times 5} = \frac{5}{20}$$

Now, the subtraction becomes:

$$2x = \frac{12}{20} - \frac{5}{20}$$

Step 4: Perform the Subtraction

Subtract the numerators:

$$ 2x = \frac{12 - 5}{20} = \frac{7}{20} $$

Step 5: Solve for x

Since $2x = \frac{7}{20}$, divide both sides by 2:

$$ x = \frac{\frac{7}{20}}{2} $$

Dividing by 2 is the same as multiplying by $\frac{1}{2}$:

$$ x = \frac{7}{20} \times \frac{1}{2} $$

Multiply numerators and denominators:

$$ x = \frac{7 \times 1}{20 \times 2} = \frac{7}{40} $$

Final Answer and Interpretation

The value of x in the equation $2x + \frac{1}{4} = \frac{12}{20}$ is $\boxed{\frac{7}{40}}$.

This fraction is in its simplest form, indicating the precise solution without any further reduction needed. To express this as a decimal, divide 7 by 40:

$$ x = \frac{7}{40} = 0.175 $$

Practical Significance

Understanding how to manipulate fractions and isolate variables is crucial not only in academic contexts but also in real-world applications such as engineering, finance, and data analysis. For example, if this equation represented a part of a larger budgeting problem, knowing the exact value of x could influence financial decisions.

Additional Tips for Solving Similar Equations

When approaching equations like $2x + \frac{1}{4} = \frac{12}{20}$, keep these guidelines in mind:

- Always simplify fractions first to ease calculations.
- Identify the variable term and aim to isolate it by performing inverse operations.
- Use common denominators to add or subtract fractions accurately.
- Perform inverse operations step-by-step, maintaining balance on both sides of the equation.
- Verify your solution by substituting x back into the original equation to ensure correctness.

Conclusion: Mastering the Art of Algebraic Equations

Solving for x in the equation $2x + \frac{1}{4} = \frac{12}{20}$ exemplifies the systematic approach necessary for tackling algebraic problems. By simplifying fractions, performing inverse operations, and carefully managing the arithmetic, we arrive at a precise solution: $x = \frac{7}{40}$.

Much like evaluating a complex product feature, understanding each step in the solution process enhances comprehension and confidence. Whether you're a student refining your algebra skills or a professional applying mathematical principles in practical scenarios, mastering such methods equips you with a valuable problem-solving toolkit. Keep practicing these steps, and algebra will become an increasingly manageable and even enjoyable part of your mathematical journey.

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