Find The Ordered Pair (s,t) That Satisfies The Systems/2+5/t=33t-6s=9

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Are you struggling to solve a system of equations involving variables s and t? If so, you're not alone. Many students and math enthusiasts encounter systems of equations that seem complex at first glance but become manageable once broken down systematically. In this article, we'll explore how to find the ordered pair (s, t) that satisfies the given system:

$$
\frac{2 + 5}{t} = 33t - 6s = 9
$$

This system appears to combine multiple equations with variables in both numerator and denominator, which can be intimidating. However, by carefully analyzing and simplifying each part, we can find the solution efficiently.

Understanding the System of Equations

Before diving into calculations, it's essential to interpret the problem properly. The notation suggests that the system involves two expressions set equal to each other:

$$
\frac{2 + 5}{t} \quad \text{and} \quad 33t - 6s
$$

and both are equal to 9:

$$
\frac{2 + 5}{t} = 33t - 6s = 9
$$

This implies the following two equations:

1. $\displaystyle \frac{2 + 5}{t} = 9$
2. $\displaystyle 33t - 6s = 9$

Let's clarify this step:

- The expression $\frac{2 + 5}{t}$ simplifies to $\frac{7}{t}$.
- Both $\frac{7}{t}$ and $33t - 6s$ are equal to 9, which forms a system

of two equations:

$$
\begin{cases}
\displaystyle \frac{7}{t} = 9 \\
\displaystyle 33t - 6s = 9
\end{cases}
$$

Note: It is common in systems notation to list multiple equalities like this, and the key is to interpret each carefully.

Step-by-Step Solution Approach

To find the ordered pair (s, t), follow these steps:

Step 1: Solve for t from the first equation

Given:

$$
\frac{7}{t} = 9
$$

Multiply both sides by t to isolate t:

$$
7 = 9t
$$

Divide both sides by 9:

$$
t = \frac{7}{9}
$$

This gives us the value of t.

Step 2: Substitute t into the second equation to find s

Second equation:

$$
33t - 6s = 9
$$

Substitute $t = \frac{7}{9}$:

$$
33 \times \frac{7}{9} - 6s = 9
$$

Simplify:

$$
\frac{33 \times 7}{9} - 6s = 9
$$

Calculate numerator:

$$
\frac{231}{9} - 6s = 9
$$

Simplify $\frac{231}{9}$:

$$
\frac{231}{9} = 25.\overline{6} \quad \text{or} \quad \frac{77}{3}
$$

Expressed as a fraction:

$$
\frac{77}{3} - 6s = 9
$$

Now, solve for s:

Subtract $\frac{77}{3}$ from both sides:

$$
-6s = 9 - \frac{77}{3}
$$

Express 9 as $\frac{27}{3}$:

$$
-6s = \frac{27}{3} - \frac{77}{3} = -\frac{50}{3}
$$

Divide both sides by -6:

$$
\

$$
s = \frac{-\frac{50}{3}}{-6} = \frac{50/3}{6} = \frac{50}{3} \times \frac{1}{6} = \frac{50}{18} = \frac{25}{9}
$$

Final Answer: The Ordered Pair (s, t)

Combining the results obtained:

$$
s = \frac{25}{9}, \quad t = \frac{7}{9}
$$

Thus, the ordered pair that satisfies the system is:

$$
\boxed{\left(\frac{25}{9}, \frac{7}{9} \right)}
$$

Summary of the Solution Process

To find the solution to the system:

1. Identify the Equations: Recognize that the given statement implies two separate equations:

- $\displaystyle \frac{7}{t} = 9$
- $\displaystyle 33t - 6s = 9$

2. Solve for t: From the first equation, solve for t:

$$
t = \frac{7}{9}
$$

3. Substitute t into the second equation: Plug the value of t into the second equation and solve for s:

$$
33 \times \frac{7}{9} - 6s = 9
$$

4. Simplify and solve for s:

$$
\frac{231}{9} - 6s = 9
$$

$$
\frac{77}{3} - 6s = 9
$$

$$
-6s = 9 - \frac{77}{3}
$$

$$
-6s = -\frac{50}{3}
$$

$$
s = \frac{25}{9}
$$

Additional Tips for Solving Similar Systems

- Always carefully interpret the notation to identify how many equations are involved.
- Simplify fractions early to make calculations more straightforward.
- When variables appear in denominators, consider cross-multiplying to clear fractions.
- Double-check your solutions by substituting back into the original equations.
- Use substitution or elimination methods depending on which makes calculations easier.

Conclusion

Finding the ordered pair (s, t) that satisfies the given system involves carefully analyzing the equalities, simplifying fractions, and systematically solving for each variable. The key steps include isolating one variable from one equation and substituting into the other. For this problem, the solution is:

$$
\boxed{\left(\frac{25}{9}, \frac{7}{9} \right)}
$$

\]

Mastering these techniques will help you approach more complex systems of equations confidently and efficiently. Keep practicing, and you'll become adept at solving such problems quickly!

Frequently Asked Questions

How do you interpret the system of equations 2 + 5/t = 33 and t - 6s = 9 to find the ordered pair (s, t)?

First, solve for t using the first equation 2 + 5/t = 33, then substitute that value into the second equation t - 6s = 9 to find s.

What is the value of t in the system 2 + 5/t = 33?

Multiply both sides by t to eliminate the denominator: t(2 + 5/t) = 33t, which simplifies to 2t + 5 = 33t. Solving for t gives t = 5/31.

How do you find the value of s once t is known in the system?

Substitute the value of t into the second equation t - 6s = 9, then solve for s: s = (t - 9) / 6.

What is the ordered pair (s, t) that satisfies the given system?

Using t = 5/31, substitute into t - 6s = 9: (5/31) - 6s = 9. Solving for s gives s = [(5/31) - 9] / 6.

Is the system of equations consistent and solvable for (s, t)?

Yes, the system is consistent and solvable. By solving for t and then s, we find a specific solution for the ordered pair (s, t).

What are common pitfalls when solving this system of equations?

Common pitfalls include incorrectly handling the fraction when solving for t, forgetting to verify the solution by substituting back into the original equations, or algebraic errors during manipulation.

Additional Resources

Find The Ordered Pair (s, t) That Satisfies The System 2 + 5/t = 33t - 6s = 9

Introduction

In the realm of algebraic systems, the task of finding ordered pairs that satisfy a set of equations is a foundational skill that underpins much of higher mathematics. The problem statement, "Find the ordered pair (s, t) that satisfies the system 2 + 5/t = 33t - 6s = 9," introduces a multi-faceted challenge: deciphering a compound equation involving rational expressions and linear relations, and identifying the specific pair (s, t) that satisfies all conditions simultaneously. This investigative approach exemplifies the rigorous reasoning process necessary to decode intricate algebraic systems, revealing underlying structures and solution pathways.

This article embarks on a detailed exploration of this problem, delving into the algebraic techniques used, the logical deductions made, and the broader implications for solving similar systems. Through methodical analysis, we aim to elucidate the pathway to the solution, highlighting critical concepts such as substitution, elimination, and rational expressions, and presenting a comprehensive understanding of this particular algebraic investigation.

Understanding the System: Clarifying the Equations

Before embarking on solving the system, it is essential to interpret the problem statement accurately. The given system appears as:

$$ 2 + \frac{5}{t} = 33t - 6s = 9 $$

At first glance, this notation suggests a chain of equalities, but it is ambiguous whether it signifies:

- Two separate equations:
1. $ 2 + \frac{5}{t} = 9 $
2. $ 33t - 6s = 9 $

- Or a single equation with an embedded expression:
$$ 2 + \frac{5}{t} = 33t - 6s $$

Given the structure and typical algebraic conventions, the most logical interpretation is that the system consists of two equations:

Equation 1:

$$ 2 + \frac{5}{t} = 9 $$

Equation 2:

$$ 33t - 6s = 9 $$

This interpretation aligns with standard problem formats, where multiple equations are separated by a line or conjunctions, and the equal signs are used to relate expressions.

Thus, the problem reduces to solving these two equations for the ordered pair (s, t).

Step 1: Solving the First Equation for t

The first equation:

$$ 2 + \frac{5}{t} = 9 $$

aims to find the value of t. To do this:

1. Subtract 2 from both sides:

$$ \frac{5}{t} = 9 - 2 $$
$$ \frac{5}{t} = 7 $$

2. Multiply both sides by t:

$$ 5 = 7t $$

3. Divide both sides by 7:

$$ t = \frac{5}{7} $$

Key Point: The value $t = \frac{5}{7}$ satisfies the first equation, provided $t \neq 0$. Since $t = \frac{5}{7} \neq 0$, the solution is valid.

Step 2: Substituting t into the Second Equation

to Find s

With $t = \frac{5}{7}$, substitute into the second equation:

$$33t - 6s = 9$$

Plugging in t:

$$33 \times \frac{5}{7} - 6s = 9$$

Calculate:

$$\frac{165}{7} - 6s = 9$$

To isolate s, first move $\frac{165}{7}$ to the right:

$$-6s = 9 - \frac{165}{7}$$

Express 9 as a fraction with denominator 7:

$$9 = \frac{63}{7}$$

So,

$$-6s = \frac{63}{7} - \frac{165}{7}$$
$$-6s = \frac{63 - 165}{7}$$
$$-6s = \frac{-102}{7}$$

Divide both sides by -6:

$$s = \frac{\frac{-102}{7}}{-6}$$

This simplifies to:

$$s = \frac{-102}{7} \times \frac{1}{-6}$$
$$s = \frac{-102}{7} \times \frac{-1}{6}$$
$$s = \frac{102}{7} \times \frac{1}{6}$$

Multiply numerator and denominator:

$$s = \frac{102 \times 1}{7 \times 6} = \frac{102}{42}$$

Simplify:

$$s = \frac{102}{42} = \frac{17}{7}$$

Final value:

$$s = \frac{17}{7}$$

Consolidated Solution: The Ordered Pair (s, t)

The solutions derived are:

$$ t = \frac{5}{7} $$
$$ s = \frac{17}{7} $$

Hence, the ordered pair satisfying the system is:

$$ \boxed{\left(\frac{17}{7}, \frac{5}{7} \right)} $$

Verification of the Solution

To ensure the solution is accurate, verify both equations:

Equation 1:

$$ 2 + \frac{5}{t} = 2 + \frac{5}{\frac{5}{7}} = 2 + 5 \times \frac{7}{5} = 2 + 7 = 9 $$

Equation 2:

$$ 33t - 6s = 33 \times \frac{5}{7} - 6 \times \frac{17}{7} = \frac{165}{7} - \frac{102}{7} = \frac{63}{7} = 9 $$

Both equations are satisfied, confirming the solution’s correctness.

Broader Implications and Additional Insights

This problem exemplifies the importance of clear interpretation in algebraic systems. The initial ambiguity in the problem statement highlights common challenges faced when parsing mathematical notation, especially in complex systems involving rational expressions.

Key takeaways include:

- Isolating variables sequentially: Solving for one variable first simplifies subsequent steps.

- Handling rational expressions carefully: Multiplying through by denominators to clear fractions is often essential.
- Verification: Always substitute solutions back into original equations to confirm validity.
- Symbolic consistency: Maintaining precise notation avoids misinterpretation.

Understanding these techniques is vital for tackling more advanced systems, such as nonlinear equations, systems with multiple variables, or those involving inequalities.

Conclusion

The systematic approach to solving the system:

$$
\begin{cases}
2 + \frac{5}{t} = 9 \\
33t - 6s = 9
\end{cases}
$$

reveals the unique solution:

$$ \boxed{\left(\frac{17}{7}, \frac{5}{7} \right)} $$

This investigation underscores the importance of careful algebraic manipulation, logical reasoning, and verification in solving systems of equations. Such skills are not only fundamental in pure mathematics but also instrumental in applied fields like engineering, physics, and economics, where modeling real-world phenomena often involves solving intricate algebraic systems.

As algebra continues to underpin scientific advancement, mastering these problem-solving strategies equips learners and professionals alike with the tools necessary for analytical rigor and mathematical precision.

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