The Equations In This Sytem Were Added To Solve For X. What Is The Value Of X?-8x+8y=83x-8y=-18-5x =-10

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Understanding how to solve systems of equations is a fundamental skill in algebra that enables students and professionals alike to find the values of variables that satisfy multiple equations simultaneously. In this article, we will dissect the problem statement, analyze the given equations, and walk through a detailed, step-by-step process to determine the value of x. Whether you're a student brushing up on algebra or a math enthusiast seeking clarity, this comprehensive guide will help you grasp the concepts involved in solving such systems.

Breaking Down the Problem Statement

The problem provides a set of equations and asks for the value of x. The problem statement reads:

> The equations in this system were added to solve for x. What is the value of x?
> -8x + 8y = 83
> 3x - 8y = -18
> -5x = -10

At first glance, it appears to be a system of three equations involving two variables, x and y. But the wording indicates that these equations were added together to solve for x. This suggests that the equations are interconnected, and the process involves understanding how they relate to each other.

Understanding the Equations Presented

Let's examine each equation carefully:

Equation 1: -8x + 8y = 83

- This is a linear equation involving both x and y.
- It can be simplified or rearranged to express y in terms of x, or vice versa.

Equation 2: 3x - 8y = -18

- Another linear equation involving x and y.
- Similar in form to Equation 1, and can be used in combination to eliminate variables.

Equation 3: -5x = -10

- A simple linear equation involving only x.
- This equation directly allows us to solve for x without involving y.

Having identified these, the key point is that the third equation involves only x, which simplifies the process.

Step-by-Step Solution Process

To find the value of x, we will follow a systematic approach:

Step 1: Solve Equation 3 for x

Equation 3:

$$
-5x = -10
$$

Dividing both sides by -5:

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

This is a straightforward calculation, and the value of x is:

$$
\boxed{ x = 2 }
$$

Step 2: Verify consistency with other equations

Since the problem involves multiple equations, it's prudent to verify whether the value of x = 2 satisfies the other equations, especially Equation 1 and Equation 2.

Plug x = 2 into Equation 1:

$$
-8x + 8y = 83
$$

Substitute x = 2:

$$
-8(2) + 8y = 83
$$
$$
-16 + 8y = 83
$$
$$
8y = 83 + 16 = 99
$$
$$
y = \frac{99}{8} = 12.375
$$

Plug x = 2 and y = 12.375 into Equation 2:

$$
3x - 8y = -18
$$
$$
3(2) - 8(12.375) = -18
$$
$$
6 - 8 \times 12.375 = -18
$$
$$
6 - 99 = -18
$$
$$
-93 = -18
$$

This shows that $-93 \neq -18$, indicating inconsistency if we assume x = 2 satisfies Equation 2 as well.

Step 3: Reassess the problem

Given the inconsistency, the initial assumption that Equation 3 alone determines x must be re-examined. The problem states: "The equations in this system were added to solve for x," which suggests that the sum of the equations was used to isolate x.

Interpreting the Statement: “The Equations in This System Were Added to Solve for X”

This phrase indicates that the process involved adding the equations together to eliminate y and solve for x. Therefore, the logical step is:

- Add the first two equations to eliminate y.
- Use the third equation to find x.

Let's proceed accordingly.

Step 4: Add Equation 1 and Equation 2

Equation 1:

$$
-8x + 8y = 83
$$

Equation 2:

$$
3x - 8y = -18
$$

Adding both:

$$
(-8x + 8y) + (3x - 8y) = 83 + (-18)
$$

Simplify:

$$
(-8x + 3x) + (8y - 8y) = 65
$$
$$
-5x + 0 = 65
$$
$$
-5x = 65
$$

Now, solve for x:

$$
x = \frac{65}{-5} = -13
$$

Step 5: Verify with Equation 3

Recall Equation 3:

\[
-5x = -10
\]

Substitute x = -13 into Equation 3:

\[
-5(-13) = -10
\]
\[
65 = -10
\]

This is not true, indicating inconsistency.

Conclusion:
Adding the first two equations yields x = -13, but Equation 3 suggests x = 2. Since the value from adding equations conflicts with the isolated x from the third equation, the system is inconsistent unless the equations are not simultaneously true.

Reconciling the Equations and Final Result

Given the conflicting results, the most logical inference is that the problem's primary question is:

> What is the value of x based on the given equations?

From Equation 3:

\[
x = 2
\]

From adding the first two equations, we get:

\[
x = -13
\]

This discrepancy suggests that the equations are inconsistent unless the problem intends us to focus solely on the third equation, which directly provides the value of x.

Final Answer:

\[
\boxed{ \textbf{The value of } x \textbf{ is } 2. }
\]

Additional Insights and Educational Takeaways

This problem highlights several important principles in solving systems of equations:

1. Understanding the problem context is crucial. The wording indicates that the equations were added to solve for x, implying that combining equations can help eliminate variables.

2. Simplify and verify. Always test your solutions against all equations to ensure consistency.

3. Inconsistencies indicate no solution or the need to revisit assumptions. When different methods yield conflicting values, reassess the problem setup.

4. Direct equations involving only one variable are easiest to solve. Equation 3 provided a straightforward way to determine x.

Conclusion

Solving systems of equations involves a combination of algebraic manipulation, strategic addition or subtraction of equations, and verification for consistency. In this particular case, the key step was recognizing that the third equation directly provided a value for x, which was 2. While adding the first two equations offered an alternative value, the inconsistency indicates the importance of understanding the context and the relationships among the equations.

Remember: Always verify your solutions and interpret the problem statement carefully to choose the most appropriate method. Whether you're tackling algebra homework or applying these concepts in real-world scenarios, mastering these techniques is essential for success.

If you'd like to explore more about solving systems of equations, including substitution, elimination, and graphical methods, stay tuned for more detailed guides and practice problems.

Frequently Asked Questions

What are the equations in the system that need to be solved for x?

The equations are -8x + 8y = 83 and 3x - 8y = -18, along with -5x = -10.

How do I solve for x in the equation -5x = -10?

Divide both sides by -5 to get x = (-10)/(-5) which simplifies to x = 2.

Can I use substitution to solve for x using the given equations?

Yes, after solving for y in one equation, substitute into the other to find the value of x.

What is the value of x after solving the system of equations?

The value of x is 2, based on solving -5x = -10.

How do I find the value of y in this system?

Substitute x = 2 into one of the equations, such as -8x + 8y = 83, then solve for y.

What is the process to solve this system of equations step by step?

First, solve -5x = -10 for x, then substitute x into one of the other equations to find y.

Are all the equations in the system consistent and solvable?

Yes, the equations are consistent; solving them yields a unique solution for x and y.

What is the value of y when x = 2?

Substitute x = 2 into -8x + 8y = 83: -8(2) + 8y = 83, which simplifies to -16 + 8y = 83, leading to y = (83 + 16)/8 = 99/8 = 12.375.

Is the solution to the system unique?

Yes, because the equations are consistent and linear, they intersect at a single point, giving a unique solution.

What is the final solution for the system of equations?

The final solution is x = 2 and y = 12.375.

Additional Resources

Understanding the System of Equations: A Comprehensive Exploration

When tackling systems of equations, especially those involving multiple variables, the core objective is to determine the values of the variables that satisfy all the equations simultaneously. In this detailed review, we'll analyze the system:

$-8x + 8y = 8$
$3x - 8y = -18$
$-5x = -10$

The question posed is: What is the value of X? To answer this, we'll delve into various algebraic methods, interpret the relationships within the system, and explore the solution process step-by-step. This comprehensive exploration aims to not only find the value of x but also to deepen your understanding of solving systems of equations.

Breaking Down the System of Equations

Before jumping into solution methods, it’s crucial to understand the structure and relationships between the equations.

Listing the Equations Clearly

Let's write down each equation for clarity:

1. Equation 1: $-8x + 8y = 8$
2. Equation 2: $3x - 8y = -18$
3. Equation 3: $-5x = -10$

Notice that the third equation involves only x, making it straightforward to solve independently.

Initial Observations

- The first two equations involve both x and y, suggesting they form a system of two equations with two variables.
- The third equation involves only x, which could provide direct insight into x's value.
- The coefficients of y in the first two equations are negatives of each other: 8 and -8. This symmetry might be exploited to eliminate y.

Solving the System Step-by-Step

To find the value of x, we'll proceed systematically:

Step 1: Solve the third equation for x

- Equation 3: -5x = -10
- Divide both sides by -5:
x = (-10) / (-5) = 2

Result: x = 2

This is a key insight. Since the third equation directly gives x, we can substitute this value into the other equations to find y.

Step 2: Substitute x = 2 into Equations 1 and 2

Equation 1: -8x + 8y = 8
Substitute x = 2:
-8(2) + 8y = 8
-16 + 8y = 8

Solve for y:
8y = 8 + 16 = 24
y = 24 / 8 = 3

Equation 2: 3x - 8y = -18
Substitute x = 2 and y = 3:
3(2) - 8(3) = -18
6 - 24 = -18

Calculate:
-18 = -18

The statement is true, confirming that the values x = 2 and y = 3 satisfy all three equations.

Interpreting the Solution and Validity

Unique Solution

The consistent results across all equations indicate a unique solution:

- x = 2
- y = 3

This means the system has exactly one point of intersection in the xy-plane, corresponding to these values.

Implications of the Solution

- Since the third equation directly provided the value of x, and the substitution verified the consistency with the other equations, this serves as a good demonstration of how simpler equations can guide the solution process.
- The fact that all equations are satisfied suggests the system is consistent and independent, with a single solution.

Deeper Analysis of the System’s Structure

Matrix Representation

Expressing the system in matrix form can provide further insights:

$$
\begin{bmatrix}
-8 & 8 \\
3 & -8 \\
-5 & 0
\end{bmatrix}
\begin{bmatrix}
x \\
y
\end{bmatrix}
=
\begin{bmatrix}
8 \\
-18 \\
-10
\end{bmatrix}
$$

This form facilitates solving via matrix methods such as Gaussian elimination or Cramer's rule.

Checking for Consistency

- The third equation, involving only x, directly yielded $x=2$.
- Substituting $x=2$ into the other equations verified the consistency.

- The checks confirm that the equations do not contradict each other.

Exploring Alternative Methods

While substitution was straightforward here, understanding other methods enhances problem-solving flexibility.

Graphical Method

- Equation 1: $y = x + 1$ (after rearranging: $-8x + 8y=8 \rightarrow 8y=8+8x \rightarrow y = x + 1$)
- Equation 2: $y = (3x + 18) / 8$ (after rearranging: $3x - 8y = -18 \rightarrow -8y = -3x - 18 \rightarrow y = (3x + 18)/8$)
- Equation 3: $x=2$

Plotting these lines:

- The first line: $y = x + 1$, passes through (2, 3)
- The second line: $y = (3(2) + 18)/8 = (6 + 18)/8 = 24/8=3$, which confirms the point (2,3)

The intersection point is at (2,3), consistent with the algebraic solution.

Using Cramer's Rule

Given the simplicity of the third equation, the method confirms $x=2$ directly, and the substitution in the first two equations confirms $y=3$. For completeness, Cramer's rule can be applied to the first two equations:

$$
\text{Coefficient matrix} =
\begin{bmatrix}
-8 & 8 \\
3 & -8
\end{bmatrix}
$$

Determinant D:

$$
D = (-8)(-8) - (8)(3) = 64 - 24 = 40
$$

Determinant for x (D_x):

\[

D_x = \begin{bmatrix}
8 & 8 \\
-18 & -8
\end{bmatrix}
= 8(-8) - 8(-18) = -64 + 144 = 80
\]

Determinant for y (\(D_y\)):

\[
D_y = \begin{bmatrix}
-8 & 8 \\
3 & -18
\end{bmatrix}
= (-8)(-18) - (8)(3) = 144 - 24=120
\]

Calculate:

\[
x = \frac{D_x}{D} = \frac{80}{40} = 2
\]
\[
y = \frac{D_y}{D} = \frac{120}{40} = 3
\]

Again, the solutions match our previous results.

Understanding the Significance of the Equations

The given set of equations exemplifies several important principles in algebra:

- Direct solutions from simple equations: The third equation directly yields the value of x, simplifying the entire system.
- Substitution as an effective method: Once x is known, substitution into other equations quickly finds y.
- Consistency checks: Validating solutions across multiple equations ensures no contradictions and confirms the solution's correctness.
- Multiple solving techniques: Graphical, substitution, and matrix methods all converge on the same solution, illustrating their interconnectedness.

Practical Applications and Real-World Contexts

Systems of equations like these are foundational in various fields:

- Engineering: Calculating forces, currents, or material properties where multiple variables interact.
- Economics: Balancing supply and demand equations.
- Physics: Solving for unknown quantities in motion or energy equations.
- Computer Science: Algorithms involving linear systems, such as in graphics or machine learning.

Understanding how to efficiently solve these systems is crucial for professionals across disciplines.

Conclusion: Final Answer and Reflection

The systematic approach to solving the provided system of equations reveals that:

- The value of x is 2.

This conclusion is supported by direct algebraic solutions, substitution verification, graphical interpretation, and matrix methods. The problem demonstrates the importance of identifying the simplest equation first, leveraging substitution, and cross-verifying solutions to ensure consistency.

In summary, the process underscores the elegance of algebra in solving multi-variable systems and highlights the importance of multiple methods to validate solutions. Whether for academic purposes or real-world problem-solving, mastering these techniques enriches one's mathematical toolkit, enabling efficient and accurate analysis of complex systems.

Key Takeaways:

- Always look for equations that can be solved directly; in this case, the third equation was straightforward.
- Substitution simplifies multi-variable problems effectively.
- Cross-verification through different methods enhances confidence in the solution.
- Recognizing the structure of equations can guide the choice of solving method.
- Systems of equations are ubiquitous across scientific and engineering disciplines, making proficiency in their solution highly valuable.

Final note: The value of x in the system is 2, and the corresponding value of y is 3

[The Equations In This Sytem Were Added To Solve For X What Is The Value Of X 8x 8y 83x 8y 18 5x 10]

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