

5 - X = 1/2 X + 4 What Is The Answer?

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Solving equations is a fundamental skill in algebra that helps us understand relationships between variables and find unknown values. One such equation that often puzzles students is $5 - X = \frac{1}{2} X + 4$. In this comprehensive guide, we will explore how to solve this equation step-by-step, understand the principles behind the process, and discuss common mistakes to avoid. Whether you're a student learning algebra for the first time or someone looking to refresh your skills, this article will serve as a detailed resource to help you find the answer confidently.

Understanding the Equation: $5 - X = \frac{1}{2} X + 4$

Before diving into solving, it's crucial to understand what the equation represents.

Breaking Down the Components

- Constant terms: The numbers 5 and 4 are constants.
- Variable: The letter X represents an unknown value that we need to find.
- Coefficients: The term $\frac{1}{2} X$ indicates that X is multiplied by $\frac{1}{2}$.

What Is Being Asked?

The question asks, "What is the value of X that makes the equation true?" Our goal is to isolate X on one side of the equation to determine its value.

Step-by-Step Solution Process

To solve the equation $5 - X = \frac{1}{2} X + 4$, follow these systematic steps:

Step 1: Simplify Both Sides

- Ensure the equation is in its simplest form.
- In this case, both sides are already simplified.

Step 2: Get All Terms Containing X on One Side

- To do this, you can add X to both sides or subtract $\frac{1}{2} X$ from both sides, depending on the equation's structure.
- It's often easier to bring all X terms to one side to combine them.

Step 3: Move Constant Terms to the Other Side

- Subtract or add constants to isolate the variable terms.

Step 4: Solve for X

- Perform algebraic operations to find the value of X .

Let's go through these steps with the specific equation.

Detailed Solution of $5 - X = \frac{1}{2} X + 4$

Step 1: Write the original equation

$$\backslash[5 - X = \frac{1}{2}X + 4 \backslash]$$

Step 2: Subtract $(\frac{1}{2} X)$ from both sides to gather all X terms on the left

$$\backslash[5 - X - \frac{1}{2}X = 4 \backslash]$$

Step 3: Combine like terms on the left side

- Recall that $(-X)$ can be written as $(-\frac{2}{2}X)$ to combine with $(-\frac{1}{2}X)$.
- So,

$$\backslash[5 - \left(\frac{2}{2}X + \frac{1}{2}X \right) = 4 \backslash]$$

- Combine the X terms:

$$\backslash[5 - \left(\frac{2}{2} + \frac{1}{2} \right) X = 4 \backslash]$$
$$\backslash[5 - \frac{3}{2} X = 4$$

\]

Step 4: Isolate the X term

- Subtract 5 from both sides:

\[

$$-\frac{3}{2}X = 4 - 5$$

\]

\[

$$-\frac{3}{2}X = -1$$

\]

Step 5: Solve for X

- Divide both sides by $(-\frac{3}{2})$ (which is equivalent to multiplying both sides by the reciprocal):

\[

$$X = \frac{-1}{-\frac{3}{2}} = -1 \times \left(-\frac{2}{3}\right)$$

\]

- Simplify:

\[

$$X = -1 \times -\frac{2}{3} = \frac{2}{3}$$

\]

Final Answer

The solution to the equation $5 - X = \frac{1}{2} X + 4$ is:

$$\boxed{X = \frac{2}{3}}$$

Verifying the Solution

It's good practice to verify your solution by substituting $X = \frac{2}{3}$ back into the original equation.

Original Equation:

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

Substitute $X = \frac{2}{3}$:

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

Calculate each side:

- Left side:

$$5 - \frac{2}{3} = \frac{15}{3} - \frac{2}{3} = \frac{13}{3}$$

\]

- Right side:

\[

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

\]

Express 4 as a fraction with denominator 3:

\[

$$\frac{1}{3} + \frac{12}{3} = \frac{13}{3}$$

\]

Both sides equal $\frac{13}{3}$, confirming that $X = \frac{2}{3}$ is the correct solution.

Understanding Different Methods to Solve Equations Like $5 - X = \frac{1}{2} X + 4$

While the above method is straightforward, there are alternative approaches.

Method 1: Using the Distributive Property

- Not applicable here since there are no parentheses, but useful in more complex equations.

Method 2: Cross-Multiplication

- Usually used for equations involving fractions, but in this case, direct manipulation suffices.

Method 3: Graphical Method

- Plot both sides of the equation as functions and find their intersection point.
- For $Y = 5 - X$ and $Y = \frac{1}{2}X + 4$, the intersection point corresponds to the solution.

Common Mistakes to Avoid When Solving Equations

When working through equations like $5 - X = \frac{1}{2}X + 4$, students often encounter pitfalls. Here are some to watch out for:

- **Incorrectly handling fractions:** Remember to find common denominators or multiply through to clear fractions.
- **Forgetting to perform the same operation on both sides:** Maintaining equality is essential.
- **Mixing signs:** Be cautious with negative signs during addition/subtraction.
- **Not verifying the solution:** Always substitute back to confirm correctness.

Additional Tips for Solving Similar Equations

- Always write down each step clearly to avoid mistakes.
- Convert all fractions to decimals or common denominators for easier calculations.
- Practice with different types of equations involving fractions, variables, and constants.
- Use algebraic properties such as the distributive property, associative, and commutative properties to simplify the process.

Conclusion

Solving the equation $5 - X = \frac{1}{2}X + 4$ reveals that $X = \frac{2}{3}$. This process demonstrates the importance of isolating variables, combining like terms, and verifying solutions. Mastering such steps enhances algebraic problem-solving skills and prepares you for more complex equations. Remember, practice makes perfect—continue working through similar problems to strengthen your understanding and confidence in solving algebraic equations.

FAQs

1. Can I solve equations with fractions without converting to decimals? Yes. Working with fractions directly often preserves accuracy and simplifies the process.
2. What should I do if my solution doesn't satisfy the original equation? Recheck your calculations,

and ensure you performed every step correctly. If the solution doesn't satisfy the original, re-express and verify your work.

3. **Are there online tools to help solve equations like $5 - X = \frac{1}{2}X + 4$?** Yes, many algebra calculators and software tools can verify solutions and provide step-by-step solutions.

By following these detailed steps and tips, you're well-equipped to solve similar algebraic equations confidently.

Frequently Asked Questions

How do I solve the equation $5 - X = (\frac{1}{2})X + 4$?

To solve $5 - X = (\frac{1}{2})X + 4$, first subtract 4 from both sides: $5 - 4 - X = (\frac{1}{2})X$, which simplifies to $1 - X = (\frac{1}{2})X$. Then, add X to both sides: $1 = (\frac{1}{2})X + X = (\frac{3}{2})X$. Finally, multiply both sides by $\frac{2}{3}$: $X = (\frac{2}{3})1 = \frac{2}{3}$.

What is the solution to the equation $5 - X = (\frac{1}{2})X + 4$?

The solution is $X = \frac{2}{3}$.

Can I verify the answer $X = \frac{2}{3}$ in the original equation?

Yes. Plug $X = \frac{2}{3}$ into the original: $5 - (\frac{2}{3}) = (\frac{1}{2})(\frac{2}{3}) + 4$. Simplify: $5 - \frac{2}{3} = \frac{1}{3} + 4$. Convert 5 to $\frac{15}{3}$: $\frac{15}{3} - \frac{2}{3} = \frac{13}{3}$. On the right: $\frac{1}{3} + 4 = \frac{1}{3} + \frac{12}{3} = \frac{13}{3}$. Both sides equal $\frac{13}{3}$, so $X = \frac{2}{3}$ is correct.

What steps are involved in solving the equation $5 - X = (\frac{1}{2})X + 4$?

The steps are: subtract 4 from both sides, then combine like terms to isolate X , and finally multiply

both sides by the reciprocal to solve for X.

Is the solution $X = 2/3$ valid for the equation $5 - X = (1/2)X + 4$?

Yes, substituting $X = 2/3$ back into the original equation confirms that both sides are equal, so it is a valid solution.

What is the importance of checking the solution in such equations?

Checking ensures that the found value of X satisfies the original equation and helps catch any arithmetic errors made during solving.

Are there any common mistakes when solving equations like $5 - X = (1/2)X + 4$?

Common mistakes include incorrect algebraic manipulations, such as forgetting to distribute or incorrectly combining like terms, which can lead to wrong solutions.

Additional Resources

5 - X = 1/2 X + 4 What Is The Answer?

Mathematics often presents us with equations that challenge our understanding and analytical skills. One such problem that has intrigued students and enthusiasts alike is the equation:

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

At first glance, it appears straightforward, but solving for the variable X requires careful algebraic manipulation and an understanding of fundamental principles. This article explores the process step-by-step, providing clarity on how to approach such equations, the logic behind each step, and the final solution.

Understanding the Equation

Before diving into the solution, it's important to comprehend what the equation represents.

The Equation in Focus

The equation:

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

is a linear equation involving a single variable, X . It combines constants (numbers without variables) and the variable itself, with the variable appearing both on the left and right sides.

Why Is This Important?

Solving such equations helps develop problem-solving skills, critical thinking, and familiarity with algebraic principles. These skills are fundamental not only in academic contexts but also in real-world scenarios such as finance, engineering, and data analysis.

The Goal

Our main goal is to find the value of X that makes the equation true. In other words, we want to determine the specific number that, when substituted for X , balances both sides of the equation.

Step-by-Step Solution Process

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

1. Isolate the Variable

The first step involves gathering all terms containing X on one side of the equation and constants on the other. This simplifies solving for X.

2. Eliminate Fractions

Since the equation contains a fractional coefficient ($\frac{1}{2}$), it's often easier to work with integers.

Multiplying both sides of the equation by the denominator (2) clears the fraction.

3. Simplify and Solve

Once the fractions are eliminated, simplify the resulting expression, combine like terms, and isolate X to find its value.

Detailed Solution Walkthrough

Let's now walk through each step with detailed explanations.

Step 1: Write Down the Original Equation

Original Equation:

$$5 - X = \left(\frac{1}{2}\right) X + 4$$

Step 2: Eliminate the Fraction

To clear the fraction, multiply both sides of the equation by 2:

$$2(5 - X) = 2\left[\left(\frac{1}{2}\right)X + 4\right]$$

This gives:

$$2 \cdot 5 - 2X = (2 \cdot \frac{1}{2})X + 2 \cdot 4$$

Simplify each term:

- Left side: $10 - 2X$

- Right side: $(1)X + 8$

So, the new equation is:

$$10 - 2X = X + 8$$

Step 3: Gather Like Terms

Now, aim to get all X terms on one side and constants on the other.

Subtract X from both sides:

$$(10 - 2X) - X = 8$$

This simplifies to:

$$10 - 3X = 8$$

Next, subtract 10 from both sides:

$$10 - 3X - 10 = 8 - 10$$

Simplify:

$$-3X = -2$$

Step 4: Solve for X

Divide both sides by -3:

$$(-3X) / (-3) = (-2) / (-3)$$

This yields:

$$X = 2/3$$

Final Answer and Verification

The solution to the equation $5 - X = 1/2 X + 4$ is:

$$X = 2/3$$

Verification

To ensure this solution is correct, substitute $X = 2/3$ back into the original equation:

Left side:

$$5 - (2/3) = (15/3) - (2/3) = (13/3)$$

Right side:

$$(1/2) (2/3) + 4 = (1/2) (2/3) + 4 = (2/3)(1/2) + 4 = (2/3)(1/2) + 4$$

Calculate:

$$(2/3) (1/2) = (2/3)(1/2) = (21)/(32) = 2/6 = 1/3$$

Now, sum:

$$1/3 + 4 = 1/3 + (12/3) = (1 + 12)/3 = 13/3$$

Both sides equal 13/3, confirming the solution:

$$X = 2/3$$

Broader Implications and Applications

While solving for X in such equations may seem purely academic, the principles involved are widely applicable.

Real-World Relevance

- Financial calculations: Determining unknown variables such as interest rates or payments.
- Engineering: Calculating forces, voltages, or other parameters.

- Data analysis: Solving for variables in models describing real-world phenomena.

Common Pitfalls to Avoid

- Ignoring the order of operations: Always perform multiplication/division before addition/subtraction.
- Forgetting to check solutions: Substituting back confirms whether the solution satisfies the original equation.
- Mistakes with fractions: Clearing denominators early simplifies calculations and reduces errors.

Tips for Success

- Write down each step clearly.
- Use the distributive property when necessary.
- Double-check calculations, especially with fractions.
- Practice similar problems to build confidence.

Conclusion

The equation $5 - X = \frac{1}{2}X + 4$ exemplifies a fundamental algebraic problem that combines fractions, variables, and constants. Through systematic steps—eliminating fractions, gathering like terms, and solving for the variable—we arrive at $X = \frac{2}{3}$ as the solution. This process underscores the importance of clarity, methodical thinking, and verification in solving equations.

Mastering such problems enhances mathematical literacy, providing a solid foundation for advanced studies and real-life applications. Whether tackling academic equations or complex data models, the logic and techniques outlined here serve as valuable tools in any problem solver's toolkit.

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