

100 = -25h + (h)(5) To Make The Equation True, What Is The Value Of H?

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When tackling algebraic equations, a fundamental skill is to isolate the variable to find its value. In this case, we are presented with the equation:

$$100 = -25h + (h)(5)$$

The goal is to determine the value of h that satisfies this equation. This process involves simplifying the expression, combining like terms, and then solving for h . Understanding each step thoroughly not only helps in solving this particular problem but also enhances your overall algebra skills.

In this comprehensive guide, we will analyze the equation, explore the concepts involved, and provide a step-by-step solution to find the value of h . Whether you're a student preparing for exams, a teacher preparing instructional materials, or someone interested in strengthening your math skills, this content aims to clarify the process and concepts involved.

Understanding the Equation

Before diving into solving the equation, it's essential to understand what each part of the expression represents.

The Given Equation

The original equation is:

$$100 = -25h + (h)(5)$$

This equation contains:

- A constant term on the left side (100)
- Terms involving the variable h on the right side

Breaking Down the Components

- $-25h$: A term indicating h multiplied by -25
- $(h)(5)$: A term indicating h multiplied by 5

Since both terms involve h , they are like terms and can be combined to simplify the right side.

Step-by-Step Solution Process

Let's proceed with solving the equation systematically.

Step 1: Simplify the Right Side

Combine the like terms involving (h) :

$$-25h + (h)(5) = -25h + 5h$$

Calculating:

$$-25h + 5h = (-25 + 5)h = -20h$$

So, the simplified equation becomes:

$$100 = -20h$$

Step 2: Isolate (h)

To find (h) , divide both sides of the equation by (-20) :

$$h = \frac{100}{-20}$$

Calculating:

$$h = -5$$

Step 3: Verify the Solution

It's good practice to check whether the found value of (h) satisfies the original equation:

Substitute $(h = -5)$:

$$100 = -25(-5) + (-5)(5)$$

Calculate each term:

$$-25 \times -5 = 125$$

$$-5 \times 5 = -25$$

\]

Sum:

\[

$$125 + (-25) = 125 - 25 = 100$$

\]

Since the right side equals 100, which matches the left side, $(h = -5)$ is indeed the solution.

Understanding the Key Concepts Involved

To reinforce your understanding, let's explore the fundamental algebraic concepts demonstrated in this problem.

Combining Like Terms

- Like terms are terms that have the same variable raised to the same power.
- Combining like terms simplifies the expression, making it easier to solve.

Solving Linear Equations

- The process involves isolating the variable on one side.
- Operations performed on one side of the equation must be performed on the other to maintain equality.

Checking the Solution

- Substituting the found value back into the original equation verifies its correctness.
- This step ensures no errors occurred during calculations and confirms the solution's validity.

Practical Applications and Importance of Solving Such Equations

Understanding how to solve equations like $100 = -25h + (h)(5)$ extends beyond academic exercises. Here are some real-world applications:

1. **Financial Calculations:** Solving for unknowns such as interest rates or investment returns.
2. **Physics:** Determining forces, velocities, or other variables in equations

modeling real-world phenomena.

3. **Engineering:** Calculating parameters in design equations and system modeling.
4. **Statistics:** Solving for variables in probability and data analysis models.

Furthermore, mastering these basic algebraic techniques fosters critical thinking and problem-solving skills vital in many professional fields.

Common Mistakes to Avoid

When solving algebraic equations, it's easy to make errors. Being aware of common pitfalls can help you avoid them:

- **Incorrectly combining like terms:** Ensure terms are truly like terms before combining.
- **Sign errors:** Pay attention to positive and negative signs during calculations.
- **Dividing by zero:** Always verify that the divisor is not zero when dividing both sides.
- **Skipping verification:** Always substitute your solution back into the original equation to verify correctness.

Additional Practice Problems

To strengthen your understanding, try solving similar equations:

1. $50 = 10h + (h)(-3)$. Find h .
2. $200 = 4h - (h)(6)$. Find h .
3. $150 = (h)(12) + 3h$. Find h .
4. $75 = -8h + (h)(2)$. Find h .

Solving these will help reinforce the concepts of combining like terms, isolating variables, and verifying solutions.

Summary and Final Thoughts

In this comprehensive guide, we've explored the equation:

$$100 = -25h + (h)(5)$$

and demonstrated the process of solving for h :

- Simplify the right side by combining like terms.
- Isolate h by dividing both sides by the coefficient.
- Verify the solution by substituting back into the original equation.

The solution is $h = -5$, and verifying confirms its correctness. Mastering such algebraic techniques is fundamental for progressing in mathematics and applying these skills practically across various disciplines.

Remember, practice makes perfect. Regularly solving similar equations will improve your confidence and problem-solving efficiency. Whether for academic purposes or real-world applications, understanding how to manipulate and solve equations like this is an essential mathematical skill.

If you want to deepen your understanding further, consider exploring related topics such as quadratic equations, systems of equations, or inequalities. These concepts build on the foundational skills demonstrated here and open doors to more advanced mathematical problem-solving.

Frequently Asked Questions

What is the first step to solve the equation $100 = -25h + (h)(5)$ for h ?

The first step is to simplify the right side of the equation by combining like terms: $-25h + 5h$, which simplifies to $-20h$.

How do I isolate the variable h in the equation $100 = -25h + 5h$?

Combine the like terms to get $100 = -20h$, then divide both sides by -20 to solve for h .

What is the value of h in the equation $100 = -25h + 5h$?

Simplifying the right side gives $100 = -20h$, then dividing both sides by -20 yields $h = -5$.

Why do we combine like terms when solving for h in the equation $100 = -25h + 5h$?

Combining like terms simplifies the equation, making it easier to isolate the variable and find its value.

Can this type of linear equation be solved using algebraic methods?

Yes, linear equations like this are solved using basic algebra, primarily by combining like terms and isolating the variable.

What does the solution $h = -5$ tell us about the original equation $100 = -25h + (h)(5)$?

It indicates that when $h = -5$, the original equation balances and becomes true.

Additional Resources

Understanding the Equation: $100 = -25h + (h)(5)$

When approaching algebraic equations, it's essential to understand the structure, the operations involved, and how to isolate the variable to find its value. The equation $100 = -25h + (h)(5)$ might seem straightforward at first glance, but it warrants a detailed exploration to fully grasp the underlying principles and solving strategies. This comprehensive review will dissect the equation step-by-step, clarify concepts, and guide you through the process of determining the value of h.

Breaking Down the Equation

Before diving into calculations, let's understand each component of the equation:

- The left side is a constant: 100.
- The right side involves algebraic expressions with h:
 - A term $-25h$.
 - A product $(h)(5)$, which simplifies to $5h$.

Rearranged, the original equation reads:

```
\[
100 = -25h + 5h
\]
```

This simplifies the process, but understanding the steps leading to this simplification is vital for mastery.

Step 1: Simplify the Equation

Why simplify? Simplification reduces the equation to fewer terms, making it easier to solve for h .

Simplification process:

- Recognize that $(h)(5)$ is equivalent to $5h$.
- Combine like terms on the right side:

$$\begin{aligned} & \backslash[\\ & -25h + 5h = (-25 + 5)h = -20h \\ & \backslash] \end{aligned}$$

Resulting simplified equation:

$$\begin{aligned} & \backslash[\\ & 100 = -20h \\ & \backslash] \end{aligned}$$

This is a linear algebraic equation, which is straightforward to solve.

Step 2: Isolate the Variable h

The goal is to solve for h :

$$\begin{aligned} & \backslash[\\ & 100 = -20h \\ & \backslash] \end{aligned}$$

To isolate h , we divide both sides of the equation by -20 :

$$\begin{aligned} & \backslash[\\ & h = \frac{100}{-20} \\ & \backslash] \end{aligned}$$

Calculating this quotient:

$$\begin{aligned} & \backslash[\\ & h = -5 \\ & \backslash] \end{aligned}$$

Thus, the solution is:

$$\begin{aligned} & \backslash[\\ & \boxed{h = -5} \\ & \backslash] \end{aligned}$$

Verification of the Solution

Verifying the solution ensures that no mistakes were made during solving.

Substitute $h = -5$ back into the original equation:

Original equation:

$$\begin{aligned} & \backslash[\\ 100 &= -25h + (h)(5) \\ & \backslash] \end{aligned}$$

Replace h with -5 :

$$\begin{aligned} & \backslash[\\ 100 &= -25 \times (-5) + (-5) \times 5 \\ & \backslash] \end{aligned}$$

Calculate each term:

- $-25 \times (-5) = 125$ (since negative times negative yields positive)
- $(-5) \times 5 = -25$

Sum these:

$$\begin{aligned} & \backslash[\\ 125 + (-25) &= 125 - 25 = 100 \\ & \backslash] \end{aligned}$$

The right side equals 100, confirming that $h = -5$ is the correct solution.

Understanding the Underlying Principles

This exercise isn't just about finding a number; it illuminates fundamental algebraic principles.

Linear Equations

- Equations like $ax + b = 0$ are called linear because their solutions are straight lines when graphed.
- They involve variables to the first power.
- The solution involves isolating the variable through inverse operations.

Combining Like Terms

- Terms with the same variable are combined to simplify the equation.
- Combining like terms reduces complexity and prepares the equation for solving.

Inverse Operations

- To isolate h , we perform inverse operations:
- Addition is undone with subtraction.
- Multiplication is undone with division.

Sign Rules

- Multiplying or dividing by a negative number flips the sign of the solution.
- Recognizing the sign rules is crucial for accurate solutions.

Alternative Approaches and Insights

While the straightforward approach was used, exploring alternative methods enhances understanding.

Method 1: Factorization

- Recognize that the right side is a combination of terms involving h .
- Factoring isn't necessary here, but understanding that combining like terms simplifies the process is valuable.

Method 2: Graphical Interpretation

- Plot the function $f(h) = -25h + 5h = -20h$.
- The line crosses $y = 100$ at $h = -5$.
- This visual approach offers an intuitive grasp of the solution.

Method 3: Using a Table of Values

h	$-25h$	$(h)(5)$	RHS (Sum)	Equation Check
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-5	125	-25	$125 - 25 = 100$	Matches LHS

This confirms that $h = -5$ solves the equation.

Common Mistakes and How to Avoid Them

Understanding potential pitfalls ensures proficiency and accuracy.

- Misinterpreting the expression: Remember that $(h)(5)$ equals $5h$.
- Sign errors: Be cautious with negative signs, especially when dividing or multiplying both sides.
- Incorrect simplification: Always combine like terms carefully. For example, $-25h + 5h \neq 0$ unless verified.
- Dividing by zero: Never divide both sides of an equation by zero; it's undefined.

Real-World Applications of the Equation

Though abstract, equations like $100 = -25h + 5h$ model various practical scenarios.

- Financial analysis: Calculating net profit or loss based on variable costs.
- Physics: Determining velocity or acceleration where relationships are linear.
- Engineering: Solving for dimensions or forces in design problems.

Understanding how to manipulate and solve such equations empowers problem-solving in numerous fields.

Extending the Concept: Variables and Coefficients

- The coefficient -25 indicates the rate at which the variable h influences the equation.
- The term $5h$ adds or subtracts from this influence.
- When combined, they give a net effect proportional to h .

General form:

$$\begin{aligned} & \backslash \\ & ax + bx = (a + b)x \\ & \backslash \end{aligned}$$

which simplifies the process of solving for x when coefficients are known.

Summary of Key Points

- The original equation simplifies to $100 = -20h$.
- Solving for h involves dividing both sides by -20 .
- The solution $h = -5$ satisfies the original equation upon substitution.
- Recognizing the structure and properties of algebraic expressions is crucial.
- Verifying solutions ensures correctness and builds confidence.

Final Thoughts

Mastering the process of solving equations like $100 = -25h + (h)(5)$ combines conceptual understanding with procedural skill. Recognizing the algebraic structure, simplifying expressions accurately, and applying inverse operations systematically enable you to find solutions efficiently. This particular equation exemplifies core algebra principles—combining like terms, handling signs carefully, and verifying solutions—which are foundational skills applicable across mathematics and beyond.

By practicing such problems, you reinforce your algebraic intuition, develop problem-solving strategies, and prepare yourself for more complex equations and real-world applications. Remember, every algebraic journey starts with understanding the components, simplifying step-by-step, and verifying your results—approaches that lead to clarity and confidence in mathematics.

In conclusion, the value of h in the equation $100 = -25h + (h)(5)$ is -5 . This result is obtained through systematic simplification, application of inverse operations, and verification. Embracing these techniques empowers you to tackle a broad spectrum of algebraic problems with confidence and precision.

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