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Introduction to Solving Linear Equations

Mathematics is an essential skill that forms the foundation for many fields, including science, engineering, finance, and everyday problem-solving. One common type of algebraic problem involves solving for an unknown variable in a linear equation. In this article, we will explore how to solve for x in the equation:

$$(450) + (28.75x) = 967.50$$

Understanding how to manipulate and solve such equations is crucial for students, educators, and professionals alike. This guide will provide a step-by-step explanation, detailed strategies, and practical tips to master solving similar linear equations.

Understanding the Equation

Before diving into the solution process, it's essential to analyze the given equation:

$$(450) + (28.75x) = 967.50$$

This is a linear equation with one variable, x . It involves:

- A constant term, 450
- A variable term, $28.75x$
- An equal sign (=) connecting the expressions

The primary goal is to isolate x on one side of the equation to find its value.

Step-by-Step Process to Solve for X

Step 1: Simplify the Equation

The equation is already simplified, with like terms separated by the equal sign. The first step is to move all constant terms to one side and variable terms to the other.

Step 2: Subtract 450 from Both Sides

To isolate the term with x, subtract 450 from both sides:

$$(450) + (28.75x) = 967.50$$

- Subtract 450:

$$28.75x = 967.50 - 450$$

Step 3: Calculate the Right Side

Perform the subtraction:

$$967.50 - 450 = 517.50$$

Now, the equation simplifies to:

$$28.75x = 517.50$$

Step 4: Divide Both Sides by 28.75

To solve for x, divide both sides of the equation by 28.75:

$$x = 517.50 / 28.75$$

Step 5: Perform the Division

Calculate:

$$x = 517.50 \div 28.75$$

Using a calculator or manual division:

$$x \approx 17.999 \text{ (or approximately 18)}$$

Final Answer

$$x \approx 18$$

The solution to the equation $(450) + (28.75x) = 967.50$ is approximately $x = 18$.

Additional Tips for Solving Similar Equations

1. Always Perform Inverse Operations

- Use addition/subtraction to move constants
- Use multiplication/division to isolate variables

2. Maintain Balance

- Whatever operation you do to one side, do the same to the other side

3. Use a Calculator When Necessary

- For precise division, especially with decimals, calculators are invaluable

4. Check Your Solution

- Substitute your value of x back into the original equation to verify correctness

Practice Problems for Mastery

To reinforce your understanding, try solving these similar equations:

- $(300) + (15x) = 600$
- $(500) + (50x) = 950$
- $(200) + (7.5x) = 350$

Solutions involve similar steps: isolate the variable, perform inverse operations, and verify.

Real-World Applications of Solving Linear Equations

Understanding how to solve equations like $(450) + (28.75x) = 967.50$ is crucial in practical scenarios:

- Financial Calculations: Determining the number of units needed to reach a revenue goal
- Physics: Calculating unknown quantities based on linear relationships
- Business: Estimating sales targets or production quantities

Common Mistakes to Avoid

- Ignoring the Order of Operations: Always perform addition/subtraction before division/multiplication
- Incorrectly Moving Terms: Remember to keep the equation balanced
- Forgetting to Check the Solution: Always verify your answer by plugging it back into the original equation

Conclusion

Mastering how to solve for an unknown variable in linear equations is a fundamental algebra skill that opens the door to more advanced mathematical concepts. The equation $(450) + (28.75x) = 967.50$ exemplifies a straightforward yet essential problem-solving process involving isolating the variable x through inverse operations.

By following the step-by-step approach outlined above, practicing similar problems, and understanding the underlying principles, you will develop confidence in handling linear equations efficiently. Whether in academic settings or real-world applications, these skills are invaluable for analytical thinking and quantitative reasoning.

FAQs About Solving Linear Equations

Q1: Can the same method be used for equations with different coefficients?
Yes. The fundamental approach of isolating the variable by performing inverse operations applies universally, regardless of the coefficients.

Q2: What if the equation involved fractions or decimals?
You can clear fractions by multiplying through by the least common denominator or work directly with decimals, ensuring careful calculation to avoid errors.

Q3: How do I check if my solution is correct?
Substitute your value of x back into the original equation and verify both sides are equal.

Q4: Are there online tools to solve linear equations automatically?
Yes. Many online calculators and algebra software can solve linear equations instantly, but understanding the manual process is crucial for comprehension.

By mastering these concepts, you'll be well-equipped to solve a wide range of algebraic problems confidently and accurately.

Frequently Asked Questions

How do I solve the equation $(450) + (28.75x) = 967.50$ for x ?

First, subtract 450 from both sides to get $28.75x = 517.50$. Then, divide both sides by 28.75 to find $x = 517.50 / 28.75$, which equals 18.

What is the value of x in the equation $(450) + (28.75x) = 967.50$?

x equals 18, as calculated by subtracting 450 from 967.50 and then dividing the result by 28.75.

Can I verify my solution for x in $(450) + (28.75x) = 967.50$?

Yes, substitute $x = 18$ back into the original equation: $450 + 28.75(18) = 450 + 517.50 = 967.50$, confirming the solution is correct.

What steps are involved in solving $(450) + (28.75x) = 967.50$?

First, isolate the term with x by subtracting 450 from both sides, then divide the result by 28.75 to solve for x .

Is the solution to $(450) + (28.75x) = 967.50$ unique?

Yes, because it is a linear equation with one variable, so it has a single unique solution: $x = 18$.

How do I interpret the coefficient 28.75 in this equation?

It represents the rate at which the variable x affects the total; specifically, for each unit increase in x , the total increases by 28.75.

What if I wanted to find x in a similar equation, like $(500) + (30x) = 1000$?

You would subtract 500 from 1000 to get $30x = 500$, then divide both sides by 30 to find $x = 500 / 30 \approx 16.67$.

Are there any common mistakes to avoid when solving $(450) + (28.75x) = 967.50$?

Yes, avoid forgetting to subtract 450 from both sides, and ensure you divide by 28.75 correctly to find x .

How can I check my solution for the equation $(450) + (28.75x) = 967.50$?

Plug your value of x back into the original equation to see if both sides are equal, confirming the correctness of your solution.

Additional Resources

$$(450) + (28.75x) = 967.50 \text{ solve For } X$$

In the world of mathematics, equations serve as foundational tools that help us understand and quantify the relationships between different variables. One such equation, $(450) + (28.75x) = 967.50$, exemplifies how algebra allows us to isolate and find the value of an unknown variable—here represented as 'x'. Whether you're a student brushing up on algebraic concepts or a professional applying these skills in real-world scenarios, understanding how to solve for 'x' is indispensable. This article delves into the step-by-step process of solving this specific equation, exploring the principles behind each move, and highlighting practical tips for tackling similar problems with confidence and clarity.

Understanding the Equation: Breaking Down the Components

Before jumping into the solution, it's important to understand the structure of the equation:

$$(450) + (28.75x) = 967.50$$

- Constants: The number 450 is a fixed value, often called a constant because it doesn't change during the problem.
- Variable term: $28.75x$ indicates that the variable 'x' is multiplied by 28.75.
- Equality Sign: The '=' sign indicates that the expressions on both sides are equal.
- Result/Target: 967.50 is the total or the target value that the expression sums up to.

This equation represents a linear relationship between the constant and the variable 'x'. The goal is to find the value of 'x' that makes the entire expression true.

Step-by-Step Solution Methodology

To solve for 'x', mathematicians and students follow a systematic process involving inverse operations—adding, subtracting, multiplying, or dividing—to isolate the variable.

Step 1: Subtract the Constant from Both Sides

The first logical move is to eliminate the constant term (450) from the left side:

- Subtract 450 from both sides of the equation to maintain equality:

$$(450) + (28.75x) = 967.50$$

becomes

$$28.75x = 967.50 - 450$$

- Calculation:

$$967.50 - 450 = 517.50$$

- Result:

$$28.75x = 517.50$$

Tip: Always perform the same operation on both sides to keep the equation balanced—this is fundamental in algebra.

Step 2: Divide Both Sides by the Coefficient of 'x'

Next, isolate 'x' by dividing both sides of the equation by 28.75, which is the coefficient multiplying 'x':

- Divide:

$$(28.75x) \div 28.75 = 517.50 \div 28.75$$

- Simplifies to:

$$x = 517.50 \div 28.75$$

Calculating the Value of 'x'

Now, the problem reduces to a straightforward division:

Step 3: Perform the Division

Calculating $517.50 \div 28.75$ requires precision. Let's explore how to do this accurately:

- Method 1: Using a calculator

Simply input:

$$517.50 \div 28.75 \approx 18$$

The exact value is:

$$x \approx 18$$

- Method 2: Manual long division

To verify or understand the process:

1. Recognize that 28.75 can be expressed as a fraction: $28.75 = 28 \frac{3}{4} = (28 \times 4 + 3) / 4 = (112 + 3)/4 = 115/4$

2. Rewrite the division as:

$$x = 517.50 \div (115/4)$$

3. Dividing by a fraction is equivalent to multiplying by its reciprocal:

$$x = 517.50 \times (4 / 115)$$

4. Calculate numerator:

$$517.50 \times 4 = 2070$$

5. Divide:

$$2070 \div 115 = 18$$

This confirms that:

$$x = 18$$

Final Answer:

$$x = 18$$

Practical Implications and Real-World Applications

Understanding how to solve such equations extends beyond academic exercises; it provides critical skills applicable in various fields like finance, engineering, data analysis, and even everyday problem-solving.

Examples of Real-World Contexts

- Finance: Calculating the amount of interest needed to reach a savings goal.
- Engineering: Determining component specifications based on constraints.
- Business: Finding the number of units to sell to meet revenue targets.
- Science: Computing concentrations or reaction rates involving variables.

Why Mastering These Techniques Matters

- Decision-Making: Quantitative reasoning supports informed choices.
- Problem Solving: Breaking down complex equations enhances analytical skills.

- Academic Success: Fundamental to success in STEM education.
- Professional Competence: Essential for careers involving data, modeling, and analysis.

Common Challenges and Tips for Success

While the process outlined is straightforward, learners often encounter stumbling blocks. Here are some tips to overcome common difficulties:

1. Pay Attention to Signage

Always verify whether the constants are positive or negative. Mistakes here can lead to incorrect solutions.

2. Maintain Balance

Perform the same operation on both sides of the equation. This is vital for preserving equality.

3. Use Precise Calculations

Utilize calculators or software for complex divisions to minimize errors, especially with decimals.

4. Double-Check Your Work

Re-insert your solution into the original equation to confirm correctness.

Extending the Concept: Solving More Complex Equations

Once comfortable with linear equations like this one, learners can progress to more complex scenarios:

- Quadratic Equations: Equations involving squared variables.
- Simultaneous Equations: Systems involving multiple equations.
- Inequalities: Expressions with '<' or '>' signs, requiring different approaches.

Mastering the fundamental approach to solving for 'x' provides a strong foundation for tackling these advanced topics.

Conclusion: The Power of Algebra in Everyday Life

The equation $(450) + (28.75x) = 967.50$ exemplifies how algebraic principles are not just abstract concepts but practical tools that empower us to analyze

and solve real-world problems. By systematically applying inverse operations—subtracting constants and dividing by coefficients—we can uncover unknown quantities with clarity and confidence. As you continue to hone these skills, you'll find that the logical structure of equations becomes a reliable compass in navigating both academic challenges and everyday decision-making. Embracing these techniques unlocks a world of analytical possibilities, reinforcing the vital role of mathematics in understanding and shaping the world around us.

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