

Do You Know This? $5x - 12 = 58$

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Mathematics is an essential part of our daily lives, from simple calculations to complex problem-solving. One of the fundamental concepts in algebra involves solving equations like $5x - 12 = 58$. Understanding how to solve such equations not only enhances your math skills but also improves your logical thinking and problem-solving abilities. In this comprehensive guide, we will explore the steps to solve the equation $5x - 12 = 58$, discuss related concepts, and provide tips to master similar problems.

Understanding the Equation $5x - 12 = 58$

Before diving into the solution, it's important to understand what the equation represents and the basic components involved.

Breaking Down the Equation

- $5x$: This is a term where 5 is multiplied by the variable x .
- -12 : This is a constant term subtracted from $5x$.
- $= 58$: The equation states that the expression on the left equals 58.

In essence, the goal is to find the value of x that makes the equation true.

The Basic Structure of Linear Equations

The equation $5x - 12 = 58$ is a linear algebraic equation, meaning it involves variables to the first power only. These equations generally have the form $ax + b = c$, where a , b , and c are constants, and x is the variable to solve for.

Step-by-Step Solution to $5x - 12 = 58$

To find the value of x , follow systematic steps that isolate x on one side of the equation.

Step 1: Add 12 to both sides

The first step involves moving constant terms to the other side to isolate the term with the variable.

- Equation: $5x - 12 = 58$

- Add 12 to both sides:

$$5x - 12 + 12 = 58 + 12$$

- Simplify:

$$5x = 70$$

Step 2: Divide both sides by 5

Next, divide both sides of the equation by the coefficient of x (which is 5) to solve for x .

- $5x / 5 = 70 / 5$

- Simplify:

$$x = 14$$

Final Answer:

$$x = 14$$

This is the solution to the equation $5x - 12 = 58$.

Verifying Your Solution

Always verify your solution by substituting the value back into the original equation.

- Original equation: $5x - 12 = 58$

- Substitute $x = 14$:

$$5(14) - 12 = ?$$

- Calculate:

$$70 - 12 = 58$$

- Result:

$$58 = 58$$

Since both sides are equal, $x = 14$ is the correct solution.

Related Concepts and Tips for Solving Algebraic Equations

Understanding the solution process for $5x - 12 = 58$ can be extended to various other algebra problems.

1. Handling Equations with Multiple Variables

While this problem involves a single variable, more complex equations may include multiple variables. Strategies include:

- Isolating one variable at a time.
- Using substitution or elimination methods for systems of equations.

2. Working with Inequalities

The techniques used here also apply to inequalities like $5x - 12 > 58$ or $5x - 12 \leq 58$. Pay attention to the inequality signs during operations.

3. Common Mistakes to Avoid

- Forgetting to perform the same operation on both sides.
- Incorrectly handling negative signs.
- Dividing by zero (ensure the coefficient of the variable is not zero).

4. Practice Problems

To strengthen your algebra skills, try solving similar equations:

- $3x + 7 = 22$
- $4x - 5 = 15$
- $2(3x - 4) = 10$
- $6x / 2 = 9$

Applications of Solving Equations in Real Life

Mastering algebraic equations like $5x - 12 = 58$ has practical applications across various fields.

1. Financial Planning

Calculating interest, loan payments, or budgeting often involves solving equations.

2. Engineering and Science

Designing structures, analyzing data, and solving physics problems frequently require algebraic solutions.

3. Computer Programming

Algorithms and code logic depend on solving equations and inequalities efficiently.

4. Everyday Problem Solving

From adjusting recipes to calculating travel time, algebraic thinking is useful in daily tasks.

Conclusion: Do You Know How to Solve $5x - 12 = 58$?

Understanding how to solve the equation $5x - 12 = 58$ is a fundamental skill in algebra. By following straightforward steps—adding 12 to both sides and then dividing by 5—you can quickly find that $x = 14$. Always verify your solutions to ensure accuracy, and apply the same principles to more complex equations. Developing proficiency in solving such equations enhances your overall mathematical literacy, which is invaluable across many domains in academics, careers, and everyday life.

Remember: Practice makes perfect. Keep solving different types of equations to build confidence and improve your problem-solving skills. Whether you're a student, educator, or lifelong learner, mastering these concepts opens the door to more advanced mathematics and logical thinking.

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- Mathematical problem solving
- Understanding algebraic expressions

Frequently Asked Questions

What is the first step to solve the equation $5x - 12 = 58$?

Add 12 to both sides of the equation to isolate the term with x: $5x = 58 + 12$.

What is the value of $5x$ after adding 12 to both sides?

$5x = 70$.

How do you solve for x in the equation $5x = 70$?

Divide both sides by 5: $x = 70 \div 5$.

What is the solution to the equation $5x - 12 = 58$?

$x = 14$.

Is the solution $x = 14$ correct for the equation $5x - 12 = 58$?

Yes, substituting $x = 14$ back into the original equation satisfies it.

How can I check my solution for the equation $5x - 12 = 58$?

Plug $x = 14$ into the original equation and verify that both sides are equal.

Can this equation be solved by graphing?

Yes, by graphing $y = 5x - 12$ and $y = 58$, their intersection point gives the solution $x = 14$.

What type of equation is $5x - 12 = 58$?

It is a linear equation in one variable.

What does the solution $x = 14$ tell us in the context of this equation?

It indicates the value of x that makes the equation true.

Are there any other solutions to $5x - 12 = 58$?

No, since it's a linear equation, it has only one solution: $x = 14$.

Additional Resources

Do You Know This? $5x - 12 = 58$

In the world of algebra, equations serve as the fundamental building blocks for understanding how variables and constants interact. Among these, linear equations—those in which variables are raised to the first power—are the most basic yet essential to mastering algebraic concepts. One such equation that often appears in textbooks, exams, and everyday problem-solving is:

$$5x - 12 = 58$$

At first glance, this simple-looking equation might seem straightforward, but it encapsulates core principles of algebra and problem-solving techniques. Exploring this equation in depth offers an opportunity to understand not just how to solve it, but also the broader concepts it illustrates, including isolating variables, maintaining balance in an equation, and interpreting solutions.

This article provides a comprehensive analysis of the equation $5x - 12 = 58$, breaking down each step involved in solving it, discussing its mathematical implications, and exploring the importance of such equations in various contexts.

Understanding the Equation: Breaking Down $5x - 12 = 58$

What Does the Equation Represent?

The equation $5x - 12 = 58$ is a linear algebraic expression involving a single variable, x . It states that when five times a certain number (x) is decreased by 12, the result is 58. The goal is to determine the value of x that satisfies this condition.

In practical terms, such an equation could model real-world scenarios. For instance, imagine a situation where a store sells items at five times a certain unit price (x), then offers a discount of 12 units (possibly dollars or another currency). The final price after discount is 58. Solving this equation would find the original unit price (x).

Components of the Equation

- Coefficient of x (5): Indicates how many times the variable x is multiplied.
- Variable (x): The unknown quantity we aim to find.
- Constant term (-12): A fixed amount subtracted from the product.
- Result (58): The total or outcome after applying the operations involving the variable.

Understanding these components is essential since it informs the algebraic manipulations needed to isolate x and find its value.

Step-by-Step Solution Process

1. Isolating the Variable Term

The goal is to solve for x. The first step involves undoing the operations applied to x.

Given: $5x - 12 = 58$

To isolate 5x, add 12 to both sides of the equation:

$$5x - 12 + 12 = 58 + 12$$

which simplifies to:

$$5x = 70$$

This step leverages the principle of maintaining equality by performing inverse operations on both sides.

2. Solving for x

Next, to find x, divide both sides of the equation by the coefficient 5:

$$(5x) / 5 = 70 / 5$$

which simplifies to:

$$x = 14$$

Result: The value of x that satisfies the original equation is 14.

3. Verification of the Solution

Verifying the solution is critical to ensure accuracy. Substitute $x = 14$ back into the original equation:

$$5(14) - 12 = ?$$

Calculate:

$$5 \cdot 14 = 70$$

$$70 - 12 = 58$$

Since the left side equals the right side, the solution $x = 14$ is confirmed as correct.

Mathematical Principles Demonstrated

Principle of Inverse Operations

The solution process hinges on the concept that addition undoes subtraction, and multiplication undoes division. By performing inverse operations on both sides, algebraists maintain the balance of the equation while isolating the variable.

Maintaining Equation Balance

Each step performed—adding 12 to both sides, dividing both sides by 5—is based on the principle that whatever operation is done to one side must be done to the other. This ensures the equation remains true throughout the process.

Linear Equations and Their Characteristics

This example illustrates the defining features of a linear equation: a first-degree polynomial with one variable, resulting in a straightforward, unique solution.

Broader Contexts and Applications

Educational Significance

Equations like $5x - 12 = 58$ are foundational in algebra education because they introduce students to problem-solving strategies, the importance of inverse operations, and the concept of maintaining equality. Mastery of such equations builds the groundwork for more complex algebraic concepts, including systems of equations, inequalities, and quadratic equations.

Practical Applications

Linear equations find applications in various fields:

- Finance: Calculating interest, loan payments, or budget allocations.
- Physics: Relating variables such as speed, distance, and time.
- Business: Determining profit margins based on cost and revenue models.
- Engineering: Modeling relationships between physical quantities.

In all these cases, the ability to manipulate and solve equations like $5x - 12 = 58$ is crucial for analysis, decision-making, and forecasting.

Real-World Problem Solving

Suppose a company is trying to determine the price per unit (x) of a product based on total revenue after discounts. The equation $5x - 12 = 58$ could represent such a scenario, where solving for x directly influences business strategies.

Advanced Considerations: Variations and Complexities

While $5x - 12 = 58$ is straightforward, algebraic equations can become more complex. Variations include:

- Multiple variables: e.g., $3x + 2y = 20$.
- Higher-degree polynomials: quadratic or cubic equations.
- Inequalities: expressions involving greater than or less than signs.
- Systems of equations: multiple equations with multiple variables.

Understanding the basic principles demonstrated in solving $5x - 12 = 58$ provides a foundation for tackling these more complex scenarios.

Common Mistakes and How to Avoid Them

Even simple equations can be mishandled if care is not taken. Here are common errors and tips:

- Ignoring inverse operations: Always perform the inverse operation to isolate the variable.
- Forgetting to perform the same operation on both sides: This maintains the equality.
- Miscalculations during arithmetic: Double-check calculations, especially during multiplication or division.
- Assuming multiple solutions: Be aware that some equations may have no solution or infinitely many solutions; linear equations like this typically have a single solution unless variables cancel out.

To avoid these pitfalls, practice systematic problem-solving, verify solutions by substitution, and develop a clear understanding of algebraic rules.

Conclusion: The Significance of Solving $5x - 12 = 58$

The equation $5x - 12 = 58$ exemplifies a fundamental algebraic problem that encapsulates key principles such as inverse operations, maintaining equality, and the process of isolating variables. Its solution— $x = 14$ —not only provides a numerical answer but also reinforces the logical structure underpinning algebra.

Mastering such equations is essential for students and professionals alike, as these skills underpin more advanced mathematical concepts and practical problem-solving across various disciplines. As a stepping stone, understanding how to approach, manipulate, and verify solutions to linear equations empowers learners to navigate the broader landscape of mathematics with confidence and precision.

In the context of education, business, science, and engineering, the ability to solve equations like $5x - 12 = 58$ remains a vital competency, illustrating the timeless relevance of algebraic reasoning in our daily lives and technological advancements.

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