

Show Your Solution $5x + 12 = 42$

Show Your Solution $5x + 12 = 42$: A Step-by-Step Guide to Solving Linear Equations

Show Your Solution $5x + 12 = 42$ is a classic example of a linear equation that students often encounter in algebra. Solving such equations is fundamental to understanding algebraic principles, and mastering this process provides a strong foundation for more complex mathematical concepts. In this comprehensive guide, we will explore how to solve the equation $5x + 12 = 42$ step-by-step, discuss the underlying principles, and provide useful tips for mastering similar problems.

Understanding the Components of the Equation

What Does $5x + 12 = 42$ Represent?

This equation is a linear expression where:

- $5x$ is a term with a variable x multiplied by 5.
- $+ 12$ is a constant added to $5x$.
- $= 42$ indicates that the expression on the left equals 42.

The goal is to find the value of x that makes the equation true.

Basic Principles in Solving Linear Equations

When solving equations like $5x + 12 = 42$, the main principles include:

- Maintaining equality by performing the same operation on both sides.
- Isolating the variable (x) to find its value.
- Using inverse operations to simplify the equation.

Step-by-Step Solution to $5x + 12 = 42$

Step 1: Subtract 12 from both sides

The first step is to eliminate the constant term (+12) from the left side to isolate the term with the variable:

$$\begin{array}{r} 5x + 12 = 42 \\ - 12 \quad - 12 \\ \hline 5x = 30 \end{array}$$

By subtracting 12 from both sides, we ensure the equality remains true.

Step 2: Divide both sides by 5

Next, we want to solve for x by dividing both sides of the equation by the coefficient of x , which is 5:

$$\begin{array}{r} 5x = 30 \\ / 5 \quad / 5 \\ \hline x = 6 \end{array}$$

Dividing both sides by 5 simplifies the equation, giving us the value of x .

Final Answer: $x = 6$

After performing these steps, we find that the solution to the equation $5x + 12 = 42$ is $x = 6$.

Verification of the Solution

Plugging the value back into the original equation

To verify that $x = 6$ is correct, substitute 6 back into the original equation:

$$\begin{array}{l} 5(6) + 12 = 42 \\ 30 + 12 = 42 \\ 42 = 42 \end{array}$$

Since both sides are equal, $x = 6$ is indeed the correct solution.

Common Mistakes to Avoid

Forgetting to perform the same operation on both sides

Always remember to perform inverse operations equally on both sides to maintain the balance of the equation.

Incorrect division or multiplication

Be careful with signs and coefficients when dividing or multiplying. Double-check your calculations to avoid errors.

Neglecting to verify the solution

Always substitute your answer back into the original equation to confirm its correctness.

Tips for Mastering Similar Equations

Practice with different types of linear equations

- Equations with variables on both sides
- Equations involving fractions
- Equations with parentheses

Use systematic approaches

1. Identify the variable and constants
2. Undo addition/subtraction first
3. Undo multiplication/division second
4. Verify your solution

Develop problem-solving habits

- Write down each step clearly
- Check calculations carefully
- Practice with varied problems to build confidence

Extending Your Skills Beyond Basic Equations

Solving Multi-Step Equations

Once comfortable with simple linear equations like $5x + 12 = 42$, challenge yourself with equations involving multiple steps, such as:

- $2x + 3 = 4x - 5$
- $(x + 2)/3 = 4$
- $3(2x - 1) + 4 = 22$

These require combining like terms and applying inverse operations multiple times.

Introduction to Inequalities

Learn to solve inequalities such as $5x + 12 > 42$, using similar steps, but pay attention to reversing inequality signs when multiplying or dividing by negative numbers.

Resources for Further Learning

Online Tutorials and Practice Problems

- Khan Academy Algebra Course
- IXL Math Practice
- Mathway Online Solver

Educational Books and Workbooks

- "Algebra for Dummies" by Mary Jane Sterling
- "Basic Math and Algebra" Workbooks for Practice

Conclusion: Mastering the Art of Solving Linear Equations

Understanding how to solve equations like $5x + 12 = 42$ is a critical skill in algebra. By following a systematic approach—subtracting constants, dividing by coefficients, and verifying your solutions—you can confidently tackle similar problems. Remember to practice regularly, double-check your work, and gradually progress to more complex equations. With dedication and practice, you'll develop strong problem-solving skills that will serve you well in mathematics and beyond.

Frequently Asked Questions

How do I solve the equation $5x + 12 = 42$?

To solve $5x + 12 = 42$, subtract 12 from both sides to get $5x = 30$, then divide both sides by 5 to find $x = 6$.

What is the value of x in the equation $5x + 12 = 42$?

The value of x is 6, obtained by solving the equation: $5x + 12 = 42 \rightarrow 5x = 30 \rightarrow x = 6$.

Can you show step-by-step how to solve $5x + 12 = 42$?

Yes. Step 1: Subtract 12 from both sides: $5x + 12 - 12 = 42 - 12 \rightarrow 5x = 30$. Step 2: Divide both sides by 5: $5x / 5 = 30 / 5 \rightarrow x = 6$.

What is the importance of isolating the variable in the equation $5x + 12 = 42$?

Isolating the variable helps find its value directly. In this case, it allows us to determine that x equals 6 by reversing the operations applied to x .

Is $5x + 12 = 42$ a linear equation, and how do I recognize it?

Yes, it is a linear equation because it has the variable x raised to the first power and can be written in the form $ax + b = c$. Linear equations graph as straight lines.

What are common mistakes to avoid when solving $5x + 12 = 42$?

Common mistakes include forgetting to perform the same operation on both sides of the equation, such as subtracting or dividing incorrectly, or making errors in arithmetic calculations. Always double-check each step.

Additional Resources

Show Your Solution $5x + 12 = 42$

In the world of mathematics, simple equations often serve as foundational stepping stones toward understanding more complex concepts. One such equation that frequently appears in algebra lessons is $5x + 12 = 42$. While seemingly straightforward, solving this equation involves a series of logical steps that exemplify the core principles of algebraic manipulation. Whether you're a student brushing up on your skills or a curious learner exploring the fundamentals of equations, understanding how to solve this problem can enhance your problem-solving toolkit. In this article, we'll delve into the process of solving $5x + 12 = 42$, exploring each step with clarity and depth to help you grasp the underlying reasoning.

Understanding the Equation: What Are We Trying to Find?

Before jumping into the solution, it's essential to clarify what the equation $5x + 12 = 42$ represents.

Breaking Down the Components

- $5x$: This term indicates five times an unknown value, represented by x .
- $+ 12$: This indicates that 12 is added to the product of 5 and x .
- $= 42$: The sum of $5x + 12$ equals 42.

The primary goal is to find the value of x that makes this equation true. In algebra, this process involves isolating x on one side of the equation to determine its value.

Why Is Solving Such Equations Important?

Understanding how to solve linear equations like $5x + 12 = 42$ is fundamental because:

- They form the basis of algebra, a crucial branch of mathematics.
- They appear frequently in real-world applications, such as calculating budgets, determining speeds, or solving problems involving relationships between quantities.
- Mastering these solutions enhances logical reasoning and problem-solving skills.

The Strategy: Isolating the Variable

To solve the equation, the overarching strategy revolves around isolating x — that is, getting x alone

on one side of the equation. This involves inverse operations that undo addition, subtraction, multiplication, or division.

Step 1: Undo Addition—Subtract 12 from Both Sides

Since the constant 12 is added to $5x$, the first move is to eliminate it by performing the inverse operation: subtraction.

- Equation: $5x + 12 = 42$
- Operation: Subtract 12 from both sides to maintain equality.

Calculation:

$$(5x + 12) - 12 = 42 - 12$$

which simplifies to

$$5x = 30$$

Why subtract from both sides?

Applying the subtraction to both sides preserves the balance of the equation, a fundamental principle in algebra. This step effectively removes the constant added to the term with x .

Step 2: Undo Multiplication—Divide Both Sides by 5

Now, $5x$ indicates five times x . To isolate x , you need to perform the inverse operation: division by 5.

- Equation: $5x = 30$
- Operation: Divide both sides by 5.

Calculation:

$$(5x) / 5 = 30 / 5$$

which simplifies to

$$x = 6$$

Why divide?

Dividing both sides by 5 cancels out the multiplication, leaving x alone.

Confirming the Solution: Substitution Check

After determining $x = 6$, it's prudent to verify the solution by substituting x back into the original equation.

Substitution

Original equation: $5x + 12 = 42$

Substitute $x = 6$:

$$5(6) + 12 = 42$$

$$30 + 12 = 42$$

$$42 = 42$$

Since both sides are equal, the solution $x = 6$ is confirmed as correct.

Alternative Methods: Exploring Other Approaches

While the straightforward method involves inverse operations, other strategies can also be employed, especially in more complex equations.

Method 1: Graphical Approach

Plotting the equation $y = 5x + 12$ and $y = 42$ on a graph can visually demonstrate where the two lines intersect, revealing the solution $x = 6$. This method offers an intuitive understanding but is less precise without graphing tools.

Method 2: Using Algebraic Properties

Applying properties of equality systematically — such as the distributive property (if applicable), combining like terms, or factoring — can be useful in more complicated equations. For $5x + 12 = 42$, the straightforward inverse operations suffice.

Common Mistakes and Pitfalls to Avoid

Even simple equations can trip up learners if caution isn't exercised. Here are some common errors:

- Forgetting to perform the same operation on both sides:

Always apply inverse operations to both sides to maintain equality.

- Incorrect arithmetic:

Double-check calculations, especially when dividing or subtracting.

- Confusing the order of operations:

Remember, addition/subtraction is performed before multiplication/division unless parentheses indicate otherwise.

- Neglecting to verify the solution:

Always substitute back into the original equation to confirm your answer.

Extending the Concept: Solving More Complex Equations

Once comfortable with $5x + 12 = 42$, you can approach more complex linear equations involving:

- Multiple variables

- Variables on both sides
- Fractions or decimals
- Parentheses

The core principles remain the same: perform inverse operations systematically to isolate the variable.

Practical Applications: Real-World Scenarios

Understanding how to solve equations like $5x + 12 = 42$ is not just an academic exercise; it has practical implications:

- Budgeting:

Determining how many units of a product to buy to stay within a budget.

- Speed and Distance Calculations:

Calculating unknown speeds or distances based on given relationships.

- Physics and Engineering:

Solving for unknown quantities in formulas involving forces, energy, or other physical properties.

Summary: The Path to the Solution

To recap, solving $5x + 12 = 42$ involves:

1. Subtracting 12 from both sides to eliminate the constant:

$$5x = 30$$

2. Dividing both sides by 5 to isolate x :

$$x = 6$$

3. Checking the solution by substituting $x = 6$ back into the original equation confirms correctness.

This process exemplifies the systematic approach fundamental to algebra: using inverse operations to peel away layers of complexity and uncover the unknown.

Final Thoughts: Building Confidence in Algebra

Mastering simple equations like $5x + 12 = 42$ lays the groundwork for tackling more challenging mathematical problems. The key is understanding the logic behind each step, practicing consistently, and verifying solutions. As you become more comfortable with these techniques, you'll find that algebra becomes an increasingly powerful tool for solving everyday problems, scientific inquiries, and advanced mathematical concepts.

Remember, every complex problem can be broken down into manageable steps — just like solving

this equation. Keep practicing, stay curious, and embrace the logical beauty of mathematics.

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