

ExampleThe Product Of 4 And (3 + X) Is Equal To 36. What Is The Value Of X?The Equation $4(3 + X) = 36$

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Understanding basic algebraic equations is fundamental to developing problem-solving skills in mathematics. One common type of algebraic problem involves solving for an unknown variable within an equation. For example, consider the equation:

$$4(3 + X) = 36$$

This equation presents a scenario where a number, represented by X, is added to a constant (3), multiplied by 4, and the result equals 36. Solving for X involves applying algebraic principles such as distributive property, inverse operations, and simplification techniques.

In this article, we will explore the step-by-step process to solve such an equation, understand its context, and learn how to approach similar problems. Whether you're a student preparing for exams or someone interested in strengthening your algebra skills, this comprehensive guide will provide clarity and confidence in solving linear equations like $4(3 + X) = 36$.

Understanding the Equation $4(3 + X) = 36$

Before diving into the solution, it's essential to understand what the equation represents. The equation involves three components:

- A coefficient (4) multiplying a binomial expression (3 + X)
- An addition inside the parentheses (3 + X)
- An equality sign (=) indicating that the expression on the left equals 36

This type of equation is called a linear equation in one variable. The goal is to isolate the variable X to determine its value.

Breaking Down the Equation

The equation:

$$4(3 + X) = 36$$

can be broken down into key steps:

1. Distribute the 4 across the parentheses
2. Simplify the resulting expression
3. Isolate the variable X
4. Solve for X

Let's go through each step in detail.

Step 1: Apply the Distributive Property

The distributive property states that:

$$a(b + c) = ab + ac$$

Applying this to our equation:

$$4(3 + X) = 36$$

becomes:

$$4 \cdot 3 + 4 \cdot X = 36$$

which simplifies to:

$$12 + 4X = 36$$

This step removes the parentheses and makes the equation easier to work with.

Step 2: Isolate the Term Containing X

Next, subtract 12 from both sides to move constants to one side:

$$12 + 4X - 12 = 36 - 12$$

which simplifies to:

$$4X = 24$$

This step simplifies the equation to a single term involving X, making it straightforward to solve.

Step 3: Solve for X

Now, divide both sides of the equation by 4 to isolate X:

$$(4X) / 4 = 24 / 4$$

which yields:

$$X = 6$$

Thus, the solution to the equation is $X = 6$.

Verifying the Solution

Always verify your solution by substituting the value of X back into the original equation:

Original equation:

$$4(3 + X) = 36$$

Substitute $X = 6$:

$$4(3 + 6) = 36$$

Calculate inside the parentheses:

$$4(9) = 36$$

Multiply:

$$36 = 36$$

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

Understanding the Key Concepts in Solving Linear Equations

To deepen your understanding, let's review the essential algebraic concepts used in solving equations like $4(3 + X) = 36$.

Distributive Property

This property allows you to eliminate parentheses by distributing the multiplication over addition or subtraction inside the parentheses. It's critical for expanding expressions:

$$a(b + c) = ab + ac$$

Inverse Operations

Solving for the variable involves performing inverse operations to undo the effects of previous steps:

- Addition and subtraction are inverse operations.
- Multiplication and division are inverse operations.

Maintaining Equality

Whatever operation you perform on one side of the equation, you must perform on the other side to maintain balance.

Step-by-Step Approach

Breaking down complex equations into manageable steps ensures accuracy and clarity during solving.

Common Mistakes to Avoid

When solving equations like $4(3 + X) = 36$, students often make errors. Be mindful of the following:

- Forgetting to distribute correctly: Always apply the distributive property properly before

simplifying.

- Neglecting to perform the same operation on both sides: This can lead to incorrect solutions.
- Dividing too early: It's important to simplify the equation fully before dividing to isolate the variable.
- Not verifying the solution: Always substitute your solution back into the original equation to confirm correctness.

Related Problems and Practice Exercises

To strengthen your understanding, try solving similar equations:

1. $5(2 + Y) = 50$
2. $3(4 + Z) = 36$
3. $7(1 + X) = 56$
4. $2(5 + A) = 22$
5. $6(3 + B) = 60$

Solution tips:

- Distribute the coefficient across the parentheses.
- Simplify the expression.
- Isolate the variable.
- Solve for the variable.
- Verify your answer.

Real-World Applications of Solving Equations

Solving equations like $4(3 + X) = 36$ isn't just an academic exercise; it has practical applications:

- Financial calculations: Determining unknown quantities in budgeting or investment scenarios.
- Physics: Calculating unknown variables such as velocity, acceleration, or force.
- Engineering: Solving for unknown parameters in design equations.
- Business: Estimating sales, profit, or production quantities.

Understanding how to manipulate and solve equations is vital in various fields that require analytical thinking and problem-solving skills.

Conclusion

The equation $4(3 + X) = 36$ offers a clear example of how algebraic principles are applied to find an unknown value. By distributing, simplifying, and performing inverse operations, you can efficiently solve for X and verify your solution for accuracy.

Key takeaways include:

- Always understand the structure of the equation before solving.
- Apply the distributive property to remove parentheses.
- Use inverse operations to isolate the variable.
- Verify your solution by substitution.
- Practice similar problems to build confidence.

Mastering these steps enhances your algebra skills and prepares you for more complex mathematical challenges. Remember, practice makes perfect—so keep solving equations and exploring their applications in real-world contexts.

Meta Description:

Learn how to solve the algebraic equation $4(3 + X) = 36$ step by step. This detailed guide explains the distributive property, inverse operations, and verification techniques to find the value of X with practical tips and examples.

Frequently Asked Questions

What is the first step to solve the equation $4(3 + X) = 36$?

The first step is to apply the distributive property or divide both sides by 4 to isolate the expression $(3 + X)$.

How do you simplify the equation $4(3 + X) = 36$?

You can divide both sides by 4, resulting in $3 + X = 9$.

What is the value of X in the equation $4(3 + X) = 36$?

After simplifying, subtract 3 from both sides to find $X = 6$.

Can you verify the solution $X = 6$ in the original equation?

Yes. Substitute $X = 6$ into $4(3 + X)$: $4(3 + 6) = 4(9) = 36$, which confirms the solution is correct.

What would be the next step if the equation was $4(3 + X) = 48$?

Divide both sides by 4 to get $3 + X = 12$, then subtract 3 to find $X = 9$.

Why is it important to check your solution in an algebraic equation?

Checking ensures the solution satisfies the original equation and helps catch any calculation errors.

Additional Resources

ExampleThe Product Of 4 And $(3 + X)$ Is Equal To 36. What Is The Value Of X ? The Equation $4(3 + X) = 36$

Understanding and solving algebraic equations is fundamental in developing mathematical literacy. The given equation, $4(3 + X) = 36$, offers a classic example of how algebraic expressions can be manipulated to find unknown values. This article explores this equation in detail, providing a comprehensive analysis that includes the underlying concepts, step-by-step solutions, and the broader context of algebraic problem-solving. Whether you're a student just beginning your journey with algebra or someone seeking to deepen your understanding, this discussion aims to clarify the process and logic behind solving such equations.

Introduction to the Equation and Its Significance

Equation: $4(3 + X) = 36$

This algebraic expression is a simple yet illustrative example of how variables interact within equations. The goal is to find the value of the variable X that satisfies the equation. Equations like these are foundational because they exemplify the process of isolating variables, which is a core skill in algebra.

The equation involves a coefficient (4) multiplied by a binomial expression $(3 + X)$. Recognizing the structure of the equation allows us to employ various algebraic techniques such as distributive property, inverse operations, and balancing both sides of the equation.

Understanding this problem also underscores the importance of translating words into mathematical symbols, a skill crucial in applied mathematics, sciences, engineering, and everyday problem-solving.

Breaking Down the Equation: Components and Concepts

2.1 Components of the Equation

- Coefficient (4): A numerical factor multiplying the expression inside the parentheses.
- Expression Inside Parentheses (3 + X): Represents a sum involving a constant (3) and an unknown variable (X).
- Equality Sign (=): Indicates that both sides of the equation are equivalent.
- Constant (36): The value the product of the multiplication must equal.

2.2 Fundamental Concepts

- Distributive Property: Used to eliminate parentheses by multiplying each term inside by the outside coefficient.
- Inverse Operations: Addition and subtraction, multiplication and division, used to isolate variables.
- Balancing the Equation: Ensuring both sides remain equal after operations.

Step-by-Step Solution of the Equation

To solve for X, we follow a logical sequence rooted in algebraic principles.

3.1 Step 1: Apply the Distributive Property

The first step is to expand the left side of the equation:

$$\backslash[4(3 + X) = 36 \backslash]$$

Applying distributive property:

$$\backslash[4 \times 3 + 4 \times X = 36 \backslash]$$

which simplifies to:

$$\backslash[12 + 4X = 36 \backslash]$$

This step is crucial because it converts the equation into a linear form where the variable term is isolated and straightforward to handle.

3.2 Step 2: Isolate the Variable Term

Subtract 12 from both sides to isolate the term containing X:

$$\backslash[12 + 4X - 12 = 36 - 12 \backslash]$$

which simplifies to:

$$\backslash[4X = 24 \backslash]$$

This operation maintains the equality while removing the constant from the left side.

3.3 Step 3: Solve for X

Divide both sides by 4 to solve for X:

$$\backslash[\frac{4X}{4} = \frac{24}{4} \backslash]$$

which yields:

$$\backslash[X = 6 \backslash]$$

This is the solution — the value of X that makes the original equation true.

Verifying the Solution

Verification is an essential step to confirm the correctness of the solution.

4.1 Substitute X Back into the Original Equation

Original equation:

$$\backslash[4(3 + X) = 36 \backslash]$$

Substitute $(X = 6)$:

$$\backslash[4(3 + 6) = 36 \backslash]$$

Calculate inside parentheses:

$$\backslash[4(9) = 36 \backslash]$$

Evaluate:

$$\backslash[36 = 36 \backslash]$$

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

Broader Context: Significance of Solving Linear Equations

5.1 Applications of Linear Equations

Linear equations, like the one discussed, are pervasive in various fields:

- Science and Engineering: For modeling relationships where change is proportional.
- Economics: To determine costs, revenues, or profit margins.
- Computer Science: In algorithms and data analysis.
- Daily Life: Budgeting, calculating distances, or adjusting recipes.

5.2 Common Methods for Solving Equations

- Substitution: Replacing a variable with a known value.
- Elimination: Combining equations to eliminate variables.
- Graphing: Visualizing solutions on coordinate axes.
- Algebraic Manipulation: Using distributive, associative, and inverse operations.

5.3 Importance of Understanding the Process

Mastering the process of solving equations enhances critical thinking and problem-solving skills. It fosters logical reasoning, precision, and the ability to translate word problems into mathematical expressions.

Potential Variations and Advanced Concepts

While the current equation is straightforward, real-world problems often involve more complexity.

6.1 Equations with Multiple Variables

For example, equations like $ax + by = c$ introduce additional variables, requiring techniques like substitution or elimination.

6.2 Quadratic and Higher-Degree Equations

When equations involve powers of variables greater than one, solving may involve factoring, completing the square, or quadratic formulas.

6.3 Nonlinear Equations

These require graphing, numerical methods, or iterative approaches to find solutions.

6.4 Systems of Equations

Simultaneously solving multiple equations to find common solutions introduces additional layers of complexity.

Educational Implications and Learning Strategies

Understanding equations like $4(3 + X) = 36$ is foundational for students. Effective strategies include:

- Practicing Step-by-Step Methods: Ensuring each operation is justified and understood.
- Visual Aids: Using graphing to see solutions.
- Word Problem Translation: Developing skills to convert real-life scenarios into mathematical expressions.
- Error Analysis: Reviewing incorrect solutions to understand misconceptions.

Conclusion: The Power of Algebra in Problem Solving

The simple yet illustrative equation $4(3 + X) = 36$ encapsulates the core principles of algebra: distribution, inverse operations, and equation balancing. By systematically applying these principles, one can confidently find that $X = 6$, demonstrating the logical flow from problem statement to solution.

Mastering such equations not only enhances mathematical skills but also builds a foundation for tackling more complex problems across various disciplines. As algebra continues to underpin scientific and technological advancements, developing proficiency in solving equations remains an essential educational goal.

In essence, this problem exemplifies how abstract mathematical concepts translate into practical problem-solving tools, empowering learners to approach diverse challenges with confidence and clarity.

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