

Solve $5x + 3010x$. Identify The Solution And An Extraneous Solution.

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When faced with algebraic expressions and equations, understanding how to simplify and solve them correctly is essential. The problem "Solve $5x + 3010x$ " appears straightforward at first glance, but it provides an excellent opportunity to revisit fundamental algebraic principles, particularly combining like terms, solving for the variable, and identifying potential extraneous solutions. In this article, we will comprehensively explore how to simplify the expression, solve the resulting equation, and distinguish between valid solutions and extraneous ones. Whether you're a student brushing up on algebra skills or someone looking to deepen your understanding, this guide will walk you through every step.

Understanding the Expression $5x + 3010x$

Before diving into solving, it's crucial to understand what the expression $5x + 3010x$ represents and how to simplify it.

Combining Like Terms

The expression contains two terms involving the variable x :

- $5x$
- $3010x$

Since both are multiples of x , they are like terms and can be combined directly.

To combine:

1. Add the coefficients: $5 + 3010 = 3015$
2. Attach the variable x to the sum: $3015x$

Thus, the simplified form of the expression is:

Simplified Expression: $3015x$

This step is fundamental in algebra—combining like terms simplifies the expression and makes solving easier.

Formulating the Equation

The original statement is "Solve $5x + 3010x$." Typically, in algebra, solving involves setting an expression equal to some value or another expression. Since the problem states "solve" without specifying an equation, it implies solving for x when the expression equals zero or some other value.

Let's consider common scenarios:

- Scenario 1: The expression equals zero:

$$5x + 3010x = 0$$

- Scenario 2: The expression equals a specific number (e.g., 0, 1, or any constant).

For the purpose of this article, we'll focus on the case where the expression equals zero, as it's the most straightforward and common in algebraic problem-solving.

Equation to Solve:

$$3015x = 0$$

Note: If you encounter a different value, replace 0 with that number and follow similar steps.

Solving the Equation $3015x = 0$

The equation is simple:

1. Write down the equation:

$$3015x = 0$$

2. Solve for x :

Divide both sides of the equation by 3015:

$$x = 0 / 3015$$

3. Simplify:

$$x = 0$$

Solution: The only solution to the equation $3015x = 0$ is $x = 0$.

Important Note: This is a straightforward linear equation, and its solution is directly obtained by

isolating the variable. In more complex equations, additional steps or considerations might be necessary, but for this problem, it's quite direct.

Identifying An Extraneous Solution

While solving algebraic equations, particularly those involving square roots, logarithms, or fractions, extraneous solutions can sometimes arise. These are solutions that satisfy the manipulated form of the equation but do not satisfy the original equation.

In the current problem—solving $5x + 3010x = 0$ —the solution $x = 0$ is valid and directly derived from the equation.

However, to illustrate how extraneous solutions might appear, consider the following:

Example of Extraneous Solutions:

Suppose we had an equation like:

$$\sqrt{5x + 10} = x + 2$$

When solving such an equation, we would:

1. Square both sides to eliminate the square root, which could introduce extraneous solutions.
2. Solve the resulting quadratic.
3. Check solutions in the original equation to verify their validity.

Why are extraneous solutions problematic?

Because they satisfy the algebraic manipulations but do not satisfy the original equation due to restrictions like domain limitations (e.g., square roots require non-negative radicands, denominators cannot be zero, etc.).

In our initial problem:

- The solution $x = 0$ is valid because substituting back into $3015x$ yields 0, which makes sense for the original expression.
- There are no extraneous solutions here because the steps involved are straightforward and do not introduce any domain restrictions or manipulations that could generate invalid solutions.

Summary of Key Steps in Solving Expressions Like $5x + 3010x$

To effectively solve similar algebraic problems, keep these steps in mind:

1. **Identify like terms:** Recognize terms involving the same variable and combine them.

2. **Simplify the expression:** Combine coefficients to reduce the expression to a single term.
3. **Set the expression equal to a value:** Usually zero unless specified otherwise.
4. **Isolate the variable:** Divide or manipulate to solve for x .
5. **Verify the solution:** Substitute back into the original equation to check for extraneous solutions.

In conclusion, solving $5x + 3010x$ involves recognizing like terms, simplifying to a single coefficient, and solving the resulting linear equation. The unique solution in this case is $x = 0$, and because the steps are straightforward, there are no extraneous solutions to worry about in this specific problem. However, understanding how extraneous solutions can arise in more complex equations is vital for mastering algebra and ensuring solutions are valid within the equation's domain.

If you continue practicing solving equations involving radicals, fractions, or other complex expressions, always remember to check your solutions against the original problem to confirm their validity. This careful approach guarantees accurate results and enhances your algebraic problem-solving skills.

Frequently Asked Questions

What is the first step to simplify the expression $5x + 3010x$?

Combine like terms by adding the coefficients: $5x + 3010x = (5 + 3010)x = 3015x$.

How do you solve the equation $3015x = 0$?

Divide both sides by 3015 to find $x = 0$.

What is the solution to the equation $5x + 3010x = 0$?

The solution is $x = 0$.

Can $3015x = 0$ have any extraneous solutions?

No, because dividing by 3015 (which is non-zero) is valid, so the only solution is $x = 0$.

What is an extraneous solution, and how does it relate to solving equations?

An extraneous solution is a solution that arises during solving but does not satisfy the original equation; it often results from invalid operations like squaring both sides without considering

restrictions.

Are there any extraneous solutions in solving $5x + 3010x = 0$?

No, because the steps involve valid operations, and the solution $x = 0$ satisfies the original equation.

If the simplified equation is $3015x = 0$, what is the solution, and is it extraneous?

The solution is $x = 0$, and it is not extraneous because it satisfies the original equation.

What is the significance of combining like terms in solving linear equations?

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

How can you verify that the solution $x = 0$ is correct for the given expression?

Substitute $x = 0$ back into the original expression: $5(0) + 3010(0) = 0 + 0 = 0$, which confirms the solution is correct.

What should you do if an extraneous solution appears after solving an equation?

Verify the solution in the original equation; discard it if it does not satisfy the original problem.

Additional Resources

Solve $5x + 3010x$. Identify The Solution And An Extraneous Solution.

Introduction

Mathematics is often regarded as the universal language, providing tools and frameworks to solve real-world problems systematically. Among these tools, algebra stands out as a fundamental branch that introduces learners to solving equations, manipulating variables, and understanding relationships between quantities. A common type of algebraic task involves simplifying expressions and solving equations to find the value(s) of the unknown variable, typically represented as x .

In this article, we delve into an illustrative example: Solve $5x + 3010x$. Identify The Solution And An Extraneous Solution. While the expression appears straightforward, it offers an excellent opportunity to explore key algebraic principles, including combining like terms, solving for variables, and understanding the concept of extraneous solutions—solutions that satisfy an equation initially

but do not satisfy the original problem when checked.

Through comprehensive analysis, we aim to clarify the steps involved in solving such expressions, interpret the results, and highlight the importance of verifying solutions to avoid extraneous solutions. This investigation will serve as both a practical guide and an educational resource for students, educators, and enthusiasts seeking a deeper understanding of algebraic problem-solving.

Understanding the Expression: Simplification of $5x + 3010x$

Before we proceed to solving, it is essential to understand the nature of the expression:

$$5x + 3010x$$

This is a linear algebraic expression involving two terms with the variable x . Both terms are algebraic "like terms" because they contain the same variable raised to the same power (to the first power). The key principle here is to combine like terms to simplify the expression.

Combining Like Terms

The process of combining like terms involves adding their coefficients:

- Coefficients: The numerical factors multiplying the variable x . In this case, they are 5 and 3010.
- Like Terms: Terms containing the same variable raised to the same power. Here, both are x .

The general rule:

$$> a x + b x = (a + b) x$$

Applying this rule:

$$> 5x + 3010x = (5 + 3010) x = 3015x$$

Result: The simplified form of the initial expression is $3015x$.

Formulating the Equation

Suppose the problem involves an equation where the expression equals some value, or perhaps it is part of a larger problem. For clarity, let's consider the general case:

Equation:

$$> 5x + 3010x = c$$

Where c is some constant value. Since the problem does not specify a particular value, the most common scenario is to set the expression equal to zero to find the solutions:

$$> 5x + 3010x = 0$$

Using the simplified form:

$$> 3015x = 0$$

Solving the Equation: $3015x = 0$

This is a straightforward linear equation. The solution involves isolating x :

Step 1: Divide both sides by 3015 (assuming $3015 \neq 0$):

$$> x = 0 / 3015$$

Step 2: Simplify:

$$> x = 0$$

Result: The only solution to the equation $3015x = 0$ is $x = 0$.

Interpreting the Solution: Is It Extraneous?

In algebra, an extraneous solution is a solution that emerges during the solving process but does not satisfy the original equation. Such solutions often appear when solving equations involving:

- Even roots (e.g., square roots)
- Rational expressions with potential division by zero
- Absolute value equations requiring checking solutions

In our simplified scenario, the solution $x = 0$ directly satisfies the original equation, as substituting back:

$$> 5(0) + 3010(0) = 0 + 0 = 0$$

which equals c (assuming $c = 0$).

Therefore, in this case, $x = 0$ is both the solution and not an extraneous solution.

Exploring More Complex Scenarios

While the initial problem appears straightforward, it's beneficial to consider more intricate cases where extraneous solutions could arise. For example, suppose the problem involved solving an equation like:

$$> 5x + 3010x = 0$$

but also involved operations that could introduce extraneous solutions, such as dividing by an expression containing x , or solving an absolute value expression.

Example:

Suppose the problem was:

$$> |5x + 3010x| = 0$$

Simplify:

$$> |3015x| = 0$$

The absolute value of an expression equals zero only if the expression inside is zero:

$$> 3015x = 0$$

Thus, $x = 0$ again. No extraneous solutions here.

Another example involving division:

Suppose you have:

$$> (5x + 3010x) / x = \text{some constant}$$

In solving, dividing by x introduces the restriction that $x \neq 0$. If, during solving, you arrive at $x = 0$, you must check whether this solution is valid or extraneous based on the domain restrictions.

Key Takeaways from the Problem

1. Simplify algebraic expressions by combining like terms.
2. Solve linear equations by isolating the variable.

3. Always check solutions in the original equation to identify extraneous solutions.
4. Understand the domain restrictions introduced by operations like division and absolute value.

Practical Implications and Educational Significance

Understanding how to solve expressions like $5x + 3010x$ and recognize extraneous solutions has practical value in various fields:

- Education: Fundamental skill in algebra, critical for advanced mathematics.
- Engineering: Simplifying expressions is essential in circuit analysis, mechanical systems, and more.
- Data Analysis: Modeling relationships between variables often involves simplifying and solving equations.

Furthermore, recognizing extraneous solutions prevents errors in real-world problem-solving, especially in scenarios where domain restrictions are crucial, such as in physics or economics modeling.

Conclusion

The problem Solve $5x + 3010x$. Identify The Solution And An Extraneous Solution underscores the importance of systematic algebraic manipulation and verification of solutions. The steps involve:

- Combining like terms to simplify the expression.
- Formulating the appropriate equation.
- Solving for the variable.
- Verifying the solution against the original expression or problem statement.

In this particular case, the solution $x = 0$ is both valid and unique, with no extraneous solutions arising. However, the broader lesson emphasizes the necessity of thorough checking when solving more complex equations to ensure that solutions are genuine and applicable within the problem's context.

Mastering these principles enhances mathematical literacy, supports critical thinking, and provides a foundation for tackling diverse quantitative challenges across disciplines.

References

- Elementary Algebra Textbooks
- Khan Academy Algebra Resources
- Mathematical Problem-Solving Guides

- University Mathematics Curriculum Standards

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