– Solve The Equation:Solve The Equation:5(5x 2) + 3x = 28(x - 1)x = 121l

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Introduction to the Equation

Understanding how to approach and solve algebraic equations is fundamental in mathematics. The given equation, 5(5x 2) + 3x = 28(x - 1)x = 121l, appears complex at first glance due to its structure and multiple expressions. To effectively solve it, we need to interpret each part carefully, identify the variables and constants, and simplify step-by-step. This article aims to break down the problem systematically, explore various possible interpretations, and guide you through the process of solving the equation.

Deciphering the Equation

Analyzing the Given Expression

The original statement is:

> 5(5x 2) + 3x = 28(x - 1)x = 121l

At first glance, it seems to contain some ambiguities, possibly typographical errors or formatting issues. The expression includes:

- A term: $5(5x\ 2)$
- An additional term: $3x$
- An equality: $= 28(x - 1)x$
- A final equality: $= 121I$

Given the presentation, it seems plausible that the intended equation is:

$$5(5x + 2) + 3x = 28(x - 1)x = 121I$$

or perhaps:

$$5(5x + 2) + 3x = 28(x - 1)x = 121I$$

However, the presence of "121I" is ambiguous. It could represent:

- 121 multiplied by I (the imaginary unit), or
- A notation error.

In typical algebraic contexts, "I" often denotes the imaginary unit, but in some cases, it might be a variable or constant.

Given the structure, the most logical interpretation is that the equation involves:

1. A left-hand expression involving $5(5x + 2) + 3x$
2. An expression: $28(x - 1)x$
3. An equality to a value, possibly $121I$ (or 121 times some variable or constant)

For clarity, let's assume the equation is:

$5(5x + 2) + 3x = 28(x - 1)x = 121I$

which suggests that:

- The first expression equals the second, and the second equals 121I

Thus, the equation implies:

$5(5x + 2) + 3x = 28(x - 1)x = 121I$

or equivalently,

$5(5x + 2) + 3x = 28(x - 1)x$

and

$28(x - 1)x = 121I$

Given this, our goal is to:

- Find the value(s) of x satisfying the first equality
- Understand the role of 121I, which could involve complex numbers if I is imaginary

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Step 1: Simplify the First Expression

Let's start by simplifying the first part of the equation:

$5(5x + 2) + 3x$

Applying distributive property:

$5 5x + 5 2 + 3x = 25x + 10 + 3x$

Combine like terms:

$(25x + 3x) + 10 = 28x + 10$

So, the first expression simplifies to:

$28x + 10$

Step 2: Simplify the Second Expression

Next, consider the second expression:

$28(x - 1)x$

This is a product of two factors: 28, and $(x - 1)x$.

First, expand $(x - 1)x$:

$(x - 1) x = x^2 - x$

Multiply by 28:

$28(x^2 - x) = 28x^2 - 28x$

Step 3: Establish the Main Equation

From the simplifications, the initial set of equalities reduces to:

$28x + 10 = 28x^2 - 28x$

Since the original statement indicates both expressions are equal (before the "= 121I"), we set:

$28x + 10 = 28x^2 - 28x$

Step 4: Formulate a Quadratic Equation

Bring all terms to one side:

$28x^2 - 28x - 28x - 10 = 0$

Simplify:

$28x^2 - 56x - 10 = 0$

Divide the entire equation by 2 to simplify coefficients:

$14x^2 - 28x - 5 = 0$

This quadratic equation is:

$$14x^2 - 28x - 5 = 0$$

Step 5: Solve the Quadratic Equation

Use the quadratic formula:

$$x = [-b \pm \text{sqrt}(b^2 - 4ac)] / 2a$$

where:

- $a = 14$
- $b = -28$
- $c = -5$

Calculate the discriminant:

$$D = b^2 - 4ac = (-28)^2 - 4\ 14\ (-5) = 784 + 280 = 1064$$

Since the discriminant is positive, there are two real solutions.

Calculate sqrt(D):

$$\text{sqrt}(1064) \approx 32.6$$

Now, apply the quadratic formula:

x = [28 ± 32.6] / (2 14) = [28 ± 32.6] / 28

Calculate both solutions:

1. x_1 = (28 + 32.6) / 28 ≈ 60.6 / 28 ≈ 2.164

2. x_2 = (28 - 32.6) / 28 ≈ -4.6 / 28 ≈ -0.164

Thus, the solutions to the quadratic are approximately:

- x ≈ 2.164
- x ≈ -0.164

Step 6: Considering the Implication of 121I

Recall that the original equation included "= 121I." If I is intended as the imaginary unit, then the equation involves complex numbers.

The equation:

28(x - 1)x = 121I

From earlier, we have:

28x^2 - 28x = 121I

Divide both sides by 28:

$x^2 - x = (121/28) I$

This suggests that:

$x^2 - x$ is a purely imaginary number.

Since the left side is a quadratic expression in x with real coefficients, for the right side to be purely imaginary, x must be complex.

Let's let:

$x = p + iq$, where p and q are real numbers.

Calculate:

$x^2 - x = (p + iq)^2 - (p + iq) = (p^2 - q^2 + 2ipq) - p - iq$

Simplify:

$= (p^2 - q^2 - p) + i(2pq - q)$

This must equal:

$(121/28) I$

which is purely imaginary. Therefore, the real part must be zero:

$p^2 - q^2 - p = 0$

and the imaginary part:

$2pq - q = (121/28)$

Factor the imaginary part:

$q(2p - 1) = 121/28$

Now, from the real part:

$p^2 - p = q^2$

Express p in terms of q:

From the imaginary part:

$q = (121/28) / (2p - 1)$

Substitute into the real part:

$p^2 - p = [(121/28)^2] / (2p - 1)^2$

This results in a complex equation in p, which can be solved numerically or graphically. Alternatively, since the problem becomes quite involved, and the primary goal is solving for x, the approximate solutions obtained earlier ($x \approx 2.164$ and $x \approx -0.164$) are relevant only if the complex component is not considered.

Summary of Solutions

- If the equation is interpreted purely in real numbers, the solutions are approximately:

- x 2.164
- x -0.164

- If the imaginary component is involved, the solutions for x are complex and require solving the system:

- $p^2 - p = q^2$
- $q(2p - 1) = 121/28$

which yields complex solutions involving real and imaginary parts.

Conclusion

The process of solving the given equation involves several steps:

1. Interpreting the notation and structure carefully.
2. Simplifying algebraic expressions to reduce the problem to a quadratic.
3. Applying the quadratic formula for real solutions.
4. Considering complex solutions if the equation involves imaginary units.

By methodically breaking down the problem, we can arrive at approximate real solutions and understand the nature of possible complex solutions. This approach

Frequently Asked Questions

How do I simplify the equation 5(5x + 2) + 3x = 28(x - 1) and solve for x?

First, expand both sides: 25x + 10 + 3x = 28x - 28. Combine like terms: 28x + 10 = 28x - 28. Subtract 28x from both sides: 10 = -28. Since this is false, there is no solution; the equation has no real solution.

Is the equation 5(5x + 2) + 3x = 28(x - 1) x = 121 consistent or inconsistent?

The equation simplifies to a contradiction, indicating it is inconsistent and has no solution for x, including x = 121.

What steps should I follow to solve 5(5x + 2) + 3x = 28(x - 1) for x?

1. Expand both sides: 25x + 10 + 3x = 28x - 28. 2. Combine like terms: 28x + 10 = 28x - 28. 3. Subtract 28x from both sides: 10 = -28. 4. Recognize the contradiction, so no solution exists.

Does the equation 5(5x + 2) + 3x = 28(x - 1) have any solutions when x=121?

Substitute x=121 into the simplified form: the left side and right side do not equal, confirming that x=121 does not satisfy the equation; therefore, no, it does not have x=121 as a solution.

Can the equation 5(5x + 2) + 3x = 28(x - 1) be true for any real value of x?

No, because simplifying the equation leads to a contradiction (10 = -28), indicating no real solutions exist.

What is the solution to the equation 5(5x + 2) + 3x = 28(x - 1)?

The equation simplifies to a contradiction, so there is no solution; it is inconsistent.

Why does solving 5(5x + 2) + 3x = 28(x - 1) lead to an inconsistency?

Because simplifying the equation results in a statement 10 = -28, which is false, indicating the original equation has no solution.

Additional Resources

Solve The Equation: A Comprehensive Guide to Solving the Equation 5(5x 2) + 3x = 28(x - 1)x = 121I

Understanding how to solve equations is fundamental in mathematics, especially when dealing with algebraic expressions. The phrase "Solve The Equation" sets the stage for a detailed exploration of solving complex algebraic equations such as the one presented: 5(5x 2) + 3x = 28(x - 1)x = 121I. This article aims to thoroughly analyze this problem, break down the steps involved, interpret its components, and discuss various methods to arrive at the solution. Whether you're a student brushing up on algebra or someone seeking a deeper understanding of equation solving, this guide provides clarity and insight.

Understanding the Equation and Its Components

Before diving into solving, it's essential to interpret the given equation correctly. The equation appears somewhat ambiguous due to formatting, but based on common algebraic notation, it likely reads as:

5(5x + 2) + 3x = 28(x - 1) x = 121I

However, the latter part "x = 121I" could imply multiple things, such as a separate statement or perhaps a typographical error. It may also be that the entire equation is:

5(5x + 2) + 3x = 28(x - 1) x = 121I

Alternatively, the expression could be intended as:

5(5x + 2) + 3x = 28(x - 1)x = 121I

Given the ambiguity, the most logical interpretation is that the primary equation to solve is:

5(5x + 2) + 3x = 28(x - 1) x

And the mention of "121I" might be an extraneous or additional part, possibly indicating a complex number or an imaginary component (since "I" often denotes the imaginary unit in mathematics). Alternatively, "121I" could be a typo, or it might mean "121 times I," which points toward complex solutions.

For clarity, this article will focus on solving the core algebraic equation:

5(5x + 2) + 3x = 28(x - 1) x

and consider the possibility that the equation involves complex solutions, given the mention of "I."

Step 1: Clarify and Simplify the Equation

The first step in solving any algebraic equation is to simplify both sides as much as possible.

Original Equation:

$$ 5(5x + 2) + 3x = 28(x - 1) \times x $$

Let's expand both sides.

Left Side:

$$ 5(5x + 2) + 3x = 25x + 10 + 3x = (25x + 3x) + 10 = 28x + 10 $$

Right Side:

$$ 28(x - 1) \times x = 28x(x - 1) = 28x^2 - 28x $$

Now, the equation becomes:

$$ 28x + 10 = 28x^2 - 28x $$

Step 2: Formulate a Standard Quadratic Equation

Bring all terms to one side to set the equation to zero:

$$ 28x + 10 - 28x^2 + 28x = 0 $$

Combine like terms:

$$ (28x + 28x) + 10 - 28x^2 = 0 $$
$$ 56x + 10 - 28x^2 = 0 $$

Rearranged:

$$ -28x^2 + 56x + 10 = 0 $$

Divide through by -2 to simplify coefficients:

$$ 14x^2 - 28x - 5 = 0 $$

This is a quadratic equation in standard form:

$$ 14x^2 - 28x - 5 = 0 $$

Step 3: Solve the Quadratic Equation

To solve:

$$ 14x^2 - 28x - 5 = 0 $$

we can apply the quadratic formula:

$$ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} $$

where:

- $a = 14$
- $b = -28$
- $c = -5$

Calculating the discriminant:

$$D = b^2 - 4ac = (-28)^2 - 4 \times 14 \times (-5) = 784 + 280 = 1064$$

Since the discriminant is positive, there are two real solutions.

Calculate the square root:

$$\sqrt{1064} \approx 32.6$$

Now, find the solutions:

$$x = \frac{-(-28) \pm 32.6}{2 \times 14} = \frac{28 \pm 32.6}{28}$$

Solution 1:

$$x = \frac{28 + 32.6}{28} = \frac{60.6}{28} \approx 2.164$$

Solution 2:

$$x = \frac{28 - 32.6}{28} = \frac{-4.6}{28} \approx -0.164$$

Step 4: Interpreting the Solutions and Considering Complex Roots

The solutions derived are approximately:

- $x \approx 2.164$
- $x \approx -0.164$

However, if the original equation involves complex numbers, or "I" denotes the imaginary unit, then we need to check for complex solutions, especially when the discriminant is negative.

In our case, the discriminant is positive, so solutions are real.

Note: If the original equation's mention of "121I" indicates a complex component, further analysis might be needed to incorporate complex solutions. But based on the simplified algebra, these are the solutions.

Features, Pros, and Cons of the Solution Method

Features:

- Utilizes standard algebraic expansion to simplify complex expressions.
- Applies the quadratic formula efficiently.
- Provides approximate solutions with reasonable accuracy.
- Highlights the importance of discriminant analysis for complex solutions.

Pros:

- Systematic approach makes solving straightforward.
- Can be generalized to similar quadratic equations.
- Suitable for both real and complex solutions with minor adjustments.
- Encourages understanding of each step, promoting deeper learning.

Cons:

- Approximate solutions may require further refinement for precise applications.
- Assumes the equation is correctly interpreted; misinterpretation can lead to errors.
- Does not explore the possibility of multiple solutions involving complex numbers explicitly, especially if the discriminant were negative.
- The initial ambiguity in the problem statement could cause confusion without clarification.

Additional Considerations: Complex Solutions and Imaginary Components

If the original problem involves complex solutions—indicated perhaps by "121I"—then the quadratic formula becomes even more relevant. When the discriminant is negative, the solutions involve imaginary numbers:

$$x = \frac{-b \pm \sqrt{D}}{2a}$$

where $\sqrt{D}$ becomes imaginary if $D < 0$.

In our case, since $D=1064 > 0$, the solutions are real. But suppose the discriminant were negative, say $D = -1064$, then:

$$ x = \frac{-b \pm i \sqrt{|D|}}{2a} $$

and solutions would involve imaginary units.

Conclusion and Final Remarks

The process of solving the equation 5(5x + 2) + 3x = 28(x - 1) x = 121l involves methodical steps: interpreting the equation, simplifying it, transforming it into a standard quadratic form, and applying the quadratic formula. The solutions obtained—approximately $x \approx 2.164$ and $x \approx -0.164$—are real solutions, consistent with the positive discriminant.

This exercise underscores the importance of clear problem statements and systematic approaches in algebra. Whether dealing with real or complex solutions, understanding the underlying principles ensures accurate and efficient problem-solving.

In summary:

- The equation simplifies nicely into a quadratic form.
- The quadratic formula provides explicit solutions.
- Discriminant analysis guides whether solutions are real or complex.
- Precise interpretation of ambiguous parts is crucial for correct solutions.

By mastering these steps, students and enthusiasts can confidently approach similar algebraic equations, enhancing their mathematical proficiency.

Note: Always double-check the original problem for clarity, especially when encountering ambiguous notation. Clarifications ensure that solutions align accurately with the intended question.

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Solve The Equation Solve The Equation 5 5x 2 3x 28 X 1 X 121i

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