

Solve $3[-x + (2X + 1)] = x - 1$

Solve $3[-x + (2X + 1)] = x - 1$: A Comprehensive Guide to Solving Linear Equations

Mathematics can sometimes seem daunting, especially when faced with complex expressions. However, with a clear step-by-step approach, solving equations like $3[-x + (2X + 1)] = x - 1$ becomes manageable and even rewarding. In this article, we will break down this specific equation and guide you through the process of solving it efficiently, ensuring you grasp the underlying concepts and methods involved.

Understanding the Equation

Before diving into solving, it's essential to understand what the equation represents and identify its components.

Breaking Down the Equation

The given equation is:

```
```plaintext
Solve 3[-x + (2 X + 1)] = x - 1
```
```

Note:

- The variable is represented by X (or x). For consistency, we'll use x throughout.
- The expression contains brackets, multiplication, and addition/subtraction operations.
- The goal is to find the value(s) of x that satisfy the equation.

Recognizing the Type of Equation

This is a linear equation in one variable, x. Such equations can be manipulated step-by-step using algebraic principles to isolate x on one side.

Step-by-Step Solution Process

Let's explore the detailed steps to solve the equation $3[-x + (2x + 1)] = x - 1$.

Step 1: Simplify Inside the Brackets

The first step involves simplifying the expression inside the brackets:

```
```plaintext
```

$$-x + (2x + 1)$$

Calculate this:

- Distribute the negative sign:

$$-x + 2x + 1$$

- Combine like terms:

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

Result: The simplified expression inside brackets is  $x + 1$ .

## Step 2: Multiply the Simplified Expression by 3

Now, multiply the entire bracketed expression by 3:

$$3(x + 1) = 3x + 3$$

Updated Equation:

$$3x + 3 = x - 1$$

## Step 3: Isolate the Variable on One Side

Next, move all terms involving  $x$  to one side, and constants to the other:

- Subtract  $x$  from both sides:

$$3x + 3 - x = x - 1 - x$$

Simplify:

$$(3x - x) + 3 = 0 - 1$$

which becomes:

$$2x + 3 = -1$$

- Subtract 3 from both sides:

$$2x + 3 - 3 = -1 - 3$$

Simplify:

$$2x = -4$$

## Step 4: Solve for x

Finally, divide both sides by 2:

$$x = \frac{-4}{2} = -2$$

Solution:  $x = -2$

## Verifying the Solution

It's always good practice to verify your solution by substituting  $x = -2$  back into the original equation.

Original equation:

$$3[-x + (2x + 1)] = x - 1$$

Substitute  $x = -2$ :

- Calculate inside brackets:

$$-(-2) + (2(-2) + 1) = 2 + (-4 + 1) = 2 + (-3) = -1$$

- Multiply by 3:

```
```plaintext
3 (-1) = -3
```
```

- Right side:

```
```plaintext
-2 - 1 = -3
```
```

Both sides equal -3, confirming  $x = -2$  as the correct solution.

## Key Takeaways for Solving Similar Equations

Understanding how to approach and solve equations like Solve  $3[-x + (2x + 1)] = x - 1$  can be generalized to other linear equations. Here are essential points to remember:

### 1. Simplify Expressions Inside Brackets First

Always start by expanding and simplifying terms inside brackets to make the equation more manageable.

### 2. Distribute Multiplication Correctly

When a term outside brackets multiplies the entire expression, distribute it carefully.

### 3. Combine Like Terms

Group similar terms to simplify the equation further.

### 4. Use Addition or Subtraction to Isolate the Variable

Bring all variable terms to one side and constants to the other to solve for the variable.

### 5. Divide to Find the Variable's Value

Divide both sides by the coefficient of the variable to isolate it completely.

## Common Mistakes to Avoid

- Forgetting to distribute multiplication across brackets.
- Miscalculating signs, especially negatives.

- Overlooking the need to simplify before solving.
- Not verifying the solution by substitution.

## Additional Practice Problems

To solidify your understanding, try solving these similar equations:

- $3[2x - (x + 4)] = 2x + 3$
- $5[-2x + (3x - 2)] = 7 - x$
- $4[x - (2x + 5)] = -x + 10$

Work through each step using the method outlined above, and verify your solutions to build confidence.

## Conclusion

Solving equations like Solve  $3[-x + (2x + 1)] = x - 1$  involves a systematic approach: simplify expressions, distribute correctly, combine like terms, and isolate the variable. With practice, these steps become second nature, empowering you to tackle more complex algebraic problems with ease. Remember to verify your solutions to ensure accuracy and deepen your understanding of algebraic principles. Keep practicing, and algebra will soon become an accessible and enjoyable subject!

## Frequently Asked Questions

### How do I start solving the equation $3[-x + (2x + 1)] = x - 1$ ?

Begin by distributing the 3 inside the brackets to eliminate parentheses, then simplify each side step by step.

### What is the first step to simplify $3[-x + (2x + 1)]$ ?

Distribute the 3 to both terms inside the brackets:  $3 \cdot -x$  and  $3(2x + 1)$ .

### How do I distribute the 3 in the expression $3[-x + (2x + 1)]$ ?

**1)]?**

Multiply 3 by  $-x$  to get  $-3x$  and 3 by  $(2x + 1)$  to get  $6x + 3$ , then combine:  $-3x + 6x + 3$ .

**What does the equation look like after distribution?**

It becomes  $-3x + 6x + 3 = x - 1$ .

**How do I simplify the equation  $-3x + 6x + 3 = x - 1$ ?**

Combine like terms on the left side to get  $3x + 3 = x - 1$ .

**What is the next step after simplifying to  $3x + 3 = x - 1$ ?**

Subtract  $x$  from both sides to gather  $x$  terms on one side:  $3x - x + 3 = -1$ .

**How do I solve for  $x$  after simplifying to  $2x + 3 = -1$ ?**

Subtract 3 from both sides:  $2x = -1 - 3$ , which simplifies to  $2x = -4$ .

**What is the value of  $x$  in the equation  $2x = -4$ ?**

Divide both sides by 2 to find  $x$ :  $x = -4 / 2$ , so  $x = -2$ .

**How can I verify the solution  $x = -2$  in the original equation?**

Substitute  $x = -2$  into the original equation and check if both sides are equal to confirm the solution.

**What is the importance of checking the solution in the original equation?**

Checking ensures that no mistakes were made during solving and that the solution satisfies the original equation.

## **Additional Resources**

Solve  $3[-x + (2x + 1)] = x - 1$  is an algebraic equation that involves combining like terms, applying the distributive property, and isolating the variable to find its value. Whether you're a student brushing up on algebra skills or someone tackling a math problem for the first time, understanding how to approach this equation step-by-step is essential. In this comprehensive guide, we'll explore the process of solving this equation in detail, breaking down each step to ensure clarity and confidence in your problem-solving abilities.

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## Understanding the Equation: An Overview

Before diving into the solution, it's helpful to understand the structure of the equation:

$$\text{Equation: } 3[-x + (2X + 1)] = x - 1$$

At first glance, the equation appears to involve the variable  $X$  (or  $x$ ) in multiple places, with a coefficient of 3 multiplying a binomial expression. The right side is a linear expression involving  $x$ .

Key points to note:

- The expression inside the brackets:  $-x + (2X + 1)$
- The multiplication by 3
- The right side:  $x - 1$

The goal is to isolate  $x$  and find its value that satisfies the equation.

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## Step-by-Step Breakdown of the Solution Process

### Step 1: Clarify the Equation

First, ensure that the notation is consistent. In algebra,  $X$  and  $x$  typically represent the same variable unless specified otherwise. For clarity, we'll assume  $X$  and  $x$  are the same variable.

So, rewrite the equation as:

$$3[-x + (2x + 1)] = x - 1$$

### Step 2: Simplify Inside the Brackets

Focus on simplifying the expression inside the brackets:

$$-x + (2x + 1)$$

Apply the distributive property or combine like terms:

$$-x + 2x + 1$$

Combine the like terms  $-x$  and  $2x$ :

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

Now, the equation becomes:

$$3[x + 1] = x - 1$$

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### Step 3: Apply the Distributive Property

Distribute the 3 across the terms inside the brackets:

$$- 3x + 3 \cdot 1 = 3x + 3$$

The equation now reads:

$$3x + 3 = x - 1$$

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### Step 4: Isolate the Variable

The goal is to solve for x. To do so, bring all x terms to one side and constants to the other:

Subtract x from both sides:

$$- 3x + 3 - x = x - 1 - x$$

Simplify:

$$- (3x - x) + 3 = 0 - 1$$

$$- 2x + 3 = -1$$

Next, subtract 3 from both sides:

$$- 2x + 3 - 3 = -1 - 3$$

$$- 2x = -4$$

Finally, divide both sides by 2:

$$- x = -4 / 2$$

$$- x = -2$$

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### Verifying the Solution

It's always good practice to verify your solution by substituting  $x = -2$  back into the original equation:

Original equation:

$$3[-x + (2x + 1)] = x - 1$$

Substitute  $x = -2$ :

Left side:

$$3[-(-2) + (2 - 2 + 1)] = ?$$

Calculate inside the brackets:

$$-(-2) = 2$$

$$2 - 2 = -4$$

$$-4 + 1 = -3$$

So, inside the brackets:

$$2 + (-3) = -1$$

Multiply by 3:

$$3(-1) = -3$$

Right side:

$$x - 1 = -2 - 1 = -3$$

Both sides equal -3, confirming that  $x = -2$  is indeed the solution.

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### Additional Insights and Tips for Solving Similar Equations

#### 1. Always Simplify Inside Parentheses First

Breaking down complex expressions inside parentheses or brackets simplifies the problem and reduces the chance of errors.

#### 2. Apply the Distributive Property Carefully

Distribute coefficients across terms inside parentheses to eliminate brackets before combining like terms.

#### 3. Combine Like Terms

Consolidate similar variables and constants to simplify the equation.

#### 4. Maintain Balance

When moving terms across the equation, do the same operation (addition/subtraction) on both sides to keep the equation balanced.

#### 5. Always Verify Your Solution

Substitute your solution back into the original equation to ensure correctness.

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### Common Mistakes to Avoid

- Misapplying the distributive property: Remember to multiply each term inside parentheses by the coefficient outside.
- Incorrectly combining like terms: Only like terms (variables with the same exponent) can be combined.
- Forgetting to perform the same operation on both sides: This can lead to incorrect solutions.
- Neglecting to verify solutions: Always double-check by substitution.

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### Summary: The Complete Solution Path

Here's a quick recap of solving  $3[-x + (2x + 1)] = x - 1$ :

1. Recognize that  $-x + (2x + 1)$  simplifies to  $x + 1$ .
2. Distribute the 3:  $3(x + 1) = 3x + 3$ .
3. Set up the simplified equation:  $3x + 3 = x - 1$ .
4. Move all  $x$  terms to one side:  $3x - x = -1 - 3$ .
5. Simplify:  $2x = -4$ .
6. Solve for  $x$ :  $x = -2$ .
7. Verify by substitution, confirming the solution.

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### Final Thoughts

Mastering the process of solving equations like  $\text{Solve } 3[-x + (2x + 1)] = x - 1$  enhances your algebra skills and builds confidence in tackling more complex problems. Always approach such equations methodically: simplify inside parentheses, distribute coefficients carefully, combine like terms, and verify your answer. With practice, you'll find that solving linear equations becomes an intuitive and rewarding experience.

If you're looking to further improve your algebra proficiency, consider practicing similar equations involving distributive properties, combining like terms, and solving for variables in various contexts. Remember, patience and attention to detail are key to becoming proficient in algebra!

## **Solve 3 X 2 X 1 X 1**

Solve 3 X 2 X 1 X 1

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