

$$-12 - 9(t-3) = 78 \quad T=?$$

$-12 - 9(t-3) = 78 \quad T=?$ is an algebraic expression involving variables and constants that can be solved to find the value of T in terms of the variable t . Understanding how to approach such equations is essential for students and individuals interested in algebra, as it lays the foundation for more advanced mathematical concepts. In this comprehensive guide, we will explore the step-by-step process to solve this equation, discuss the importance of algebraic manipulation, and provide practical tips to master similar problems.

Understanding the Equation: $-12 - 9(t-3) = 78 \quad T=?$

Before diving into the solution, it's crucial to understand the structure of the equation and identify its components:

- The constants: -12 and 78
- The variable: T (which appears to be multiplied by some expression involving t)
- The expression: $(t-3)$, which is multiplied by -9

This equation appears to be a linear algebraic equation with variables T and t . The goal is to isolate T and express it explicitly as a function of t .

Step-by-Step Solution of the Equation

Let's approach this systematically.

Step 1: Rewrite the Equation for Clarity

The original equation is:

```
```plaintext
-12 - 9(t - 3) = 78 T
```
```

The equation involves T on the right side, multiplied by 78 , and the left side involving constants and a term with t .

Step 2: Simplify the Left Side

Begin by expanding the term $-9(t - 3)$:

```
```plaintext
-9(t - 3) = -9t + 27
```
```

Now, rewrite the entire equation:

```
```plaintext
-12 + (-9t + 27) = 78 T
```
```

Combine like terms on the left:

```
```plaintext
(-12 + 27) - 9t = 78 T
```
```

Simplify:

```
```plaintext
15 - 9t = 78 T
```
```

Step 3: Isolate T

To find T, divide both sides of the equation by 78:

```
```plaintext
T = (15 - 9t) / 78
```
```

This is the explicit expression for T in terms of t.

Step 4: Simplify the Expression

Reduce the fraction if possible:

Note that numerator and denominator are divisible by 3:

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```plaintext
T = [(15 ÷ 3) - (9t ÷ 3)] / (78 ÷ 3) = (5 - 3t) / 26
```
```

Therefore, the simplified form of T is:

```
```plaintext
T = (5 - 3t) / 26
```
```

Interpreting the Solution

The derived formula:

```
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```

$$T = (5 - 3t) / 26$$

allows you to compute  $T$  for any given value of  $t$ . This solution shows that  $T$  is a linear function of  $t$ , with a slope of  $-3/26$  and a  $y$ -intercept of  $5/26$ .

## Practical Applications of Such Equations

While this equation might seem straightforward, understanding how to manipulate and solve similar equations is fundamental in various fields:

- **Physics:** Calculating related physical quantities where one depends linearly on another, such as velocity and time.
- **Economics:** Modeling relationships between variables like supply and demand or cost and production levels.
- **Engineering:** Designing systems where variables are interdependent, such as voltage and current in circuits.
- **Data Analysis:** Fitting linear models to data points to predict unknown values.

Mastering the algebraic manipulation exemplified here enables problem-solvers to approach complex real-world problems effectively.

## Additional Tips for Solving Similar Equations

To enhance your algebra skills, consider these practical tips:

### 1. Always Simplify First

Start by expanding parentheses and combining like terms to make the equation more manageable.

### 2. Isolate the Variable Step-by-Step

Use inverse operations systematically—addition/subtraction first, then multiplication/division.

### 3. Check Your Work

After finding a solution, substitute it back into the original equation to verify correctness.

## 4. Practice with Variations

Work on equations with different structures, including quadratic, exponential, or systems of equations.

## Common Mistakes to Avoid

Be mindful of typical errors:

- Failing to expand parentheses correctly.
- Neglecting to distribute negative signs properly.
- Forgetting to divide both sides of the equation when isolating the variable.
- Overlooking the importance of simplifying fractions where possible.

By paying attention to these details, you'll improve accuracy and confidence.

## Conclusion: Mastering the Algebraic Equation

In summary, solving the equation  $-12 - 9(t-3) = 78$   $T=?$  involves expanding brackets, combining like terms, and isolating the variable  $T$ . The final solution:

```
```plaintext
T = (5 - 3t) / 26
```
```

provides a clear relationship between  $T$  and  $t$ , enabling calculations for any given value of  $t$ . Developing proficiency in such algebraic manipulations is invaluable across scientific, technical, and everyday contexts. With consistent practice and attention to detail, you can confidently tackle similar equations and enhance your mathematical problem-solving skills.

## Frequently Asked Questions

**How do I solve the equation  $-12 - 9(t - 3) = 78$  for  $T$ ?**

First, expand the equation:  $-12 - 9t + 27 = 78$ . Combine like terms:  $15 - 9t = 78$ . Subtract 15 from both sides:  $-9t = 63$ . Divide both sides by  $-9$ :  $T = -7$ .

**What is the value of  $T$  in the equation  $-12 - 9(t-3) =$**

**78?**

T equals -7.

**Can you show step-by-step how to find T in  $-12 - 9(t - 3) = 78$ ?**

Yes. Expand:  $-12 - 9t + 27 = 78$ . Simplify:  $15 - 9t = 78$ . Subtract 15:  $-9t = 63$ . Divide by -9:  $T = -7$ .

**Is the solution to the equation  $-12 - 9(t - 3) = 78$  unique?**

Yes, the linear equation has a unique solution, which is  $T = -7$ .

**What type of equation is  $-12 - 9(t-3) = 78$ , and how do you solve it?**

It's a linear equation. To solve, expand the brackets, combine like terms, isolate T, and divide to find T.

**How does simplifying the equation help in finding the value of T?**

Simplifying reduces the equation to a straightforward linear form, making it easier to isolate and solve for T accurately.

## **Additional Resources**

Mathematical Expression Analysis: Understanding and Solving  $-12 - 9(t - 3) = 78$

In the world of algebra, equations serve as the foundation for problem-solving, critical thinking, and mathematical reasoning. Today, we delve into a specific algebraic problem:  $-12 - 9(t - 3) = 78$ , with the goal of determining the value of T. This problem exemplifies the application of fundamental algebraic principles such as distribution, combining like terms, and isolating variables. Let's explore this equation comprehensively, from understanding its structure to solving for the unknown.

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## **Deciphering the Equation: Components and Structure**

Before jumping into the solution, it's essential to understand each part of the equation:

Equation:  
 $-12 - 9(t - 3) = 78$

Variables:

-  $T$  (or  $T$ ), which is the unknown we want to solve for.

Constants:

- Numbers such as  $-12$ ,  $-9$ ,  $3$ , and  $78$ .

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## Understanding the Components

-  $-12$ : A constant term on the left side, representing a fixed value that shifts the equation.

-  $-9(t - 3)$ : A product involving a coefficient ( $-9$ ) and a binomial expression  $(t - 3)$ . This indicates that distribution is necessary.

-  $78$ : The constant on the right side, which the entire left expression equals.

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## Step-by-Step Approach to Solving the Equation

The process involves several stages: expanding, simplifying, and isolating the variable.

### 1. Applying the Distributive Property

The distributive property states that:

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

In this case, we distribute  $-9$  across  $(t - 3)$ :

$$-9(t - 3) = -9t + (-9)(-3) = -9t + 27$$

Note: Since  $-9$  multiplied by  $-3$  yields  $+27$ .

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### 2. Rewrite the Equation with Distribution

Replacing  $-9(t - 3)$  with  $-9t + 27$ :

$$-12 - 9t + 27 = 78$$

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### 3. Combine Like Terms

Combine the constants -12 and 27:

$$(-12 + 27) - 9t = 78$$

$$15 - 9t = 78$$

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#### **4. Isolate the Variable Term**

Subtract 15 from both sides to move constants to the right:

$$15 - 9t - 15 = 78 - 15$$

$$-9t = 63$$

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#### **5. Solve for T**

Divide both sides by -9 to isolate t:

$$t = 63 / -9$$

$$t = -7$$

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### **Final Result and Interpretation**

The solution to the equation  $-12 - 9(t - 3) = 78$  is:

$$T = -7$$

This indicates that when T equals -7, the original equation balances perfectly.

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### **In-Depth Analysis: Why This Method Works**

Understanding why the solution process works is crucial for mastering algebra:

Distributive Property

This property allows us to eliminate parentheses and write the equation in a linear form, making it easier to combine like terms. It's especially useful when dealing with equations involving products of coefficients and binomials.

## Combining Like Terms

Simplifying constants reduces the complexity of the equation, leading to a straightforward variable isolation.

## Algebraic Inversion

Dividing both sides by the coefficient of the variable (here, -9) is the final step to neatly isolate T.

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## Common Pitfalls and Tips for Success

When tackling similar equations, keep these pointers in mind:

- Always distribute carefully: Double-check your multiplication, especially with negative numbers.
- Combine constants accurately: Negative and positive constants can be tricky; use scratch work if needed.
- Maintain balance: Whatever operation you perform on one side, do the same on the other.
- Check your solution: Substitute  $T = -7$  back into the original equation to verify correctness.

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## Verification: Confirming the Solution

Let's verify that  $T = -7$  satisfies the original equation:

Original equation:

$$-12 - 9(t - 3) = 78$$

Substitute -7:

$$-12 - 9(-7 - 3) = 78$$

Calculate inside parentheses:

$$-7 - 3 = -10$$

Multiply:

$$-9 \cdot -10 = 90$$

Now, sum:

$$-12 + 90 = 78$$

The left side equals 78, which matches the right side, confirming our solution.

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## Broader Implications and Applications

While this specific problem is an algebraic exercise, the principles involved extend to various real-world scenarios:

- Financial calculations: Adjusting for discounts or interest rates.
- Physics problems: Calculating forces or motion where variables are unknown.
- Engineering designs: Balancing equations to meet specifications.
- Data analysis: Solving for parameters in models.

Understanding how to manipulate and solve equations like  $-12 - 9(t - 3) = 78$  equips learners with critical tools for analytical thinking and problem-solving across disciplines.

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## Conclusion: Mastery Through Practice

The algebraic journey from the initial equation to the solution  $T = -7$  demonstrates the importance of systematic reasoning, attention to detail, and foundational algebraic rules. By mastering these steps—distribution, combining like terms, and variable isolation—students and professionals alike can confidently tackle a wide array of mathematical challenges.

Remember, practice makes perfect: working through similar problems enhances your skill and intuition. Whether in academic settings or real-world applications, a thorough understanding of such equations forms the backbone of quantitative reasoning.

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In summary:

- The original equation  $-12 - 9(t - 3) = 78$  simplifies through distribution to  $-12 - 9t + 27 = 78$ .
- Combining constants yields  $15 - 9t = 78$ .
- Subtracting 15 from both sides results in  $-9t = 63$ .
- Dividing both sides by  $-9$  gives  $T = -7$ .

This comprehensive analysis underscores the importance of methodical problem-solving in algebra, transforming a complex-looking equation into a straightforward solution.

**[12 9 T 3 78 T](#)**

12 9 T 3 78 T

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