

What Is The Answer To $-3(9-x)+6x$

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Understanding algebraic expressions and how to evaluate them is a fundamental skill in mathematics. When presented with an expression like $-3(9-x)+6x$, learners often ask, "What is the answer to $-3(9-x)+6x$?" This article aims to provide a comprehensive explanation of how to simplify and evaluate this expression step by step, making it accessible for students at various levels of mathematical proficiency.

Breaking Down the Expression: $-3(9-x)+6x$

Before diving into the solution, it's essential to understand the components of the expression:

- The expression contains a distribution component: $-3(9-x)$
- It also includes a linear term: $+6x$

Understanding these parts allows us to approach the problem systematically.

Step-by-Step Solution to $-3(9-x)+6x$

Let's explore how to evaluate this expression thoroughly.

Step 1: Apply the Distributive Property

The distributive property states that for any numbers a , b , and c :

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

In our case, we have:

$$-3(9 - x) = -3 \cdot 9 + (-3) \cdot (-x)$$

Calculating each term:

$$-3 \cdot 9 = -27$$

$$-3 \cdot (-x) = +3x$$

Note: The negative sign distributes to both terms inside the parentheses, changing the signs accordingly.

Step 2: Rewrite the Expression

After distributing, the original expression becomes:

$$-27 + 3x + 6x$$

Step 3: Combine Like Terms

The terms $3x$ and $6x$ are both ' x ' terms and can be combined:

$$3x + 6x = 9x$$

Now, the expression simplifies to:

$$-27 + 9x$$

Final Simplified Expression

The simplified form of $-3(9-x)+6x$ is:

$$-27 + 9x$$

This is a linear expression that can be further evaluated if a specific value of x is provided.

Evaluating the Expression for Different Values of x

To find the answer for specific x -values, substitute the value into the simplified expression.

Example 1: $x = 0$

$$-27 + 9(0) = -27 + 0 = -27$$

Example 2: $x = 1$

$$-27 + 9(1) = -27 + 9 = -18$$

Example 3: $x = 3$

$$-27 + 9(3) = -27 + 27 = 0$$

Example 4: $x = -2$

$$-27 + 9(-2) = -27 - 18 = -45$$

Understanding the Role of Variables and Coefficients

In the expression $-27 + 9x$, the coefficient 9 indicates that for every increase of 1 in x , the value of the expression increases by 9. Conversely, decreasing x by 1 decreases the overall value by 9.

Key points:

- The slope of the line represented by this expression is 9.
- The y-intercept is -27, which is the value of the expression when $x = 0$.

Graphing the Expression

The simplified expression $-27 + 9x$ can be graphed on a coordinate plane as a straight line.

Steps to graph:

1. Plot the y-intercept at $(0, -27)$.
2. Use the slope (rise over run) of 9 to find additional points:
 - From $(0, -27)$, move up 9 units and right 1 unit to reach $(1, -18)$.
 - From $(0, -27)$, move down 9 units and right 1 unit to reach $(1, -36)$.
3. Draw a straight line passing through these points.

Interpretation:

This graph illustrates how the value of the expression changes with x , highlighting the linear relationship.

Real-Life Applications of Linear Expressions

Understanding how to manipulate and evaluate expressions like $-3(9-x)+6x$ is

valuable beyond pure mathematics. Linear expressions appear in numerous real-world contexts:

- Financial calculations: determining total cost based on unit price and quantity.
- Physics: calculating displacement over time with constant velocity.
- Economics: modeling supply and demand relationships.

Example:

Suppose a company sells x units of a product, with fixed costs of \$27 and a profit of \$9 per unit. The profit function can be modeled as:

$$\text{Profit} = -27 + 9x$$

Evaluating this at different sales levels helps in decision-making and financial planning.

Common Mistakes and How to Avoid Them

When simplifying algebraic expressions, students often make errors. Here are some common mistakes related to the expression $-3(9-x)+6x$:

1. Forgetting to distribute the negative sign properly:

- Incorrect: $-3(9-x) = -39 - x = -27 - x$
- Correct: $-3(9-x) = -39 + (-3)(-x) = -27 + 3x$

2. Combining unlike terms:

- Only combine terms with the same variable and exponent.

3. Sign errors during distribution:

- Always carefully distribute negative signs.

Tip: Write each step clearly and double-check each distribution and combination to ensure accuracy.

Practice Problems to Reinforce Learning

To solidify understanding, try solving these problems:

1. Simplify the expression: $-2(5 + x) + 4x$

2. Evaluate the expression $-3(7 - x) + 5x$ when $x = 2$
3. Graph the simplified expression of $-4(3 - x) + 2x$
4. Find the value of x when $-27 + 9x = 0$
5. Write a real-world scenario where the expression $-27 + 9x$ could be used, and interpret its meaning.

Solutions:

1. $-2(5 + x) + 4x = -10 - 2x + 4x = -10 + 2x$
2. $-3(7 - 2) + 5(2) = -3(5) + 10 = -15 + 10 = -5$
3. Simplify: $-4(3 - x) + 2x = -12 + 4x + 2x = -12 + 6x$
4. Set the expression to zero: $-27 + 9x = 0 \Rightarrow 9x = 27 \Rightarrow x = 3$
5. Scenario: A factory produces x units, with a fixed cost of \$27 and a profit of \$9 per unit. The total profit can be modeled as $-27 + 9x$. When $x = 10$, the profit is $-27 + 9(10) = -27 + 90 = \63 , indicating a profitable production level.

Conclusion

In summary, to find the answer to $-3(9-x)+6x$, the key steps involve applying the distributive property, simplifying the resulting expression, and then substituting specific values for x as needed. The simplified form, $-27 + 9x$, reveals the linear relationship between the variable x and the overall value of the expression. Mastery of such algebraic manipulations is foundational for further studies in mathematics, science, economics, and many other fields. With practice, evaluating and graphing these expressions becomes intuitive, empowering students to solve complex problems with confidence.

Frequently Asked Questions

What is the simplified form of the expression $-3(9 - x) + 6x$?

The simplified form is $-27 + 3x$.

How do you solve the equation $-3(9 - x) + 6x$ for x ?

Distribute -3 to get $-27 + 3x$, then combine like terms if needed, depending on the equation setup.

What is the value of x when $-3(9 - x) + 6x$ equals zero?

Set $-27 + 3x = 0$, then solve for x : $3x = 27$, so $x = 9$.

Can you factor the expression $-3(9 - x) + 6x$?

Yes, it simplifies to $3x - 27$, which can be factored as $3(x - 9)$.

Is the expression $-3(9 - x) + 6x$ linear or quadratic?

It is a linear expression because it simplifies to $3x - 27$.

What real-world problem could involve evaluating $-3(9 - x) + 6x$?

For example, calculating net profit where costs and revenues depend linearly on x , with adjustments represented by the expression.

How do you interpret the negative coefficient in $-3(9 - x)$?

The negative coefficient indicates that as x increases, the term $-3(9 - x)$ decreases, reflecting an inverse relationship.

What is the importance of distributing in the expression $-3(9 - x)$?

Distributing helps to expand and simplify the expression for easier solving or analysis.

If x equals 4, what is the value of $-3(9 - x) + 6x$?

Plugging in $x=4$: $-3(9 - 4) + 6(4) = -3(5) + 24 = -15 + 24 = 9$.

Additional Resources

What Is The Answer To $-3(9-x)+6x$: A Comprehensive Explanation

Mathematics often presents us with expressions that require careful analysis to understand their structure and to find their solutions. One such expression is $-3(9 - x) + 6x$. While this may seem straightforward at first glance, exploring it in detail reveals key concepts about algebraic manipulation, simplifying expressions, and solving for variables. Understanding how to approach this problem not only helps in solving similar expressions but also solidifies foundational algebra skills. This article aims to thoroughly analyze the expression, break down the steps involved in simplifying it, and finally determine its answer.

Understanding the Expression: $-3(9 - x) + 6x$

Before diving into the calculations, it's important to understand what the expression represents and its components.

Breaking Down the Components

The expression $-3(9 - x) + 6x$ consists of:

- A distributive term: $-3(9 - x)$, which involves multiplying -3 by each term inside the parentheses.
- A linear term: $6x$, which is simply 6 times the variable x .

This structure suggests that the expression is linear with respect to x . The goal typically is to simplify the expression or, in some cases, solve for x when the expression equals a certain value.

Possible Goals with the Expression

- Simplify the expression to a form like $ax + b$.
- Solve for x when the expression equals a specific number.
- Understand the behavior of the expression as x varies.

In this article, we focus on simplifying the expression to find its most basic form, which helps in understanding its characteristics and potential solutions.

Step-by-Step Simplification of $-3(9 - x) + 6x$

The process of simplifying algebraic expressions involves applying fundamental algebra rules, particularly the distributive property and combining like terms.

Applying the Distributive Property

The distributive property states that:

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

Applying this to $-3(9 - x)$:

$$-3 \times 9 + (-3) \times (-x)$$

$$-27 + 3x$$

Now, the expression becomes:

$$-27 + 3x + 6x$$

Combining Like Terms

The terms involving x are $3x$ and $6x$. Combining these:

$$3x + 6x = 9x$$

The simplified expression is:

$$-27 + 9x$$

This form is often the most useful for analysis, as it clearly shows the linear relationship between x and the overall value of the expression.

Understanding the Simplified Expression

The simplified form:

$$-27 + 9x$$

is a linear expression in terms of x . It has the following features:

- Slope (coefficient of x): 9
- Y-intercept (constant term): -27

This means:

- For each unit increase in x , the value of the expression increases by 9.
- When $x = 0$, the value of the expression is -27.

Graphical Representation

Plotting the expression as a function of x yields a straight line with slope 9 and intercept -27. This visualization can help in understanding the behavior of the expression across different values of x .

Answering Common Questions About the Expression

1. What is the value of the expression for specific values of x?

You can plug in values to find the corresponding value:

- If $x = 0$:
$$-27 + 9(0) = -27$$
- If $x = 1$:
$$-27 + 9(1) = -27 + 9 = -18$$
- If $x = 3$:
$$-27 + 9(3) = -27 + 27 = 0$$

This demonstrates the linear growth of the expression as x increases.

2. How to find the value of x when the expression equals a certain number?

Suppose we want to find x when the expression equals zero:

$$\begin{aligned} -27 + 9x &= 0 \\ 9x &= 27 \\ x &= 3 \end{aligned}$$

Similarly, for any target value k :

$$\begin{aligned} -27 + 9x &= k \\ 9x &= k + 27 \\ x &= \frac{k + 27}{9} \end{aligned}$$

Applications and Significance

Understanding how to simplify and analyze such expressions is vital in various fields, including engineering, physics, economics, and computer science. Linear expressions like $-27 + 9x$ often model real-world phenomena such as cost functions, velocity equations, or population growth models.

Features of the Expression

- Linear nature: Easy to analyze and graph.
- Predictable behavior: Slope indicates how the output changes with x .
- Flexibility: Can be easily solved for specific x or specific output values.

Pros and Cons

Pros:

- Simple to understand and manipulate.
- Directly visualizable as a line on a graph.

- Easy to solve for specific values.

Cons:

- Limited to linear relationships; cannot model more complex behaviors.
- Assumes the relationship between variables remains constant.

Conclusion: Final Thoughts on the Expression

The expression $-3(9 - x) + 6x$ simplifies cleanly to $-27 + 9x$, a straightforward linear function. By applying the distributive property and combining like terms, we've uncovered its underlying structure, which reveals how the value of the expression depends linearly on x . Whether used in algebraic equations or real-world modeling, understanding this process enhances problem-solving skills and nurtures a deeper appreciation of algebra's power. Recognizing the features, applications, and methods of simplifying such expressions paves the way for tackling more complex mathematical challenges with confidence.

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