

If $X = 4$ And $Y = 6$, Evaluate The Following Expressions: $3(4x + 3y)$

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Understanding the Problem

Before delving into the calculations, it's essential to understand what the problem is asking. The expression provided is:

$$3(4x + 3y)$$

Given the values:

- $x = 4$
- $y = 6$

The goal is to evaluate the entire expression with these values substituted in. This process involves recognizing the order of operations, performing substitutions, and simplifying the expression step by step.

Step 1: Recognize the Components of the Expression

Breaking Down the Expression

The expression can be broken down into parts:

- The term $4x$
- The term $3y$
- The sum $4x + 3y$
- The multiplication of this sum by 3

Understanding these parts helps in organizing the calculation systematically.

Why Is It Important?

- Simplifies the calculation process
- Prevents errors
- Clarifies the order of operations (PEMDAS/BODMAS rules)

Step 2: Substitute the Given Values

Substitution Process

- Replace (x) with 4
- Replace (y) with 6

This results in the expression:

$$3(4 \times 4 + 3 \times 6)$$

Step 3: Simplify Inside the Parentheses

Calculate Each Term

- $4 \times 4 = 16$
- $3 \times 6 = 18$

Now, the expression becomes:

$$3(16 + 18)$$

Sum Inside the Parentheses

- $16 + 18 = 34$

So, the expression simplifies to:

$$3 \times 34$$

Step 4: Final Calculation

Multiplying the Result

- $3 \times 34 = 102$

Therefore, the value of the expression when $x = 4$ and $y = 6$ is 102.

Understanding the Calculation Process in Depth

Order of Operations (PEMDAS/BODMAS)

The process used aligns with the standard order:

1. Parentheses: Simplify $(4x + 3y)$
2. Multiplication: Multiply the sum by 3

This ensures the calculation is accurate and follows mathematical conventions.

Importance of Substitution

Substituting known values before performing operations simplifies the process, reduces errors, and makes calculations more manageable.

Alternative Methods and Checks

Using a Step-by-Step Approach

- First, evaluate $(4x)$ and $(3y)$ separately
- Then, sum these two results
- Finally, multiply by 3

Verifying the Result

To confirm the accuracy:

- Recalculate $(4 \times 4 = 16)$
- Recalculate $(3 \times 6 = 18)$
- Sum: $(16 + 18 = 34)$
- Multiply: $(3 \times 34 = 102)$

The consistency in results confirms the correctness.

Implications and Real-World Applications

Why Understanding Such Calculations Matters

- In Algebra: Fundamental for solving equations
- In Engineering and Science: Used in calculations involving formulas and models
- In Daily Life: Budgeting, measurements, and estimations

Example Scenario

Suppose x and y represent quantities like distances or costs, and the expression models a total cost or distance based on these variables. Correctly evaluating such expressions is crucial for accurate planning or analysis.

Summary

- The given expression is $3(4x + 3y)$
- Substituting $x = 4$ and $y = 6$
- Simplify inside parentheses: $(4 \times 4 + 3 \times 6 = 16 + 18 = 34)$
- Multiply by 3: $(3 \times 34 = 102)$

The final answer is 102.

Conclusion

Evaluating algebraic expressions requires a structured approach—substitution, simplification, and adherence to the order of operations. By carefully breaking down the problem and performing each step diligently, we find that when $x = 4$ and $y = 6$, the value of $3(4x + 3y)$ is 102. Mastery of such fundamental skills lays the groundwork for more advanced mathematical concepts and real-life problem-solving.

Frequently Asked Questions

What is the value of the expression $3(4x + 3y)$ when $x = 4$ and $y = 6$?

First, substitute the values: $3(4 \cdot 4 + 3 \cdot 6) = 3(16 + 18) = 3(34) = 102$.

How do you evaluate $3(4x + 3y)$ with given values $x=4$ and $y=6$?

Replace x with 4 and y with 6, then simplify inside the parentheses: $3(4 \cdot 4 + 3 \cdot 6) = 3(16 + 18)$, which equals $3 \cdot 34 = 102$.

What is the step-by-step solution for $3(4x + 3y)$ given $x=4$ and $y=6$?

Step 1: Calculate $4x = 4 \cdot 4 = 16$. Step 2: Calculate $3y = 3 \cdot 6 = 18$. Step 3: Add these: $16 + 18 = 34$. Step 4: Multiply by 3: $3 \cdot 34 = 102$.

If $X=4$ and $Y=6$, what is the simplified form of $3(4x + 3y)$?

The simplified value is 102.

Can you verify the answer for $3(4x + 3y)$ with $X=4$ and $Y=6$?

Yes, substituting gives $3(16 + 18) = 3(34) = 102$, confirming the answer.

What mathematical principles are used to evaluate $3(4x + 3y)$ with given values?

Substitution, order of operations (parentheses first), multiplication, and addition are used.

How does changing the values of X and Y affect the value of $3(4x + 3y)$?

Changing X and Y will change the sum inside the parentheses, which when multiplied by 3, will alter

the final result accordingly.

What is the importance of parentheses in the expression $3(4x + 3y)$?

Parentheses indicate that $4x + 3y$ should be evaluated first before multiplying by 3, ensuring correct order of operations.

Additional Resources

If $X = 4$ And $Y = 6$, Evaluate The Following Expressions: $3(4x + 3y)$

When tackling algebraic expressions, understanding the fundamentals of substitution and operation order is essential for arriving at the correct result. The problem “If $X = 4$ And $Y = 6$, evaluate the following expression: $3(4x + 3y)$ ” serves as an excellent illustration of these core concepts. While it appears straightforward at first glance, a detailed exploration reveals the importance of precise calculation steps, clear comprehension of algebraic rules, and the practical importance of these skills in various fields ranging from engineering to finance.

This article aims to dissect this problem thoroughly, breaking down each component to foster both clarity and confidence in solving similar algebraic expressions. Whether you're a student brushing up on basic algebra or an enthusiast interested in the logical process behind calculations, this guide will walk you through the necessary steps in a clear, professional manner.

Understanding the Problem: The Significance of the Given Values

Before delving into calculations, it's crucial to understand what the problem states and what it asks for. The problem provides specific values for variables X and Y :

- $X = 4$
- $Y = 6$

And presents an algebraic expression:

- $3(4x + 3y)$

The goal is to evaluate this expression when the variables X and Y take those given values.

Key points to understand:

- The expression involves variables (x and y).
- The values for these variables are provided.
- The expression involves both multiplication and addition operations.
- The order of operations (often abbreviated as PEMDAS or BODMAS) must be followed.

Step 1: Recognizing the Components of the Expression

The expression $3(4x + 3y)$ consists of:

- A coefficient outside the parentheses: 3
- Inside the parentheses:
 - $4x$: four times x
 - $3y$: three times y
- The addition inside parentheses: $4x + 3y$

Understanding the structure is essential because it determines how the calculation proceeds.

Note: The expression can be viewed as:

$$> 3 ((4 x) + (3 y))$$

which emphasizes the multiplication and addition operations.

Step 2: Substituting the Given Values

Using the provided values:

- $x = 4$
- $y = 6$

we replace the variables with their numerical counterparts:

$$> 3 ((4 4) + (3 6))$$

This step is crucial because substitution transforms the algebraic expression into a numerical one, ready for straightforward calculation.

Step 3: Calculating the Inner Terms

Now, evaluate each part inside the parentheses:

- $4 \cdot 4 = 16$
- $3 \cdot 6 = 18$

The expression now simplifies to:

$$> 3 (16 + 18)$$

Step 4: Performing the Addition Inside the Parentheses

Add the two inner results:

$$> 16 + 18 = 34$$

The expression reduces to:

$$> 3 \times 34$$

Step 5: Final Multiplication

Multiply 3 by 34:

$$> 3 \times 34 = 102$$

Thus, the value of the original expression when $X = 4$ and $Y = 6$ is 102.

Why This Process Matters: The Importance of Order of Operations

The calculation process underscores the significance of following the correct order of operations:

- Parentheses first: Simplify the expression inside parentheses.
- Multiplication and division: Perform these next, from left to right.
- Addition and subtraction: Complete these last.

In this example, neglecting the parentheses or the order could lead to miscalculations, such as multiplying 3 by $4x$ before adding $3y$, which would be incorrect.

Practical Applications of Evaluating Algebraic Expressions

While this example is straightforward, similar principles are used in various real-world contexts:

- Financial calculations: Determining interest or investment returns based on variable inputs.
- Engineering: Computing forces, stresses, or other parameters that depend on multiple variables.
- Computer programming: Assigning and manipulating variables in algorithms.
- Data analysis: Applying formulas to datasets where variables change dynamically.

Mastering the skill of evaluating algebraic expressions accurately is foundational for professionals in science, technology, engineering, and mathematics (STEM).

Additional Tips for Success

To become proficient in evaluating algebraic expressions like this, consider these tips:

- Always identify variables and their values: Clarify what each symbol represents.
- Follow the order of operations meticulously: Parentheses, exponents, multiplication/division, addition/subtraction.
- Double-check substitutions: Confirm variables are replaced correctly.
- Break down complex expressions: Simplify step-by-step rather than rushing to the final answer.
- Practice with diverse problems: Exposure to different structures solidifies understanding.

Summary: The Power of Systematic Calculation

In conclusion, evaluating the expression $3(4x + 3y)$ with $X = 4$ and $Y = 6$ involves a systematic approach that emphasizes understanding the structure, careful substitution, and strict adherence to the order of operations. The final answer, 102, exemplifies how foundational algebraic skills translate into solving real-world problems with accuracy and confidence.

Whether in academic settings or professional environments, the ability to manipulate and evaluate algebraic expressions is a vital competence. This exercise not only reinforces core mathematical principles but also demonstrates the clarity and precision necessary for complex problem-solving tasks across disciplines.

In essence, the process is straightforward: substitute, simplify inside parentheses, perform multiplication and addition in order, and arrive at the final result. As you practice and internalize this methodology, evaluating similar expressions becomes an intuitive part of your mathematical toolkit, empowering you to tackle more advanced algebraic challenges with ease.

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