

Use The Distributive Property To Evaluate The Following Expression: $9 \times (4 + 9)$. Show Your Work In Your

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Understanding how to evaluate algebraic expressions is a fundamental skill in mathematics, especially in algebra. One of the most useful tools for simplifying and solving expressions involving parentheses and multiplication is the distributive property. In this article, we will explore how to apply the distributive property to evaluate the expression $9 \times (4 + 9)$ and demonstrate each step clearly. Whether you're a student preparing for exams or someone looking to strengthen your math skills, understanding this process will help you approach similar problems with confidence.

What Is The Distributive Property?

Before diving into the evaluation process, it's important to understand what the distributive property is and how it works.

Definition of the Distributive Property

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

$$a \times (b + c) = (a \times b) + (a \times c)$$

This property allows you to distribute the multiplication over addition inside parentheses. Essentially, you multiply each addend separately by the factor outside the parentheses and then sum the results.

Why Is The Distributive Property Useful?

- Simplifies complex expressions involving parentheses.
- Facilitates mental math and quick calculations.
- Prepares students for algebraic solving and factoring.
- Provides a systematic approach to evaluate expressions efficiently.

Step-by-Step Evaluation of $9 \times (4 + 9)$

Let's apply the distributive property to evaluate the expression $9 \times (4 + 9)$ step by step.

Step 1: Recognize the Expression Structure

The expression is:

$$9 \times (4 + 9)$$

It involves multiplication over a sum inside parentheses. According to the distributive property, we can distribute the 9 to both 4 and 9 separately.

Step 2: Apply the Distributive Property

Using the formula:

$$a \times (b + c) = (a \times b) + (a \times c)$$

Set:

- $a = 9$
- $b = 4$
- $c = 9$

So,

$$9 \times (4 + 9) = (9 \times 4) + (9 \times 9)$$

Step 3: Calculate Each Multiplication

Now, perform each multiplication separately:

- $9 \times 4 = 36$
- $9 \times 9 = 81$

Step 4: Sum the Results

Add the two products:

$$36 + 81 = 117$$

Step 5: Final Answer

The value of the original expression is 117.

Alternative Methods for Evaluation

While the distributive property provides a straightforward approach, there are other methods to evaluate expressions like this.

Method 1: Simplify Inside the Parentheses First

- First, compute the sum inside the parentheses:

$$4 + 9 = 13$$

- Then multiply:

$$9 \times 13 = 117$$

This method involves directly simplifying the parentheses before multiplication, which is often faster for simple addition.

Method 2: Mental Math Approach

- Recognize that 9×13 can be broken down as:

$$9 \times 10 + 9 \times 3 = 90 + 27 = 117$$

This mental strategy leverages distribution in your head without writing steps down.

Understanding When To Use The Distributive Property

The distributive property is particularly useful in the following scenarios:

- When dealing with algebraic expressions involving variables and parentheses.
- When simplifying numerical expressions with parentheses.
- When performing mental math or quick calculations.
- When factoring expressions in algebra.

Examples of applicable expressions:

- $7 \times (3 + 5)$
- $4 \times (8 + 2)$
- $6 \times (10 - 3)$ — note that subtraction can be handled similarly by distributing the negative.

Practice Problems To Strengthen Your Skills

Below are some practice problems that utilize the distributive property. Try solving these to reinforce your understanding.

1. Evaluate $5 \times (2 + 7)$
2. Calculate $3 \times (6 + 4)$
3. Find the value of $8 \times (5 + 12)$
4. Evaluate $10 \times (3 + 9)$
5. Compute $7 \times (8 + 15)$

Solutions:

1. $5 \times (2 + 7) = (5 \times 2) + (5 \times 7) = 10 + 35 = 45$
2. $3 \times (6 + 4) = (3 \times 6) + (3 \times 4) = 18 + 12 = 30$
3. $8 \times (5 + 12) = (8 \times 5) + (8 \times 12) = 40 + 96 = 136$
4. $10 \times (3 + 9) = (10 \times 3) + (10 \times 9) = 30 + 90 = 120$
5. $7 \times (8 + 15) = (7 \times 8) + (7 \times 15) = 56 + 105 = 161$

Common Mistakes To Avoid

When applying the distributive property, be mindful of the following:

- Forgetting to distribute to all terms: Ensure you multiply the outside number by each term inside the parentheses.
- Incorrect signs: If the expression involves subtraction, remember to distribute the negative sign appropriately.
- Adding before multiplying: Avoid the temptation to add the numbers inside parentheses before distributing unless it's simpler to do so. Remember, the distributive property is especially useful when parentheses involve addition or subtraction.

Conclusion: Mastering The Distributive Property

The distributive property is a powerful tool in mathematics that simplifies the process of evaluating expressions involving parentheses and multiplication. By understanding and applying this property, you can effortlessly evaluate expressions like $9 \times (4 + 9)$ and more complex algebraic formulas. Remember to follow the step-by-step approach:

1. Recognize the structure of the expression.
2. Apply the distributive property properly.
3. Perform each multiplication.
4. Sum the results to find the final answer.

Practice regularly with different types of problems to develop fluency and confidence in using the distributive property. With consistent effort, you'll find that solving algebraic expressions becomes quicker and more intuitive.

Meta Description: Learn how to evaluate the expression $9 \times (4 + 9)$ using the distributive property with detailed step-by-step instructions, helpful tips, and practice problems to enhance your algebra skills.

Frequently Asked Questions

What is the first step to evaluate $9 \times (4 + 9)$ using the distributive property?

The first step is to distribute 9 to both 4 and 9 inside the parentheses, meaning you'll multiply 9 by each term separately.

How do you apply the distributive property to the expression $9 \times (4 + 9)$?

You rewrite the expression as $(9 \times 4) + (9 \times 9)$ by distributing 9 to both 4 and 9.

What is the result of 9×4 when applying the distributive property?

9×4 equals 36.

What is the result of 9×9 after applying the distributive property?

9×9 equals 81.

What is the final step after distributing and multiplying in the expression $9 \times (4 + 9)$?

Add the two products: $36 + 81$, which equals 117.

Why is using the distributive property helpful in evaluating expressions like $9 \times (4 + 9)$?

It simplifies the calculation by breaking it into smaller, manageable parts, especially useful with larger numbers or variables.

What is the value of $9 \times (4 + 9)$ when evaluated using the distributive property?

The value is 117.

Additional Resources

Use The Distributive Property To Evaluate The Following Expression: $9 \times (4 + 9)$

When faced with algebraic expressions, students often encounter the question of how to evaluate them efficiently and correctly. One of the most powerful tools in an algebraist's toolkit is the distributive property. This property allows you to simplify and evaluate expressions involving parentheses by distributing a factor across terms inside the parentheses. Here, we focus on using the distributive property to evaluate the expression $9 \times (4 + 9)$, illustrating step-by-step how this approach can make complex calculations more manageable and less error-prone.

Understanding the Distributive Property

What Is The Distributive Property?

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

$$a \times (b + c) = (a \times b) + (a \times c)$$

This means that multiplying a number outside the parentheses by a sum inside the parentheses is the same as multiplying that number separately by each addend and then adding the results.

Why Use The Distributive Property?

Using the distributive property:

- Simplifies calculations, especially when dealing with larger numbers or variables.
- Clarifies the process of expanding expressions.
- Helps in understanding algebraic concepts like combining like terms.
- Prepares you for solving equations involving parentheses.

Step-by-Step Guide to Evaluating $9 \times (4 + 9)$

Let's walk through the process of evaluating the expression $9 \times (4 + 9)$ using the distributive property.

Step 1: Recognize the Expression Structure

The expression is:

$$9 \times (4 + 9)$$

This is a multiplication of 9 and a sum $(4 + 9)$. The parentheses indicate the order of operations, but the distributive property offers an alternative to first calculating the sum inside.

Step 2: Apply the Distributive Property

Using the property:

$$a \times (b + c) = (a \times b) + (a \times c)$$

Set $a = 9$, $b = 4$, $c = 9$:

$$9 \times (4 + 9) = (9 \times 4) + (9 \times 9)$$

Step 3: Calculate Each Term Individually

Now, evaluate each multiplication:

$$- 9 \times 4 = 36$$

$$- 9 \times 9 = 81$$

Step 4: Add the Results

Add the two products:

$$36 + 81 = 117$$

Therefore, the value of $9 \times (4 + 9)$ is 117.

Alternative Approach: Direct Calculation Without Distributive Property

While the distributive property is especially useful for more complex expressions, for this particular example, you could simply evaluate inside the parentheses first:

- Calculate $4 + 9 = 13$
- Then multiply: $9 \times 13 = 117$

Both methods lead to the same result, but understanding the distributive property provides a foundation for tackling more complicated problems.

Why The Distributive Property Is Essential in Algebra

Building Blocks for Algebraic Manipulation

The distributive property is fundamental for expanding expressions, simplifying algebraic equations, and solving for variables. For example:

- Simplifying expressions like $3(x + 5) = 3x + 15$
- Solving equations such as $2(3x - 4) = 6x - 8$

Facilitating Mental Math and Estimation

Distributing allows for easier mental calculations by breaking down complex expressions into manageable parts.

Connecting to Factoring

Understanding the distributive property also helps in factoring expressions, which is the reverse process of distribution.

Practice Problems to Reinforce Understanding

Try evaluating the following expressions using the distributive property:

1. $7 \times (2 + 5)$
2. $3 \times (8 + 12)$
3. $5 \times (10 + 15)$
4. $4 \times (6 + 9)$

Solutions:

1. $7 \times 2 + 7 \times 5 = 14 + 35 = 49$
2. $3 \times 8 + 3 \times 12 = 24 + 36 = 60$
3. $5 \times 10 + 5 \times 15 = 50 + 75 = 125$
4. $4 \times 6 + 4 \times 9 = 24 + 36 = 60$

Common Mistakes to Avoid

- Forgetting to distribute to each term: Remember that the distributive property applies to every term inside the parentheses.
- Incorrectly adding before multiplying: Always distribute first, then perform the multiplication.
- Misapplying signs: Be cautious with negative numbers, for example, $a \times (b - c) = a \times b - a \times c$.

Summary

Using the distributive property to evaluate the expression $9 \times (4 + 9)$ involves recognizing the structure of the problem, applying the property to expand the multiplication, calculating each part separately, and then summing the results. This approach not only simplifies the calculation but also deepens your understanding of algebraic principles that are essential for success in mathematics. Whether you're solving simple arithmetic problems or tackling complex algebraic equations, mastering the distributive property is a critical skill that will serve you well throughout your mathematical journey.

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