What Is The Simplest Form Of This Expression?(x 3)(x + 4x +--5)

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Understanding how to simplify algebraic expressions is a fundamental skill in mathematics that enables us to work more efficiently and clearly. The expression in question, (x 3)(x + 4x +--5), appears to contain some typographical or formatting issues, but assuming it represents a typical algebraic expression involving multiplication and addition, we can interpret and simplify it step-by-step. This article will explore how to approach such expressions, clarify their components, and arrive at their simplest form through systematic algebraic methods.

Interpreting the Expression

Deciphering the Symbols and Terms

Before simplifying, it is crucial to understand what the expression actually represents. Given the notation (x 3)(x + 4x +--5), there are some ambiguities:

- The term (x 3) could be a typographical error for (x + 3) or (x 3).
- The addition of +--5 suggests a double negative, which simplifies to +5.
- The entire expression appears to be a product of two binomials or a binomial and a trinomial.

Assumption for Clarification:

Based on common algebraic expressions, a reasonable interpretation is:

(x + 3)(x + 4x + 5)

or possibly:

(x 3)(x + 4x - 5)

Given the context, the most logical and standard form seems to be:

(x + 3)(x + 4x - 5)

This interpretation aligns with typical algebraic expressions involving binomials and simplifies the process.

Step-by-Step Simplification Process

Step 1: Expand the Expression

To simplify, begin by applying the distributive property (FOIL method for binomials):

(x + 3)(x + 4x - 5)

Break down the expansion:

- Multiply x by each term in the second parentheses
- Multiply 3 by each term in the second parentheses

Expansion:

$x x + x 4x - x 5 + 3 x + 3 4x - 3 5$

Step 2: Perform the Multiplications

Calculate each term:

- $x x = x^2$
- $x 4x = 4x^2$
- $x (-5) = -5x$
- $3 x = 3x$
- $3 4x = 12x$
- $3 (-5) = -15$

Now, write the expanded form:

$x^2 + 4x^2 - 5x + 3x + 12x - 15$

Step 3: Combine Like Terms

Group similar terms:

- Quadratic terms: $x^2 + 4x^2 = 5x^2$
- Linear terms: $-5x + 3x + 12x = (-5 + 3 + 12) x = 10x$

- Constant term: -15

So, the simplified form is:

$5x^2 + 10x - 15$

Step-by-Step Final Simplification

Step 4: Factor Out the Greatest Common Factor (GCF)

Identify the GCF of all terms:

- GCF of $5x^2$, $10x$, and -15 is 5

Factor out 5:

$5(x^2 + 2x - 3)$

Step 5: Factor the Quadratic Expression

Focus on factoring $x^2 + 2x - 3$. To factor:

Find two numbers that multiply to -3 and add to 2.

Possible pairs:

- 3 and -1 (since 3 -1 = -3 and 3 + (-1) = 2)

Express as:

$x^2 + 3x - x - 3$

Group terms:

$(x^2 + 3x) + (-x - 3)$

Factor each group:

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

Factor out (x + 3):

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

Final factored form:

$5(x + 3)(x - 1)$

Conclusion: The Simplest Form

The original expression, interpreted as $(x + 3)(x + 4x - 5)$, simplifies to:

$5(x + 3)(x - 1)$

This form is considered simplest because:

- It is fully factored.
- No further simplification or factorization is possible.
- The expression clearly shows its structure, making it easier for substitution or solving.

Additional Notes on Simplification Techniques

1. Recognizing Common Factors

- Always look for the greatest common factor among terms.
- Factoring out GCF simplifies expressions and reveals their structure.

2. Factoring Quadratics

- Use methods such as trial, grouping, or quadratic formula.
- Recognize patterns like difference of squares, perfect square trinomials, and sum/difference of cubes.

3. Handling Negative Signs

- Double negatives (like --5) simplify to positive.
- Be attentive to signs during expansion and factoring.

Summary

- The process begins with interpreting the expression correctly.
- Expand using distributive property.
- Combine like terms.
- Factor out GCF.
- Further factor quadratics where applicable.

By following these systematic methods, complex algebraic expressions can be simplified efficiently, leading to clearer understanding and easier problem-solving.

In summary, assuming the expression is $(x + 3)(x + 4x - 5)$, its simplest form is:

$5(x + 3)(x - 1)$

This fully factored form is the most reduced and manageable version for further mathematical operations.

Frequently Asked Questions

What is the expression given in the problem?

The expression is $(x\ 3)(x + 4x + -5)$.

Is there a typo or missing operator in the expression?

Yes, it appears that 'x 3' might be a typo; it probably means $(x + 3)$ instead of $(x\ 3)$.

How do you interpret the expression (x + 3)(x + 4x - 5)?

You treat it as the product of two binomials: (x + 3) and (x + 4x - 5).

What steps are involved in simplifying this expression?

First, clarify and rewrite the expression, then expand using distributive property, and combine like terms to find the simplest form.

What is the simplified form of (x + 3)(x + 4x - 5)?

Expand: (x + 3)(x + 4x - 5) = (x + 3)(5x - 5). Then, distribute: x5x - x5 + 35x - 35, which simplifies to 5x^2 - 5x + 15x - 15. Combine like terms: 5x^2 + 10x - 15.

Can the simplified expression 5x^2 + 10x - 15 be factored further?

Yes, factor out the common factor 5: 5(x^2 + 2x - 3). Then, factor the quadratic: x^2 + 2x - 3 = (x + 3)(x - 1). So, the fully factored form is 5(x + 3)(x - 1).

What is the simplest form of the original expression based on these steps?

The simplest form of the expression (assuming the correct interpretation is (x + 3)(x + 4x - 5)) is 5(x + 3)(x - 1).

Additional Resources

What Is The Simplest Form Of This Expression? (x 3)(x + 4x + -5)

Mathematics often appears as a labyrinth of symbols, expressions, and formulas, but at its core lies a pursuit of simplicity and clarity. One common task in algebra involves transforming complex expressions into their simplest form for ease of understanding and solving. In this investigative exploration, we analyze the expression (x 3)(x + 4x + -5) to determine its most reduced, straightforward representation. We will methodically dissect the expression, clarify potential ambiguities, and present a comprehensive breakdown suitable for both students and seasoned mathematicians alike.

Understanding the Expression

Before delving into the algebraic manipulations, it is crucial to interpret the given expression accurately. The expression presented is:

(x 3)(x + 4x + -5)

At first glance, the expression seems to contain a typographical or formatting ambiguity, particularly with the segment (x 3). It is not standard notation to write x 3 without an operator; thus, it could be interpreted in several ways:

- As (x + 3), assuming a missing plus sign.
- As (x 3), representing 3x.
- As (x - 3), if the minus sign was omitted.

Similarly, the second part (x + 4x + -5) simplifies to an algebraic sum, but clarifying its structure is essential.

Clarification of the Components

Given the context and common algebraic conventions, the most plausible interpretation is:

(x + 3)(x + 4x - 5)

This interpretation assumes:

- The first factor is (x + 3).
- The second factor is (x + 4x - 5).

Alternatively, if the original intended expression was:

(x 3)(x + 4x - 5)

then the first factor is 3x, and the second as above.

For simplicity and consistency, we will analyze both interpretations:

Interpretation A:
(x + 3)(x + 4x - 5)

Interpretation B:
(3x)(x + 4x - 5)

In the following sections, we explore both cases, providing detailed algebraic steps to arrive at the simplest form.

Interpreting and Simplifying the Expression

Case 1: (x + 3)(x + 4x - 5)

This form involves binomials and combines like terms within the second binomial.

Step 1: Simplify the second binomial

$x + 4x - 5 = (x + 4x) - 5 = 5x - 5$

Step 2: Write the expression in simplified form

$(x + 3)(5x - 5)$

Step 3: Apply the distributive property (FOIL method)

- First: $x\ 5x = 5x^2$
- Outer: $x\ (-5) = -5x$
- Inner: $3\ 5x = 15x$
- Last: $3\ (-5) = -15$

Step 4: Combine like terms

- Combine the x-terms: $-5x + 15x = 10x$

Final simplified form:

$5x^2 + 10x - 15$

Step 5: Factor out the greatest common factor (GCF)

All terms are divisible by 5:

$5(x^2 + 2x - 3)$

Step 6: Factor the quadratic inside the parentheses

$x^2 + 2x - 3$

Find two numbers that multiply to -3 and add to 2: 3 and -1

So:

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

Complete factored form:

$5(x + 3)(x - 1)$

Case 2: $(3x)(x + 4x - 5)$

Here, the first factor is 3x, and the second is the same as above.

Step 1: Simplify the second binomial

$x + 4x - 5 = 5x - 5$

Step 2: Write the entire product

$3x (5x - 5)$

Step 3: Distribute

$3x 5x = 15x^2$

$3x (-5) = -15x$

Step 4: Write the simplified expression

$15x^2 - 15x$

Step 5: Factor out GCF

Both terms are divisible by $15x$:

$15x(x - 1)$

Summary of Results and Final Simplifications

Interpretation	Simplified Expression	Fully Factored Form
$(x + 3)(x + 4x - 5)$	$5x^2 + 10x - 15$	$5(x + 3)(x - 1)$
$(3x)(x + 4x - 5)$	$15x^2 - 15x$	$15x(x - 1)$

Note: Both forms share a common factor of $(x - 1)$, indicating that the roots or solutions of the expression are connected to this factor.

Implications and Significance of Simplification

Simplifying algebraic expressions is fundamental in mathematics, serving multiple purposes:

- Ease of solving equations: Factored forms directly reveal roots or solutions.
- Reducing computational complexity: Simplified forms streamline calculations.
- Facilitating further algebraic operations: Simplified expressions are more manageable for addition, subtraction, or substitution into other equations.

In the context of the expressions analyzed, the factored forms 5(x + 3)(x - 1) and 15x(x - 1) reveal the roots x = -3, 1 and x = 0, 1, respectively, which are critical in solving related equations or understanding the behavior of polynomial functions.

Common Pitfalls and Clarifications

- Ambiguity in notation: As demonstrated, unclear notation can lead to multiple interpretations. Always clarify the intended operators and grouping.
- Sign errors: Negative signs, especially with double negatives (e.g., - -5), can cause confusion. Carefully process each term.
- Factoring quadratic polynomials: Recognize common factoring patterns, such as difference of squares, trinomial factoring, and GCF extraction.

Conclusion

The investigation into "What Is The Simplest Form Of This Expression? (x 3)(x + 4x + -5)" underscores the importance of precise notation and methodical algebraic manipulation. Depending on the initial interpretation, the expression simplifies to either $5(x + 3)(x - 1)$ or $15x(x - 1)$. Both factorizations reveal roots at $x = -3, 1$ or $x = 0, 1$, respectively, which are essential in understanding the behavior of the underlying polynomial functions.

In a broader sense, this exploration exemplifies the critical process of simplifying algebraic expressions—transforming complexity into clarity. Whether for solving equations, graphing functions, or gaining insights into polynomial structures, such simplifications form the backbone of algebraic reasoning and mathematical problem-solving.

Final note: Always double-check your initial expression and clarify any ambiguous notation before proceeding with algebraic operations. This ensures accurate, meaningful results and prevents misinterpretation—a vital practice in both educational and professional mathematical contexts.

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