Factorise Fully 50x + 100

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Factorise Fully 50x + 100 is a fundamental algebraic operation that involves rewriting a given polynomial expression as a product of its simplest factors. This process simplifies the expression, making it easier to solve equations, analyze algebraic relationships, or perform further algebraic manipulations. In this article, we will explore the step-by-step method to fully factorise the expression 50x + 100, understand the concepts behind factoring, and discuss common techniques used in polynomial factorisation.

Understanding the Expression 50x + 100

Analyzing the Terms

The expression 50x + 100 is a binomial consisting of two terms:

- 50x — a term with a variable x multiplied by 50
- 100 — a constant term

Both terms share a common factor, which is key to the process of factorisation. Recognizing common factors simplifies the process significantly.

Common Factors and the Distributive Property

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

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

Conversely, factorisation involves reversing this process: given an expression, find a common factor and factor it out.

Step-by-Step Approach to Fully Factorise 50x + 100

Step 1: Identify the Greatest Common Factor (GCF)

To factorise fully, the first step is to find the greatest common factor (GCF) of the coefficients of the terms. For 50x and 100, the coefficients are 50 and 100.

- Factors of 50: 1, 2, 5, 10, 25, 50
- Factors of 100: 1, 2, 4, 5, 10, 20, 25, 50, 100

The largest common factor is 50.

Step 2: Factor out the GCF

Dividing each term by 50 gives:

- 50x ÷ 50 = x
- 100 ÷ 50 = 2

Thus, we can factor out 50:

50x + 100 = 50(x + 2)

Step 3: Check for Further Factorisation

After extracting the GCF, the remaining binomial (x + 2) is simplified and cannot be factorised further since it is a linear binomial with two terms and no common factors other than 1. Therefore, the complete factorisation of 50x + 100 is:

50(x + 2)

Understanding Fully Factorised Expressions

What Does Fully Factorised Mean?

A fully factorised expression is one that cannot be broken down into simpler factors over the set of integers or real numbers. It involves extracting all common factors and factoring any reducible

polynomials (like quadratics or higher-degree polynomials) into irreducible factors.

Importance of Fully Factorising

- Simplifies solving equations: setting factors equal to zero makes solving straightforward.
- Helps identify roots or solutions of algebraic expressions.
- Facilitates integration and differentiation in calculus.
- Assists in algebraic simplification and comparison of expressions.

Additional Techniques for Polynomial Factorisation

Factoring Quadratics

Quadratic expressions, such as $ax^2 + bx + c$, can often be factorised into two binomials using methods like:

1. Factoring by grouping
2. Using the quadratic formula to find roots and then expressing as factors
3. Trial and error (especially for simple quadratics)

Factoring by Common Factors

As demonstrated earlier, always check for the greatest common factor among all terms before proceeding to other techniques.

Difference of Squares

Expressions like $a^2 - b^2$ can be factorised as:

$(a - b)(a + b)$

Sum or Difference of Cubes

Expressions such as $a^3 + b^3$ or $a^3 - b^3$ can be factorised using specific formulas:

- Sum of cubes: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
- Difference of cubes: $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Applying These Techniques to More Complex Expressions

Example: Fully Factorise $6x^2 + 9x$

Step 1: Find GCF of coefficients 6 and 9, which is 3.

Step 2: Factor out 3:

$6x^2 + 9x = 3(2x^2 + 3x)$

Step 3: Factor further inside the parentheses:

- Both terms have x, so factor out x:
- $2x^2 + 3x = x(2x + 3)$

Final fully factorised form:

$3x(2x + 3)$

Common Mistakes to Avoid in Factorisation

- Failing to identify the greatest common factor properly.
- Overlooking the possibility of further factorising after extracting the GCF.
- Attempting to factorise non-factorable quadratics or higher-degree polynomials incorrectly.
- Not applying the correct formulas for special products like difference of squares or sum/difference of cubes.

Summary

To fully factorise an algebraic expression such as 50x + 100, the key steps involve identifying the greatest common factor, extracting it, and then simplifying the remaining factors. In the case of 50x + 100, the GCF is 50, leading to the factorisation 50(x + 2). This process exemplifies the importance of recognizing common factors and understanding various factoring techniques to simplify algebraic expressions effectively.

Conclusion

Mastering the art of factorisation is essential for solving algebraic equations, simplifying expressions, and understanding the structure of polynomials. The example of fully factorising 50x + 100 demonstrates how identifying common factors streamlines the process. As you advance in algebra, familiarising yourself with various factorisation methods will enhance your problem-solving skills and mathematical understanding.

Frequently Asked Questions

How do I factorise the expression 50x + 100 fully?

First, find the greatest common factor (GCF) of 50x and 100, which is 50. Then, factor out 50: 50x + 100 = 50(x + 2).

What is the fully factorised form of 50x + 100?

The fully factorised form is 50(x + 2).

Can I factor out any other common factors from 50x + 100?

No, 50 is the greatest common factor for the terms 50x and 100, so factoring out 50 is the most simplified common factor.

Is 50(x + 2) the fully factorised expression of 50x + 100?

Yes, 50(x + 2) is the fully factorised form of 50x + 100.

Why is it important to factorise expressions like 50x + 100?

Factoring helps simplify expressions, solve equations more easily, and understand their structure better.

Can 50x + 100 be factorised further after pulling out 50?

No, once you've factored out 50, the remaining expression x + 2 cannot be simplified further.

Are there any special methods to factorise expressions like 50x + 100?

For linear expressions like 50x + 100, finding the GCF is the straightforward method. For more complex expressions, methods like factoring by grouping or quadratic factoring might be used.

Additional Resources

Factorise Fully 50x + 100: A Comprehensive Guide to Simplifying Algebraic Expressions

Understanding how to factorise fully 50x + 100 is a fundamental skill in algebra that helps simplify expressions, solve equations, and understand the relationships between variables. Whether you're a student brushing up on your algebraic techniques or a teacher preparing lesson plans, mastering the process of fully factorising expressions like 50x + 100 is essential. In this guide, we'll explore what it means to factorise, step-by-step methods to factorise this particular expression, and tips to make the process easier.

What Does Fully Factorise Mean?

Before diving into the specific example, it's important to understand what "fully factorise" entails. When you factorise an algebraic expression, you rewrite it as a product of its factors, ideally breaking it down as much as possible until no further factorisation is possible. This is known as expressing the expression in its completely factored form.

For example, consider the expression 50x + 100. The process involves:

- Identifying common factors in each term
- Extracting the greatest common factor (GCF)
- Factoring out the GCF
- Checking if the remaining expression can be further factored

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Step-by-Step Guide to Fully Factorising 50x + 100

Let's walk through the process of fully factorising 50x + 100 in detail.

Step 1: Identify the Greatest Common Factor (GCF)

The first crucial step is to find the GCF of the coefficients in the terms.

- Coefficients are 50 and 100.
- Prime factorisation of 50: 2×5^2

- Prime factorisation of 100: $2^2 \times 5^2$

The common factors are:

- 2 (since both have at least one 2)
- 5^2 (since both have 5 squared)

Therefore, the GCF of 50 and 100 is:

GCF = $2 \times 5^2 = 2 \times 25 = 50$

Step 2: Factor Out the GCF

Next, factor out the GCF from the entire expression:

50x + 100 = 50 (some expression)

Divide each term by 50:

- 50x ÷ 50 = x
- 100 ÷ 50 = 2

So, the expression becomes:

50 (x + 2)

Step 3: Check for Further Factorisation

Now, examine the expression inside the parentheses: (x + 2). Is this further factorable?

- Since (x + 2) is a binomial with no common factors other than 1, it cannot be factored further over the integers.
- Therefore, 50(x + 2) is the fully factorised form.

Summary of the Fully Factorised Form

The fully factorised form of 50x + 100 is:

50(x + 2)

This form is useful because it makes solving equations or simplifying expressions more straightforward.

Additional Tips for Factorising Expressions Like 50x + 100

- Always look for the GCF first. This simplifies the expression significantly.
- Remember the prime factorisation method to identify the GCF when dealing with larger coefficients.

- Check if the remaining expression can be factored further. For simple binomials, this often isn't necessary, but for quadratic or more complex expressions, additional factoring techniques (like difference of squares, quadratic formula) may be applicable.
- Practice with different expressions to become comfortable identifying common factors and applying various factorisation techniques.

Practice Problems to Master Fully Factorising

Try fully factorising these expressions to reinforce your understanding:

1. 36x + 48
2. 75x + 125
3. 18x + 27
4. 60x + 90
5. 45x + 60

Solutions:

- 36x + 48 = 12(3x + 4)
- 75x + 125 = 25(3x + 5)
- 18x + 27 = 9(2x + 3)
- 60x + 90 = 30(2x + 3)
- 45x + 60 = 15(3x + 4)

Why Is Fully Factorising Important?

Fully factorising algebraic expressions like 50x + 100 is more than just an academic exercise. It's a vital step in solving equations, simplifying complex expressions, and understanding algebraic relationships. When expressions are fully factorised, it's easier to:

- Find solutions to equations
- Simplify algebraic fractions
- Identify roots or zeros of an expression
- Recognize patterns such as difference of squares or quadratic trinomials

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Final Thoughts

Mastering the art of fully factorising expressions like 50x + 100 is a foundational skill that will serve you well throughout your mathematical journey. Remember to always seek the greatest common factor first, factor it out, and then assess if additional factorisation is possible. With practice and attention to detail, you'll be able to tackle increasingly complex algebraic expressions with confidence.

Whether you're preparing for exams, teaching others, or just sharpening your math skills, understanding how to factorise fully is an essential step in mastering algebra. Keep practicing, and

soon you'll see factorising as a straightforward and powerful tool in your mathematical toolkit.

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