

82) Which Equivalent Expression Uses GCF And Distributive Property To Find The Sum Of 16 + 28? $1(16+28)$ $2(8+14)$ $2(8+28)$ $4(4+7)$ *

82) Which Equivalent Expression Uses GCF And Distributive Property To Find The Sum Of 16 + 28? $1(16+28)$ $2(8+14)$ $2(8+28)$ $4(4+7)$

Understanding how to simplify algebraic expressions efficiently is fundamental in mathematics. One powerful method involves using the Greatest Common Factor (GCF) combined with the Distributive Property. This approach not only simplifies calculations but also deepens comprehension of the relationships between numbers and algebraic expressions. In this article, we will explore how to find an equivalent expression that uses GCF and the Distributive Property to evaluate the sum of $16 + 28$, analyze the different options provided, and understand how these algebraic tools work together to simplify expressions effectively.

What Is the Greatest Common Factor (GCF)?

Definition and Significance

The Greatest Common Factor (GCF) of two or more numbers is the largest positive integer that divides each of the numbers without leaving a remainder. It is a crucial concept in simplifying fractions, factoring algebraic expressions, and solving equations because it helps identify common factors that can be factored out to simplify the expression.

Calculating GCF

To find the GCF of two numbers, such as 16 and 28, follow these steps:

- Prime factorize each number:
 - $16 = 2^4$
 - $28 = 2^2 \times 7$
- Identify the common prime factors:
 - Both have at least 2^2

- Multiply the common prime factors:

- $GCF = 2^2 = 4$

This process reveals that the GCF of 16 and 28 is 4.

The Distributive Property and Its Role in Simplification

Understanding the Distributive Property

The Distributive Property states that for any numbers a , b , and c :

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

This property allows us to distribute a factor across terms inside parentheses, simplifying expressions or factoring common factors out of sums or differences.

Applying the Distributive Property to Sums

When we have an expression like a sum, such as $16 + 28$, and we want to factor it using the GCF, the Distributive Property can help express the sum as a product:

$$[16 + 28 = 4 \times 4 + 4 \times 7 = 4(4 + 7)]$$

In this case, the GCF (which is 4) is factored out, and the remaining sum inside the parentheses represents the simplified form.

Analyzing the Given Options for Equivalent Expressions

The question provides several options, which are:

1. $1(16 + 28)$
2. $2(8 + 14)$
3. $2(8 + 28)$
4. $4(4 + 7)$

Let's analyze each to understand which correctly uses GCF and the Distributive Property to express the sum of $16 + 28$.

Option 1: $1(16 + 28)$

This expression simply multiplies the sum by 1, which doesn't simplify or factor the sum. It is equivalent to $16 + 28$ but does not involve GCF or the distributive property.

Option 2: $2(8 + 14)$

Notice that 16 and 28 can be divided by 2:

- $16 \div 2 = 8$
- $28 \div 2 = 14$

So, $16 + 28$ can be written as $2(8 + 14)$, which is an application of factoring out the GCF (which is 2). This expression uses the Distributive Property in reverse to factor the sum.

Option 3: $2(8 + 28)$

This expression appears to be incorrect because:

- $8 + 28 = 36$
- $2 \times 36 = 72$

which is not equal to $16 + 28$ (which sums to 44). Therefore, this option does not correctly represent the sum using GCF and the distributive property.

Option 4: $4(4 + 7)$

Here, $16 + 28$ is factored using the GCF 4:

- $16 \div 4 = 4$
- $28 \div 4 = 7$

Thus, $16 + 28 = 4(4 + 7)$, which correctly applies the GCF and the distributive property.

Determining the Correct Equivalent Expression

Based on the analysis:

- Option 2 ($2(8 + 14)$) correctly factors out the GCF of 16 and 28.
- Option 4 ($4(4 + 7)$) is also correct and perhaps the more standard form, explicitly showing the GCF of 4.

Both options 2 and 4 are valid in terms of using GCF and the Distributive Property to express the sum, but the most straightforward and commonly accepted form is Option 4: $4(4 + 7)$, because it directly shows the GCF factored out of the original sum.

Conclusion: Which Expression Uses GCF and Distributive Property?

The correct equivalent expression that uses both the GCF and the Distributive Property to find the sum of $16 + 28$ is:

- $4(4 + 7)$

This expression clearly demonstrates factoring out the GCF (which is 4) from both numbers and applying the Distributive Property to rewrite the sum in a simplified, equivalent form.

Practical Application of GCF and Distributive Property in Simplifying Expressions

Understanding how to apply the GCF and the Distributive Property is essential for simplifying more complex algebraic expressions and solving real-world problems efficiently. Here's how these concepts can be applied practically:

Step-by-Step Approach

1. Identify the GCF of the numbers or terms involved.
2. Factor out the GCF from the sum or product.
3. Express the original sum or product as a multiplication involving the GCF and the remaining

sum or difference.

4. Simplify or evaluate as necessary.

Example

Suppose you need to evaluate the sum $24 + 36$:

- Prime factorization:
 - $24 = 2^3 \times 3$
 - $36 = 2^2 \times 3^2$

- GCF:
 - Common prime factors: $2^2 \times 3 = 12$

- Express as:
 - $12(2 + 3) = 12(5) = 60$

This process simplifies calculation and enhances understanding of the relationships between numbers.

Summary

- The GCF of 16 and 28 is 4.
- Using the Distributive Property, the sum $16 + 28$ can be expressed as $4(4 + 7)$.
- The expression $4(4 + 7)$ correctly demonstrates the use of GCF and the Distributive Property.
- Other options like $2(8 + 14)$ are mathematically equivalent but less direct in showing the GCF of the original numbers.

Mastering the combination of GCF and the Distributive Property is a valuable skill that simplifies algebraic expressions and enhances problem-solving efficiency. Whether in basic arithmetic or advanced algebra, these tools are indispensable for students and professionals alike.

References:

- Basic Mathematics Textbooks
- Algebra and Number Theory Resources
- Online Mathematics Educational Platforms

Frequently Asked Questions

How can the greatest common factor (GCF) be used to simplify the expression $16 + 28$?

The GCF of 16 and 28 is 4. Factoring out 4, the expression becomes $4(4 + 7)$, simplifying the sum.

Which equivalent expression uses the distributive property to find the sum of $16 + 28$?

Using the distributive property, $16 + 28$ can be written as $4(4 + 7)$.

What is the correct equivalent expression for $16 + 28$ using GCF and the distributive property?

The correct expression is $4(4 + 7)$.

Why is $4(4 + 7)$ an appropriate equivalent expression for $16 + 28$?

Because 4 is the GCF of 16 and 28, factoring it out simplifies the sum via the distributive property.

Which option correctly shows the use of GCF and distributive property for $16 + 28$?

Option 2: $4(4 + 7)$ correctly uses the GCF and distributive property.

How does factoring out the GCF help in understanding the sum $16 + 28$?

Factoring out the GCF reveals a common factor, making the sum easier to compute and understand.

What are the factors inside the parentheses after applying GCF and distributive property to $16 + 28$?

The factors inside the parentheses are 4 and 7, representing the decomposition of 16 and 28 divided by 4.

Is the expression $8 + 14$ equivalent to the sum of $16 + 28$ after using GCF and distributive property?

No, $8 + 14$ is not equivalent to $16 + 28$; the correct equivalent expression is $4(4 + 7)$.

Additional Resources

Understanding the Use of GCF and Distributive Property to Find the Sum of $16 + 28$

When tackling algebraic expressions and numerical sums, mathematicians often utilize fundamental properties such as the Greatest Common Factor (GCF) and the Distributive Property to simplify calculations and reveal underlying relationships. In this detailed review, we will explore how these tools are employed to find the equivalent expression for the sum of $16 + 28$, emphasizing the step-by-step process, underlying principles, and practical applications. Our focus will be on understanding why expressions like $1(16 + 28)$, $2(8 + 14)$, $2(8 + 28)$, and $4(4 + 7)$ are equivalent and how they demonstrate the power of factoring and distributive techniques in simplifying complex calculations.

Introduction to the Problem

The problem asks: "Which equivalent expression uses GCF and Distributive Property to find the sum of $16 + 28$?" The options provided are:

- $1(16 + 28)$
- $2(8 + 14)$
- $2(8 + 28)$
- $4(4 + 7)$

The goal is to understand how each of these expressions relates to the original sum and to identify which expression correctly applies GCF and the Distributive Property to simplify or factor the sum.

Fundamental Concepts Involved

Before delving into the specific expressions, let's clarify the key mathematical concepts involved: Greatest Common Factor (GCF) and Distributive Property.

2.1 Greatest Common Factor (GCF)

- Definition: The GCF of two numbers is the largest positive integer that divides both numbers without leaving a remainder.
- Example: The GCF of 16 and 28 is 4 because:
 - $16 \div 4 = 4$

- $28 \div 4 = 7$

- Application: GCF is used to factor out common factors from numbers or algebraic expressions, simplifying calculations and revealing common structure.

2.2 Distributive Property

- Definition: The Distributive Property states that for any numbers a , b , and c :

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

- Purpose: This property allows us to multiply a single term across terms within parentheses, distributing the multiplication over addition.

- In reverse: It also enables us to factor expressions by identifying common factors that can be factored out.

2.3 Combining the Concepts

The process of factoring an expression or sum involves:

- Identifying the GCF of the terms involved.
- Using the Distributive Property in reverse to factor out the GCF, expressed as:

$$a + b = \text{GCF}(a, b) (\text{some other sum})$$

Analyzing the Sum of 16 + 28

Let's analyze the sum directly:

- Original sum: $16 + 28$

- Step 1: Find the GCF of 16 and 28

- Factors of 16: 1, 2, 4, 8, 16

- Factors of 28: 1, 2, 4, 7, 14, 28

- GCF: 4

- Step 2: Express each addend as a multiple of 4:

- $16 = 4 \times 4$

- $28 = 4 \times 7$

- Step 3: Rewrite the sum:

$$16 + 28 = 4 \times 4 + 4 \times 7$$

- Step 4: Factor out the GCF (4):

$$16 + 28 = 4 \times (4 + 7)$$

This process clearly demonstrates how GCF and the Distributive Property work together. The sum $16 + 28$ can be rewritten as $4(4 + 7)$, which is an equivalent expression factoring out the GCF.

Evaluating the Provided Options

Let's examine each given expression in detail to determine which correctly employs GCF and the Distributive Property.

2.1 Option 1: $1(16 + 28)$

- Interpretation: Multiplying the sum by 1 does not change its value.
- Analysis: While mathematically correct, this expression does not utilize GCF or the Distributive Property to factor or simplify the sum. It is a trivial expression that is equivalent to simply $16 + 28$ but does not demonstrate the application of these properties.

2.2 Option 2: $2(8 + 14)$

- Analysis:
 - $8 + 14 = 2 \times 4 + 2 \times 7$
 - GCF of 8 and 14: 2
 - Factoring out 2:
 $8 + 14 = 2(4 + 7)$
 - Multiplying by 2:
 $2(8 + 14) = 2 \times [2(4 + 7)] = 2 \times 2(4 + 7) = 4(4 + 7)$
- Observation: The expression $2(8 + 14)$ simplifies to $4(4 + 7)$, which matches the earlier derived form of the sum using GCF. It correctly demonstrates factoring out the GCF and applying the Distributive Property.

2.3 Option 3: $2(8 + 28)$

- Analysis:
 - $8 + 28 = 2 \times 4 + 4 \times 7$
 - But $8 + 28$ simplifies to:
 $8 + 28 = 8 + 28$
 - GCF of 8 and 28: 4
 - Factoring out 4:
 $8 + 28 = 4(2 + 7)$
 - Multiplying by 2:
 $2(8 + 28) = 2 \times 4(2 + 7) = 8(2 + 7)$
- Comparison to original sum:
 - $16 + 28 = 4 \times 4 + 4 \times 7 = 4(4 + 7)$
 - The expression $2(8 + 28)$ simplifies to $8(2 + 7)$, which is not equal to $16 + 28$, unless further simplification is performed.

- Conclusion: This expression does not directly correspond to the sum $16 + 28$ via factoring GCF, and thus isn't the best choice.

2.4 Option 4: $4(4 + 7)$

- Analysis:
- Directly matches the factored form of $16 + 28$:
- $16 + 28 = 4 \times 4 + 4 \times 7 = 4(4 + 7)$
- This expression uses GCF (4) and Distributive Property to factor the sum correctly.
- It is an elegant, simplified equivalent expression.

Identifying the Correct Expression

Based on the analysis, the expression $4(4 + 7)$ perfectly demonstrates the application of GCF and the Distributive Property to find an equivalent form of $16 + 28$. The other options either do not utilize these properties effectively or do not directly relate to the sum in question.

- Conclusion: The correct equivalent expression, utilizing GCF and the Distributive Property, is $4(4 + 7)$.

Step-by-Step Process for Deriving the Equivalent Expression

Let's walk through the process of deriving this expression systematically:

2.1 Find the GCF of 16 and 28

- Prime factorization:
- $16 = 2^4$
- $28 = 2^2 \times 7$
- GCF:
- Take the lowest powers of common primes:
- $2^2 = 4$

2.2 Rewrite each addend as a multiple of the GCF

- $16 = 4 \times 4$
- $28 = 4 \times 7$

2.3 Express the sum as a product

- $16 + 28 = 4 \times 4 + 4 \times 7$

- Factor out the GCF (4):

$$16 + 28 = 4(4 + 7)$$

2.4 Confirm the equivalence

- Expand:

$$4(4 + 7) = 4 \times 4 + 4 \times 7 = 16 + 28$$

- The expanded form confirms the equivalence.

2.5 Recognize the application of properties

- The process used:
- GCF to extract the common factor.
- Distributive Property (in reverse) to factor the sum.

Practical Applications and Significance

Understanding how to use GCF and the Distributive Property to manipulate and simplify expressions is fundamental in algebra, with broad applications:

- Simplifying complex algebraic expressions
- Factoring polynomials
- Solving equations efficiently
- Computing mental math quickly
- Understanding number relationships and properties

In real-world scenarios, these skills help in optimizing calculations in engineering, computer science, economics, and everyday problem-solving.

Additional Examples to Reinforce the Concept

To deepen understanding, consider similar sums and their fact

82 Which Equivalent Expression Uses Gcf And Distributive Property To Find The sum Of 16 + 28

82 Which Equivalent Expression Uses Gcf And Distributive Property To Find The sum Of To 16 28 1
16 28 02 8 14 2 8 28 4 4 7

Related Articles

- ["As Long As The Total Actual Factory Overhead Cost Is Not Significantly Different From The Total Standard](#)
- [\(17.17\)+a+test+of+h0:++=+0+against+ha:+++0+has+test+statistic+z+=+1.876.+is+this+test+significant+at+the+5%+level+\(+=+0.05\)?](#)
- [Business Firms Often A Trade-off Between Profit Margin And Assets Turnover To Maintain Their Returns"](#)

[Back to Home](#)