

USE THE DISTRIBUTIVE PROPERTY TO RE-WRITE THE EXPRESSION: $5(13) + 5(10)$ A. $(5+5)(13+10)$ B. $5(13 + 10)$ C.

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UNDERSTANDING HOW TO MANIPULATE ALGEBRAIC EXPRESSIONS IS FUNDAMENTAL IN MATHEMATICS, ESPECIALLY WHEN SIMPLIFYING OR FACTORING EXPRESSIONS. ONE POWERFUL TOOL FOR THIS PURPOSE IS THE DISTRIBUTIVE PROPERTY, WHICH ALLOWS US TO REWRITE EXPRESSIONS IN DIFFERENT, OFTEN MORE MANAGEABLE FORMS. IN THIS ARTICLE, WE WILL EXPLORE HOW TO USE THE DISTRIBUTIVE PROPERTY TO RE-WRITE THE EXPRESSION $5(13) + 5(10)$, AND ANALYZE THE TRANSFORMATIONS LEADING TO THE FORMS: $(5+5)(13+10)$ AND $5(13 + 10)$. BY THE END OF THIS GUIDE, YOU'LL HAVE A CLEAR UNDERSTANDING OF HOW THE DISTRIBUTIVE PROPERTY WORKS AND HOW TO APPLY IT EFFECTIVELY IN VARIOUS ALGEBRAIC CONTEXTS.

UNDERSTANDING THE DISTRIBUTIVE PROPERTY

WHAT IS THE DISTRIBUTIVE PROPERTY?

THE DISTRIBUTIVE PROPERTY IS A FUNDAMENTAL ALGEBRAIC RULE THAT STATES:

$$A(B + C) = AB + AC$$

IN WORDS, IT MEANS THAT MULTIPLYING A NUMBER BY A SUM IS THE SAME AS MULTIPLYING EACH ADDEND INDIVIDUALLY AND THEN ADDING THE RESULTS. CONVERSELY, THE PROPERTY CAN ALSO BE USED IN REVERSE: TO FACTOR COMMON FACTORS OUT OF AN EXPRESSION.

WHY IS IT IMPORTANT?

THIS PROPERTY SIMPLIFIES CALCULATIONS, HELPS IN EXPANDING OR FACTORING EXPRESSIONS, AND IS ESSENTIAL FOR SOLVING EQUATIONS EFFICIENTLY. IT ALSO PROVIDES A BRIDGE BETWEEN FACTORED AND EXPANDED FORMS, MAKING IT A VERSATILE TOOL IN ALGEBRA.

APPLYING THE DISTRIBUTIVE PROPERTY TO THE EXPRESSION $5(13) + 5(10)$

ORIGINAL EXPRESSION

THE GIVEN EXPRESSION IS:

$$5(13) + 5(10)$$

THIS EXPRESSION INVOLVES TWO TERMS, EACH WITH A COMMON FACTOR OF 5. RECOGNIZING SUCH COMMON FACTORS IS KEY TO APPLYING THE DISTRIBUTIVE PROPERTY.

STEP-BY-STEP RE-WRITING USING THE DISTRIBUTIVE PROPERTY

- **FACTOR OUT THE COMMON FACTOR:** SINCE BOTH TERMS HAVE A 5, WE CAN FACTOR 5 OUT:

$$5(13) + 5(10) = 5(13 + 10)$$

THIS IS AN APPLICATION OF THE REVERSE DISTRIBUTIVE PROPERTY, WHERE WE FACTOR OUT THE COMMON FACTOR FROM THE SUM.

- **RESULTING SIMPLIFIED EXPRESSION:** THE EXPRESSION NOW READS:

$$5(13 + 10)$$

THIS FORM IS OFTEN MORE STRAIGHTFORWARD FOR COMPUTATION OR FURTHER ALGEBRAIC MANIPULATION.

ANALYZING THE ALTERNATIVE FORMS: $(5+5)(13+10)$ AND $5(13 + 10)$

NOW, LET'S ANALYZE THE TWO ALTERNATIVE FORMS MENTIONED:

OPTION A: $(5 + 5)(13 + 10)$

THIS EXPRESSION SUGGESTS ADDING THE COEFFICIENTS FIRST, THEN MULTIPLYING:

$$(5 + 5)(13 + 10)$$

WHAT DOES THIS REPRESENT?

- THE SUM $(5 + 5)$ EQUALS 10.
- THE SUM $(13 + 10)$ EQUALS 23.
- THEREFORE, THE EXPRESSION EQUALS $10 \cdot 23 = 230$.

IS THIS EQUIVALENT TO THE ORIGINAL?

LET'S VERIFY:

- ORIGINAL EXPRESSION: $5(13) + 5(10) = 65 + 50 = 115$.
- THE VALUE OF $(5 + 5)(13 + 10)$: $10 \cdot 23 = 230$.

SINCE $115 \neq 230$, THE EXPRESSION $(5 + 5)(13 + 10)$ IS NOT EQUIVALENT TO THE ORIGINAL EXPRESSION. INSTEAD, IT'S A DIFFERENT EXPRESSION THAT RESULTS IN A DIFFERENT VALUE.

CONCLUSION: THE FORM $(5 + 5)(13 + 10)$ IS NOT A VALID RE-WRITING OF $5(13) + 5(10)$ USING THE DISTRIBUTIVE PROPERTY. IT COMBINES ADDITION OF COEFFICIENTS AND FACTORS IN A WAY THAT ALTERS THE VALUE.

OPTION B: $5(13 + 10)$

THIS FORM IS OBTAINED BY FACTORING OUT 5 FROM THE ORIGINAL EXPRESSION:

$$5(13) + 5(10) = 5(13 + 10)$$

WHY IS THIS CORRECT?

- BOTH TERMS SHARE THE COMMON FACTOR 5.
- APPLYING THE REVERSE DISTRIBUTIVE PROPERTY, WE FACTOR 5 OUT:

$$5(13 + 10) = 5 \cdot 23 = 115$$

- THE ORIGINAL EXPRESSION EVALUATES TO THE SAME:

$$5(13) + 5(10) = 65 + 50 = 115$$

CONCLUSION: THE EXPRESSION $5(13 + 10)$ IS A VALID AND SIMPLIFIED RE-WRITING OF THE ORIGINAL EXPRESSION USING THE DISTRIBUTIVE PROPERTY.

SUMMARY OF THE RE-WRITING PROCESS

STEP	OPERATION	RESULT	EXPLANATION
1	ORIGINAL EXPRESSION	$5(13) + 5(10)$	TWO SEPARATE TERMS WITH COMMON FACTOR 5
2	FACTOR OUT COMMON FACTOR	$5(13 + 10)$	USING THE DISTRIBUTIVE PROPERTY IN REVERSE
3	EXPAND $(13 + 10)$	$5 \cdot 23$	TO VERIFY EQUIVALENCE
4	COMPUTE	115	FINAL SIMPLIFIED FORM

PRACTICAL EXAMPLES OF USING THE DISTRIBUTIVE PROPERTY

EXAMPLE 1: SIMPLIFYING ALGEBRAIC EXPRESSIONS

SUPPOSE YOU HAVE THE EXPRESSION:

$$7(4) + 7(6)$$

APPLYING THE DISTRIBUTIVE PROPERTY:

$$7(4 + 6) = 7 \cdot 10 = 70$$

ALTERNATIVELY, EXPANDING EACH TERM:

$$74 + 76 = 28 + 42 = 70$$

BOTH METHODS LEAD TO THE SAME RESULT, DEMONSTRATING THE FLEXIBILITY OF THE DISTRIBUTIVE PROPERTY.

EXAMPLE 2: FACTORING OUT COMMON TERMS

GIVEN THE EXPRESSION:

$$9x + 9y$$

APPLY THE DISTRIBUTIVE PROPERTY IN REVERSE:

$$9(x + y)$$

THIS SIMPLIFIES THE EXPRESSION AND MAKES SOLVING EQUATIONS MORE STRAIGHTFORWARD.

COMMON MISTAKES TO AVOID WHEN USING THE DISTRIBUTIVE PROPERTY

- **INCORRECT APPLICATION OF THE PROPERTY:** DON'T ADD OR SUBTRACT COEFFICIENTS OR TERMS UNLESS EXPLICITLY FACTORING OR EXPANDING.
- **CONFUSING ADDITION INSIDE THE PARENTHESES:** REMEMBER THAT THE DISTRIBUTIVE PROPERTY APPLIES TO MULTIPLICATION OVER ADDITION, NOT THE OTHER WAY AROUND.
- **MISINTERPRETING THE FORMS:** RECOGNIZE THAT FORMS LIKE $(5 + 5)(13 + 10)$ ARE NOT EQUIVALENT TO THE ORIGINAL EXPRESSION, DESPITE SIMILAR NUMBERS.

CONCLUSION

THE DISTRIBUTIVE PROPERTY IS AN ESSENTIAL CONCEPT IN ALGEBRA THAT ENABLES US TO MANIPULATE AND SIMPLIFY EXPRESSIONS EFFECTIVELY. WHEN APPLIED TO THE EXPRESSION $5(13) + 5(10)$, IT ALLOWS US TO FACTOR OUT THE COMMON

TERM 5, REWRITING THE EXPRESSION AS $5(13 + 10)$. THIS FORM SIMPLIFIES CALCULATIONS AND PROVIDES CLARITY IN ALGEBRAIC OPERATIONS.

UNDERSTANDING THE DISTINCTION BETWEEN VALID RE-WRITES USING THE DISTRIBUTIVE PROPERTY AND FORMS THAT ARE MATHEMATICALLY DIFFERENT—LIKE $(5 + 5)(13 + 10)$ —HELPS IN DEVELOPING STRONG ALGEBRA SKILLS. REMEMBER, THE KEY IS RECOGNIZING COMMON FACTORS AND KNOWING WHEN TO EXPAND OR FACTOR EXPRESSIONS, MAKING YOUR MATHEMATICAL PROBLEM-SOLVING MORE EFFICIENT AND ACCURATE.

WHETHER YOU'RE SIMPLIFYING EXPRESSIONS OR SOLVING EQUATIONS, MASTERING THE DISTRIBUTIVE PROPERTY IS A FOUNDATIONAL STEP TOWARD BECOMING PROFICIENT IN ALGEBRA. PRACTICE APPLYING IT IN VARIOUS CONTEXTS TO STRENGTHEN YOUR UNDERSTANDING AND ENSURE YOU'RE USING IT CORRECTLY.

FREQUENTLY ASKED QUESTIONS

WHAT IS THE DISTRIBUTIVE PROPERTY IN ALGEBRA?

THE DISTRIBUTIVE PROPERTY STATES THAT $A(B + C) = AB + AC$. IT ALLOWS YOU TO DISTRIBUTE A MULTIPLYING FACTOR ACROSS TERMS INSIDE PARENTHESES.

HOW CAN I USE THE DISTRIBUTIVE PROPERTY TO REWRITE $5(13) + 5(10)$?

YOU CAN FACTOR OUT THE COMMON 5: $5(13) + 5(10) = 5(13 + 10)$.

WHICH OPTION CORRECTLY APPLIES THE DISTRIBUTIVE PROPERTY TO $5(13) + 5(10)$?

OPTION B: $5(13 + 10)$ CORRECTLY REWRITES THE EXPRESSION USING THE DISTRIBUTIVE PROPERTY.

IS $(5+5)(13+10)$ EQUIVALENT TO $5(13) + 5(10)$?

NO, $(5+5)(13+10)$ SIMPLIFIES TO $10 \times 23 = 230$, WHICH IS DIFFERENT FROM $5(13) + 5(10) = 65 + 50 = 115$.

WHAT DOES OPTION C, $5(13 + 10)$, REPRESENT IN THE CONTEXT OF THE ORIGINAL EXPRESSION?

OPTION C IS THE CORRECT APPLICATION OF THE DISTRIBUTIVE PROPERTY, COMBINING THE TWO TERMS INTO A SINGLE FACTORED EXPRESSION: $5(13 + 10)$.

WHY IS IT USEFUL TO REWRITE EXPRESSIONS USING THE DISTRIBUTIVE PROPERTY?

REWRITING EXPRESSIONS WITH THE DISTRIBUTIVE PROPERTY CAN SIMPLIFY CALCULATIONS, FACTOR EXPRESSIONS, AND MAKE SOLVING EQUATIONS EASIER.

CAN THE DISTRIBUTIVE PROPERTY BE APPLIED TO ANY ALGEBRAIC EXPRESSION?

IT CAN BE APPLIED WHEN A SINGLE TERM IS MULTIPLIED BY A SUM OR DIFFERENCE INSIDE PARENTHESES, FOLLOWING THE FORM $A(B + C) = AB + AC$.

ADDITIONAL RESOURCES

USE THE DISTRIBUTIVE PROPERTY TO RE-WRITE THE EXPRESSION: $5(13) + 5(10)$ A. $(5+5)(13+10)$ B. $5(13 + 10)$ C.

UNDERSTANDING HOW TO USE THE DISTRIBUTIVE PROPERTY TO RE-WRITE ALGEBRAIC EXPRESSIONS IS A FUNDAMENTAL SKILL IN MATHEMATICS THAT SIMPLIFIES CALCULATIONS AND ENHANCES PROBLEM-SOLVING EFFICIENCY. THIS POWERFUL PROPERTY ALLOWS US TO BREAK DOWN COMPLEX EXPRESSIONS INTO SIMPLER, MORE MANAGEABLE PARTS, MAKING IT EASIER TO EVALUATE OR MANIPULATE THEM. SPECIFICALLY, IN THE EXPRESSION $5(13) + 5(10)$, APPLYING THE DISTRIBUTIVE PROPERTY REVEALS UNDERLYING STRUCTURES AND OFFERS ALTERNATIVE REPRESENTATIONS THAT CAN BE BENEFICIAL IN VARIOUS MATHEMATICAL CONTEXTS. THIS GUIDE EXPLORES HOW TO EFFECTIVELY USE THE DISTRIBUTIVE PROPERTY TO RE-WRITE SUCH EXPRESSIONS, COMPARING DIFFERENT APPROACHES AND HIGHLIGHTING THEIR APPLICATIONS.

WHAT IS THE DISTRIBUTIVE PROPERTY?

BEFORE DIVING INTO THE SPECIFIC EXPRESSIONS, LET'S CLARIFY WHAT THE DISTRIBUTIVE PROPERTY ENTAILS. IT STATES THAT:

- > FOR ANY NUMBERS A, B, AND C,
- > $A(B + C) = AB + AC$

IN SIMPLE TERMS, THE DISTRIBUTIVE PROPERTY ALLOWS US TO MULTIPLY A SINGLE TERM ACROSS TERMS INSIDE PARENTHESES AND THEN SIMPLIFY OR RE-ARRANGE THE EXPRESSION AS NEEDED.

KEY POINTS:

- IT IS USED TO EXPAND EXPRESSIONS.
- IT HELPS TO FACTOR EXPRESSIONS IN REVERSE.
- IT PROVIDES A BRIDGE BETWEEN ADDITION AND MULTIPLICATION, EMPHASIZING THEIR RELATIONSHIP.

APPLYING THE DISTRIBUTIVE PROPERTY TO THE EXPRESSION: $5(13) + 5(10)$

LET'S EXAMINE THE EXPRESSION $5(13) + 5(10)$. THIS IS AN EXAMPLE WHERE THE DISTRIBUTIVE PROPERTY CAN BE USED TO FACTOR OUT THE COMMON FACTOR, WHICH IS 5 IN THIS CASE.

STEP 1: RECOGNIZE THE COMMON FACTOR

BOTH TERMS $5(13)$ AND $5(10)$ SHARE THE FACTOR 5, SO WE CAN FACTOR IT OUT:

$$- 5(13) + 5(10) = 5 \cdot 13 + 5 \cdot 10$$

STEP 2: FACTOR OUT THE COMMON MULTIPLIER

USING THE DISTRIBUTIVE PROPERTY IN REVERSE, WE FACTOR OUT THE 5:

$$- 5(13 + 10)$$

STEP 3: SIMPLIFY THE EXPRESSION

ADD THE NUMBERS INSIDE THE PARENTHESES:

$$- 13 + 10 = 23$$

SO, THE EXPRESSION BECOMES:

$$- 5(23)$$

SUMMARY:

USING THE DISTRIBUTIVE PROPERTY, $5(13) + 5(10)$ CAN BE REWRITTEN AS $5(13 + 10)$, WHICH SIMPLIFIES THE CALCULATION AND HIGHLIGHTS THE COMMON FACTOR.

EXPLORING THE PROVIDED OPTIONS

THE ORIGINAL PROBLEM PRESENTS THREE OPTIONS FOR RE-WRITING THE EXPRESSION:

A. $(5 + 5)(13 + 10)$

B. $5(13 + 10)$

C. $(5 + 5)(13 + 10)$

LET'S ANALYZE EACH ONE TO SEE IF THEY CORRECTLY REPRESENT THE ORIGINAL EXPRESSION.

OPTION A: $(5 + 5)(13 + 10)$

INTERPRETATION:

THIS EXPRESSION SUGGESTS MULTIPLYING $(5 + 5)$ BY $(13 + 10)$:

- $(5 + 5)(13 + 10) = 10 \cdot 23 = 230$

DOES IT MATCH THE ORIGINAL?

CALCULATE THE ORIGINAL:

- $5(13) + 5(10) = 65 + 50 = 115$

COMPARE WITH OPTION A:

- $230 \neq 115$

CONCLUSION: THIS OPTION DOES NOT CORRECTLY RE-WRITE THE ORIGINAL EXPRESSION; IT'S ESSENTIALLY DOUBLING IT, WHICH IS INCORRECT.

OPTION B: $5(13 + 10)$

INTERPRETATION:

THIS EXPRESSION IS THE DIRECT APPLICATION OF THE DISTRIBUTIVE PROPERTY IN REVERSE:

- $5(13 + 10) = 5 \cdot 23 = 115$

DOES IT MATCH THE ORIGINAL?

CALCULATE THE ORIGINAL:

- $5(13) + 5(10) = 65 + 50 = 115$

YES, THIS MATCHES PERFECTLY.

CONCLUSION: OPTION B IS THE CORRECT RE-WRITING OF THE ORIGINAL EXPRESSION USING THE DISTRIBUTIVE PROPERTY.

OPTION C: $(5 + 5)(13 + 10)$

THIS IS IDENTICAL TO OPTION A, SO IT ALSO DOES NOT REPRESENT THE ORIGINAL EXPRESSION ACCURATELY.

SUMMARY OF CORRECT RE-WRITE

- THE MOST ACCURATE RE-WRITE OF THE EXPRESSION $5(13) + 5(10)$ USING THE DISTRIBUTIVE PROPERTY IS OPTION B: $5(13 + 10)$.

WHY IS USING THE DISTRIBUTIVE PROPERTY USEFUL?

APPLYING THE DISTRIBUTIVE PROPERTY PROVIDES MULTIPLE BENEFITS IN MATHEMATICS:

1. SIMPLIFICATION OF EXPRESSIONS

- IT ALLOWS YOU TO FACTOR COMMON TERMS, MAKING COMPLEX EXPRESSIONS EASIER TO HANDLE.

2. MENTAL MATH EFFICIENCY

- RECOGNIZING COMMON FACTORS STREAMLINES CALCULATIONS, ESPECIALLY IN MENTAL MATH OR QUICK ESTIMATIONS.

3. FOUNDATIONS FOR ALGEBRA

- IT'S CRITICAL FOR SOLVING EQUATIONS, EXPANDING POLYNOMIAL EXPRESSIONS, AND UNDERSTANDING ALGEBRAIC CONCEPTS.

4. PROBLEM-SOLVING FLEXIBILITY

- RE-WRITING EXPRESSIONS OPENS ALTERNATIVE APPROACHES TO PROBLEM-SOLVING, OFTEN REVEALING SHORTCUTS OR MORE STRAIGHTFORWARD METHODS.

PRACTICAL EXAMPLES OF USING THE DISTRIBUTIVE PROPERTY

EXAMPLE 1: SIMPLIFY $7(4 + 9)$

- RECOGNIZE THE COMMON FACTOR: 7

- RE-WRITE: $7(4 + 9) = 7 \cdot 4 + 7 \cdot 9 = 28 + 63 = 91$

EXAMPLE 2: FACTOR $12x + 18$

- FIND THE GREATEST COMMON FACTOR (GCF): 6

- RE-WRITE: $6(2x + 3)$

EXAMPLE 3: EXPAND $3(a + 5)$

- USE DISTRIBUTIVE PROPERTY: $3a + 15$

COMMON MISTAKES TO AVOID

- INCORRECTLY COMBINING TERMS WITHOUT FACTORING OR DISTRIBUTING PROPERLY.

- MISAPPLYING THE DISTRIBUTIVE PROPERTY ACROSS SUBTRACTION WITHOUT ADJUSTING SIGNS.

- ASSUMING DISTRIBUTIVE PROPERTY APPLIES TO ADDITION AND SUBTRACTION INTERCHANGEABLY WITHOUT PROPER CONTEXT.

FINAL THOUGHTS

THE ABILITY TO USE THE DISTRIBUTIVE PROPERTY TO RE-WRITE EXPRESSIONS LIKE $5(13) + 5(10)$ IS A CORNERSTONE OF

ALGEBRA AND ARITHMETIC PROFICIENCY. RECOGNIZING WHEN TERMS SHARE COMMON FACTORS ALLOWS FOR EFFICIENT FACTORING AND SIMPLIFIES CALCULATIONS. IN THE CONTEXT OF THE GIVEN OPTIONS, OPTION B: $5(13 + 10)$ IS THE CORRECT RE-WRITE, ILLUSTRATING THE POWER OF THE DISTRIBUTIVE PROPERTY IN TRANSFORMING EXPRESSIONS INTO MORE MANAGEABLE FORMS.

BY MASTERING THIS PROPERTY, STUDENTS AND MATHEMATICIANS ALIKE CAN APPROACH COMPLEX PROBLEMS WITH CONFIDENCE, LEVERAGING THIS FUNDAMENTAL TOOL TO UNLOCK SOLUTIONS AND DEEPEN UNDERSTANDING OF ALGEBRAIC STRUCTURES.

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