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ARE YOU STRUGGLING WITH SIMPLIFYING ALGEBRAIC EXPRESSIONS OR SOLVING EQUATIONS INVOLVING VARIABLES SUCH AS x ? IF SO, YOU'VE COME TO THE RIGHT PLACE! IN THIS COMPREHENSIVE GUIDE, WE WILL WALK THROUGH THE PROCESS OF SIMPLIFYING EXPRESSIONS LIKE $3x + 3x - 6$ AND $6x + 18x + 12$, AS WELL AS SOLVING FOR SPECIFIC VALUES SUCH AS $x = -1$ OR $x = -2$. WHETHER YOU'RE A STUDENT PREPARING FOR EXAMS OR SOMEONE BRUSHING UP ON ALGEBRA FUNDAMENTALS, UNDERSTANDING HOW TO SIMPLIFY AND EVALUATE EXPRESSIONS IS ESSENTIAL. LET'S EXPLORE THESE CONCEPTS STEP BY STEP.

UNDERSTANDING ALGEBRAIC EXPRESSIONS

BEFORE DIVING INTO SIMPLIFICATION TECHNIQUES, IT'S IMPORTANT TO UNDERSTAND WHAT ALGEBRAIC EXPRESSIONS ARE.

WHAT IS AN ALGEBRAIC EXPRESSION?

AN ALGEBRAIC EXPRESSION IS A MATHEMATICAL PHRASE THAT COMBINES NUMBERS, VARIABLES, AND OPERATION SYMBOLS (LIKE $+$, $-$, $\times$, $\div$). UNLIKE EQUATIONS, EXPRESSIONS DO NOT CONTAIN AN EQUAL SIGN. SIMPLIFYING AN EXPRESSION INVOLVES COMBINING LIKE TERMS TO MAKE IT EASIER TO EVALUATE OR UNDERSTAND.

WHAT ARE LIKE TERMS?

LIKE TERMS ARE TERMS THAT HAVE THE SAME VARIABLE RAISED TO THE SAME POWER. FOR EXAMPLE:

- $3x$ AND $5x$ ARE LIKE TERMS
- $6x$ AND $18x$ ARE LIKE TERMS
- -6 AND 12 ARE LIKE TERMS (CONSTANTS)

SIMPLIFYING INVOLVES COMBINING THESE LIKE TERMS TO REDUCE THE EXPRESSION TO ITS SIMPLEST FORM.

STEP-BY-STEP GUIDE TO SIMPLIFY ALGEBRAIC EXPRESSIONS

LET'S EXAMINE THE SPECIFIC EXPRESSIONS FROM THE PROMPT:

1. $3x + 3x - 6$
2. $6x + 18x + 12$

AND EXPLORE HOW TO SIMPLIFY EACH.

SIMPLIFYING $3x + 3x - 6$

STEP 1: IDENTIFY LIKE TERMS

- THE TERMS $3x$ AND $3x$ ARE LIKE TERMS.
- THE NUMBER -6 IS A CONSTANT.

STEP 2: COMBINE THE LIKE TERMS

- $3x + 3x = 6x$

STEP 3: WRITE THE SIMPLIFIED EXPRESSION

- $6x - 6$

RESULT:

THE SIMPLIFIED FORM OF THE EXPRESSION IS $6x - 6$.

SIMPLIFYING $6x + 18x + 12$

STEP 1: IDENTIFY LIKE TERMS

- $6x$ AND $18x$ ARE LIKE TERMS.
- 12 IS A CONSTANT.

STEP 2: COMBINE THE LIKE TERMS

- $6x + 18x = 24x$

STEP 3: WRITE THE SIMPLIFIED EXPRESSION

- $24x + 12$

RESULT:

THE SIMPLIFIED FORM IS $24x + 12$.

EVALUATING EXPRESSIONS FOR SPECIFIC VALUES OF x

ONCE THE EXPRESSIONS ARE SIMPLIFIED, YOU MIGHT NEED TO EVALUATE THEM FOR SPECIFIC VALUES OF x SUCH AS $x = -1$ OR $x = -2$. LET'S SEE HOW TO DO THIS STEP-BY-STEP.

EVALUATING $6x - 6$ AT $x = -1$

STEP 1: SUBSTITUTE THE VALUE OF x INTO THE SIMPLIFIED EXPRESSION

- $6(-1) - 6$

STEP 2: PERFORM THE CALCULATIONS

- $6 \times -1 = -6$
- $-6 - 6 = -12$

RESULT:

WHEN $x = -1$, THE VALUE OF $6x - 6$ IS -12 .

EVALUATING $24x + 12$ AT $x = -2$

STEP 1: SUBSTITUTE THE VALUE OF x INTO THE SIMPLIFIED EXPRESSION

$$- 24(-2) + 12$$

STEP 2: PERFORM THE CALCULATIONS

$$- 24 \times -2 = -48$$

$$- -48 + 12 = -36$$

RESULT:

WHEN $x = -2$, THE VALUE OF $24x + 12$ IS -36 .

COMMON MISTAKES TO AVOID WHEN SIMPLIFYING ALGEBRAIC EXPRESSIONS

WHILE SIMPLIFYING ALGEBRAIC EXPRESSIONS IS STRAIGHTFORWARD, SEVERAL MISTAKES CAN TRIP YOU UP. BE AWARE OF THESE COMMON PITFALLS:

1. NOT COMBINING LIKE TERMS CORRECTLY

ALWAYS ENSURE THAT ONLY LIKE TERMS ARE COMBINED. FOR EXAMPLE, YOU CANNOT COMBINE $3x$ AND 6 CONSTANTS OR $3x$ AND $2y$ UNLESS SPECIFIED.

2. SIGN ERRORS

PAY CLOSE ATTENTION TO POSITIVE AND NEGATIVE SIGNS DURING ADDITION AND SUBTRACTION. MISTAKES HERE CAN LEAD TO INCORRECT ANSWERS.

3. FORGETTING TO APPLY THE DISTRIBUTIVE PROPERTY

WHEN EXPRESSIONS INVOLVE PARENTHESES, REMEMBER TO DISTRIBUTE COEFFICIENTS PROPERLY BEFORE COMBINING LIKE TERMS.

4. IGNORING THE ORDER OF OPERATIONS

FOLLOW PEMDAS (PARENTHESES, EXPONENTS, MULTIPLICATION AND DIVISION, ADDITION AND SUBTRACTION) TO EVALUATE EXPRESSIONS CORRECTLY.

PRACTICE PROBLEMS TO MASTER SIMPLIFICATION AND EVALUATION

TO REINFORCE YOUR UNDERSTANDING, TRY SOLVING THESE PRACTICE PROBLEMS:

- SIMPLIFY: $4x + 2x - 5 + 3$
- EVALUATE: $5x - 3$ AT $x = 2$

- SIMPLIFY: $(2x + 3) + (4x - 5)$
- EVALUATE: $3x + 7$ AT $x = -2$

SOLUTIONS:

1. SIMPLIFY: $4x + 2x - 5 + 3 = (4x + 2x) + (-5 + 3) = 6x - 2$
2. EVALUATE: $5(2) - 3 = 10 - 3 = 7$
3. SIMPLIFY: $(2x + 3) + (4x - 5) = 2x + 4x + 3 - 5 = 6x - 2$
4. EVALUATE: $3(-2) + 7 = -6 + 7 = 1$

CONCLUSION: MASTERING SIMPLIFICATION AND EVALUATION OF ALGEBRAIC EXPRESSIONS

SIMPLIFYING ALGEBRAIC EXPRESSIONS LIKE $3x + 3x - 6$ AND $6x + 18x + 12$ IS A FUNDAMENTAL SKILL THAT FORMS THE BASIS FOR SOLVING MORE COMPLEX EQUATIONS AND PROBLEMS. BY UNDERSTANDING HOW TO IDENTIFY LIKE TERMS, CORRECTLY COMBINE THEM, AND EVALUATE EXPRESSIONS FOR SPECIFIC VARIABLE VALUES, YOU BUILD CONFIDENCE AND PROFICIENCY IN ALGEBRA.

REMEMBER TO ALWAYS DOUBLE-CHECK YOUR WORK FOR SIGN ERRORS AND ENSURE YOU'VE COMBINED ONLY LIKE TERMS. PRACTICE REGULARLY WITH VARIOUS PROBLEMS TO STRENGTHEN YOUR SKILLS AND PREPARE FOR EXAMS OR REAL-WORLD APPLICATIONS INVOLVING ALGEBRA.

IF YOU NEED TO DEMONSTRATE YOUR SOLUTIONS, SIMPLY SUBSTITUTE THE GIVEN VALUES FOR x INTO THE SIMPLIFIED EXPRESSIONS TO FIND THEIR RESPECTIVE RESULTS. WHETHER YOU'RE SOLVING FOR $x = -1$ OR $x = -2$, THE PROCESS REMAINS CONSISTENT: SIMPLIFY FIRST, THEN EVALUATE.

HAPPY SIMPLIFYING!

FREQUENTLY ASKED QUESTIONS

HOW DO YOU SIMPLIFY THE EXPRESSION $3x + 3x - 6$?

COMBINE LIKE TERMS: $3x + 3x = 6x$, SO THE SIMPLIFIED EXPRESSION IS $6x - 6$.

WHAT IS THE SIMPLIFIED FORM OF $6x + 18x + 12$?

COMBINE LIKE TERMS: $6x + 18x = 24x$, SO THE SIMPLIFIED EXPRESSION IS $24x + 12$.

WHAT ARE THE SOLUTIONS FOR x IN THE EQUATIONS $x - 1$ AND $x - 2$?

$x - 1$ EQUALS ZERO WHEN $x = 1$; $x - 2$ EQUALS ZERO WHEN $x = 2$.

HOW CAN I FACTOR THE EXPRESSION $6x + 18x + 12$?

FACTOR OUT THE COMMON FACTOR 6: $6(x + 3x + 2)$, WHICH SIMPLIFIES TO $6(4x + 2)$.

ARE THE EXPRESSIONS $3x + 3x - 6$ AND $6x + 18x + 12$ EQUIVALENT?

NO, AFTER SIMPLIFICATION, THE FIRST IS $6x - 6$, AND THE SECOND IS $24x + 12$, SO THEY ARE NOT EQUIVALENT.

WHAT IS THE VALUE OF x IF WE SET $6x - 6$ EQUAL TO ZERO?

ADD 6 TO BOTH SIDES: $6x = 6$, THEN DIVIDE BOTH SIDES BY 6: $x = 1$.

ADDITIONAL RESOURCES

COMPREHENSIVE REVIEW AND BREAKDOWN OF SIMPLIFY: $3x + 3x - 6$ $6x + 18x + 12$; $x = 1, -2$

INTRODUCTION TO THE PROBLEM

MATHEMATICS, ESPECIALLY ALGEBRA, OFTEN INVOLVES THE PROCESS OF SIMPLIFYING EXPRESSIONS TO THEIR MOST MANAGEABLE FORM. THE PROBLEM PRESENTED—"SIMPLIFY: $3x + 3x - 6$ $6x + 18x + 12$; $x = 1, -2$ "—APPEARS TO COMBINE MULTIPLE ALGEBRAIC EXPRESSIONS ALONG WITH SOME SPECIFIC VALUES FOR THE VARIABLE x .

AT ITS CORE, THIS PROBLEM INVOLVES SEVERAL KEY SKILLS:

- COMBINING LIKE TERMS
- SIMPLIFYING ALGEBRAIC EXPRESSIONS
- SUBSTITUTING SPECIFIC VALUES INTO THE SIMPLIFIED EXPRESSION

THE TASK APPEARS TO BE TWOFOLD: FIRST, TO SIMPLIFY THE ALGEBRAIC EXPRESSION, AND SECOND, TO EVALUATE THE SIMPLIFIED FORM AT PARTICULAR VALUES OF x (NAMESLY, $x = 1$ AND $x = -2$).

UNDERSTANDING THE COMPONENTS OF THE EXPRESSION

LET'S DISSECT THE GIVEN INPUT INTO UNDERSTANDABLE SEGMENTS:

- ALGEBRAIC EXPRESSION:
 - ' $3x + 3x - 6$ $6x + 18x + 12$ '
- VALUES FOR x :
 - ' $x = 1$ '
 - ' $x = -2$ '

THE EXPRESSION SEEMS TO BE A CONCATENATION OF TWO PARTS SEPARATED BY A SPACE OR PERHAPS A TYPO, BUT BASED ON TYPICAL ALGEBRAIC PROBLEMS, IT MOST LIKELY REPRESENTS A COMBINED EXPRESSION OR TWO SEPARATE EXPRESSIONS TO SIMPLIFY AND EVALUATE.

CLARIFYING THE EXPRESSION STRUCTURE

GIVEN THE FORMATTING, ONE PLAUSIBLE INTERPRETATION IS:

> SIMPLIFY THE SUM OF TWO EXPRESSIONS:

1. EXPRESSION 1: ' $3x + 3x - 6$ '

2. EXPRESSION 2: ' $6x + 18x + 12$ '

AND THEN EVALUATE THE RESULTING SIMPLIFIED EXPRESSION AT $x = 1$ AND $x = -2$.

ALTERNATIVELY, IT MIGHT BE:

- AN EXPRESSION WITH A TYPO OR MISSING OPERATORS, BUT THE MOST LOGICAL READING, BASED ON ALGEBRAIC CONVENTIONS, IS THE SUM OF THE TWO EXPRESSIONS.

ASSUMPTION FOR CLARIFICATION

FOR CLARITY, LET'S ASSUME THE PROBLEM IS:

> SIMPLIFY $(3x + 3x - 6) + (6x + 18x + 12)$, THEN EVALUATE AT $x = 1$ AND $x = -2$.

STEP-BY-STEP SIMPLIFICATION PROCESS

1. SIMPLIFY THE FIRST EXPRESSION: ' $3x + 3x - 6$ '

- COMBINE LIKE TERMS:

- ' $3x + 3x = 6x$ '

- RESULT:

- ' $6x - 6$ '

2. SIMPLIFY THE SECOND EXPRESSION: ' $6x + 18x + 12$ '

- COMBINE LIKE TERMS:

- ' $6x + 18x = 24x$ '

- RESULT:

- ' $24x + 12$ '

3. ADD THE TWO SIMPLIFIED EXPRESSIONS

- COMBINED EXPRESSION:

- ' $(6x - 6) + (24x + 12)$ '

- COMBINE LIKE TERMS:

- ' $6x + 24x = 30x$ '

- ' $-6 + 12 = 6$ '

- FINAL SIMPLIFIED FORM:

- ' $30x + 6$ '

EVALUATION OF THE SIMPLIFIED EXPRESSION

NOW, WITH THE SIMPLIFIED EXPRESSION ' $30x + 6$ ', THE NEXT STEP IS TO EVALUATE IT AT $x = 1$ AND $x = -2$.

1. WHEN $x = 1$

- SUBSTITUTE $x = 1$ INTO THE EXPRESSION:

- ' $30(1) + 6 = 30 + 6 = 36$ '

- RESULT: 36

2. WHEN $x = -2$

- SUBSTITUTE $x = -2$ INTO THE EXPRESSION:

- ' $30(-2) + 6 = -60 + 6 = -54$ '

- RESULT: -54

DEEPER INSIGHTS INTO ALGEBRAIC SIMPLIFICATION

THE PROCESS OF SIMPLIFYING ALGEBRAIC EXPRESSIONS LIKE THESE IS FUNDAMENTAL IN MATHEMATICS BECAUSE IT ALLOWS FOR EASIER COMPUTATION, BETTER UNDERSTANDING, AND PREPARATION FOR SOLVING EQUATIONS OR MODELING REAL-WORLD PROBLEMS.

WHY IS SIMPLIFICATION IMPORTANT?

- EFFICIENCY: SIMPLIFIED EXPRESSIONS ARE EASIER TO WORK WITH, ESPECIALLY WHEN EVALUATING AT MULTIPLE POINTS OR SOLVING EQUATIONS.

- CLARITY: IT REVEALS THE CORE STRUCTURE OF THE EXPRESSION, HELPING TO IDENTIFY KEY COMPONENTS LIKE COEFFICIENTS AND CONSTANTS.

- FOUNDATION FOR FURTHER OPERATIONS: SIMPLIFICATION IS A CRUCIAL STEP BEFORE SOLVING FOR VARIABLES, GRAPHING FUNCTIONS, OR PERFORMING CALCULUS OPERATIONS.

TECHNIQUES USED IN SIMPLIFICATION

- COMBINING LIKE TERMS: THE CORE SKILL DEMONSTRATED HERE, COMBINING TERMS WITH THE SAME VARIABLE AND EXPONENT.
- DISTRIBUTIVE PROPERTY: ALTHOUGH NOT EXPLICITLY REQUIRED HERE, THIS IS OFTEN USED TO EXPAND OR FACTOR EXPRESSIONS.
- FACTORING: USEFUL FOR MORE COMPLEX EXPRESSIONS, NOT DIRECTLY NEEDED IN THIS SPECIFIC PROBLEM BUT ESSENTIAL IN ALGEBRA.

COMMON MISTAKES AND HOW TO AVOID THEM

WHEN SIMPLIFYING ALGEBRAIC EXPRESSIONS, STUDENTS OFTEN ENCOUNTER PITFALLS. BEING AWARE OF THESE HELPS IMPROVE ACCURACY:

- MISIDENTIFYING LIKE TERMS: ENSURE THAT ONLY TERMS WITH THE SAME VARIABLE AND EXPONENT ARE COMBINED.
- SIGN ERRORS: PAY CLOSE ATTENTION TO PLUS AND MINUS SIGNS, ESPECIALLY WHEN COMBINING NEGATIVE TERMS.
- INCORRECT SUBSTITUTIONS: DOUBLE-CHECK THE SUBSTITUTION OF THE VALUE OF x TO AVOID COMPUTATIONAL ERRORS.
- OVERLOOKING CONSTANTS: REMEMBER TO INCLUDE CONSTANTS LIKE -6 AND $+12$ WHEN COMBINING.

PRACTICAL APPLICATIONS OF SUCH SIMPLIFICATION

WHILE THE PROBLEM SEEMS PURELY ACADEMIC, THE SKILLS INVOLVED HAVE BROAD APPLICATIONS:

- ENGINEERING: SIMPLIFYING FORMULAS FOR STRESS, STRAIN, OR ELECTRICAL CIRCUITS.
- ECONOMICS: MODELING COST FUNCTIONS OR PROFIT EQUATIONS.
- COMPUTER SCIENCE: OPTIMIZING ALGORITHMS THAT INVOLVE ALGEBRAIC COMPUTATIONS.
- PHYSICS: SIMPLIFYING EQUATIONS OF MOTION OR ENERGY.

CONCLUSION AND FINAL THOUGHTS

IN SUMMARY, THE PROBLEM PRESENTED INVOLVES MULTIPLE LAYERS OF ALGEBRAIC MANIPULATION. BY CAREFULLY BREAKING DOWN THE EXPRESSIONS, COMBINING LIKE TERMS, AND THEN EVALUATING AT SPECIFIC POINTS, WE GAIN BOTH COMPUTATIONAL SKILLS AND A DEEPER UNDERSTANDING OF ALGEBRA.

TO ENCAPSULATE:

- THE COMBINED AND SIMPLIFIED ALGEBRAIC EXPRESSION IS $30x + 6$.
- AT $x = 1$, THE VALUE IS 36.
- AT $x = -2$, THE VALUE IS -54.

THIS EXERCISE EXEMPLIFIES FUNDAMENTAL ALGEBRAIC TECHNIQUES THAT ARE BUILDING BLOCKS FOR MORE ADVANCED MATHEMATICS. MASTERY OF SUCH SKILLS ENABLES STUDENTS AND PROFESSIONALS TO APPROACH COMPLEX PROBLEMS WITH CONFIDENCE AND CLARITY.

FURTHER RECOMMENDATIONS

- PRACTICE SIMPLIFYING DIFFERENT TYPES OF EXPRESSIONS, INCLUDING THOSE WITH EXPONENTS, FRACTIONS, AND PARENTHESES.
- ALWAYS DOUBLE-CHECK YOUR WORK, ESPECIALLY SIGNS AND COMBINING LIKE TERMS.
- USE SUBSTITUTION TO VERIFY THE CORRECTNESS OF YOUR SIMPLIFIED EXPRESSIONS.
- EXPLORE RELATED PROBLEMS INVOLVING EQUATIONS, INEQUALITIES, AND WORD PROBLEMS TO STRENGTHEN YOUR UNDERSTANDING.

IN CONCLUSION, SIMPLIFYING ALGEBRAIC EXPRESSIONS IS AN ESSENTIAL SKILL THAT UNDERPINS MUCH OF HIGHER MATHEMATICS AND REAL-WORLD PROBLEM SOLVING. CONSISTENT PRACTICE AND ATTENTION TO DETAIL WILL DEVELOP PROFICIENCY AND CONFIDENCE IN HANDLING INCREASINGLY COMPLEX ALGEBRAIC CHALLENGES.

Simplify $3x^3 - 6x^2 + 18x - 12$ Type Your Answer In The Box Below

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