

IF $X = 4$ AND $Y = 7$, EVALUATE THE - FOLLOWING EXPRESSION: $20 + 2(3Y - 4X)$

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UNDERSTANDING HOW TO EVALUATE ALGEBRAIC EXPRESSIONS IS A FUNDAMENTAL SKILL IN MATHEMATICS, ESPECIALLY IN ALGEBRA. WHEN GIVEN SPECIFIC VALUES FOR VARIABLES, SUCH AS X AND Y , THE PROCESS INVOLVES SUBSTITUTION AND FOLLOWING THE ORDER OF OPERATIONS. IN THIS ARTICLE, WE WILL THOROUGHLY EXPLORE HOW TO EVALUATE THE EXPRESSION $20 + 2(3Y - 4X)$ WHEN X EQUALS 4 AND Y EQUALS 7. WE WILL ALSO DISCUSS THE IMPORTANCE OF PROPER SUBSTITUTION, THE HIERARCHY OF OPERATIONS, AND HOW TO VERIFY YOUR FINAL ANSWER.

BREAKING DOWN THE PROBLEM

BEFORE DIVING INTO CALCULATIONS, IT'S CRUCIAL TO UNDERSTAND WHAT THE PROBLEM IS ASKING. THE TASK IS TO EVALUATE A MATHEMATICAL EXPRESSION FOR GIVEN VARIABLE VALUES:

- $X = 4$
- $Y = 7$

THE EXPRESSION TO EVALUATE IS:

$$20 + 2(3Y - 4X)$$

THIS INVOLVES SUBSTITUTION OF THE KNOWN VALUES INTO THE EXPRESSION, FOLLOWED BY SIMPLIFYING ACCORDING TO THE ORDER OF OPERATIONS.

THE ORDER OF OPERATIONS: PEMDAS

WHEN EVALUATING EXPRESSIONS, MATHEMATICIANS FOLLOW A SPECIFIC ORDER TO ENSURE CONSISTENCY AND CORRECTNESS. THE ACRONYM PEMDAS HELPS REMEMBER THIS SEQUENCE:

- PARENTHESES: SIMPLIFY EXPRESSIONS INSIDE PARENTHESES FIRST.
- EXPONENTS: CALCULATE ANY EXPONENTS.
- MULTIPLICATION AND DIVISION: PROCEED FROM LEFT TO RIGHT.
- ADDITION AND SUBTRACTION: PROCEED FROM LEFT TO RIGHT.

APPLYING PEMDAS TO OUR EXPRESSION ENSURES WE EVALUATE IT CORRECTLY.

STEP-BY-STEP EVALUATION

LET'S GO THROUGH THE PROCESS SYSTEMATICALLY.

STEP 1: SUBSTITUTE THE KNOWN VALUES

REPLACE Y WITH 7 AND X WITH 4 IN THE EXPRESSION:

$$20 + 2(3(7) - 4(4))$$

STEP 2: SIMPLIFY INSIDE THE PARENTHESES

CALCULATE EACH TERM INSIDE THE PARENTHESES:

$$\begin{aligned}-3(7) &= 21 \\ -4(4) &= 16\end{aligned}$$

So, the expression becomes:

$$20 + 2(21 - 16)$$

STEP 3: SIMPLIFY THE PARENTHESES

SUBTRACT INSIDE THE PARENTHESES:

$$21 - 16 = 5$$

Now, the expression is:

$$20 + 2(5)$$

STEP 4: MULTIPLY

MULTIPLY 2 BY 5:

$$2 \times 5 = 10$$

THE EXPRESSION SIMPLIFIES TO:

$$20 + 10$$

STEP 5: ADD

FINALLY, ADD 20 AND 10:

$$20 + 10 = 30$$

FINAL ANSWER: 30

THIS STEP-BY-STEP APPROACH ENSURES ACCURACY AND CLARITY IN SOLVING ALGEBRAIC PROBLEMS.

UNDERSTANDING THE COMPONENTS OF THE EXPRESSION

BREAKING DOWN THE ORIGINAL EXPRESSION HELPS IN GRASPING HOW EACH PART CONTRIBUTES TO THE FINAL VALUE.

CONSTANT TERM: 20

- REPRESENTS A FIXED VALUE ADDED TO THE RESULT AFTER EVALUATING THE PARENTHESES.

COEFFICIENT 2

- MULTIPLIES THE ENTIRE EXPRESSION INSIDE THE PARENTHESES, SERVING AS A SCALING FACTOR.

PARENTHESES EXPRESSION: $(3y - 4x)$

- CONTAINS THE VARIABLES y AND x , WHICH ARE REPLACED BY THEIR NUMERICAL VALUES FOR EVALUATION.

THE SIGNIFICANCE OF PROPER SUBSTITUTION IN ALGEBRA

SUBSTITUTION IS A CRITICAL STEP IN EVALUATING EXPRESSIONS. ACCURATE SUBSTITUTION ENSURES THE INTEGRITY OF THE CALCULATION AND PREVENTS ERRORS. WHEN SUBSTITUTING:

- ALWAYS REPLACE VARIABLES WITH THEIR NUMERICAL VALUES.
- MAINTAIN THE STRUCTURE OF THE ORIGINAL EXPRESSION.
- BE CAUTIOUS WITH SIGNS (POSITIVE OR NEGATIVE).

FOR EXAMPLE, IF x OR y HAD NEGATIVE VALUES, CAREFUL ATTENTION WOULD BE NEEDED TO SIGNS AND ORDER OF OPERATIONS.

COMMON MISTAKES TO AVOID

WHILE EVALUATING ALGEBRAIC EXPRESSIONS, SEVERAL COMMON ERRORS CAN OCCUR:

- **MISPLACING PARENTHESES:** FORGETTING TO EVALUATE EXPRESSIONS INSIDE PARENTHESES FIRST.
- **INCORRECT SUBSTITUTION:** SWAPPING VALUES OR MIXING UP VARIABLES.
- **IGNORING THE ORDER OF OPERATIONS:** PERFORMING ADDITION BEFORE MULTIPLICATION.
- **ARITHMETIC ERRORS:** MISTAKES IN BASIC CALCULATIONS, SUCH AS ADDITION, SUBTRACTION, MULTIPLICATION, OR DIVISION.

BEING MINDFUL OF THESE PITFALLS CAN IMPROVE ACCURACY AND CONFIDENCE IN SOLVING SIMILAR PROBLEMS.

ADDITIONAL PRACTICE PROBLEMS

TO REINFORCE UNDERSTANDING, CONSIDER PRACTICING WITH SIMILAR PROBLEMS:

1. EVALUATE $15 + 3(2x + y)$ WHEN $x=2$ AND $y=5$.
2. CALCULATE $8 - 4(3a - 2b)$ WHEN $a=3$ AND $b=4$.
3. FIND THE VALUE OF $10 + 5(2m - n)$ WHEN $m=1$ AND $n=3$.

PRACTICING THESE TYPES OF PROBLEMS HELPS SOLIDIFY THE CONCEPTS OF SUBSTITUTION AND ORDER OF OPERATIONS.

APPLICATIONS OF EVALUATING ALGEBRAIC EXPRESSIONS

UNDERSTANDING HOW TO EVALUATE EXPRESSIONS IS FOUNDATIONAL IN VARIOUS FIELDS:

- ENGINEERING: CALCULATING FORCES, VELOCITIES, AND OTHER VARIABLES.
- ECONOMICS: COMPUTING COST FUNCTIONS AND PROFIT MODELS.
- COMPUTER SCIENCE: PROGRAMMING ALGORITHMS INVOLVING MATHEMATICAL COMPUTATIONS.
- SCIENCE: ANALYZING EXPERIMENTAL DATA AND FORMULAS.

MASTERING THIS SKILL ENHANCES PROBLEM-SOLVING ABILITIES ACROSS DISCIPLINES.

CONCLUSION

EVALUATING THE EXPRESSION $20 + 2(3y - 4x)$ WHEN x EQUALS 4 AND y EQUALS 7 INVOLVES SYSTEMATIC SUBSTITUTION AND APPLICATION OF THE ORDER OF OPERATIONS. THE DETAILED PROCESS CONFIRMS THE FINAL RESULT AS 30. THIS EXAMPLE ILLUSTRATES THE IMPORTANCE OF UNDERSTANDING ALGEBRAIC PRINCIPLES, PROPER SUBSTITUTION, AND THE HIERARCHY OF OPERATIONS. REGULAR PRACTICE WITH SIMILAR PROBLEMS WILL IMPROVE PROFICIENCY AND CONFIDENCE IN ALGEBRAIC EVALUATIONS, WHICH ARE ESSENTIAL SKILLS IN MANY ACADEMIC AND REAL-WORLD APPLICATIONS.

REMEMBER, APPROACH EACH PROBLEM METHODICALLY—SUBSTITUTE CAREFULLY, SIMPLIFY STEP-BY-STEP, AND VERIFY YOUR CALCULATIONS. WITH THESE STRATEGIES, YOU'LL BE WELL-EQUIPPED TO HANDLE COMPLEX EXPRESSIONS CONFIDENTLY AND ACCURATELY.

FREQUENTLY ASKED QUESTIONS

WHAT IS THE VALUE OF THE EXPRESSION $20 + 2(3y - 4x)$ WHEN $x = 4$ AND $y = 7$?

THE VALUE IS 30.

HOW DO YOU EVALUATE $20 + 2(3y - 4x)$ GIVEN $x = 4$ AND $y = 7$?

SUBSTITUTE $x = 4$ AND $y = 7$ INTO THE EXPRESSION AND SIMPLIFY: $20 + 2(3(7) - 4(4)) = 20 + 2(21 - 16) = 20 + 2(5) = 20 + 10 = 30$.

WHAT IS THE STEP-BY-STEP SOLUTION FOR $20 + 2(3y - 4x)$ WITH $x=4$ AND $y=7$?

STEP 1: SUBSTITUTE VALUES: $20 + 2(3(7) - 4(4))$. STEP 2: CALCULATE INSIDE PARENTHESES: $3(7)=21$, $4(4)=16$, so $21 - 16 = 5$. STEP 3: MULTIPLY BY 2: $2(5)=10$. STEP 4: ADD TO 20: $20 + 10=30$.

IS THE RESULT OF $20 + 2(3y - 4x)$ WHEN $x=4$ AND $y=7$ EQUAL TO 30?

YES, THE EVALUATED RESULT IS 30.

CAN THE EXPRESSION $20 + 2(3y - 4x)$ BE SIMPLIFIED FURTHER AFTER SUBSTITUTING $x=4$ AND $y=7$?

NO, AFTER SUBSTITUTION AND CALCULATION, THE SIMPLIFIED VALUE IS 30, WHICH IS THE FINAL ANSWER.

WHAT COMMON MISTAKES SHOULD BE AVOIDED WHEN EVALUATING $20 + 2(3y - 4x)$ WITH GIVEN VALUES?

AVOID FORGETTING TO PERFORM OPERATIONS INSIDE PARENTHESES FIRST AND ENSURE CORRECT SUBSTITUTION OF VALUES BEFORE CALCULATION.

HOW DOES THE ORDER OF OPERATIONS AFFECT EVALUATING $20 + 2(3y - 4x)$ WITH $x=4$ AND $y=7$?

ORDER OF OPERATIONS (PEMDAS) DICTATES THAT YOU EVALUATE PARENTHESES FIRST, THEN MULTIPLICATION, AND FINALLY ADDITION, LEADING TO THE CORRECT RESULT OF 30.

ADDITIONAL RESOURCES

IF $x = 4$ AND $y = 7$, EVALUATE THE FOLLOWING EXPRESSION: $20 + 2(3y - 4x)$

IN THE REALM OF MATHEMATICS, EXPRESSIONS INVOLVING VARIABLES OFTEN SERVE AS THE FOUNDATION FOR UNDERSTANDING MORE COMPLEX CONCEPTS SUCH AS ALGEBRA, CALCULUS, AND PROBLEM-SOLVING STRATEGIES. WHEN GIVEN SPECIFIC VALUES FOR VARIABLES, EVALUATING THESE EXPRESSIONS BECOMES A FUNDAMENTAL SKILL THAT BRIDGES THEORETICAL KNOWLEDGE WITH PRACTICAL APPLICATION. TODAY, WE WILL EXPLORE HOW TO EVALUATE THE EXPRESSION: $20 + 2(3y - 4x)$, GIVEN THAT $x = 4$ AND $y = 7$. THIS PROCESS NOT ONLY REFINES ALGEBRAIC MANIPULATION SKILLS BUT ALSO EXEMPLIFIES HOW TO APPROACH SIMILAR PROBLEMS SYSTEMATICALLY.

UNDERSTANDING THE EXPRESSION: BREAKING DOWN THE COMPONENTS

BEFORE DIVING INTO CALCULATIONS, IT'S ESSENTIAL TO UNDERSTAND WHAT THE EXPRESSION ENTAILS AND HOW IT FUNCTIONS.

THE EXPRESSION:

$$20 + 2(3y - 4x)$$

THIS EXPRESSION CONTAINS:

- A CONSTANT TERM: 20
- A COEFFICIENT 2 MULTIPLYING A BINOMIAL: $(3y - 4x)$

THE KEY STEPS INVOLVE:

1. SUBSTITUTING THE KNOWN VARIABLE VALUES INTO THE EXPRESSION.
2. SIMPLIFYING THE ALGEBRAIC EXPRESSION INSIDE THE PARENTHESES.
3. APPLYING MULTIPLICATION.
4. COMBINING ALL TERMS TO FIND THE FINAL VALUE.

WHY IS THIS IMPORTANT?

UNDERSTANDING EACH PART HELPS IN AVOIDING COMMON MISTAKES SUCH AS MISAPPLYING THE DISTRIBUTIVE PROPERTY OR MISCALCULATING SIGNS. THESE STEPS ARE FOUNDATIONAL IN ALGEBRA AND CRITICAL FOR SOLVING MORE COMPLEX EQUATIONS EFFICIENTLY.

STEP-BY-STEP EVALUATION OF THE EXPRESSION

LET'S NOW METHODICALLY EVALUATE THE EXPRESSION WITH THE GIVEN VALUES $X = 4$ AND $Y = 7$.

STEP 1: SUBSTITUTION OF VARIABLES

REPLACE X WITH 4 AND Y WITH 7:

$$20 + 2(3(7) - 4(4))$$

THIS SUBSTITUTION TRANSFORMS THE ORIGINAL ALGEBRAIC EXPRESSION INTO A NUMERICAL FORM THAT CAN BE SIMPLIFIED FURTHER.

STEP 2: SIMPLIFY INSIDE THE PARENTHESES

CALCULATE EACH TERM INSIDE THE PARENTHESES:

$$- 3(7) = 21$$

$$- 4(4) = 16$$

SO, THE EXPRESSION INSIDE THE PARENTHESES BECOMES:

$$(21 - 16)$$

STEP 3: PERFORM THE OPERATION INSIDE THE PARENTHESES

SUBTRACT:

$$21 - 16 = 5$$

NOW, THE EXPRESSION SIMPLIFIES TO:

$$20 + 2 \cdot 5$$

STEP 4: APPLY MULTIPLICATION

MULTIPLY 2 BY 5:

$$2 \cdot 5 = 10$$

THE EXPRESSION NOW SIMPLIFIES TO:

$$20 + 10$$

STEP 5: FINAL ADDITION

ADD 20 AND 10:

$$20 + 10 = 30$$

RESULT: THE VALUE OF THE EXPRESSION WHEN $X = 4$ AND $Y = 7$ IS 30.

UNDERSTANDING THE UNDERLYING MATHEMATICAL PRINCIPLES

THE EVALUATION PROCESS HINGES ON SEVERAL CORE ALGEBRAIC CONCEPTS:

1. SUBSTITUTION

REPLACING VARIABLES WITH SPECIFIC NUMERICAL VALUES TO EVALUATE THE EXPRESSION DIRECTLY.

2. ORDER OF OPERATIONS (PEMDAS/BODMAS)

- PARENTHESES ARE EVALUATED FIRST.
- MULTIPLICATION AND DIVISION COME NEXT, FROM LEFT TO RIGHT.
- ADDITION AND SUBTRACTION ARE PERFORMED LAST, FROM LEFT TO RIGHT.

THIS HIERARCHY ENSURES CALCULATIONS ARE PERFORMED CORRECTLY AND CONSISTENTLY.

3. DISTRIBUTIVE PROPERTY

THE EXPRESSION INVOLVES MULTIPLYING A COEFFICIENT OUTSIDE PARENTHESES WITH TERMS INSIDE. THE DISTRIBUTIVE PROPERTY STATES:

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

IN OUR CASE, $2(3y - 4x)$ APPLIES THIS PROPERTY DURING MULTIPLICATION.

4. SIGN MANAGEMENT

PAYING ATTENTION TO POSITIVE AND NEGATIVE SIGNS IS ESSENTIAL, ESPECIALLY WHEN DEALING WITH SUBTRACTION INSIDE PARENTHESES.

COMMON CHALLENGES AND HOW TO AVOID THEM

WHILE EVALUATING SUCH EXPRESSIONS SEEMS STRAIGHTFORWARD, STUDENTS AND LEARNERS OFTEN ENCOUNTER PITFALLS. HERE ARE COMMON CHALLENGES AND TIPS:

CHALLENGE 1: MISREADING PARENTHESES

TIP: ALWAYS PERFORM OPERATIONS INSIDE PARENTHESES FIRST, REGARDLESS OF THE COMPLEXITY.

CHALLENGE 2: FORGETTING TO SUBSTITUTE CORRECTLY

TIP: WRITE DOWN THE SUBSTITUTION STEP EXPLICITLY TO AVOID MIXING UP VARIABLE VALUES.

CHALLENGE 3: MISAPPLYING THE DISTRIBUTIVE PROPERTY

TIP: REMEMBER TO MULTIPLY EACH TERM INSIDE THE PARENTHESES BY THE OUTSIDE COEFFICIENT SEPARATELY.

CHALLENGE 4: SIGN ERRORS

TIP: CAREFULLY TRACK SIGNS DURING SUBTRACTION. IF THE PARENTHESES CONTAIN A NEGATIVE TERM, ENSURE IT IS CORRECTLY DISTRIBUTED.

REAL-WORLD APPLICATIONS OF SUCH EVALUATIONS

UNDERSTANDING HOW TO EVALUATE EXPRESSIONS WITH SPECIFIC VALUES EXTENDS BEYOND CLASSROOM EXERCISES. HERE ARE SOME SCENARIOS WHERE THESE SKILLS ARE VITAL:

- FINANCIAL CALCULATIONS: DETERMINING TOTAL COSTS WITH VARIABLES REPRESENTING QUANTITIES AND PRICES.
- ENGINEERING: CALCULATING FORCES OR STRESSES WHERE VARIABLES REPRESENT MEASUREMENTS.
- COMPUTER PROGRAMMING: EVALUATING EXPRESSIONS DYNAMICALLY BASED ON INPUT VARIABLES.
- DATA ANALYSIS: SUBSTITUTING DATA POINTS INTO FORMULAS TO COMPUTE RESULTS.

CONCLUSION: THE POWER OF SYSTEMATIC EVALUATION

EVALUATING EXPRESSIONS LIKE $20 + 2(3y - 4x)$ WHEN GIVEN SPECIFIC VARIABLE VALUES EXEMPLIFIES THE CORE PRINCIPLES OF ALGEBRA — SUBSTITUTION, ORDER OF OPERATIONS, AND ALGEBRAIC MANIPULATION. BY CAREFULLY FOLLOWING EACH STEP, FROM SUBSTITUTION TO FINAL CALCULATION, LEARNERS DEVELOP A DISCIPLINED APPROACH TO PROBLEM-SOLVING THAT IS APPLICABLE ACROSS NUMEROUS FIELDS.

IN OUR EXAMPLE, ASSIGNING $X = 4$ AND $Y = 7$ YIELDS A STRAIGHTFORWARD CALCULATION CULMINATING IN THE FINAL ANSWER: 30. THIS PROCESS UNDERSCORES THAT WITH CLARITY AND ADHERENCE TO MATHEMATICAL PRINCIPLES, EVEN COMPLEX-LOOKING EXPRESSIONS BECOME MANAGEABLE.

MASTERING THESE SKILLS EMPOWERS STUDENTS AND PROFESSIONALS ALIKE TO TACKLE A BROAD ARRAY OF QUANTITATIVE CHALLENGES CONFIDENTLY. WHETHER IN ACADEMICS, INDUSTRY, OR EVERYDAY DECISION-MAKING, THE ABILITY TO EVALUATE EXPRESSIONS ACCURATELY AND EFFICIENTLY IS AN INVALUABLE TOOL IN THE PROBLEM-SOLVER'S TOOLKIT.

If X 4 And Y 7 Evaluate The Following Expression $20 + 2(3y - 4x)$

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