What is the value of the expression 10 (n minus 6) when n = 14?

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Understanding how to evaluate mathematical expressions is a fundamental skill in mathematics, especially when dealing with algebraic formulas. In this article, we will explore how to determine the value of the expression 10 (n minus 6) when n equals 14. We will break down the steps involved, explain key concepts, and provide additional insights to enhance your understanding of algebraic expressions and their evaluation.

Introduction to Algebraic Expressions

What Are Algebraic Expressions?

Algebraic expressions are mathematical phrases that combine numbers, variables, and operation symbols such as addition (+), subtraction (−), multiplication (×), and division (÷). These expressions can be simple or complex, and they often involve one or more variables, which are symbols representing unknown or changing numbers.

For example:
- 3x + 5
- 2a − 7
- 10(n − 6)

Variables and Constants

In an algebraic expression:
- Variables are symbols (like n, x, y) that stand for unknown or variable quantities.
- Constants are fixed numbers (like 6, 10, or 14) that do not change.

Understanding the roles of variables and constants is crucial for correctly evaluating expressions.

Understanding the Given Expression

Expression Breakdown

The expression we're focusing on is:
- 10 (n − 6)

Here:
- 10 is a constant multiplier.
- (n − 6) is a binomial expression involving the variable n.

Our goal is to evaluate this expression when n equals 14.

Why is Evaluating Expressions Important?

Evaluating expressions helps in:
- Solving real-world problems involving unknown quantities.
- Understanding how changing the value of variables impacts the overall expression.
- Building foundations for more advanced topics like equations and functions.

Step-by-Step Evaluation Process

Step 1: Substitute the Given Value of n

The first step is to replace the variable n with the provided value:
- n = 14

So, the expression becomes:
- 10 (14 − 6)

Step 2: Simplify Inside the Parentheses

Next, evaluate the expression inside the parentheses:
- 14 − 6 = 8

This simplifies the original expression to:
- 10 × 8

Step 3: Perform the Multiplication

Multiply 10 by 8:
- 10 × 8 = 80

Step 4: Final Answer

The value of the expression 10 (n − 6) when n = 14 is:
- 80

Additional Concepts and Related Topics

Understanding the Distributive Property

The process of evaluating the expression involves the distributive property of multiplication over subtraction:
- a(b − c) = a×b − a×c

In our case:
- 10 (n − 6) = 10×n − 10×6

Applying this property:
- 10×n − 60

When n = 14:
- 10×14 − 60 = 140 − 60 = 80

This confirms our earlier calculation.

Exploring Similar Expressions

You can extend this understanding to evaluate other similar expressions:
- For example, 5(n + 3) when n = 10:
- Substitute n: 5(10 + 3) = 5×13 = 65
- Or, 2(3n − 4) when n = 7:
- Substitute n: 2(3×7 − 4) = 2(21 − 4) = 2×17 = 34

Real-World Applications of Evaluating Expressions

Financial Calculations

Estimating total costs where variables represent quantities or prices.

Engineering and Science

Calculating forces, distances, or other quantities based on changing variables.

Business Analytics

Determining profit or loss based on sales volume or cost per unit.

Common Mistakes to Avoid

1. **Incorrect substitution:** Forgetting to replace the variable with the given value.
2. **Order of operations errors:** Not following the PEMDAS/BODMAS rule (Parentheses, Exponents, Multiplication and Division, Addition and Subtraction).
3. **Misapplying distributive property:** Not distributing correctly when expanding expressions.

Practice Problems to Reinforce Learning

- Evaluate 10(n + 4) when n = 5.
- Calculate 3(2n − 1) when n = 8.
- Find the value of 7(n − 2) when n = 10.

Solutions:
- 10(5 + 4) = 10×9 = 90
- 3(2×8 − 1) = 3(16 − 1) = 3×15 = 45
- 7(10 − 2) = 7×8 = 56

Conclusion

In summary, evaluating the expression 10(n − 6) when n = 14 involves substituting the value of n into the expression, simplifying inside the parentheses, and performing multiplication. The process highlights core algebraic principles such as substitution, the distributive property, and order of operations. The final result, 80, demonstrates how algebra can be applied to solve problems efficiently and accurately. Mastery of these fundamental skills lays the groundwork for tackling more complex mathematical concepts and real-world applications.

Additional Resources for Learning Algebra

- Online algebra tutorials and videos
- Practice worksheets and quizzes
- Interactive algebra calculators
- Mathematics textbooks and workbooks

By regularly practicing evaluation of algebraic expressions and understanding the underlying concepts, students can develop confidence and proficiency in mathematics, paving the way for academic success and practical problem-solving skills.

Frequently Asked Questions

What is the value of the expression 10(n - 6) when n = 14?

The value is 80.

How do you evaluate the expression 10(n - 6) for n = 14?

Substitute n = 14 into the expression: 10(14 - 6) = 10 × 8 = 80.

What is the first step to find the value of 10(n - 6) when n equals 14?

Replace n with 14 in the expression: 10(14 - 6).

If n equals 14, what is the simplified form of the expression 10(n - 6)?

It simplifies to 10 × (14 - 6) = 10 × 8 = 80.

Can you explain how to compute 10(n - 6) when given n = 14?

Yes. First, subtract 6 from 14 to get 8, then multiply by 10 to get 80.

What is the result of substituting n = 14 into the expression 10(n - 6)?

The result is 80.

Why is the answer 80 when n = 14 in the expression 10(n - 6)?

Because 14 minus 6 equals 8, and 10 times 8 equals 80.

Additional Resources

Mathematics

Understanding the Expression: What Does 10(n - 6) Represent?

When delving into the world of algebra and mathematical expressions, it's essential to understand the components and their significance. The expression 10(n - 6) might seem straightforward at first glance, but it embodies fundamental principles of algebra that underpin countless real-world applications — from calculating financial interest to engineering designs.

In this article, we'll thoroughly explore this expression, evaluate it for the specific value n = 14, and contextualize its importance across different scenarios. Whether you're a student seeking clarity or an enthusiast interested in the nuances of algebra, this comprehensive guide aims to provide clarity and insight.

Breaking Down the Expression: The Components and Their Roles

What Does the Expression 10(n - 6) Mean?

At its core, 10(n - 6) is a linear algebraic expression. It combines multiplication and subtraction operations applied to a variable, n.

- 10: A constant multiplier, often referred to as the coefficient.
- (n - 6): A linear expression involving the variable n.

The expression suggests that for any value of n, you subtract 6 from n, and then multiply the result by 10.

The Significance of Each Part

Let's analyze each component in detail:

1. The Variable: n

- Represents an unknown or a placeholder for any real number.
- Can be replaced with specific values to evaluate the expression.
- In real-world scenarios, n could represent quantities like days, units, or measurements.

2. The Subtraction: (n - 6)

- Represents the difference between n and 6.
- This difference can signify how much n exceeds 6 or falls short of 6.
- In practical applications, this might symbolize a margin, a threshold, or a deviation.

3. The Multiplier: 10

- Amplifies the difference (n - 6).
- Could represent scaling, weighting, or rate factors in applications.
- For example, if (n - 6) indicates units of a product exceeding a baseline, multiplying by 10 could reflect total revenue, cost, or other scaled quantities.

Evaluating the Expression When n = 14

Step 1: Substitute the Value of n

Given n = 14, substitute directly into the expression:

$$
10(n - 6) = 10(14 - 6)
$$

Step 2: Simplify Inside the Parentheses

Calculate (14 - 6):

$$
14 - 6 = 8
$$

Step 3: Multiply by 10

Multiply the result by 10:

$$
10 \times 8 = 80
$$

Result:

$$
\boxed{80}
$$

Thus, when n = 14, the value of 10(n - 6) is 80.

Contextualizing the Result: Practical Interpretations

While the calculation appears simple, understanding its implications can elevate our grasp of its utility. Let's explore how this expression applies across various contexts:

1. Business and Finance

Suppose n represents the number of units sold, and 6 is a baseline or minimum threshold. Multiplying the difference (n - 6) by 10 could represent:

- The total profit per unit exceeding the minimum threshold.
- The total revenue generated beyond a baseline, scaled by a rate of 10.

Example:

- If n = 14, then:

$$
10(14 - 6) = 80
$$

This could mean that sales exceeding the baseline of 6 units yield a profit or revenue of $80.

2. Engineering and Manufacturing

In manufacturing, the expression could signify:

- The total weight, cost, or resource usage based on the deviation from a standard value.

Example:

- If n is the number of items produced, and the standard is 6, then producing 14 items results in a scaled resource consumption or cost of 80 units.

3. Education and Learning Metrics

In an educational context, n might represent a student’s score, with 6 being a passing score. The expression then measures:

- The scaled excess of a student's score over the passing mark.

Example:

- For n = 14, the scaled excess is 80, indicating a high level of performance relative to the baseline.

Generalizing the Expression: Variations and Insights

How does changing n affect the output?

Let's examine how different values of n influence the result:

n	n - 6	10(n - 6)
0	-6	-60
6	0	0
10	4	40
14	8	80
20	14	140

Key observations:

- When n = 6, the expression evaluates to 0. This signifies the baseline or neutral point.
- For n < 6, the output becomes negative, indicating a deficit or negative impact in the context.
- For n > 6, the output is positive and increases linearly with n.

Graphical Representation

Plotting y = 10(n - 6):

- The graph is a straight line passing through the point (6, 0).
- Slope of 10 indicates a steep increase.
- For every increase of 1 in n, y increases by 10.

This linear behavior makes the expression predictable and easy to interpret across different ranges.

Why Is This Important? The Broader Significance

Understanding and evaluating such expressions is fundamental in numerous fields:

- Problem Solving: Algebraic expressions form the backbone of mathematical modeling.
- Data Analysis: Quantitative relationships often rely on similar formulas.
- Decision Making: Recognizing how variables influence outcomes aids

strategic choices.
- Programming: Coding algorithms often involve similar calculations.

Furthermore, mastering such expressions enhances logical reasoning, critical thinking, and numerical fluency — skills vital in education and professional development.

Summary and Takeaways

- The expression 10(n - 6) combines subtraction and multiplication to model scaled differences.
- When n = 14, the value is 80, calculated by plugging in the value and simplifying.
- The expression's linear nature makes it easy to analyze and visualize.
- The point n = 6 acts as a baseline where the output is zero; values below or above indicate negative or positive deviations.
- Such expressions are pervasive across disciplines, emphasizing the importance of understanding their structure and implications.

Final Thoughts: The Power of Simple Expressions

While 10(n - 6) might seem like a straightforward algebraic expression, it exemplifies how simple formulas can encapsulate complex relationships and be applied across various contexts. Recognizing the components, performing accurate calculations, and interpreting results are key skills that empower learners and professionals alike.

In conclusion, the value of 10(n - 6) when n = 14 is 80 — a small but significant number that can represent many meaningful quantities depending on the scenario. Embracing such fundamental concepts paves the way for deeper mathematical understanding and practical problem-solving prowess.

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