Akaria Bought One New Book For 20$ And Three Used Books For $4.95 Each, Write And Evaluate An Expression

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When it comes to calculating the total cost of multiple items, especially when they are purchased at different prices, understanding how to write and evaluate algebraic expressions is essential. In this article, we will explore the scenario where Akaria bought one new book for $20 and three used books for $4.95 each. We will learn how to translate this purchase into an algebraic expression and evaluate it step-by-step. This process not only enhances mathematical skills but also provides practical insights into budgeting and financial calculations.

Understanding the Purchase Details

Before diving into the mathematical expression, it's important to understand the details of Akaria's purchase:

The New Book

- Cost: $20
- Quantity: 1

The Used Books

- Cost per used book: $4.95
- Quantity: 3

Knowing these details allows us to set up an algebraic expression that accurately reflects the total expenditure.

Writing the Algebraic Expression

The goal is to create an expression that represents the total amount Akaria spent on books. To do this, we

will identify the parts of the purchase:

Variables and Constants

- Let's assign variables to quantities if needed. Since the quantities are specified, we can directly use numbers.
- Constants are the prices per item.

Constructing the Expression

- Total cost of the new book: since only one is purchased at $20, it is simply 20.
- Total cost of the used books: three used books at $4.95 each, which is 3×4.95.

Putting these together, the total cost T can be expressed as:

$$
T = 20 + 3 \times 4.95
$$

This algebraic expression succinctly summarizes the total expenditure.

Evaluating the Expression Step-by-Step

To find the total amount Akaria paid, we need to evaluate the expression:

$$
T = 20 + 3 \times 4.95
$$

Follow these steps for a clear calculation:

Step 1: Multiply the cost per used book by the number of used books

$$
3 \times 4.95
$$

- Multiply 3 by 4.95:

$$
3 \times 4.95 = (3 \times 4) + (3 \times 0.95) = 12 + 2.85 = 14.85
$$

\]

Step 2: Add the cost of the new book

\[
20 + 14.85 = 34.85
\]

Therefore, Akaria spent a total of $34.85 on the books.

Understanding the Importance of Writing and Evaluating Expressions

Writing algebraic expressions for real-world situations like shopping helps develop critical thinking and mathematical reasoning. Evaluating these expressions allows us to determine totals, compare costs, and make informed financial decisions.

Practical Applications

- Budget planning: Estimating expenses before making purchases.
- Discount calculations: Adjusting totals based on sales or discounts.
- Cost comparison: Analyzing different purchasing options.

Additional Examples and Practice Problems

To reinforce understanding, consider the following scenarios:

- Akaria wants to buy 2 new books for $20 each and 5 used books at $4.95 each. Write and evaluate the total cost.
- Suppose the used books are on sale for 10% off. How does this affect the total cost? Write and evaluate the new expression.
- If Akaria has a budget of $50, does her purchase stay within her budget? Use your expression to find out.

Let's explore one of these in detail:

Scenario: Buying Multiple Books with Discount

- 2 new books at $20 each.
- 5 used books at $4.95 each, with a 10% discount.

Step 1: Write the expression:

$$
T = 2 \times 20 + 5 \times (4.95 \times (1 - 0.10))
$$

Step 2: Simplify the used books' cost:

$$
4.95 \times 0.90 = 4.455
$$

Step 3: Calculate total:

$$
T = 40 + 5 \times 4.455 = 40 + 22.275 = 62.275
$$

Result: Akaria would spend approximately $62.28, exceeding her hypothetical $50 budget.

Conclusion

Mastering the skill of writing and evaluating algebraic expressions is invaluable for everyday calculations. In the case of Akaria's purchase—buying one new book and three used books at specific prices—we created an expression $T = 20 + 3 \times 4.95$ and evaluated it to find her total expenditure of $34.85. This process demonstrates how algebra can be applied to real-life financial situations, enabling better budgeting and decision-making.

Whether you're shopping, planning expenses, or analyzing discounts, understanding how to translate words into mathematical expressions and evaluate them accurately is a vital skill. Practice with different scenarios will further strengthen your ability to handle complex calculations with confidence.

Frequently Asked Questions

What is the total amount Akaria spent on one new book and three used books?

The total is $20 for the new book plus 3 times $4.95 for the used books, which is $20 + (3 × $4.95) = $20 + $14.85 = $34.85.

How do you write an expression to find the total cost of Akaria's books?

The expression is 20 + 3 × 4.95, representing the cost of the new book plus three used books.

What is the value of the expression 20 + 3 × 4.95?

Calculating: 3 × 4.95 = 14.85, then 20 + 14.85 = 34.85. So, the total cost is $34.85.

Why is multiplication used in the expression for the used books?

Because the cost of each used book is the same ($4.95), and there are three of them, so multiplication simplifies calculating the total for all used books.

If Akaria bought two new books and four used books, how would you write the expression?

The expression would be 2 × 20 + 4 × 4.95.

What is the importance of writing expressions for shopping calculations?

Writing expressions helps clearly represent the problem, simplifies calculations, and makes it easier to find the total cost accurately.

How can you evaluate the expression 20 + 3 × 4.95 step-by-step?

First, multiply 3 by 4.95 to get 14.85, then add 20 to get the total of 34.85.

What does the order of operations tell us when evaluating 20 + 3 × 4.95?

The order of operations indicates we should perform multiplication before addition, so we multiply first, then add.

Can the expression be written with parentheses? How?

Yes, it can be written as (20) + (3 × 4.95) to explicitly show the order of operations.

If the price of the used books changed to $5 each, what would the new expression and total be?

The new expression is 20 + 3 × 5, which equals 20 + 15 = $35.

Additional Resources

Akaria's Book Purchase: An In-Depth Financial and Mathematical Analysis

When it comes to budgeting for educational or leisure reading, understanding how to evaluate costs, especially when dealing with multiple items at different prices, is essential. Today, we'll explore a practical example involving Akaria's recent book purchase: she bought one new book for $20 and three used books for $4.95 each. Our goal is to write and evaluate an algebraic expression representing this scenario, providing a detailed breakdown of the process, including calculation strategies, the formulation of the expression, and an assessment of the total expenditure.

Understanding the Scenario: The Context of Akaria's Book Purchase

Before we delve into the mathematical formulation, it's important to grasp the real-world context of Akaria's transaction.

Details of the Purchase

- One new book: Priced at $20.
- Three used books: Each priced at $4.95.

This scenario raises several questions:
- How much did Akaria spend in total?
- How can we represent this purchase mathematically?
- What insights can we draw about the cost-efficiency of buying used books versus new ones?

Understanding these questions helps us formulate an accurate and meaningful expression.

Formulating the Expression: Step-by-Step Approach

Creating a mathematical expression that captures Akaria's purchase involves identifying the parts of the transaction and combining them systematically.

Step 1: Assigning Variables

While variables aren't strictly necessary, assigning them can clarify the process, especially for more complex situations.

- Let x be the price of the new book.
- Let y be the price of one used book.

In this case:
- x = 20
- y = 4.95

Step 2: Expressing the Cost of Multiple Used Books

Since Akaria bought three used books, the total cost of used books is:
$$ 3 \times y $$

Step 3: Combining the Costs

The total amount spent, T, can be expressed as the sum of:
- The cost of the new book.
- The total cost of the used books.

Therefore, the total expenditure expression is:
$$ T = x + 3 \times y $$

Writing the Complete Expression

Substituting the known values of x and y into the expression:
$$
T = 20 + 3 \times 4.95
$$

Simplify the multiplication:
$$
T = 20 + (3 \times 4.95)
$$

Calculating 3×4.95:
$$
3 \times 4.95 = 14.85
$$

Thus, the total cost:
$$
T = 20 + 14.85 = 34.85
$$

Final expression:
$$
\boxed{T = 20 + 3 \times 4.95}
$$

This expression efficiently captures the entire transaction, allowing for easy calculation and understanding.

Evaluation and Interpretation of the Expression

Evaluating the expression involves computing the total cost, which we've already performed. But beyond the numerical calculation, it's valuable to examine the implications and insights it provides.

1. Cost Breakdown

- The new book accounts for $20, representing a significant portion of the total.
- The used books collectively contribute $14.85, which is approximately 43% of the total expenditure,

highlighting the cost savings from purchasing used books.

2. Cost Efficiency Analysis

- Buying used books at $4.95 each is substantially cheaper than purchasing new ones if the goal is to save money.
- The total expenditure of $34.85 suggests that strategic choices in purchasing used versus new items can significantly impact the overall budget.

3. Flexibility of the Expression

- The algebraic expression $T = x + 3 \times y$ can be adapted for different scenarios:
- Varying the number of used books.
- Changing prices based on discounts or sales.
- Comparing costs across different types of products.

4. Extending the Analysis

- If Akaria wanted to purchase more or fewer used books, she could adjust the coefficient:

$$
T = x + n \times y
$$

where n is the number of used books bought.

- The expression's general form provides a useful template for budgeting and financial planning.

Additional Considerations and Practical Applications

Beyond the straightforward calculation, understanding how to formulate such expressions has broader applications.

Budget Management

- Using algebraic expressions enables individuals to plan purchases in advance.
- By adjusting variables, shoppers can evaluate different scenarios and make cost-effective decisions.

Educational Value

- Learning to write and evaluate expressions enhances problem-solving skills.
- It bridges real-world situations with mathematical concepts, fostering practical understanding.

Comparing Alternatives

- Calculating total costs for various options helps consumers decide the best purchase.
- Example: Should Akaria buy more used books or invest in a new one? The expression can help quantify such choices.

Potential Extensions

- Incorporate discounts: If a used book is discounted, modify y accordingly.
- Include taxes or additional fees: Add terms to account for these costs.
- Calculate average cost per book:

$$
\text{Average} = \frac{T}{4}
$$

since she purchased a total of 4 books.

Conclusion: The Power of Mathematical Expression in Everyday Purchases

Akaria's simple act of buying books exemplifies how algebraic expressions serve as powerful tools for understanding and managing expenses. By translating a real-world scenario into a clear mathematical form, we gain insights into cost distribution, savings, and decision-making strategies.

The expression $T = 20 + 3 \times 4.95$ succinctly captures the total expenditure, allowing for straightforward calculation and adaptable to various contexts. Whether planning future purchases or analyzing spending habits, mastering the art of writing and evaluating such expressions is invaluable.

In essence, this exercise demonstrates the seamless integration of mathematics into daily life, empowering consumers and learners alike to make informed, strategic financial decisions.

Final Note: Remember, the ability to translate real-world situations into algebraic expressions not only

sharpens your mathematical skills but also enhances your understanding of budgeting, saving, and financial planning. Embrace these tools to navigate everyday financial decisions with confidence and clarity.

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