ALMS8

TAILORED LEARNING, PERSONALIZED PROGRESS

SUPPLEMENTARY MODULE 3

Model Real-Life Situations Using Algebraic Expressions

GRADE 8

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3 MODEL REAL LIFE SITUATIONS USING ALGEBRAIC EXPRESSIONS

WELCOME!

If you're here, it means you're on the path to mastering the art of modeling real-life situations using algebraic expressions – and that's awesome! We understand that everyone learns at their own pace, and it's okay to need a little extra support sometimes. In this supplementary session, we're here to provide that support and help you build confidence in your skills. So, let's tackle these concepts together, step by step, and celebrate your progress along the way!

LEARNING OBJECTIVES

1. Analyze and break down complex real-life scenarios into manageable components
2. Refine algebraic models with precision, focusing on effectively translating real-life situations into mathematical representations
3. Develop proficiency in navigating complex real-world situations using algebraic expressions.

Scenario: Grocery Shopping for a Family Dinner

Imagine you're tasked with shopping for ingredients for a family dinner. Your shopping list includes fruits, vegetables, and other items such as pasta, sauces, and snacks. After filling your cart, you head to the checkout counter to pay for your items.

Using the traditional model of grocery shopping, you calculate the total cost of your purchases by multiplying the price per unit of each item by the quantity you've bought.

Let's denote:

P_f as price of fruits per unit

P_v as price of vegetables per unit

P_o as price of other

Q_f quantities of fruits purchased

Q_v quantities of vegetables pruchased

Q_o quantities of other items purchased

Modeling the total cost purchase in the grocery would be:

$$P_f \cdot Q_f + P_v \cdot Q_v + P_o \cdot Q_o$$

Letting C as the total cost of grocery, then the algebraic equation for the scenario will be:

$$\boldsymbol{C = P_f \cdot Q_f + P_v \cdot Q_v + P_o \cdot Q_o}$$

Processing Questions:

1. *What are the key components of the traditional model?*
2. *What are the strengths and weaknesses of the created traditional model?*
3. *Are there any factors that have not been considered?*

Strengths of the Traditional Model of Grocery Shopping:

a. **Simplicity:** The traditional model is straightforward and easy to understand, making it accessible to a wide range of people, including those with limited mathematical background.

b. **Flexibility:** It allows for customization based on individual preferences and needs, as shoppers can adjust quantities and prices according to their specific requirements.

c. **Transparency:** The model provides a clear breakdown of costs, enabling shoppers to see exactly how much they're spending on each type of item, which can aid in budgeting and decision-making

Weaknesses of the Traditional Model of Grocery Shopping:

a. **Lack of Consideration for Discounts:** The traditional model does not account for discounts or promotions, which means shoppers may not accurately estimate their final costs or miss out on potential savings.

b. **Assumes Fixed Prices**: It assumes that prices remain constant, whereas in reality, prices may vary over time or between different stores, leading to discrepancies between predicted and actual costs.

c. **Limited Scope:** The traditional model focuses solely on the monetary aspect of grocery shopping and does not consider other factors such as quality, freshness, or environmental impact, which are also important considerations for many shoppers.

Recreating and adjusting the model

Let's say the store offers a discount of 10% for fruits, 20% for vegetables, and no discount for other items. You want to model the total cost of your shopping trip considering these discounts.

Remember that the percentages discount can be written in the decimal form as:

Percentage/ 100 = Decimal form

10/ 100 = 0.1

20/100 = 0.2

Representing it the scenario algebraically:

Let's denote:

$P_f\ (1 - 0.1)$ as price of discounted fruits per unit
P_v (1-0.2) as price of discounted vegetables per unit
P_o as price of other
Q_f quantities of fruits purchased
Q_v quantities of vegetables pruchased
Q_o quantities of other items purchased

Hence, the algebraic expressions representing the total cost of the grocery would be:

$$P_f\ (1 - 0.1) \cdot Q_f + P_v(1 - 0.2) \cdot Q_v + P_o \cdot Q_o$$

Letting C as the total cost of the grocery, the algebraic equation modeling the situation is:

$$\boldsymbol{C = P_f\ (1 - 0.1) \cdot Q_f + P_v(1 - 0.2) \cdot Q_v + P_o \cdot Q_o}$$

This algebraic model allows us to calculate the total cost of shopping considering the different discounts offered for fruits and vegetables.