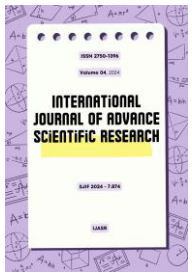
International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 04 ISSUE 12 Pages: 72-75
OCLC – 1368736135



Journal Website: http://sciencebring.com/index.php/ijasr

Research Article

WORKING WITH VARIABLE EXPRESSIONS IN PRIMARY SCHOOL MATHEMATICS LESSONS

Submission Date: December 02, 2024, **Accepted Date:** December 07, 2024,
Published Date: December 12, 2024
Crossref doi: https://doi.org/10.37547/ijasr-04-12-12

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Abstract

This article discusses the issue of working with variable expressions in primary school mathematics lessons.

Keywords

Numerical expression, literal expression, arithmetic, equation, and function.

Introduction

In the Republic of Uzbekistan, identifying the priorities for systematic reform of higher education, elevating the process of training highly qualified personnel with modern knowledge and high moral and ethical values to a qualitatively new level, modernizing higher education, and relying on advanced educational technologies have significantly contributed to the development of social and economic sectors.

Teaching primary school students how to solve the numerous problems and tasks encountered in their mathematics textbooks starting from grade 1 is crucial for developing their cognitive and reasoning abilities. The importance of teaching problem-solving lies in the teacher's focus on translating the content of word problems into mathematical language. First of all, forming solid mathematical concepts is critical for mastering

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the fundamental theoretical knowledge outlined in the curriculum.

For example, if we aim to provide students with a proper understanding of addition, they need ample opportunities to practice combining sets during grade 1. Problems involving one or two operations are introduced at this stage. Problem-solving and computational skills in solving numerical problems take relatively less time compared to mechanical drills. After providing students with a clear understanding of a problem's solution, it is important to guide them toward identifying the most rational parts of the problem and to engage students in problem-solving more actively.

Incorporating elements of algebra into the primary school mathematics curriculum aims to elevate students' generalizations about numbers and mathematical relationships to a higher level, laying the groundwork for effectively learning more complex algebraic elements in subsequent grades. Algebraic materials are not taught as a separate section in primary school but are closely linked to arithmetic topics.

The study of algebraic elements in primary school mathematics concludes with a generalization of arithmetic operations and the introduction of mathematical symbols. At this stage, students begin using letters as mathematical symbols, gaining an initial understanding of algebraic expressions, equalities, inequalities, and equations. This is aimed at fully revealing the essence of arithmetic operations and preparing students for future studies in algebra. However, solving algebraic problems relies on arithmetic rules rather than algebraic laws and definitions.

Teaching algebraic elements in primary school progresses through the following stages:

Mathematical expressions:

Numerical expressions

Substitution of numerical expressions

Literal expressions

Equalities and inequalities

Equations and their types, etc.

Conveying these topics effectively to students requires the teacher to choose appropriate and engaging teaching methods. Further sections and chapters of the research will elaborate on the selection and integration of such methods.

The initial concepts of algebra emerged as early as three centuries BC in Egypt and Greece. The introduction of the concept of representing known and unknown quantities with letters by F. Viet (1540–1603) laid a significant foundation for the development of this field.

The generalization of addition and multiplication rules from arithmetic expressions to literal expressions, involving unknowns, significantly contributed to the development of arithmetic equation theory. Algebraic equations and their solutions remained the primary focus of algebraic material until the early 19th century.

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For instance, consider the following task involving numerical expressions:

Task: The distance between points A and B is 1760 km. A truck departs from point A toward point B at a speed of 80 km/h. Two hours later, a car departs from point B toward point A at a speed of 120 km/h. After how many hours of travel will the two vehicles meet?

To solve this, we first calculate the distance covered by the truck in 2 hours by multiplying 80 by 2. Without performing the calculation, we write it as 80×280 \times 2.

Next, we determine the truck's remaining distance from point B: 1760−(80×2)1760 - (80 \times 2).

Then, we find the combined speed of the truck and the car: 80+12080 + 120.

Finally, we calculate the time it takes for them to meet:

1760−(80×2)80+120\frac{1760 - (80 \times 2)}{80 + 120}

This calculation gives:

1760−160200=1600200=8\frac{1760 - 160}{200} = \frac{1600}{200} = 8

Thus, the two vehicles will meet after 8 hours. This task involves working exclusively with numerical expressions.

Definition 1: A notation involving numbers, arithmetic operations, and parentheses is called a numerical expression.

In general, a numerical expression is defined as follows:

Every number is a numerical expression.

If a andbb are numerical expressions, then a+ba+b, a−ba-b, a×ba times b, and a/b are also numerical expressions.

The result obtained by sequentially performing all operations indicated in a numerical expression is called its value. To avoid an overabundance of parentheses, it is agreed that not every number needs to be enclosed in parentheses. Similarly, when multiple expressions are added, subtracted, multiplied, or divided, parentheses are omitted, and operations are performed from left to right.

For example: 35−4+56−12−3435 - 4 + 56 - 12 - 34 or 80÷2×5×8÷580 \div 2 \times 5 \times 8 \div 5. Operations involving multiplication and division are performed first, followed by addition and subtraction.

Mathematical expressions are categorized into:

Numerical expressions

Literal expressions (also called variable expressions).

For example: 5+65+6, 7−37-3, and 12÷412 \div 4 are numerical expressions as they involve only numbers.

On the other hand, a+5a+5, b−3b-3, and x×yx \times y are literal expressions or variable expressions as they include unknowns.

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Teaching students to write and read mathematical expressions, perform operations involving two or more terms, and substitute equivalent expressions using arithmetic properties is part of the primary school mathematics curriculum.

Initial teaching focuses on simple numerical expressions such as sums and differences, which are introduced in grade 1. More complex expressions, such as products and quotients, are introduced in grade 2.

This gradual progression helps students develop logical thinking skills and prepares them for solving more complex problems in higher grades. Solving non-standard problems and tasks also enhances students' logical reasoning and strengthens their understanding of mathematics.

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