Research Article

WORKING WITH ALGORITHMIC TASKS IN PRIMARY SCHOOL MATHEMATICS LESSONS

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ABSTRACT

This article explores methods for working with algorithmic tasks in primary school mathematics lessons, the sequence of algorithmic tasks, and the skills required to correctly structure these tasks. The significance of algorithms in enhancing mathematical literacy among primary school students is explained.

KEYWORDS

Primary mathematics curriculum, algorithmic tasks, development of practical skills, rectangle concept algorithm, problem-solving, algorithms.

INTRODUCTION

The President of Uzbekistan emphasizes that the greatest wealth is intellect, the best inheritance is good upbringing, and the worst poverty is ignorance. Shavkat Mirziyoyev stated:

"The greatest wealth is intellect and knowledge; the greatest inheritance is good upbringing; the worst poverty is ignorance. The foundation of progress, the strength of a country, and the greatness of a nation lie in science, education, and upbringing. Our future and the bright prospects of our homeland are closely tied to our education system and the upbringing we provide to our children."

In primary school mathematics lessons, problems and educational tasks play a crucial role in developing students' mathematical thinking, as well as their logical and analytical reasoning. These tasks assist students in solving practical problems and comprehending various mathematical concepts.

A key feature of the primary mathematics curriculum is its practical orientation. Unlike higher grades, where some mathematics topics are theoretical, every new concept, property, or law in primary school is introduced through practical activities.

For example, in Grade 4, students not only learn the definition of a rectangle but also develop the ability to derive its properties logically and use these properties to solve practical problems. They measure the equality of opposite sides of a rectangle and acquire skills to draw rectangles and calculate their perimeter and area.

Many practical skills formed in primary school are fundamental to the mathematics curriculum. However, such mastery cannot be said about concepts. For instance, understanding numbers evolves significantly between Grades 3 and 4. Nonetheless, arithmetic operations learned in early grades are used throughout middle and high school.

The role of algorithmic tasks in primary education:

The primary school teacher has a fundamental responsibility to develop practical skills and abilities in students. This requires solving two interrelated methodological problems:

1.   Detailing and concretizing the content of specific practical tasks.

2.   Developing methods for students to master these tasks and ensuring effective control over their learning process.

An algorithm is defined as a sequence of finite, elementary actions required to accomplish a given task. Algorithmic tasks in mathematics lessons help students develop mathematical reasoning and problem-solving skills. They foster logical thinking, understanding of sequences, and the ability to effectively tackle practical challenges.

The process of teaching algorithmic tasks involves several stages:

•   Developing the algorithm.

•   Introducing students to the algorithm.

•   Practicing the algorithm repeatedly until students fully master it.

For some problems, algorithms cannot be easily developed, such as composing equations based on problem conditions or expressing textual problems in mathematical terms. However, algorithmic approaches can be effectively applied in situations like establishing "greater," "less," and "equal" relations, solving equations, drawing geometric shapes, or performing arithmetic operations with fractions.

The teacher can use two methodological approaches when introducing students to algorithms:

1.   Demonstrating through specific examples how a new problem can be solved by systematically performing previously learned steps. Students practice these steps under the teacher's guidance, eventually generalizing the experience into a schematic framework.

2.   Encouraging students to verbalize each elementary action while following the algorithm, transitioning to independent execution as they gain proficiency.

Algorithmic tasks in primary school mathematics foster logical thinking and problem-solving abilities, serving as a foundation for further mathematical education. By carefully planning and implementing algorithm-based teaching methods, teachers can significantly enhance students' learning outcomes.
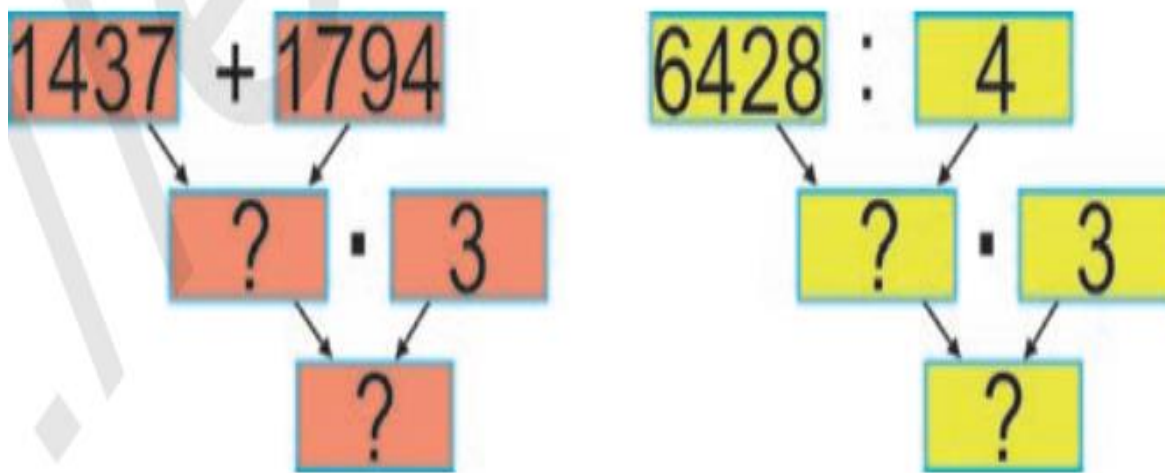
2. The formation of an algorithm occurs gradually and purposefully. Elementary actions are selected with their active participation and understood clearly, and their sequence is determined. To achieve this, the definitions and properties of previously known objects are used, along with exploring the possibilities of fully or partially applying algorithms already known for "similar" objects. This approach allows for significant student involvement in the process of developing algorithms, making the process itself resemble research work in terms of content. Below, we present several examples of implementing this approach.
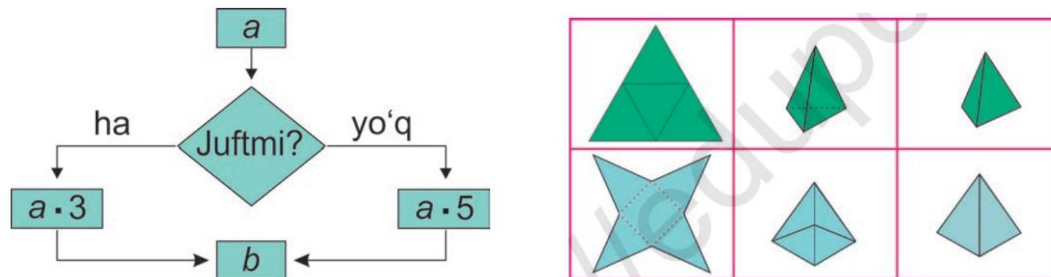
When developing algorithms as a teaching topic, it is necessary to consider not only the primary requirements mentioned above but also a number of additional didactic conditions. The same tasks may result in different algorithms for the same class, differing in the number and necessity of elementary actions. Therefore, the algorithm being studied should be presented in an optimized manner, comprising a minimal number of sufficiently simple elementary actions. An algorithm is a sequence that specifies the order of tasks to be performed. Let us examine several types of algorithms in relation to primary school learning materials.

Nargiza loves fried potatoes. Arrange her mother's actions in order:

1) She salted the potatoes..
2) She put the potatoes into the heated oil..
3) She turned on the gas stove.
4) She peeled the potatoes..
5) She bought potatoes and oil from the store.
6) She turned off the gas and placed the potatoes on a plate.
7) She poured the oil into the pan and placed it on the stove.
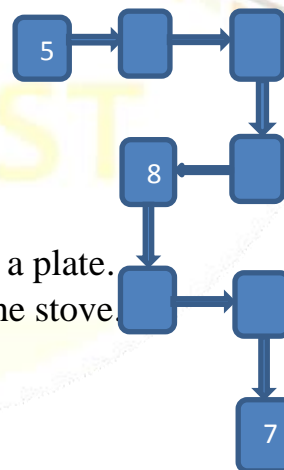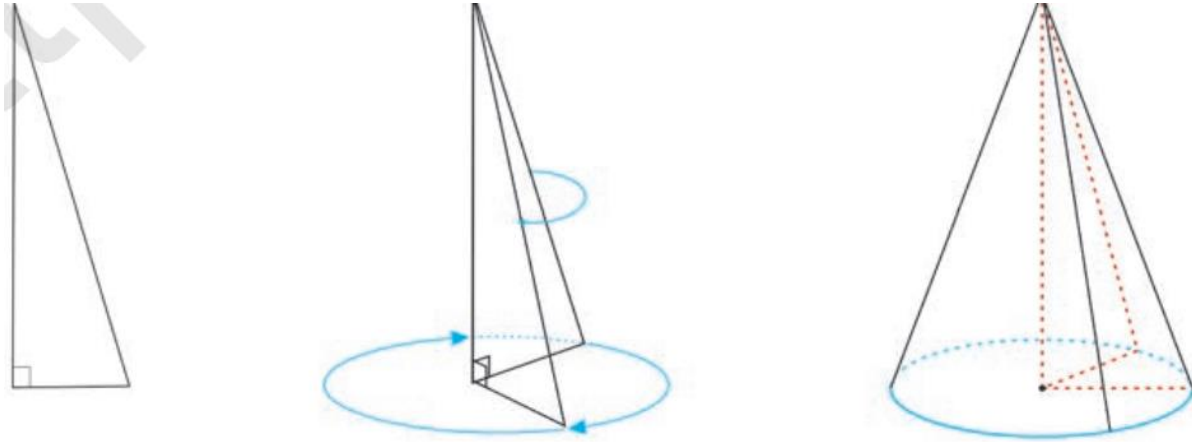
1. Algorithm for Determining the Length of a Broken Line:

Measure the length of each segment of the broken line.

Calculate the sum of the measured values.

Draw a straight line segment equal to the total length of the broken line segments.

Measure the resulting straight line segment.

2. Correct Algorithm for Brewing Tea:

Rinse the teapot with boiling water.

Prepare dry tea leaves.

Place the dry tea leaves into the teapot.

Pour boiling water into the teapot.

Cover the teapot with a special lid.

Let the tea steep.

Overall, algorithmic tasks in primary school mathematics lessons are highly effective tools for developing students' mathematical thinking, teaching them to solve problems sequentially, and fostering a logical approach.

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