



## METHODOLOGY OF COMBINATORY PROBLEMS SOLVING IN THE TIMSS INTERNATIONAL ASSESSMENT PROGRAM IN PRIMARY CLASS MATHEMATICS LESSONS.

<sup>1</sup>Djumayeva Hulkarxon Muhammadjonovna

Doctor of Philosophy (PhD)

Termez State University,

<sup>2</sup>Turayev Abduamit Murodulla o'g'li

Graduate student of Termiz State Pedagogical Institute.

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### ABSTRACT

*This article describes today's easy methodological solutions for solving combinatorial problems related to the TIMSS international assessment program.*

In the world, the education and upbringing of the young generation on the path of spiritual maturity is gaining great importance. Because the positive effectiveness of systemic reforms in all areas, which are deeply rooted in the process of globalization, as well as the extent to which the highly responsible and important task of making the future sustainable and stable is solved, directly depends on the spirituality of young people [5; p. 94].

Strengthening the status and moral potential of young people as individuals can be considered as the main strategy in the system of ensuring the moral security of society. In turn, these strategies are based on a comprehensive understanding of youth problems and the implementation of a number of measures [6; p. 122]. In this regard, primary education is the main link. Primary education is not only the first type of continuous education, but also the first step in forming a creative, socially active, spiritually rich person. Currently, special attention is being paid to educating

elementary school students, who are the main participants in building the future of our country, with high morale.

To date, one of the problems that may arise during the lesson with students is the time problem. Especially when it comes to the topic of solving the problem, the problem itself "eats up" a lot of time. Theoretical issues gain practical value during the solution of the exercises, thus the exercises act as a link between theory and practice.

It will be the same if we use the intensive method while teaching the students. Through this, we get away from uniformity and save time. Through an intensive approach, we achieve the emergence of personal "issues" of each of the students. They have their own worldview approach, show what they are capable of through their inner potential. Let's consider the practical result of this.

The most basic "problems" in elementary school mathematics classes are fractions, problems, word problems. Why the problem? a question may arise. These types of "problems" mainly encourage students



to think, reflect, and expand their imagination. These "problems" are different from mathematical examples.

First, let's talk about combinatorics. What exactly is combinatorics? Combinatorics (lat. Combinare-combination), combinatorial analysis, combinatorial mathematics is a branch of mathematics that studies operations performed on finite sets [4]. Some combinations are realized in combinatorics. Now we will learn the method of solving using the example of problems related to combinatorics:

#### Task 1

Numbers 9,0,4 are given. How many three-digit numbers can be formed using these numbers?

We need to pay attention to the numbers when performing this type of tasks. We are given 3 numbers. When forming a three-digit number, we must start with the smallest number as the first number. The smallest number we have is 0. But there is no 3-digit number starting with 0. Because of this, we use the next digit to form the number. Number 4 comes to our aid. Taking 4 as the first number, we continue the combination between the numbers 0 and 9. 409 (0 is the first small number, then 9 is the big number), 490 (this time we use 9 as the first big number, and then 0 is the small number). Now we get 9 as the first number and as we can see the combination continues between 0 and 4. 904 (as we taught earlier, we use the first small number 0, then 4 large numbers) 940 (now the opposite, first we use 4 large numbers, then 0). The rest of the tasks will continue in the same way. So, 4 three-digit numbers can be formed.

#### Task 2

There are 3 ways from the wolf's den to the fox's den, and 2 from the fox's den to the bear's den. How many ways can a wolf pass through a fox's den and go to a bear's to visit a guest? When solving the problem, we do it by the following determinations. We are given paths: B1, B2, B3 - the three paths of the wolf, T1, T2 - the paths of the fox. B1+T1, B1+T2, B2+T1, B2+T2, B3+T1, B3+T2. So, there are 6 ways. [5; p. 102]

#### Task 3

Red, yellow and white flowers are blooming side by side. Bees can land on each flower only once. How many ways can he go around all the flowers?

We introduce the following designations into the problem: Q-red, S-yellow, O-white. The problem can be solved in the following way: QSO, QOS, SOQ, SQO, OSQ, OQS. So, 6 [5; p. 103].

#### Task 4

On Saturday, 4 hours of lessons were held in the 5th grade: mathematics, mother tongue, English, technology. In how many different ways can you choose the Saturday class schedule?

In solving this problem, we introduce the following designations: M-mathematics, M-mother tongue, T-Technology, E-English. So, we can make the lesson schedule as follows:



Mother tongue	Mother tongue	Mother tongue	Mother tongue	Mother tongue	Mother tongue
maths	maths	English	English	Technology	Technology
English	Technology	maths	Technology	Maths	English
Technology	English	Technology	Maths	English	Maths
Maths	maths	Maths	Maths	Maths	Maths
Mother tongue	Mother tongue	English	English	Technology	Technology
English	Technology	Mother tongue	Technology	Mother tongue	English
Technology	English	Technology	Mother tongue	English	Mother tongue
English	English	English	English	English	English
Maths	Maths	Mother tongue	Mother tongue	Technology	Technology
Mother tongue	Technology	Maths	Technology	Mother tongue	Maths
Technology	Mother tongue	Technology	Maths	Maths	Mother tongue
Technology	Technology	Technology	Technology	Technology	Technology
Maths	Maths	Mother tongue	Mother tongue	English	English
Mother tongue	English	Maths	English	Maths	Mother tongue
English	Mother tongue	English	Maths	Mother tongue	Maths

The following problems can be used for practical work in solving problems related to combinatorics in mathematics lessons for elementary school students.

1. How many three-digit numbers can be formed using the numbers 5,8,2,3, if the numbers are repeated. What if the numbers are not repeated?
2. Anwar goes to school in 4 different ways. How many ways can he get to school if he goes back and forth by these roads?

3. Using 10 students, in how many ways can the teacher choose 2 students to lead the event?
4. How many different ways can you make juice from only 3 fruits using apple, quince, apricot, cherry and lemon? How about 2 fruits?
5. Nigora wanted to make a bouquet for her mother's birthday. In how many ways can she make a bouquet of 2 flowers using roses, carnations, chamomiles and violets?



In order to respond correctly to the test items in the TIMSS study, students must be aware of the assessment of mathematics content, but must also be able to demonstrate knowledge skills. Representation of these skills plays an important role in the improvement of studies such as TIMSS 2019, as it is essential to ensure that they cover the relevant part of the knowledge skills for the given topics within the study. The first domain, knowledge, covers the facts, concepts and procedures that students need to know, and the second, application, refers to students' ability to acquire knowledge and apply knowledge of scientific concepts to answer questions. The third direction, reasoning, covers unfamiliar situations, complex contexts, and multilevel problems in addition to solving routine problems.[1; 55. p] Students demonstrate knowledge, application, and reasoning competencies at different levels when they demonstrate their mathematical competencies outside of their domain of knowledge. This TIMSS survey measures the competencies of solving problems in cognitive domains, evaluating situations mathematically (for example, using symbols and graphs), creating mathematical models of problem situations, and using tools such as a ruler

or calculator to solve problems. The three cognitive domains are used for both grades, with each question corresponding to one of the three cognitive domains. Due to the difference in the age and experience of the students, the balance of time determined is different in the fourth and eighth grades. For both grades, each content area includes some questions designed to address each of the three cognitive domains. For example, the content area of numbers and operations includes other content areas, knowing, applying, and reasoning.

Elementary school students require the use of mental processes: analysis and synthesis, concretization and abstraction, comparison, and generalization when solving problems related to combinatorics in mathematics lessons. For example, when solving a problem, the student analyzes it and separates the requirement (question) from the condition of the problem; synthesizes when making a solution plan, in which he uses concretization and then abstraction (chooses a solution based on a concrete situation). By solving such problems, students learn to approach each problem in different ways. As a result, they can easily solve any problem in the future.

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