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STAGES OF FORMATION OF STUDENTS' MATHEMATICAL COMPETENCES

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Abstract
The article evaluates students' mathematical competence as "a set of knowledge, skills, experience and abilities in mathematics" and examines the issues of competence levels that allow to successfully solve various problems that require the use of mathematics.

Key words and phrases: mathematics, knowledge, skills, competence, recovery level, connection level, reasoning level.

The state of students' mathematical literacy is characterized by the level of development of "mathematical competence" in addition to having the materials of the selected content area.
Mathematical competence of students is evaluated as "a set of mathematical knowledge, skills, experience and abilities" that allows to successfully solve various problems that require the use of mathematics.
Three levels of mathematical competence in research on mathematics teaching methodology:
recovery rate;
level of communication;
level of reasoning is indicated.
Also, in such studies, the following types of activities are determined to determine the level of mathematical competence:
a) restoration (repetition), definitions and calculations;
b) communication and integration necessary to solve the problem;
c) mathematical modeling, logical thinking, generalization and intuition.
These activities are listed in ascending order. However, this does not mean that in order to perform the next type of activity, it is necessary to skillfully master the previous types. For example, it is not necessary to master calculus to start thinking mathematically.

1. The first level of competence: recovery (repetition), description and calculations. Competencies at the first level include activities tested in many standardized tests, mainly in the form of tasks such as multiple-choice tasks. This level of competence includes knowing various facts, reproducing properties, recognizing similar mathematical objects, implementing standard algorithms and routines, using standard methods and algorithmic skills.

Issue 1. Equal amounts of two-wheeled and three-wheeled bicycles are sold in a children's toy store. What is the total number of wheels of all bicycles?
A) 16; Б) 24; C) 25; Д) 28;
Solving. Since the number of two- and three-wheeled bicycles is equal, their number of wheels must be a multiple of 5. Correct answer: S. 25.

Issue 2. The buyer bought a winter jacket, the price of which was 750,000 soums during the season, at a discount price of 300,000 soums during the sale at low prices. How much interest did the buyer save?

A) 60%; Б) 150%; C) 90%; Д) 87,5%;

Solving. Discount price from season price (750000 – 300000 = 450000) 450 since one thousand soums is less, it is necessary to find what percentage of the seasonal price this difference is, that is, we find what percentage of 450,000 is 750,000. Correct answer: A.

Issue 3. Three friends went on a trip and decided to buy a tent. The first of them paid 60% of the price of the tent, the second paid 40% of the remaining price, and the third - the last 30 dollars. How much does a tent cost?

A) $ 120; Б) $ 150; C) $ 90 ; Д) $ 125;

Solving. Suppose the price of the tent is x dollars. Then one of them-first: 0.6x , second: - 0.4x×0.4 = 0.16x, third paid x - (0.6x + 0.16x) = 0.24x dollars. According to the condition, the third friend paid $30.
So 0.24x = 30 or x = 125. The price of the tent is $125. Correct answer. D. $125

2. The second level of competence: communication and integration necessary for problem solving.
Secondary competences involve making connections between different areas, divisions and topics of mathematics in order to solve simple problems. These tasks cannot be included in the standard tasks, but the situation in them requires deeper mathematical knowledge. At this level of competence, students should be able to present the given information and pose a problem according to the task. Students are required to be able to distinguish and relate concepts, terms, proofs, assertions, and examples when making connections between materials in different sections of mathematics. This level of competence also includes the ability to explain and interpret the content of writings written in a formalized language with different symbols, and to translate them into a common language. In terms of tasks related to this level of competence, students are offered a specific situation that requires decision-making based on the specifics of the situation.

Issue 1. Two partners allocated 50,000 monetary units for the development of the business scale. Due to price changes in the market, the first increased its share by 30%,

and the second by 70%. As a result, their total capital was equal to 81 thousand monetary units. How much did each partner contribute?
Solving. This situation can be modeled as a system of linear equations in two variables.
Let x be the contribution of the first partner,
Let y be the contribution of the second.
After the price increase, the first partner's contribution will be 1.3x, and the second partner's contribution will be 1.7u.
As a result, we have the following system of linear equations:

$$\begin{cases} x + y = 50000 \\ 1,3x + 1,7y = 81000 \end{cases}$$

Solving it, we find that the first businessman contributed 13,000 and the second 68,000 monetary units.

Issue 2. Three friends played a game. The leader of the game deals cards numbered from 1 to 8 to two players. He dealt 3 cards to the first player and 5 cards to the second. As a result, the sum of their card numbers was the same in both. A third participant made the following comments:
1) the second player has three odd-numbered cards;
2) number 2 cards are on the second player;
3) Number 1 card is not on the first player.
Is he right?
Solving. Since the sum of the card numbers in the players is the same, they are half the sum of all the numbers from 1 to 8. So, the sum of their card numbers (1+2+3+4+5+6+7+8=half of 36) is 18.
So the first player with three cards can have cards numbered 5, 6 and 7 or 3, 7, 8. Because, in other cases, the sum of card numbers will be less than 18. Then the second player can have cards numbered 1, 2, 3, 4 and 8 or 1, 2, 3, 5 and 7 or 1, 2, 4, 5 and 6. Thus, the first statement is false, the second is true, and the third is also true.
Answer: 1) No, 2) Yes, 3) Yes.

Issue 3. A mathematician witnessed a traffic accident and remembered the following: The number plate of the culprit's car is a four-digit number that is a multiple of 19 and ends with the number 19. How many cars should the car inspectors check to find the culprit?
Solving. Let's say that the number plate of the car consists of the number A. In it
A - 19 is also a multiple of 19. On the other hand

$$A - 19 = k \cdot 19 = b \cdot x \cdot 100.$$

19 and 100 are mutually prime numbers. So, the number of faces is also divisible by 19. There are only 5 such numbers: 19, 38, 57, 76 and 95. So, only five cars with numbers 1919, 3819, 5719, 7619 and 9519 should be checked.

3. The third level of competence: mathematical modeling, logical thinking, generalization and intuition.

Students are required to mathematically model the situation presented at the third level of competence: analyze the data given in the problem condition, study and independently interpret the mathematical model, use mathematics to solve the problem, find a solution using mathematical reasoning, necessary mathematical proofs, proofs and generalizations. . This activity involves critical thinking, analysis and observation.

Students should not only be able to solve the proposed problems, but also to formulate it in accordance with the situation of the problem, as well as to deeply understand the content and essence of mathematics as a science. This level of competence is the pinnacle of mathematical literacy, is at its core, and poses great challenges for assessment and testing. It is not appropriate to use multiple-choice tests to evaluate the results achieved on it. Open-ended tasks are suitable for this level. Developing and evaluating such tasks is a very difficult task.

Matter. Bank A exchanges 1 dollar for 3000 dinars (notional monetary unit) and takes 7000 dinars regardless of how much money it has exchanged for providing money services, that is, for exchanging. Bank B exchanges 1 dollar for 3020 dinars and takes 1 dollar for service. The traveler found that changing a certain amount of money in these banks - it does not matter to him. How much money did he want to exchange?

Solving. Suppose a traveler wants to withdraw x dollars from a bank. Then he gives (3000x + 7000) dinars to bank A and 3020 (x + 1) dinars to bank B.

By condition, we have the following equation:

$$3000x + 7000 = 3020(x + 1),$$

Solving it, we find that x = 199.

So, the traveler wants to exchange a total of 3020·200=60400 dinars.

Answer: The traveler wants to exchange 60,400 dinars, for which he will receive $199.

Based on the above analysis, the following requirements can be placed on the knowledge and skills of students in order to develop their mathematical competence:

search for and use definitions, formulas and other facts related to mathematics in textbooks and reference books;

application of algebraic knowledge, skills and graphic skills in different life situations;

data collection, analysis, processing, synthesis;

using a mathematical formula, independently creating formulas expressing the relationship between quantities based on the generalization of certain special cases;

apply the mastered algebraic substitutions and functional graphic images and representations in the representation and analysis of the surrounding or relevant objects in other disciplines;

to be able to justify one's point of view, participate in its discussion and draw a logically correct conclusion;

working with mathematical text (analyzing and extracting the necessary information), being able to write clearly and correctly with the help of mathematical terms, symbols and symbols, and to express their thoughts verbally and in writing;
to solve vital problems of a practical nature, to be able to use the necessary references and computing tools to solve them if necessary;
analysis of real numerical data in tables, diagrams, graphic form and statistical data;
use of modern information technologies as a means of solving mathematical problems of a practical nature.
To solve the current situation, mathematics teachers are recommended to pay attention to the following:
correct and clear formulation of mathematical speech;
distinguish mathematical content and methods in solving textual problems and apply them to a new situation;
change the terms of the problem from a textual form to a mathematical language and reveal the meaning and essence of these form changes;
creating problem situations for students to form creative work skills and perform active mental actions;
creation of differentiated individual engagement trajectories of students in the educational process;
use of interactive and active educational technologies in the lesson - project method, game technologies, problem-based teaching, working with text, cluster, poster, sinkwein, BBB (I know, I want to know, I know), FSMU, fish skeleton, lily flower.
Mathematical problems are the main means of forming students' logical thinking skills.

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