

## References

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### ORGANIZING LEARNING USING MIND MAPS FOR TEACHING THE SOLUTION OF WORD PROBLEMS

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Students of the educational program 6B01501–Mathematics undergo pedagogical practice according to the curriculum. During their practice, future teachers explore effective ways to use modern methods and tools to teach students how to solve word problems. One such method is the use of mind maps. This approach helps students analyze the problem's context, structure key information, and systematically plan solutions, thereby enhancing their logical thinking.

In the modern educational process, one of the key objectives is the development of students' logical thinking and creative activity. Special attention should be given to developing analytical and systemic thinking skills, particularly when solving word problems. In this context, the use of mind maps is considered an effective tool that helps students understand the structure of a problem and guides them toward a step-by-step solution. This article discusses the methodology and effectiveness of using mind maps in solving word problems.

When solving word problems in the mathematics curriculum, several key challenges arise. First, students often fail to fully and accurately understand the problem text. This results in their inability to identify the necessary information from the conditions of the problem and correctly translate it into mathematical language. As a result, it becomes difficult to find the correct solution method.

The method of teaching how to solve word problems through mind maps enables students to develop analytical and logical thinking, graph and chart creation skills, as well as improve communication skills. This helps them better understand mathematical problems and solve them with greater confidence and efficiency, which in turn improves their overall academic performance in mathematics.

Mind maps are graphic organizational tools that help students structure information and connect it with related elements. They are used in solving word problems, helping learners visualize information and highlight the main ideas of the task [1].

The process of using mind maps to solve word problems typically involves the following steps:

1. Read the problem statement and identify key words and phrases.
2. Create a mind map that displays the key words and phrases.
3. Highlight the main ideas of the problem and their connections on the mind map.
4. Select the appropriate mathematical operations and represent them on the mind map.
5. Solve the problem using the mind map.

The use of mind maps helps students visualize information and the relationships between elements, making the problem-solving process clearer and more efficient. In addition, mind maps can be used as a tool for learning and reviewing material, helping students better retain information. They allow students to see the connections between mathematical concepts, which supports deeper understanding and memory retention.

For example, in teaching geometry, a teacher can create a mind map showing different shapes and their properties. Students can add further characteristics such as side lengths, angles, etc.

In algebra, a teacher might create a mind map showing various types of equations and methods for solving them. Students can include examples of equations and their solution methods.

It is important to note that mind maps do not replace direct instruction or textbooks. They should be used as a supplementary tool to help understand and retain the material [2].

The first step in using mind maps for solving mathematical word problems is creating a task map. This can be done by the teacher or the students themselves, using a scheme that shows the relationship between different parts of the problem. For example, the task cards may include the names of characters, objects, or events, as well as the actions occurring in the problem [3].

A mind map can also be used to create a plan for solving the problem after analyzing it. Using the mind map, students identify which steps must be taken to solve the problem and the order in which to perform them. For instance, they learn to choose appropriate formulas and determine the necessary information for solving the task.

Once the solution plan is ready, the mind map helps students recall the information and prepare to complete the task. It is especially helpful for remembering key words, formulas, and steps involved in the solution.

However, using mind maps to teach word problem-solving may not be effective for students who struggle with visualizing information or prefer other learning styles. Therefore, it is important to incorporate a variety of methods when teaching word problems to ensure every student can succeed [4].

The use of mind maps for teaching word problem-solving is particularly effective for students in grades 5–6. This method helps students improve their problem-solving skills, while also developing creative thinking and the ability to work with information.

Main stages of the methodology for teaching the solution of word problems using mind maps:

1. Introduction to the topic. The teacher provides a general overview of the topic and explains the key concepts used in solving problems.
2. Working with word problems. The teacher offers students several word problems. Students can work independently or in pairs.
3. Creating a mind map. After receiving the word problem, students must create a mind map that shows all the necessary data and connections between them.
4. Solving the problem. After creating the mind map, students should use it to solve the problem. Using the mind map as a basis, they determine what information is necessary to solve the problem.
5. Analysis of solutions.

The teacher reviews the problem together with the students and provides feedback. Additionally, students may be asked to explain how they arrived at the solution and how they used the mind map.

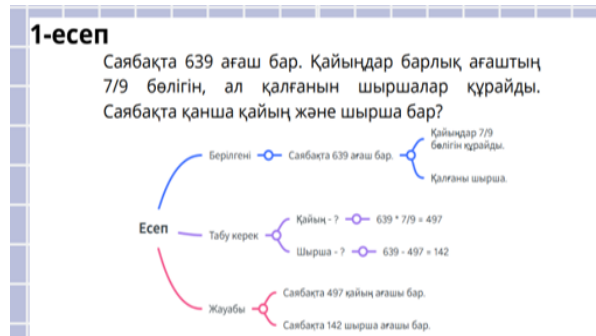


Fig 1: Mind map of task 1

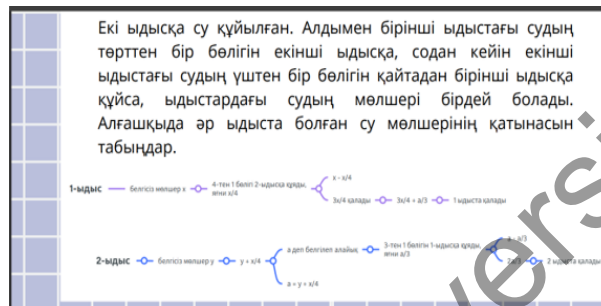


Fig 2: Mind map of task 2

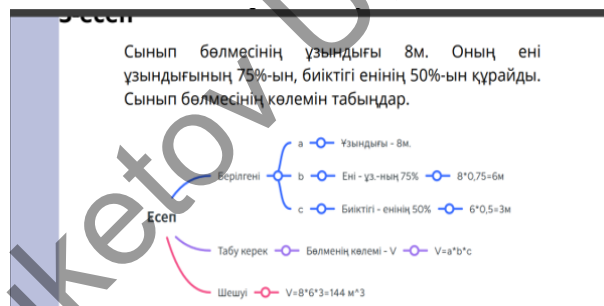


Fig 3: Mind map of task 3

Task 4. A student read 25% of the book on the first day, 60% of the remaining part on the second day, and the rest of the book on the third day. The student read 12 pages more on the second day than on the third day. How many pages are there in the entire book?

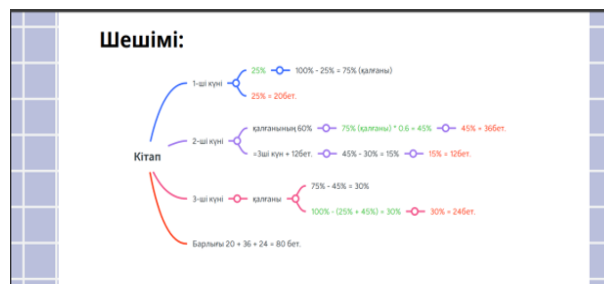


Fig 4: Mind map of task 4

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### FEATURES OF TEACHING THE TOPIC «SOLIDS OF REVOLUTION» IN THE SCHOOL GEOMETRY COURSE THROUGH STEM

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The article addresses the main difficulties in teaching the topic of "Rotational Bodies" in the school geometry curriculum. It analyzes the level of abstraction of the material, the lack of visual aids, and the insufficient interdisciplinary connections. It suggests ways to increase the effectiveness of teaching using the STEM (Science, Technology, Engineering, Mathematics) approach. The article shows how the widespread use of digital technologies and project work contributes to the development of students' spatial thinking and motivation.

The «Rotational Bodies» section of the school geometry course plays a crucial role in forming students' spatial thinking skills and understanding of three-dimensional objects. This topic helps to develop spatial imagination and understand three-dimensional figures. However, traditional teaching methods face problems such as a high level of abstraction, insufficient visual aids, and limited practical connections. In this regard, the STEM approach, by integrating Science, Technology, Engineering, and Mathematics, allows for organizing the learning process in a practical and interdisciplinary manner [1-2].

Many students find it difficult to imagine the rotation of a figure around an axis and its transformation into a three-dimensional body. This leads to rote memorization of formulas and a lack of understanding of the geometric meaning of the topic. Educational materials often present static images and formulas, which do not allow for a complete formation of spatial understanding. The lack of interdisciplinary connections and real-life applications decreases students' interest in the subject.

Using dynamic geometry programs like GeoGebra allows students to observe the rotation process and create models of bodies independently. This helps to develop spatial thinking. In the lesson, students can draw a right triangle in GeoGebra, show its rotation around one leg, and