

Секция № 1

ИННОВАЦИИ В ОБУЧЕНИИ МАТЕМАТИКЕ НА УРОВНЕ ОБЩЕГО СРЕДНЕГО, СРЕДНЕГО СПЕЦИАЛЬНОГО, ВЫСШЕГО ОБРАЗОВАНИЯ И В ПОДГОТОВКЕ УЧИТЕЛЯ МАТЕМАТИКИ

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МЕТОДИКА ИЗУЧЕНИЯ ПРИКЛАДНЫХ ЗАДАЧ, ПОРОЖДАЕМЫХ СИСТЕМОЙ НЕРАВЕНСТВ С ДВУМЯ ПЕРЕМЕННЫМИ

METHODOLOGY FOR LEARNING APPLICATION PROBLEMS GENERATED BY A SYSTEM OF INEQUALITIES WITH TWO VARIABLES

Учитывая обновленную образовательную программу в Казахстане, довольно сложно качественно объяснить учащимся средней школы тему «Прикладные задачи, порождаемые системой неравенств с двумя переменными». В этой статье предлагается вариант изложения этой темы учащимся с использованием таксономии Блума. Если при изложении рассматриваемой темы придерживаться шести шагов таксономии Блума, то это поможет заинтересовать учащихся и обеспечить понимание темы.

According to the updated education program in Kazakhstan, it is very difficult to explain the topic of "application problems generated by the system of two-variable inequalities" to students in primary school and show the high quality of education. therefore, this article examines how to best explain this topic to students using Bloom's Taxonomy. If we teach this topic to students through the six steps of Bloom's taxonomy, it will definitely help the students to become more interested in mathematics and understand the topic better.

Ключевые слова: две переменные; система неравенств; прикладные задачи; анализ текста; таксономия Блума; методика преподавания.

Keywords: two variables; inequality system; application problems; text analysis; Bloom's taxonomy; teaching methodology.

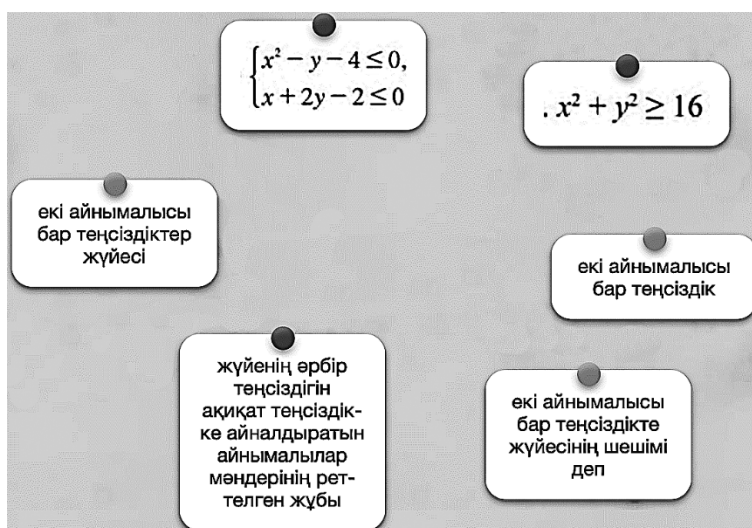
In the ever-evolving landscape of modern education, the teaching of mathematics remains a cornerstone of intellectual development. Today's children, equipped with high levels of logical thinking, are primed to tackle increasingly complex mathematical challenges. One such challenge that demands their logical prowess is the topic of "Methodology for Teaching Text Problems Generated by a System of Inequalities with Two Variables." While modern education programs allocate only a finite number of hours to this subject, its real-world applications and the enhancement of critical thinking skills make it an indispensable component of a well-rounded mathematical curriculum.

In a world where technological advancements continually reshape the way we live and work, the ability to analyze and solve problems involving systems of inequalities with two variables has never been more relevant. Despite the limited time dedicated to this topic in the curriculum, its importance transcends the classroom, extending into various facets of everyday life.

This introduction sets the stage for an exploration of the methodology employed in teaching text problems generated by systems of inequalities with two variables. It underscores the inherent difficulty of these problems, even for students with strong logical thinking abilities. As we delve deeper into this subject, we will uncover strategies and approaches that educators can employ to equip their students with the problem-solving skills necessary to navigate the complexities of this mathematical domain effectively. Through a focused and thoughtful methodology, we aim to bridge the gap between limited classroom hours and the real-world significance of this mathematical concept, ensuring that students not only grasp the fundamentals but also appreciate the role it plays in solving practical problems they may encounter throughout their lives.

Teaching students to solve text problems using a system of equations with two variables can be a challenging endeavor. However, a structured approach based on Bloom's Taxonomy can significantly enhance comprehension and mastery of this topic. By following the cognitive steps of knowing, understanding, applying, analyzing, summarizing, and evaluating in sequence, educators can guide their students towards a deeper understanding and proficiency in solving such problems.

1. Knowing: The journey begins with building a solid foundation of knowledge. Students must grasp the basic concepts, equations, and terminologies related to systems of equations with two variables. This step ensures that they have a clear understanding of what they are dealing with.



Picture 1 – Exercise in Learningapp

With the help of an interactive board, students perform the matching task to the level of knowledge of the definition. will show in green when matching matches are found.

2. Understanding: Once the groundwork is laid, it's essential to move to the understanding phase. Students should comprehend the underlying principles, recognizing how the variables interact within the system and the significance of each equation.

Task. The sum of the legs of a right triangle is not less than 10 centimeters, and the hypotenuse is not more than 9 centimeters. What number can the area of this triangle be greater than?

Solution.

Introduce new variables:

Let the legs be and respectively.

and hypotenuse

then the system of inequalities will be as follows:

Through the "fill in the blank" task, students complete the comprehension level task. learn to introduce a variable and create an inequality using that variable.

3. Applying: With a firm grasp of the basics, students can progress to applying their knowledge. They should be given ample opportunities to solve simple problems, gradually advancing to more complex ones.

At this stage, students should be taught how to solve a system of constructed inequalities. Using the "stopping" method, one student goes to the blackboard step by step and writes one solution step. In this way, a given system of inequalities is generated by several students.

Task. 100-meter distance motor boat traveled in no more than 5.4 seconds when traveling with the river current, and 7.2 seconds against the current. Determine what the specific speed of the boat might be.

Solution.

Introduce new variables:

Let the specific speed of the boat be x

and the speed of water flow be y

then the system of inequalities will be as follows:

$$\begin{cases} \frac{100}{x+y} \leq 5,4, \\ \frac{100}{x-y} \leq 7,2; \end{cases} \begin{cases} x + y \geq \frac{1000}{54}, \\ x - y \geq \frac{1000}{72}; \end{cases} 2x \geq \frac{1000}{54} + \frac{1000}{72}; 2x \geq \frac{1750}{54}; x \geq 16\frac{11}{54}.$$

Answer: specific speed of the boat is not less than $16\frac{11}{54}$.

Seven students go to the board and complete the task for the "approach" level by performing seven steps in turn.

4. Analyzing: Encourage students to dissect and analyze text problems carefully. Challenge them to identify the relevant information, formulate equations, and consider multiple approaches to solving the problem.

In the "analysis" step, students are given group work using the "group think" method. students perform the task by discussing it in a group. Each group comes to the front of the class and tells step by step about the completed task. Other group members listen and remember what they liked and use it the next time they make a report.

5. Summarizing: Summarization is a crucial skill in problem-solving. Students should be able to concisely express their methods and findings, fostering clarity in their thought process.

In the "Assembly" step, students should learn to construct the problem themselves. that is, through the tasks they have done so far, if they are given a system of inequalities with two opposite variables, they should be able to solve text problems based on it. As a result of this task, the students' understanding of the topic will be strengthened and they will have a deep understanding.

6. Evaluating: Finally, invite students to evaluate their solutions critically. Are their answers plausible? Do they align with the problem's context? Encouraging self-assessment promotes a deeper understanding and self-correction.

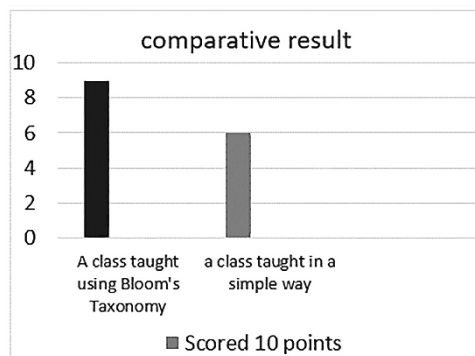
In the "evaluation" step, students are given a task, after completing that task, they evaluate each other. There are many different ways of assessment, for example, two students mutual assessment, group mutual assessment, self-assessment.

By adhering to Bloom's Taxonomy in teaching this challenging topic, educators can help students navigate the intricacies of systems of equations with two variables systematically. This method not only accelerates comprehension but also equips students with the problem-solving skills they can apply to real-world scenarios, making mathematics not just a subject to study, but a tool to use effectively in life's challenges.

With these steps, you can teach students the topic "solving a word problem using an inequality with two variables" and get good results. In order to see the results of the research, students were given control work. The class taught using Bloom's taxonomy and the class taught

using the simple method showed very different results. The results obtained by the students can be seen in the chart below (picture 2).

In conclusion, Bloom's Taxonomy provides a powerful framework for teaching students how to solve application questions involving two-variable inequalities. By following the cognitive levels outlined in Bloom's Taxonomy – from knowledge and comprehension to application, analysis, synthesis, and evaluation – educators can guide students through a structured and effective learning process.



Picture 2 – Comparative result

Starting with the foundational knowledge of inequalities and their properties, students can progress to comprehending the specific context of application problems. Through guided practice and real-world examples, they can learn to apply their knowledge to analyze the problem, identify relevant variables, and set up appropriate equations or inequalities.

Moving up the taxonomy, students can develop the skills needed to synthesize information and make connections between mathematical concepts and real-life situations. This encourages critical thinking and problem-solving abilities, helping them navigate the complexities of two-variable inequalities.

Finally, at the highest level of evaluation, students can assess their own problem-solving strategies and solutions, fostering a sense of self-awareness and metacognition. Bloom's Taxonomy not only equips students with the tools to solve word problems but also empowers them to become independent, confident learners.

Incorporating Bloom's Taxonomy into teaching strategies for two-variable inequalities not only makes the process easier for students but also enhances their overall mathematical proficiency. It encourages active engagement, deep understanding, and the development of essential skills that extend beyond the classroom. As educators, it is our responsibility to harness the power of this framework to equip our students with the problem-solving skills they need to succeed academically and in their future endeavors.

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