Oleksandr Shkolnyi
Doctor of Pedagogical Sciences, Docent
National Dragomanov Pedagogical University, Kyiv, Ukraine
shkolnyi@ukr.net
Yurii Zakhariichenko
PhD in Mathematics
National University «Kyiv-Mohyla Academy», Kyiv, Ukraine
yzakhar@gmail.com

ABOUT MODERN THEMATIC PREPARATION FOR EIA IN MATHEMATICS: TEXT PROBLEMS

External Independent Assessment (EIA) is now the main instrument of assessing the quality of mathematical preparation for Ukrainian senior school students. Therefore, there is no doubt about the relevance and the need for research on different aspects of preparation for the EIA in mathematics. One such aspect is the systematic and thematic repetition of the course of school mathematics. Based on our experience in preparing for EIA, during this repetition we divide the whole mathematics course into 10 thematic blocks: «Numbers and expressions», «Functions», «Equations and systems of equations», «Inequalities and systems of inequalities», «Text problems», «Elements of mathematical analysis», «Geometry on the plane», «Geometry in the space», «Coordinates and vectors», «Elements of combinatorics and stochastics». This division allows repeated repetition of the same material throughout the preparation process for the EIA.

During the last 15 years, our author's team has been constantly working to provide methodological support for the process of preparation for the EIA in mathematics. The theory and methodology of assessing the academic achievement of senior school students in Ukraine is presented in the monograph [1]. For the training and systematization of the school mathematics course, we use the methodological set of books [2] and [3].

The purpose of this report is to give some methodological advice to teachers and tutors regarding the thematic training of senior school students to EIA in mathematics. We present here author's solutions of some basic tasks from the topic «Text problems» with methodological comments for them.

Text problems have always been difficult to learn in school course of mathematics, because they required not only purely mathematical knowledge and skills, but also the skills of mathematical modeling of processes and phenomena of reality. Forming students' competences in this field is one of the most important tasks of the modern mathematics course in the school. Solving text problems enhances students' motivation to study mathematics, and these tasks show how important mathematical methods are in real life.

Task 1. (MCQ type) The cost of the first cake is m UAH, and the second cake cost on 30% less than the first. Determine the cost of the second cake (in UAH).

A	B	C	D	E
$0,7m$	$m-30$	$1,3m$	$m+30$	$0,3m$

Solution. To find the percentage of the number, you need to transfer that percentage into fractions and then multiply that fraction by a given number. Therefore, the discount for the second cake is equal to $0,3m$. Then the price of the second cake with a discount is equal to $m - 0,3m = 0,7m$ and the correct answer is **A**.

Comment. One can solve this problem in another way. Let the price of the first cake be 100%. Then the price of the second cake will be 100% – 30% = 70% of the first cake price. Further, according to the rule given above, we have that the price of the second cake is $0,7m$.

Different ways of solving show the student that almost any practical task has many alternative ways of getting the needed result. This contributes to the formation of an adequate outlook of the children and leads to a constant search for alternative solutions in different situations in their own life. In addition, the rule of finding the percentage of a number, unlike the method of using proportions, is simple and straightforward, and this rule works better in situations where the condition contains not a specific number but a parameter.

Task 2. (SA type) During the day, the tourist group made two crossings – flat (9 km long) and mountainous (5 km long). During the flat transition, the group moved at a constant speed of x km per hour, and during the mountain, it decreased that speed by 2 km per hour. Find out x, if you know that the total movement time of the group was 4 hours.

Solution. According to the task condition, the time of flat and mountain transitions are $\frac{9}{x}$ hours and $\frac{5}{x-2}$ hours respectively. Because the total time for the whole trip was 4 hours, we obtain the equation $\frac{9}{x}+\frac{5}{x-2}=4$. After solving of this equation, we will have $x_1 = 4,5$ and $x_2 = 1$. Obviously, the second solution is not satisfy the task term and the answer is **4,5**.

Comment. The solution of this problem illustrates well all the steps of the mathematical modeling process. First, you need to separate the essential data from the irrelevant ones and make an equation that is a mathematical model of the practical problem. The condition of the task gives a little hint to the student exactly how to make this equation, because the variable whose value is to be found is already present in it. Next, you need to solve the mathematical problem correctly, that is, get the root equations. Finally, at the last stage, the

student have to determine, which solutions of the mathematical problem will be the solutions of the practical problem and which do not satisfy its condition. The presence of such tasks enriches children, allows them to develop their thinking and to form practical skills in the real world.

Text problems tasks have a significant worldview in the learning process. They contribute to the formation of practical competences and the development of abstract and critical thinking of the children. That is why the EIA test in mathematics contains tasks on this topic. During preparation for the test, the teacher has an opportunity to pay attention to such tasks, further emphasizing their importance.

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Анотація. **Школьний О.В., Захарійченко Ю.О. Про сучасну тематичну підготовку до ЗНО з математики: текстові задачі.** *В сучасних умовах реаліях актуальність досліджень, присвячених тематичній підготовці до ЗНО з математики, не викликає сумнівів. У доповіді ми наводимо розв'язання окремих типових задач змістового блоку «Текстові задачі» та подаємо методичні коментарі до цих розв'язань. Традиційно саме наведена тема викликає значні труднощі в учнів під час підготовки до тестування, тому вчителю доцільно звернути на неї особливу увагу. Ми вважаємо, що належним чином організована тематична систематизація і повторення шкільного курсу математики дозволить учням успішно скласти ЗНО з математики, а вчителям сприяти досягненню цього успіху.*

Ключові слова: ЗНО з математики, тематична підготовка, навчальні досягнення учнів, тематичні тести, базові задачі, текстові задачі.

Аннотация. Школьный А.В., Захарийченко Ю.А. О современной тематической подготовке к ВНО по математике: текстовые задачи. *В современных условиях реалиях актуальность исследований, посвященных тематической подготовке к ВНО по математике, не вызывает сомнений. В докладе мы приводим решение отдельных типовых задач содержательного блока «Текстовые задачи» и даем методические комментарии к этим решениям. Традиционно именно эта тема вызывает значительные трудности у учащихся при подготовке к тестированию, поэтому учителю целесообразно обратить на неё особое внимание. Мы считаем, что должным образом организованная тематическая систематизация и повторение школьного курса математики позволит ученикам успешно сдать ВНО по математике, а учителям способствовать достижению этого успеха.*

Ключевые слова: ВНО по математике, тематическая подготовка, учебные достижения учащихся, базовые задачи, текстовые задачи.

Summary. Shkolnyi O., Zakhariichenko Yu. About modern thematic preparation for EIA in mathematics: text problems. *In present-day realities, the relevance of research on thematic preparation for the EIA in mathematics is undeniable. In the report, we present the individual typical tasks of the content block «Text Problems» and provide methodological comments for these solutions. Traditionally, this topic cause significant difficulties for students in preparing for the test, so it is advisable for the teacher to pay special attention to it. We believe that a properly organized thematic systematization and repetition of the school course of mathematics will allow students to successfully complete the math exams, and to help teachers reach this success.*

Keywords: EIA on mathematics, thematic preparation, pupils' academic achievements, basic tasks, text problems.