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ABOUT MODERN THEMATIC PREPARATION FOR EIA IN MATHEMATICS: NUMBERS AND EXPRESSIONS

External Independent Assessment (EIA) is now the main instrument of assessing the quality of mathematical preparation for Ukrainian graduates. One of the most important current didactic problem in this context is the systematic and thematic repetition of the school mathematics course. Based on our many years of 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. For example, the transformations of trigonometric expressions are repeated during the study of thematic blocks 1, 2, 3, 6, 7, 8 and 9. This permits the teacher constantly to keep the student in a tone, when he would forget something, but he can't do this, because proposed thematic training system doesn't allow it.

During more than 15 years we have been constantly working to provide methodological support for EIA in mathematics training process. The theory and methodology of evaluating the academic achievement of senior school students in Ukraine is described in (Shkolnyi, 2015).

We believe that in preparing for the EIA it is advisable to refrain from a variety of problem forms in the repetition, limiting only to open-ended tasks with full explanation, as they are the most effective for teaching mathematics and feedback. However, after completing each of the 10 thematic blocks, it is

natural to carry out a diagnostic thematic test in which to use all forms of test tasks inherent in the EIA math test. In the report we will regard a couple of basic tasks from thematic test «Numbers and Expressions» and also will put a solutions for these tasks with some methodological comments to them. Here we will present only two of such tasks.

Task 1. Simplify the expression $3a+4+\sqrt{(3a+1)^2}$, if $3a+1<0$.

A	**B**	**C**	**D**	**E**
3	5	$6a+3$	$6a+5$	$9a^2+9a+5$

Solution. Whereas $\sqrt{a^2}=|a|$, then $3a+4+\sqrt{(3a+1)^2}=3a+4+|3a+1|$. By the definition of absolute value, if $3a+1<0$, then $|3a+1|=-3a-1$, therefore, $3a+4+\sqrt{(3a+1)^2}=3a+4-3a-1=3$ and the correct answer is **A**.

Comment. This task is aimed primarily at testing the knowledge and understanding of the formula $\sqrt{a^2}=|a|$, because many students mistakenly believe that $\sqrt{a^2}=a$ and they choose the distractor **D**. Understanding the notion of absolute value is traditionally difficult for students. This is especially true of the procedure for opening the sign of absolute value in letter expressions. If the student incorrectly opens the sign of absolute value, then he will again select distractor **D**. If there is a technical error, he will choose distractor **B** or **C**. Finally, distractor **E** we can obtaine ignoring the root sign in the expression.

Task 2. Find p, if $\sqrt{\frac{2\sqrt[4]{2}}{\sqrt{2}}}=2^p$. *Solution.* Let's transform an expression using the properties of the roots: $\sqrt{\frac{2\sqrt[4]{2}}{\sqrt{2}}}=\sqrt{\frac{\sqrt[4]{2^4\cdot 2}}{\sqrt[4]{2^2}}}=\sqrt{\sqrt[4]{\frac{2^5}{2^2}}}=\sqrt[8]{2^3}$. By the definition of degree with fractional index: $\sqrt[8]{2^3}=2^{\frac{3}{8}}$ and $p=\mathbf{0{,}375}$.

Comment. This task, first of all, checks whether the student knows the definition of degree with fractional index, and therefore it permits an alternative

solution without using the properties of the roots: $\sqrt{\frac{2\sqrt[4]{2}}{\sqrt{2}}}=\left(\frac{2^{1}\cdot 2^{\frac{1}{4}}}{2^{\frac{1}{2}}}\right)^{\frac{1}{2}}=\left(2^{1+\frac{1}{4}-\frac{1}{2}}\right)^{\frac{1}{2}}=\left(2^{\frac{3}{4}}\right)^{\frac{1}{2}}=2^{\frac{3}{8}}$. In addition, when preparing to solve short-answer tasks, students should pay attention to converting important fractions to decimal: $\frac{1}{2}=0,5$; $\frac{1}{4}=0,25$; $\frac{3}{4}=0,75$; $\frac{1}{8}=0,125$; $\frac{3}{8}=0,375$; $\frac{5}{8}=0,625$; $\frac{7}{8}=0,875$. If a student during solving a short-answer task gets a fraction that cannot be written in decimals ($\frac{2}{3}$, $\frac{1}{6}$, $\frac{5}{7}$ etc.), then he need to check the solution, because an error was made. The same should be done if irrationality appears in the answer, e.g. $\sqrt{2}$, $\sqrt{5}$, $\sqrt[3]{9}$ etc.

We believe that a well-organized thematic preparation for independent assessment will allow teachers to keep their heartbeat on the problems encountered by students in the systematization and repetition of the school mathematics course. We hope that the suggested methodological advice will be of use to all specialists involved in this process.

REFERENCES

1. Shkolnyi, Oleksandr V. (2015). Osnovy teorii ta metodyky ociniuvannia navchal'nyh dosiahnen z matematyky uchniv starshoii shkoly v Ukraini [*The basic of theory and methodology of educational achievements for senior school students in Ukraine*]. Monograph. Kyiv: Dragomanov NPU Publishing.