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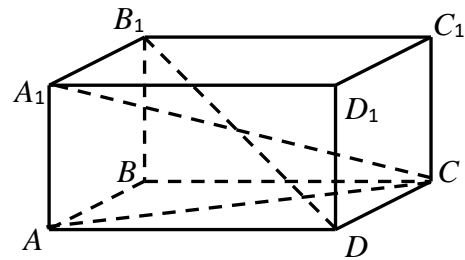
ABOUT MODERN THEMATIC PREPARATION FOR EIA IN
MATHEMATICS: GEOMETRY IN THE SPACE

One of the main instrument of assessing the quality of mathematical preparation for Ukrainian graduates is External Independent Assessment (EIA). The most relevant didactic problem in this context is the systematic and thematic repetition of the school mathematics course. Based on many years of our experience in training for EIA, during this repetition we divide the school 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».

During more than 16 years we have been permanently working to provide methodological support for the process of training for the EIA in mathematics. The theory and methodology of assessing the academic achievement of senior school students in Ukraine is given in the monograph (Shkolnyi, 2015).

We believe that in preparing for the external testing, it is advisable to refrain from a variety of problem forms in the repetition and systematization of the material of each topic, limiting only to open-ended tasks with full explanation. 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 consider a couple of basic tasks from thematic test «Geometry in the Space» and also will give solutions for these tasks with some methodological comments to them. Here we will present only two of such tasks.

Task 1. On the picture is shown a rectangular parallelepiped $ABCD A_1 B_1 C_1 D_1$. Match the beginning of the sentence (1 – 3) and its end (A – E) so that the correct statement will be formed.



Beginning of the sentence

- 1 Straight lines CA_1 and DB_1
- 2 Straight lines CA_1 and AC
- 3 Straight lines CA and DB_1

End of the sentence

- A are intersected at a point that belongs to the plane (ABA_1)
- B are intersected at a point that belongs to the plane (DBD_1)
- C are intersected at a point that belongs to the plane (ABC)
- D are parallel
- E are crossbreeding

Solution. **1.** These straight lines are intersect at a point belonging to the plane (DBD_1) , that completely contains the straight line DB_1 . **2.** These straight lines are intersect at the point C that belongs to the plane (ABC) . **3.** These straight lines have no common point, but do not belong to the same plane. Thus, they are crossbreeding lines. So, the correct answer is **1 – B, 2 – C, 3 – E.**

Comment. This task checks the formation of students' spatial imagination and is not technically difficult. However, in order to find the right answer, it is also important not only to use intuition, but to prove the correctness of each statement that was used. This is the way to reduce the number of errors during solving of such tasks.

Task 2. The assembly hall of the school has the form of a rectangular parallelepiped, the dimensions of which are 10m, 21m and 5m. To install individual heating in this room, one plan to use the same gas convectors, each of which is designed for heating for 150m^3 of air. How many convectors are needed to install?

Solution. The volume of the assembly hall is equal to $10 \cdot 21 \cdot 5 = 1050 \text{ m}^3$. Since one gas convector is designed to heat 150 m^3 of air, then $1050:150=7$ such convectors are required.

Comment. This task is also not technically difficult, but it does not test the theoretical knowledge, but the students' ability to create a mathematical model of real processes and phenomena. It is clear that the above task is educational and in reality, almost never, as a result of division, we will not get an integer. Therefore, after solving task 2, it is advisable to offer children a series of similar tasks that require additional conditions. For example, if each gas convector is designed to heat only 100 m^3 of air, you first need to find out whether the overheating of the room is more harmful than a slight underheating. Depending on the answer to this question, the answer will be either 10 or 11 gas convectors needed.

We believe that 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 useful for all specialists involved in this process.

REFERENCES

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