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THE INTERNATIONAL OLYMPIAD IN ASTRONOMY AND ASTROPHYSICS (IOAA)

МЕЖДУНАРОДНАЯ ОЛИМПИАДА ПО АСТРОНОМИИ И АСТРОФИЗИКЕ (IOAA)

В статье «Международня олимпиада по астрономии и астрофизике (IOAA)» рассказывается о Международной олимпиаде по астрономии и астрофизике (IOAA), более 15 лет являющейся важнейшим форумом знаний для старшеклассников и студентов со всех стран мира. Рассматривается ее организационная структура – типы и длительности туров, функции лидеров команд и участников, принцип коллегиальности при формировании заданий. Проводится краткое сравнение IOAA с республиканской олимпиадой по астрономии в нашей стране.

The International Olympiad on Astronomy and Astrophysics - IOAA is an annual competition in the field of astronomy and astrophysics for high school and first year students. To date, thirteen Olympiads have already been held. The first of them took place in Thailand in November 2007, and the last one took place in Hungary in August 2019. The number of participating countries reached 45. Every year, the country of the IOAA changes, while, as a rule, the part of the world where it is located host state. However, in this list, Asian countries are leading, currently actively developing these areas of knowledge. Each of the participating countries sends one team of five participants, accompanied by two team leaders, usually scientists or university professors. In this case, the host country has the right to participate in an additional team.

The most important distinguishing feature of the astronomy competition is the need to have excellent knowledge of the celestial sphere and the skills to conduct systematic observations of celestial bodies. Astrophysics, in turn, requires from the participants an accurate understanding of physical laws and possession of a rather complex mathematical apparatus, including differential and integral calculus. Therefore, participants must show high theoretical and practical knowledge and skills.

The Olympiad includes four rounds:

1 Theoretical round: the round consists of two long, four medium and five short problems (5 hours). The tour gives 50% of the final grade.

2 Hands-on tour: The tour consists of analyzing observational data obtained by professional scientists. This tour is four hours long and still gives 25% of the final grade.

3 Observation tour: related to questions relaned to observing the night sky (in reality or in a planetarium), recognizing stars, constellations, nebulae, great circles, etc. The tour also gives 25% of the final grade. The duration of the tour is limited by the number of tasks and their time limits, but, as a rule, it is also 4-5 hours.

4 Team round: a separate competition, which does not affect the individual results of the participants. At the same time, national teams receive a package of theoretical and practical problems, the solution of which requires more team efforts.

Although the official working language of the IOAA is English, the tasks of each round are translated in advance by the team leaders of each country, into the native languages of the participants. Of course, if it is necessary. The host country must form a jury, which is obliged to prepare tasks and objectively check them as they are completed. Team leaders get the following critical functions:

– team leaders, who are isolated from the participants for the duration of all tasks, discuss each task, suggesting changes, or even replacing the task with another more correct one;

– they translate assignments into the national language so that each participant can work in his own language, which is naturally more comfortable;

– team leaders will receive copies of the work performed by the participants, with the marks given by the jury. If the team leader disagrees with some of the assessments, they can appeal to the appropriate committee. The participants of the Olympiad themselves do not have the right to appeal.

The point criterion for receiving the prizes of the Olympiad is as follows:

– gold medals are awarded to participants with a score above 90%;

– silver medals correspond to a score between 78% and 90%;

– bronze medals are awarded when the result is from 65% to 78%;

– Commendations are received by participants who have scored from 50% to 65% of the total score.

The arithmetic mean of the top three results is taken as the 100% score. The participant with the best result is recognized as the absolute winner of the Olympiad. Also, participants with the best results shown

in each round (theoretical, practical and observational) receive special prizes from the organizing committee.

The author of these lines had the opportunity to personally participate in the tenth IOAA, held in the Indian city of Bhubaneswar in December 2016, as one of the leaders of the national team of the Republic of Belarus. This made it possible to feel in reality the technology of this Olympiad. Carefully analyze its positive constituent elements in order to use them in the Belarusian Republican Olympiad in Astronomy. Of course, this primarily concerns the final stage of our Olympiad, the best of the winners of which apply for subsequent participation in the IOAA. The understanding of the Belarusian Olympiad from the inside is due to many years of experience as a member of the jury of the regional and final stages of the Olympiad.

So what unites and distinguishes these activities? One of the most important advantages of IOAA is the use of the principle of collegiality in the formation of tasks for all tours. The primary wordings of tasks are analyzed and
can be corrected by all team leaders up to cancellation. In this case, the final decision on the texts is made by voting. After such a procedure, all participants in the Olympiad find themselves in an equal position. This is not at all typical of the Republican Olympiad, where tasks are formed by specific people and are not available for preliminary discussion by specialists from the regions.

As for the content of the tasks of the theoretical round, the tasks of the Republican Olympiad correlate well with the tasks of the IOAA, based on the theoretical material of university textbooks such as the "Course of General Astronomy" by the authors E.V. Kononovich and V.I. Moroz, as well as the American textbook "An Introduction to Modern Astrophysics" by B.W. Carroll and D.A. Ostlie.

The practical round of our Olympiad is also comparable to the similar round of the IOAA. And in recent years the same template technique for validating work has been using. That is, a previously prepared template is simply superimposed on maps, graphs and other auxiliary materials, which makes it possible to determine the correctness of the answer within the limits of the error inherent in the template. It is very convenient and objective, since it does not depend on the subjective opinion of the inspector.

Observation and team rounds at the republican level are not yet available. It is difficult to organize an observation tour for two reasons - climatic and financial. Since it is quite cold in Belarus from January to March, it is still problematic to order a clear sky on the day of the Olympiad. Well, when the last requirement is fulfilled, it also fails to

provide all participants with observation instruments. The team tour, on the other hand, requires an extra day and is not included simply due to time constraints.

This is the correlation between the Olympiads under consideration. If we talk about the achievements of the Belarusian team, they are quite high. Our guys won medals of all qualities, except for absolute championship.