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Methods of Tracks for Training Juniors in Olympiad Informatics: The ISIJ Experience

Marina S. TSVETKOVA[1], Vladimir M. KIRYUKHIN[1],
Nikolai A. BORISOV[2], Mikhail I. KINDER[3]

[1]*Russian Academy of Natural History, Russian Federation*
Moscow, 105037, box 47
[2]*Lobachevsky University, Russian Federation*
Nizhny Novgorod, 603022, Gagarina av., 23, 2 bld., 320
[3]*Kazan Federal University, Russian Federation*
Kazan, 420008, 35 Kremlyovskaya str., 2 bld., 806
e-mail: {ms-tsv, vkiryukh, n.a.borisov, detkinm}@mail.ru

Abstract. The article describes methodological approaches to the formation of olympiad competencies for juniors, children 12–15 years old, based on five training tracks in olympiad informatics in accordance with the IOI Syllabus. An integrated approach to the preparation of rounds for children in the framework of the experience of the International School in Informatics for Juniors (ISIJ) is also described.

Keywords: talented children, olympiad informatics, competencies of olympiad informatics, digital skills, computational thinking, algorithmic thinking.

1. Introduction

In the modern world, the computer has absorbed the complex of human knowledge – mathematics, formal logic, combinatorics, physics and circuitry, the theory of algorithms and programming languages, modeling and design tools, and continues to absorb all the new modern scientific knowledge of natural sciences, philology, art ... The computer also gave rise to a new view of man on the world, things and processes, made it possible to create artificial virtual worlds and artificial intelligence for the world of people, things and processes ... Such a broad view of a new kind of human thinking, like computer thinking, is based on algorithmic, formal and logical thinking, research and design thinking, which together created the phenomenon of a new civilization: computer and programs as a new computer style of thinking based on algorithmic thinking (Tsvetkova M., Kiryukhin V., 2021).

Such an artificial digital world is created by humanity on a gigantic scale and pace and is controlled by programs that are also created by people based on artificial intelligence algorithms and significantly change the picture of the world. As a result, life in the digital world has included digital literacy in the educational context, complementing traditional literacy, and requires the formation of computer thinking as a complex of different types of thinking, especially in children.

Children who are passionate about computer science and programming essentially become pioneers of computer thinking at each new stage of its development. But it is necessary to form such a level of a new style of thinking in an integrated manner. At an early level of the formation of computer thinking, it is necessary to promote learning along several training tracks: in mathematical informatics as a formal tool for describing algorithms, in algorithmic thinking as an intellectual tool for the creative creation of algorithms, in programming technique as a computer tool for implementing algorithms, and in the speed of thinking in integration with technological computer skills, that is, to combine the high-speed qualities of human creative work and the high speed of a computer. All this is the basis for the development of integrated approaches in the methodology for the development of talented schoolchildren in olympiad informatics and the development of new types of competitions that will activate various aspects of computer thinking in key competencies included in IOI Syllabus (IOI Syllabus, 2019).

2. Training Tracks of Olympiad Informatics

The experience of holding the International School of Informatics for Juniors, children from 12 to 16 years old (Tsvetkova M., Kiryukhin V., 2018), revealed certain deficiencies in the preparation of children and showed us new directions of training in olympiad informatics, taking into account the international experience of holding Olympiads in Informatics. Juniors generally do not yet have the experience of high olympiad achievements, but they have high motivation in development. It is important to build training tracks for children so that they evenly master the entire range of competencies.

To determine the preparation tracks, consider the IOI Syllabus, which includes the main sections of preparation for olympiad informatics (Kiryukhin V., 2007):

- Mathematical informatics.
- Algorithms.
- Programming technology.
- ICT tools.
- Modeling.

Traditionally, when preparing for Olympiads in Informatics, the emphasis is mainly on algorithms and methods of their implementation in programs, that is, on the development of algorithmic thinking. You can call this approach specialized, but for the preparation of children, it greatly narrows their development horizon. We consider the development of talents more broadly and requires the formation of computer thinking based on algorithms. Juniors do not yet have complex competencies like students. At the

same time, the mathematical foundations of informatics and programming technology are mainly included in the school informatics course in general, which is not enough for the olympiad preparation.

The success of the preparation is expressed in the results of the participation of juniors in the Olympiads in Informatics. This success requires instrumental readiness, which is determined by the level of proficiency in programming tools and technical proficiency, which is determined by the digital literacy of a junior (Tsvetkova M., Kiryukhin V., 2020). But schoolchildren do not have the opportunity to gain experience in competitions in these sections of the olympiad preparation.

In this regard, it is important to supplement the olympiad preparation with new competitive rounds, which will be able to focus on certain important competencies of juniors. Taking this into account, the complex of competencies of olympiad informatics can be represented by five main training tracks. Chief among them is *intellectual* (algorithms, traditional rounds of olympiad informatics). Additional tracks by competency categories are *formal* (mathematical informatics), *instrumental* (programming language), *technical* (computer literacy) and *applied* (modeling various processes and objects by means of algorithms and programs). Additional tracks determine an important aspect of the development of juniors, since this type of training shows them digital samples in various professional fields (technology, science, art, culture, economics, etc.), but using algorithms and programming.

3. Types of Training Rounds for Juniors Based on ISIJ Experience

Mathematical Informatics and programming language are the main creative tools, characteristic of algorithmic thinking. The development of algorithmic thinking is implemented within the framework of training programs on relevant topics from the IOI Syllabus, in particular from the sections Computing Science, Algorithms and Complexity (IOI Syllabus, 2019).

All international Olympiads for schoolchildren and most national Olympiads in Informatics reflect this olympiad track. At ISIJ, this corresponds to a traditional round, called Marathon. The duration of this round is 4–5 hours, and it offers 3 problems for solving (experience of IOI, EJOI, IATI, APIO and other Olympiads).

The basis or foundation of knowledge at the start of preparing juniors for Olympiad in Informatics is formal thinking and instrumental skills. Formal thinking develops from elementary school based on mathematics, and further should be improved in mathematical informatics in the course of school informatics. It is important to form a deep knowledge of the mathematical foundations of informatics, an understanding of optimal solutions, the formation of a fast algorithmic search for ideas through mathematical problems in informatics to enter the olympiad achievements.

Formal thinking based on mathematical informatics can be developed using mathematical rounds as part of the olympiad preparation. Tasks that can be used in the design of Math- round must comply with the Mathematics section in IOI Syllabus (IOI Syllabus, 2019).

Instrumental competence of proficiency in a programming language based on developed formal thinking and an intellectual knowledge stock of algorithms are the keys to the olympiad readiness of juniors. Training in instrumental programming competencies requires separate training for children, taking into account the specifics of the programming environment and the requirements of a particular Olympiad. Therefore, trainings on programming techniques, as basic programming skills, taking into account the specifics of a particular programming language, are very important for children. It is important to choose a language as a basis, where you can show different aspects, approaches for developing code and optimizing it based on the software tool of a particular Olympiad.

It is impossible to involve children in the Olympiads without deep training in programming techniques. The participant of the Olympiad in Informatics should not experience barriers in technical competence in the competition. For this purpose, during the ISIJ, a Coder round is introduced, which reflects this training track. Sections of preparation on which instrumental rounds on programming techniques can be formed are included in the IOI Syllabus, in the sections 6.1 Programming Fundamentals and Software Engineering (IOI Syllabus, 2019).

It is also believed that the participants of the Olympiad must have excellent knowledge of the general competencies of digital literacy (information, computer, communication), that is, masterly master keyboard input, control the interface on a computer, use a computer network and file system ... Sections of training corresponding to the formation of computer literacy are included in IOI Syllabus, in the sections Software Engineering and Computer Literacy (IOI Syllabus, 2019).

For juniors, the requirement to have excellent general competencies in digital literacy can be a barrier to successful performance at the Olympiad. Therefore, trainers need to pay special attention to digital literacy of children, since it removes technical and psychological barriers in the speed of children's work on a computer and in making decisions based on the limitations of a computer or operating system when working with digital information.

All children acquire important digital skills of elementary computer literacy in school. These skills are technically competent high-speed input, fluency in the interface, knowledge of the technical limitations of computer devices and experience in customizing programs for the user, using network services and settings. Skills of working with digital information are the basis for decision-making for data processing, the choice of data structures, taking into account the parameters of the problem, which allows a junior to freely navigate in terms such as memory capacity, computation speed. All this should be included in trainings on mastering the tools of olympiad informatics. In ISIJ, such rounds are called speed work technique rounds based on typical IOI olympiad problems or IOI relay race as *the Estafette* round. The most useful for olympiad preparation here is the C++ programming environment. As tasks for these rounds, it is advisable to use the set of tasks of the IOI archive. A rich collection with an accessible debugging environment, which is successfully used in the ISIJ, is presented on the YandexContest 2022 website (YandexContest, 2022).

The ISIJ experience has allowed us to expand the range of junior competition rounds that make up the set of all-around ISIJ Summer Cup. This helps schoolchildren at an early age evaluate different aspects of training in olympiad informatics across all competency tracks, as well as try to apply their skills in algorithm development and programming in an applied environment. Such an environment can be an environment for simulating the work of a virtual (screen) or real robot. For the ISIJ, this is the *Robot* round.

4. ISIJ Cup Structure

The ISIJ Cup started in 2018 following the EJOI. The order of this Cup is significantly different from the traditional Olympiads in Informatics.

Firstly, it introduces an element of competition in the conduct of the ISIJ, which is very important for the involvement of juniors in the olympiad movement in informatics and for them to get competitive practice.

Secondly, it is held in a hybrid form, that is, both offline and online, which allows junior children who do not have the means for mobility to take part in this competition. As a result, not only European participants take part in the Cup, but also juniors from China, New Zealand, Mongolia, Sri Lanka, the Russian Far East and Siberia. It is also important that when it is carried out in the online form, the large difference in the time zones of residence of the juniors is taken into account.

Thirdly, the variety of rounds within the cup allows to reveal different abilities of all participants and to reward many of them for different manifestations of talent.

Fourthly, all participants in the competition are divided into two groups for summing up: beginners and advanced. This allows children, even with little experience in olympiad preparation, to get the opportunity to participate in an international competition and gain valuable experience of participation in Olympiads in Informatics.

And the last one, the teams of the participating countries work at the school together with their coaches, who also take part in all rounds of the Cup, and their results are evaluated in the same way as for children. This allows coaches to deeply analyze the specifics, complexity and algorithms for solving problems, see the difficulties of their juniors and properly organize training for them to move forward.

By tradition, the ISIJ Cup has the following 5 rounds:

- *Marathon*.
- *Math*.
- *Coder*.
- *Estafette*.
- *Project*.

Let's consider each of these rounds in more detail.

Marathon round is a round for the development of algorithms and programming with individual credit. The round is conducted using 3 problems for groups A (advanced) and B (base) and is designed for 4 hours. Compared to traditional IOI round, the duration of this round is 1 hour less, which gives the participant the opportunity to try to solve

the problems of the round in less time, so that at the IOI there is 1 hour of time for the participant's "internal clock".

Math round is a blitz round on the speed of solving problems in mathematical informatics and logic, which is very important for participants in Olympiads in Informatics. This round offers 12–15 blitz ideas for 2 hours. The round includes 12 blitz problems (for group B) and 15 blitz problems (for group A). All tasks are related to mathematical informatics and computational algorithms. Each problem has one correct solution, and the round is held in the Yandex-Contest system.

Coder round is a round of correcting the program-solution in C++, proposed by the jury for each of the 3 problems. The participant must identify possible problems in each program-solution and correct any mistakes. Problems may reflect upgrades, fixes, additions of part of the algorithm in the proposed programs of the jury. The round is designed for 3 hours and is conducted in the Yandex-Contest system.

Estafette round is a round in which two approaches are implemented: the traditional one for the speed and completeness of solving the problem, the second is the team one. The round involves teams from each country, consisting of no more than 6 juniors. Each team is given as many tasks as there are participants to solve within one hour, but each participant solves only one task. All tasks are IOI tasks or similar. At the end of the round, each team is awarded an average score of the team (the total score of the team divided by the number of participants of this team). This round can also be conducted on problems that are new to the participants, but it is better to use a deep study approach, when the participants have already solved the problems, analyzed the solution and the *Estafette* round is needed to check how the children cope with the known problem for the speed and completeness of the solution. It is important that the child's internal clock and memory are included during the round.

Project round (*Robot* round) is devoted to the topic of programming in C++ for unmanned devices for various purposes. The round is conducted for teams of 2–3 participants online using virtual or real robots or in person using robotic equipment. The *Robot* round is focused on the STEM approach, and its goal is to show how you can apply your algorithms and programming skills to applied information technology. A *Robot* round can deal with various applied topics, for example, cybernetics and artificial intelligence, and in the process of carrying out it can be used devices with feedback and sensors, learning devices, groups of interconnected devices (a swarm of drones), moving models in different environmental conditions, models manipulators and others.

Such a structure of the ISIJ Cup implements all five tracks of the olympiad preparation of children, and can become traditional in the work of coaches, both in the formation of deep complex olympiad competencies of children, necessary to participate in Olympiads in Informatics, and in the improvement of the technique of speed thinking and complex digital skills, which help in the development of computer thinking in a broad sense.

Next, we will consider in more detail several features of some of the elements of the ISIJ Cup structure described above.

5. Features of the Math Round

The purpose of the math blitz round is to motivate the participants of the ISIJ to study sections of mathematics as part of the preparation for olympiad informatics, as well as check the preparation of participants for the main topics of mathematical informatics.

Each math blitz round task is a small mathematical olympiad problem on one of the topics of the school curriculum of the course "Mathematical Foundations of Informatics": logic, combinatorics, set theory, graphs, elements of probability theory, chess, numerical laws and sequences, number systems, computational, geometric algorithms and strategies, etc.

The set of tasks includes such a number of tasks on various topics, which, according to the developers, should take an average of 2 hours for their complete solution. According to the complexity of the problem, the jury takes into account the approximate time for the blitz. Blitz solution orients the student towards a creative approach and solving the problem "in the mind".

The examples of tasks on specific topics below show how a task is presented to a participant and how he should submit a response for review.

The participant receives the text of the problem and a description of the format of the response. An automatic check system records his correct answer. After the end of the round, the participants of the competition are given access to solutions of problems. Below are examples of some of the math blitz round tasks.

Task "Cake"

The cake has the form of a parallelogram with vertex coordinates (0; 0), (4; 0), (6; 6), (2; 6). Rabbit and Fox share the cake as follows. Rabbit points to a point on the surface of the cake, and the Fox cuts the cake into two pieces in a straight line passing through this point and takes one for himself. Everyone wants a bigger piece. Where should the Rabbit put the dot?

Output the answer – *the coordinate of this point as two numbers separated by spaces.*

Answer: 3 3.

Solution. This is the center of the parallelogram, i.e., intersection point of diagonals. Rabbit can't get more than half of the cake. Any straight line passing through the center of a parallelogram divides it into two equal parts.

Note. This is a simple geometric problem on the properties of a parallelogram and on the topic "Game strategies". The approximate time for solving the problem is 3–5 minutes.

Task "Sum of permutations"

Find the sum of all five-digit numbers that are obtained by permuting the numbers from 12345.

Print one integer that is the answer to the problem.

Answer: 3 999 960.

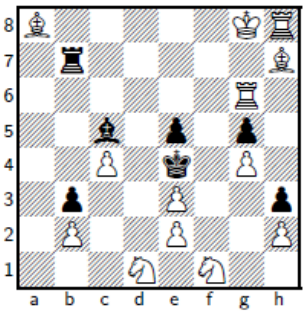
Solution. There are only 5! = 120 ways to rearrange numbers in the number 12345. Among these methods, in exactly one fifth among these (i.e., in 24 cases), the number 1 is in the first place. The same is true for any number and for any place. Therefore, the required sum is equal to:

$$24(10\,000 + 1\,000 + 100 + 10 + 1 + 20\,000 + 2\,000 + 200 + 20 + 2 + 30\,000 + 3\,000 + 300 + 30 + 3 + 40\,000 + 4\,000 + 400 + 40 + 4 + 50\,000 + 5\,000 + 500 + 50 + 5) = 24(11\,111 + 22\,222 + 33\,333 + 44\,444 + 55\,555) = 24 \cdot 11\,111 \cdot (1 + 2 + 3 + 4 + 5) = 3\,999\,960.$$

Note. This is a combinatorial problem on the topic "Permutations", "Number systems". The approximate time for solving the problem is 10–15 minutes.

Task "Chess"

In position on the chessboard, White has only one move that does not checkmate for Black.



The coordinate of a cell on a chessboard is given by a capital Latin letter and a number without a space between them. In the response line *enter the required move in the format of cell coordinates: cell coordinate "from" and cell coordinate "to" separated by a space between them.*

Answer: G6 C6.

Solution. After the move Rg6–c6! the rook blocks the diagonal of the white bishop on a8, and now black has protection from checkmate Rb7:h7.

Note. The approximate time for solving a chess problem is 8–12 minutes.

6. Features of the Estafette Round

This round aims to identify the basic qualifications of school participants in preparation for the IOI. The peculiarity of this round is that the basic qualifications of the participants are determined in the process of teamwork when solving olympiad problems that were offered from the IOI archive of previous years. The basic qualification includes the skill of technically competent and high-speed work with the specifics of IOI tasks, the speed of solving problems on the round (the target is one hour per one task), the strategy for solving the problem on the round (the ability to navigate the parameters of subtasks and skillfully regulate the time for sending solutions to simple restrictions, gaining points). Collections of IOI tasks available for constructing the Estafette round are presented on the Yandex Contest website in the IOI archive in the public domain (YandexContest, 2022).

Teams for participation in the round are formed from participants from one country. No more than 6 juniors can be on one team. For each team, one set of tasks of past IOIs, common for all teams, is randomly allocated, and the tasks included in it can be

of varying complexity. Team members, together with the coach, distribute tasks among themselves so that each team member gets one task, which he can solve in the best way within 1 hour, which corresponds to the duration of the round.

The solution to each task is evaluated similarly to the corresponding IOI task, but the results are summed up on a team-by-team basis. If a participant has completed the task for a full point in less than 1 hour, then his score is increased taking into account the time to solve (the speed coefficient is taken into account). The team score is calculated as the average score of all team members for their tasks. Team round medals are ranked by the teams' average scores at 25, 25 and 50 percent for gold, silver and bronze medals.

Experience has shown that it was the Estafette round that caused the greatest difficulties for ISIJ participants in solving tasks of all rounds of the Cup. Out of 200 participants in 2021, only 2 juniors managed 75–100 points in the relay. Thus, juniors do not have a trained sense of timing, a strategy for solving tasks, as well as high-speed work techniques. Also, the Estafette round showed that the participants are practically not focused on the IOI tasks, do not own the IOI archive, which is an important criterion for the formation of the basic olympiad qualification for participation in the IOI. All this must be taken into account in the further preparation of juniors to participate in the IOI.

7. Features of the Coder Round

The Coder round is designed to identify deficiencies in programming techniques among juniors. To participate in the IOI, it is important to motivate participants to develop their programming skills in C++, to show participants the features of the C++ language, to check their level of proficiency in C++ capabilities for implementing olympiad algorithms, to develop critical thinking for analyzing algorithms in C++, to be able to transform code taking into account the advantages of C++.

The round consists of three tasks (based on three types) for 4 hours. For group A (advanced group), two tasks of type 1 and one task of type 2 are offered. For level B (beginners level), three tasks are proposed, one of each type. The tasks are solved in the Yandex contest system. For a problem of type 1, the solution is the participant's code after correcting the jury's error in the source text (no more than three operators to correct). For a problem of type 2, the solution is the modified by the participant code, which will allow for a given incomplete jury solution to get a solution that can get a full score when tested on all jury tests for this task. As a solution to a problem of type 3, a test is provided that reveals an error in the code for solving the problem assigned by the jury. The test either catches an error or it doesn't.

A problem of type 1 is evaluated as 100 points if the participant's solution is correct and 0 points if it is incorrect. The problem of type 2 is evaluated out of 100 points on the tests of the jury to check the solution provided by the participant. In a problem of type 3, the jury code contains two algorithmic errors. If the participant's test finds one error in the jury's code, then he gets 50 points, if both errors, then 100 points. The maximum score for a Coder round is 300 points.

8. Features of the Project (Robot) Round

The developer of the Project (Robot) round sets the methodology for its implementation in agreement with the International Scientific and Technical Committee[1]. He has the right to determine the type of robot for the round, develop a set of tasks and provide robots for the round venues for the participating teams on the ISIJ Cup site. It is also possible to conduct a round in an online format, while the tasks of the round are focused on managing a virtual (on-screen) command executor. It can be a controlled device, a training robot, a software environment with robot control, a software environment with decision-making to control the device. The online round is open to all registered ISIJ participants.

Teams of 2–3 juniors participate in the round, the teams are divided into groups A (advanced) and B (basic). The round offers 2–3 tasks. Each task may contain simpler subtasks or a set of steps for executing control commands. The duration of the round is 4 hours, and it is carried out on robots that are the same for all teams. The solutions of the problems of the round are programs in the C++ programming language. During the round, each participating team gets access to the robot and computer and downloads the solutions created by the team into it, either in the presence of a coach at training rounds, or in the presence of a jury, or under video recording on a real round. The round is held in the competition hall with working points for the participating teams indicating the number, group A or B and the country.

Tasks can include valid task types with subtasks in groups A and B.

Task types can be:

- The task of simple control of the movement of robot elements on the test site, indicating all possible obstacles or conditions for performing actions by the robot, taking into account the parameters of the objects with which the robot performs an action.
- The task of selecting/search for types of movement on a given track from target 1 to target 2 with possible conditions, a set of valid commands and feedback with checking the valid actions of the robot.
- The task of controlling a robot under conditions of uncertainty, taking into account the restrictions imposed in the task.
- A task of increased complexity (for group A) to adjust the control of the robot with feedback – a response to an action in real time with a given clock delay.

The solutions of each task of the Robot round are evaluated out of 100 points, but complex tasks for additional subtasks for group A can be evaluated at 200 points. The maximum score for solving the tasks of the round is 300 points. To obtain a rating distribution, it is necessary to differentiate solutions by steps or subtasks. The awarding of teams following the results of the round fully complies with the awarding rules defined in the Regulations on Online rounds of the ISIJ Cup.

[1] www.isi-junior.com

9. Conclusion

Monitoring of the performance indicators of the ISIJ 2018–2022 participants in the Olympiads in Informatics showed that optimally two years of immersion of children in the training tracks described above is enough to create conditions for a jump to the level of high olympiad results. However, this requires strengthening in children a stable motivation for independent work in the tracks of the olympiad informatics, the olympiad culture of training. ISIJ participants from different countries become leaders in national Olympiads in Informatics, and also win medals at various international Olympiads. This is the main value of such an integrated approach in the preparation of juniors, and what is very important, it allows you to unlock the potential of the child through participation in ISI.

However, all children who have completed such training tracks, even without remaining in the Olympiad movement, demonstrate stable skills of computational thinking in the future. This helps them in their individual choice of profession to realize their potential and expands their horizons for the application of programming in different professions, which is extremely valuable.

A unique feature of the ISIJ is the participation of all coaches of the ISIJ teams along with juniors in all tracks. This allows them to pedagogically evaluate the complexity, specificity, content and methodology of each track and then apply the gained experience in their future work. Informatics teachers, coaches of teams from different schools of the world actually go through a seasonal international internship at the ISIJ, get acquainted with the specifics of International Olympiads in Informatics, exchange their work experience with each other and can bring these innovations to work with juniors methodically competently (ISIJ, 2022).

Reference

IOI (2022). *International Olympiad in Informatics*. https://ioinformatics.org/

IOI Syllabus (2019). *IOI Syllabus*. https://ioinformatics.org/files/ioi-syllabus-2019.pdf

ISIJ (2022). *International School in Informatics for juniors*. http://isi-junior.com/

Tsvetkova, M., Kiryukhin, V. (2021). Algorithmic Thinking and New Digital Literacy. *Olympiads in Informatics*, 2021, 15, 105–118. https://ioinformatics.org/journal/v15_2021_105_118.pdf

Tsvetkova, M., Kiryukhin, V. (2020). Top 10 Key Skills in Olympiad in Informatics. *Olympiads in Informatics*, 2020, 14, 151–167. https://ioinformatics.org/journal/v14_2020_151_167.pdf

Tsvetkova, M., Kiryukhin, V. (2018). International School in Informatics "Junior" for IOI Training. *Olympiads in Informatics*, 2018, 12, 187–193. https://ioinformatics.org/journal/v12_2018_187_193.pdf

Kiryukhin, V. (2007). The Modern Contents of the Russian National Olympiads in Informatics. *Olympiads in Informatics*, 2007. 1, 90–104. https://ioinformatics.org/journal/INFOL017.pdf

YandexContest (2022). *Yandex Contest website, the IOI archive*. https://contest.yandex.ru/ioi/

M.S. Tsvetkova, professor of the Russian Academy of Natural Sciences, PhD in pedagogic science, prize-winner of competition "The Teacher of Year of Moscow" (1998). From 2002 to 2018 she is a member of the Central methodical commission of the Russian Olympiad in informatics and the pedagogic coach of the Russian team on the IOI. She is the author of many papers and books in Russia on the informatization of education and methods of development of talented students. She is the author of official textbooks and copybooks in Russia for primary school in Informatics. She is author and director of the International school in Informatic ISIJ (since 2017). She is the Russian team leader (2013–2017). She was awarded the President of Russia Gratitude for the success organizing the training of IOI medalists (2016). She is now the Expert of Committee on Education and Science State Duma of the Russian Federation (since 2017), and she has the Committee on Education and Science State Duma Gratitude (2021).

V.M. Kiryukhin is professor of the Russian Academy of Natural Sciences, PhD. He is the author of many papers and books in Russia on development of Olympiad movements in informatics and preparations for the Olympiads in informatics. He is the exclusive representative who took part at all IOI from 1989 to 2017 as a member of the IOI International Committee (1989–1992, 1999–2002, 2013–2017) and as the Russian team leader (1989, 1993–1998, 2003–2012). He received the IOI Distinguished Service Award at IOI 2003, the IOI Distinguished Service Award at IOI 2008 as one of the founders of the IOI making his long term distinguished service to the IOI from 1989 to 2008 and the medal "20 Years since the First International Olympiad in Informatics" at the IOI 2009. He was the chairman of the IOI 2016 in Russia and has the award medal of the President of Russia (2016) for organizing the Olympiad in Informatics in Russia and training IOI medalists since 1989. He is now the President of the International Organizing Committee of the ISIJ.

N.A. Borisov is associate professor at the Nizhny Novgorod State University (Lobachevsky University), PhD. He is now the Chairman of the Scientific-Technical Committee of ISIJ / member of ISIJ-Cup Jury. He was the leader of Russian Team in EJOI-2017 in Sofia. He is also an active participant of ICPC movement, and the leader of Nizhny Novgorod University student team that won the last ICPC World Championship in Moscow in October 2021.

M.I. Kinder is associate professor of the Institute of Mathematics and Mechanics (Lobachevsky Institute) of Kazan Federal State University, Ph.D. in physics and mathematics. More than 30 years of experience in Olympiad mathematics and computer science, member of the jury of the International ICL-Tournament (Kazan) in programming among students and schoolchildren. Among his students are winners and prize-winners of the All-Russian Olympiads in mathematics and informatics. He is the author of many articles and books in Russia on Olympiad mathematics and computer science. He is also an active member of the ICPC movement. Deputy Chairman of the ISIJ Scientific and Technical Committee / member ISIJ-Cup Jury.