

# Short overview of the All - Russian Internet Olympiad on nanotechnology "Breakthrough to the future" (RION)



НАНОТЕХНОЛОГИИ - ПРОРЫВ В БУДУЩЕЕ!

The permanent link to the Rules is given in the page <https://enanos.nanometer.ru/about.html>

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**Moscow  
2020**

## Introduction

The main ideological goal of the International Olympiad “**Nanotechnology – Breakthrough to the Future!**” is providing a free educational interdisciplinary competition organized for pupils at secondary and higher school levels with the aim of attracting of interest of community to R&D in nanotechnologies and new materials. It is intended also to stimulate the activities of students interested in chemistry, physics, biology and mathematics by a way of the independent and creative solution of complicated problems originated from on-going research in modern materials science. The competition helps to facilitate cordial relations between young adults of different nationalities and encourage cooperation and international understanding of different generations of students, tutors and mentors.

The National All – Russian Olympiad “**Nanotechnology – Breakthrough to the Future!**” is a unique tool for selection of **young talents** and their **career promotion**. Nowadays, this official top level multidisciplinary Olympiad represents **joint educational, scientific and PR activity** of two co-organizers, **Moscow University and Fund for Infrastructural and Educational Program**, involving a wide range of participants – from young **schoolchildren to young PhD scientists and teachers**. The basic idea of the Olympiad has successfully transformed through the years into sharing and social implementation of achievements of advanced chemical, physical, mathematical, biological sciences related to nanotechnology innovations. At the moment, about 28 000 participants are involved as participants of the Olympiad of 2017-2020 years. Such a combination attracts people since they learn new verified facts, present and discuss their ideas, earn new career pathways and contacts.



Выступление декана химического факультета МГУ, члена-корреспондента РАН С.Н.Калмыкова



Награждение победителей Олимпиады и.о.декана ФНМ академиком К.А.Солнцевым



Награждение участников Олимпиады директором ИОНХ РАН членом-корреспондентом РАН В.К.Ивановым



Награждение победителей конкурса «Гениальные мысли» Почетным Президентом НМ–МДТ СИ В.А.Быковым



Награждение победителей конкурса тьюторов АСИ



Награждение победителей конкурса «Просто о сложном» Генеральным директором АНО «еНано» И.А.Вальдманом

*The variety of RION contests*



A quite unique feature of the Olympiad is related to a **large number of social groups** involved into the network of the Olympiad project lasting for years including schoolchildren, students, PhD students, young scientists, teachers; many former schoolchildren participants take part in the Olympiad each year and thus grow up to the student and PhD status still participating in the Olympiad competitions of their level and even generating new authors of the Olympiad problems and increasing the population of its volunteers in different regions of Russia.



*Организаторы и партнеры XIV Олимпиады*



*Общая фотография студентов - гидов Олимпиады*

*Общая фотография участников XIII Олимпиады в Шуваловском корпусе*



*Встреча призеров Олимпиады  
из национальной команды  
Таджикистана в аэропорту  
Душанбе*



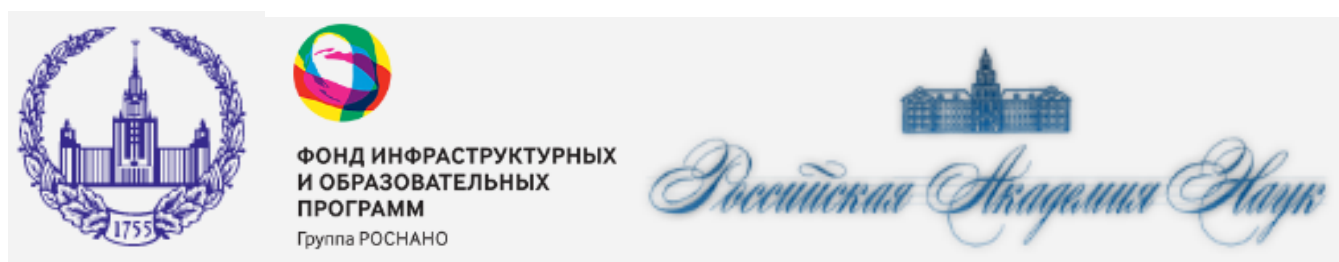
*A large variety of groups of participants of RION*

A **key idea** of the Olympic events of recent years falls into a sequence of **three main stages** of getting new knowledge and achievements. The first stage starts from publication of new complex tasks specific for each of the group of participants. This stage lasts intentionally for a month or even longer to allow the participants searching and composing their original answers. The second stage of evaluation includes publication of official solutions and a distant discussion of participants' solutions. The meaning of this stage is not only a formal appeal but also a first contact of participants and the jury. The third stage is also important and it gives a chance of top level ranked participants to take part in the in – person stage of the Olympiad in Lomonosov Moscow State University. Finally, the Olympiad develops itself further and is ready to be implemented into international events and mutual collaboration between the countries provoking a **beneficial exchange of ideas** and students.

## Organizational Structure

The chair of the Organizing Committee of the Olympiad is Rector of Moscow State University academician Victor. A. Sadovnichy, three vice-chairs are represented by the academician Alexey R. Khokhlov, the dean of the Faculty of Materials Science of MSU academician Konstantin A. Solntsev and the Dean of Chemistry Department of MSU, corresponding member of the Russian Academy of Science Stepan N. Kalmykov.

The Olympiad is organized in bilateral cooperation of Lomonosov Moscow State University and Fund for Infrastructural and Educational Programs. The Organizers decide on nominations and prizes for the competitors. The Organizers provide the Basic rules, the schedule of the Olympiad; that the organization of the competition will adhere to the regulations; the certificates and prizes presented at the official closing ceremony; all necessary arrangements for the observance of safety regulations.



All the educational features of the Olympiad are provided by Department of Materials Science, Department of Chemistry, Department of Physics, Department of Biology, as well as by representatives from a number of leading Russian universities and institutes of the Russian Academy of Sciences invited to join the Methodology Committee and the Jury council of the Olympiad. The Supervisory Board of the Olympiad includes representatives of Russian research and business organizations playing the leading role in nanotechnology. The Olympiad team works closely with the School League of RUSNANO.

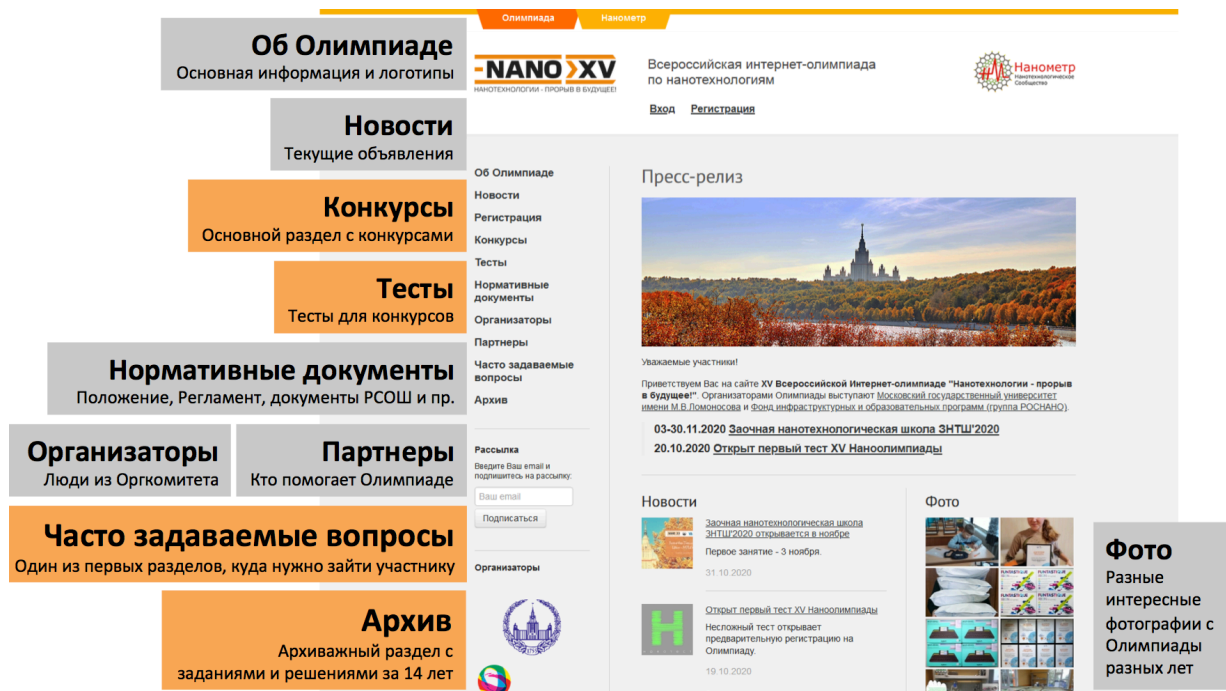
## Participants

The Olympiad allows the participation of **primary, secondary and high school students, BSc, MSc, PhD students, young scientists, teachers and tutors, or enthusiasts of materials sciences and nanotechnologies**. To receive a participant status on line, a minimum of personal information is required. All the stages of the Olympiad require no payment. Competitors must be Russian or English speaking persons.

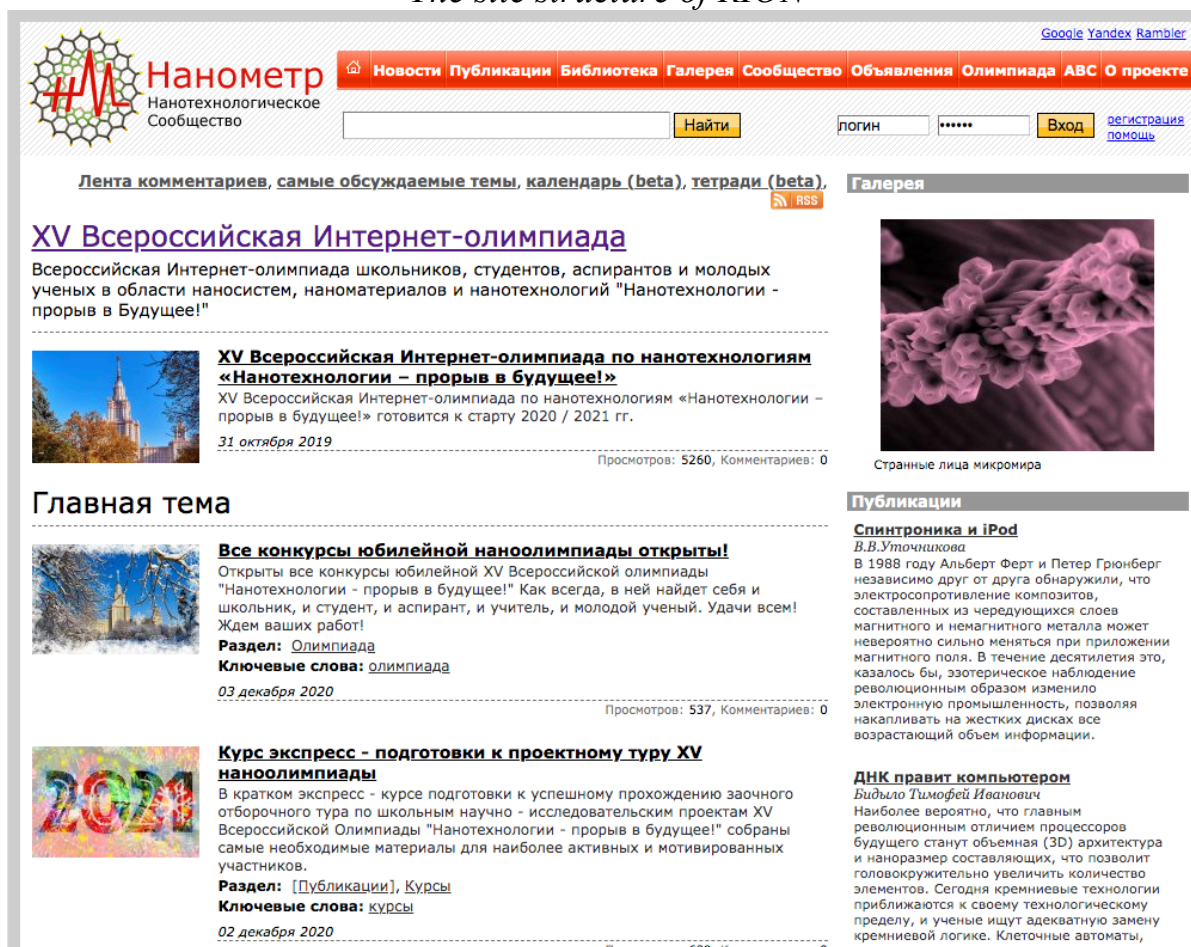
Competitors should get an access to the Internet network to download texts of the problems and submit their solutions individually using their personal login and password. To become a participant of the Olympiad applicant should **register** at the official web-side of the Olympiad, **confirm** his/her agreement for participation and his/her permission for publication of the minimum of his/her personal information, including full name and family name, date of birth, sex, country and city in open statistics of the Olympiad.

## Site structure

The main page of the Olympiad official site is located at <https://enanos.nanometer.ru/>



The site structure of RION




The informational portal [www.nanometer.ru](http://www.nanometer.ru)



Basic introductory information is located here <https://enanos.nanometer.ru/about.html>

Олимпиада

Нанометр




НАНОТЕХНОЛОГИИ - ПРОРЫВ В БУДУЩЕЕ!

Загрузить логотип

Всероссийская интернет-олимпиада по нанотехнологиям

Гудилин Евгений Алексеевич    Администратор

[МОИ ОТВЕТЫ](#)    [ПРОФИЛЬ](#)



Нанометр  
Нанотехнологическое Сообщество

[Выход](#)

Администратор

Об Олимпиаде

Новости

Конкурсы

Тесты

Ответы    Тесты    Пользователи    Статистика    Результаты    Контент

Рассылка

## Об Олимпиаде

Edit

Юбилейная XV Всероссийская Интернет-олимпиада по нанотехнологиям «Нанотехнологии – прорыв в будущее!» продолжает традиции олимпиады, проводимой с 2007 года. Ежегодно в олимпиаде принимают участие около 10 000 школьников, студентов, аспирантов, молодых ученых, учителей. Организаторами Олимпиады выступают [Московский государственный университет имени М.В.Ломоносова](#) и [Фонд инфраструктурных и образовательных программ \(группа РОСНАНО\)](#).

This introductory part includes a brief text and links for foreign participants.

**Information for foreign participants:** The National All – Russian Olympiad "Nanotechnology – Breakthrough to the Future!" is a unique tool for selection of young talents and their career promotion. Nowadays, this official top level multidisciplinary Olympiad represents joint educational, scientific and PR activity of two co-organizers, Moscow University and the Fund for Infrastructural and Educational Program, involving a wide range of participants – from young schoolchildren to young PhD scientists and teachers. The basic idea of the Olympiad has successfully transformed through the years into sharing and social implementation of achievements of advanced chemical, physical, mathematical, biological sciences related to nanotechnology innovations. See more in details [here](#). The National Student Team Contest is described [here](#).

Registration page <https://enanos.nanometer.ru/register/>

Регистрация

После регистрации у вас появится возможность отправлять ответы на конкурсы.

Фамилия \*

Имя \*


Отчество \*

Email \*

Пароль \*

Подтвердите пароль \*

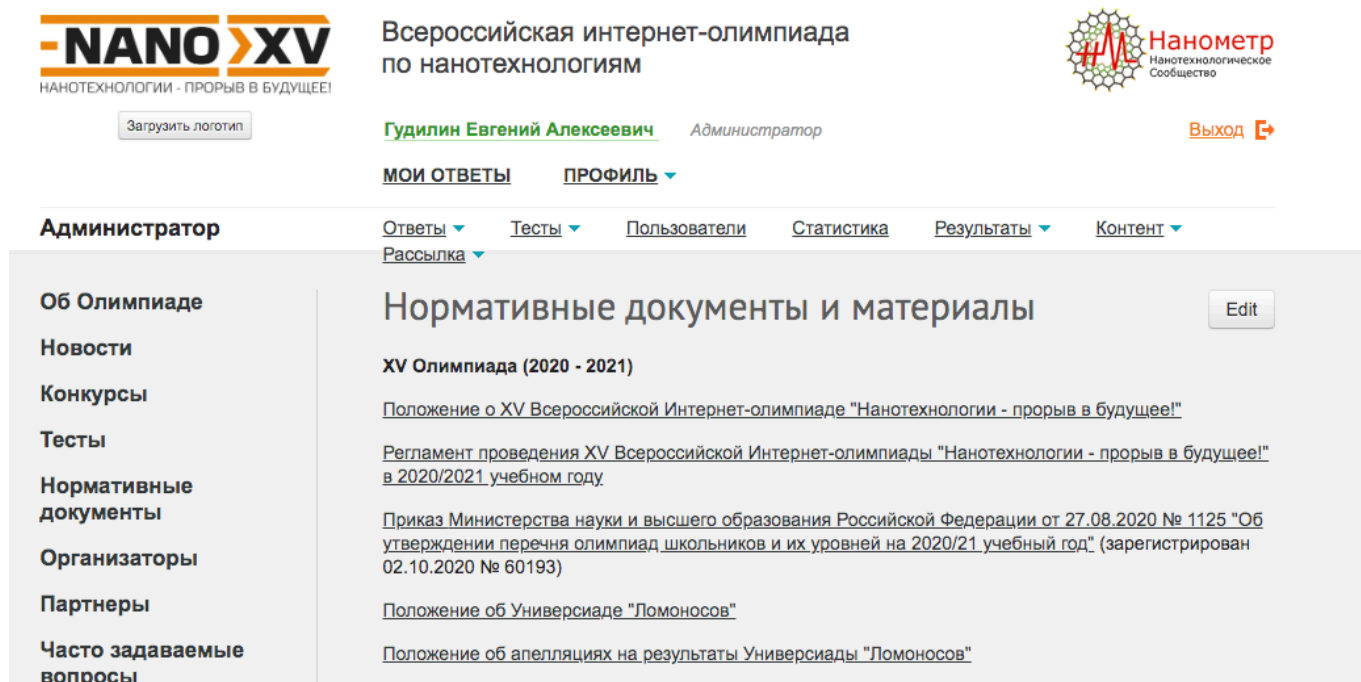
Введите код с изображения



☒ Получать письма новостной рассылки

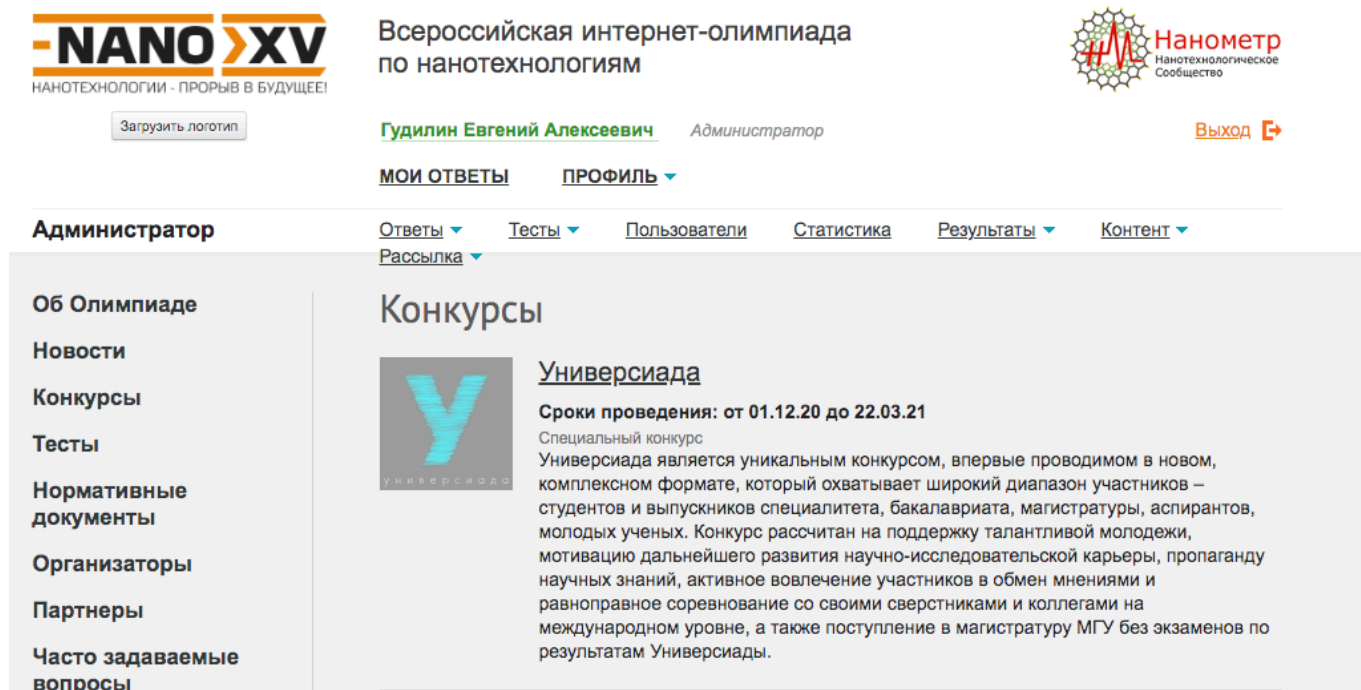
☐ Даю согласие на обработку моих персональных данных, в соответствии с требованиями Федерального закона № 152-ФЗ «О персональных данных» от

Regulations including documents for foreign participants are given in this part of the Olympiad site <https://enanos.nanometer.ru/regulations.html>



The screenshot shows the website interface for the All-Russian Internet Olympiad in Nanotechnology. The header includes the logo 'NANO XV' with the tagline 'НАНОТЕХНОЛОГИИ - ПРОРЫВ В БУДУЩЕЕ!', the site title 'Всероссийская интернет-олимпиада по нанотехнологиям', and the Nanometer logo. A user profile for 'Гудилин Евгений Алексеевич' is shown as the administrator, with a 'Выход' (Exit) button. The main navigation bar includes 'МОИ ОТВЕТЫ' and 'ПРОФИЛЬ'. The left sidebar lists menu items: 'Об Олимпиаде', 'Новости', 'Конкурсы', 'Тесты', 'Нормативные документы', 'Организаторы', 'Партнеры', and 'Часто задаваемые вопросы'. The main content area is titled 'Нормативные документы и материалы' and contains a list of documents for the 'XV Олимпиада (2020 - 2021)', including the competition rules, regulations, and orders from the Ministry of Science and Higher Education.

The interactive page of all the current and archival competitions and contests is collected here <https://enanos.nanometer.ru/contests>



This screenshot displays the 'Конкурсы' (Contests) section of the website. The layout is consistent with the previous page, showing the same header and navigation elements. The main content area is titled 'Конкурсы' and features a large blue 'У' logo for the 'Универсиада' (Universityiad) competition. The text describes it as a special competition with a unique format, held for the first time, involving a wide range of participants from students to postgraduates. It aims to support talented youth, motivate further development of scientific careers, and promote scientific knowledge through active participation and exchange of ideas.

The interactive page of tests is given here <https://enanos.nanometer.ru/tests>



## Тесты



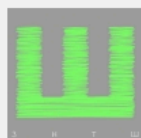
### Нанотест - приглашение на Олимпиаду

Сроки проведения: от 19.10.20 до 25.01.21

Комплекс предметов

Тренировочный краткий тест, позволяющий получить дополнительные баллы к основному конкурсу по комплексу предметов "химия, физика, математика, биология". Тест включает 5 вопросов, правильный ответ на каждый из которых оценивается в 1 балл. Набранные баллы будут добавлены к сумме баллов по комплексу предметов «химия, физика, математика, биология».

Тест открыт. Вопросы: 5



### Тест ЗНТШ

Сроки проведения: от 23.11.20 до 25.01.21

Комплекс предметов

В тесте собраны **очень простые** (для 5-7 класса), **простые** (8-9 класс) и **обычные** (10-11 класс) вопросы в области нанотехнологий и наноматериалов, в том числе основанные на материалах занятий в **Заочной Нанотехнологической Школе (ЗНТШ)**. Некоторые из вопросов требуют простых рассуждений и несложных расчетов.

В каждом вопросе только **один ответ** правильный, он оценивается **1 баллом** для **простых и очень простых** вопросов и **2 баллами** для «**обычных** вопросов».

Половина балла(ов) дается за **правильный номер** ответа в каждом вопросе, а половина – за правильные краткие **обоснования** выбранного ответа, которые будет оценивать жюри во время ручной проверки.

Тест ЗНТШ могут пройти все участники Олимпиады и получить **дополнительные баллы** (25% от набранных, максимум 10 баллов) за отборочный тур вплоть до окончания сроков приема работ на конкурс по комплексу предметов «химия, физика, математика, биология» (до 25 января 2021 г.). Даже те участники, которые не занимались в ЗНТШ в дистанционном режиме или не смотрели записи занятий, могут пройти тест для получения дополнительных баллов и повышения шансов попасть на заключительный тур Олимпиады, но без получения сертификатов ЗНТШ. В то же время, **сертификаты слушателей (выпускников) ЗНТШ** будут выданы только тем участникам, кто успешно прослушает лекции ЗНТШ, а также до 30 ноября 2020 г. пройдет данный контрольный тест, по итогам которого наберет не менее 60% баллов.

Материалы (видеозаписи) ЗНТШ собраны [в этой новости](#).

Тест открыт. Вопросы: 30

[Архив тестов](#)

The FAQ section is present on this page <https://enanos.nanometer.ru/faq.html>, it contains a brief text and links for foreign participants. Previous materials of **preceding years** are accumulated here <https://enanos.nanometer.ru/archive.html>.



## Competitions and Time Schedule

Registration of participants is available from **December 1 2020 till 25 of January 2021**. Uploading solutions for contests is also available until that dates:



<https://enanos.nanometer.ru/contest/61>

***Universiade*** – complex contest for students, BS, MS, PhD fellows, young scientists.

<https://enanos.nanometer.ru/contest/54>

***Physics*** for secondary school.

<https://enanos.nanometer.ru/contest/55>

***Math*** for secondary school.

<https://enanos.nanometer.ru/contest/56>

***Biology*** for secondary school.

<https://enanos.nanometer.ru/contest/57>

***Chemistry*** for secondary school.

<https://enanos.nanometer.ru/contest/58>

***“Young Erudite”*** contest for younger schoolchildren.

<https://enanos.nanometer.ru/contest/59>

***“Genious Thoughts”*** contest for research works in school.

<https://enanos.nanometer.ru/contest/60>

***“Tutor’s”*** contest for yutors and teachers.

A basic theoretical stage is demanded for schoolchildren in the form of on - line (distant) competition using the **set of four school disciplines**: “chemistry”, “physics”, “mathematics”, and “biology”. The Olympiad is assigned officially the highest 1<sup>st</sup> level Olympiad of the [Russian Council for School Olympiads](#).

Various satellite conquests of the Olympiad make it possible for the participants to demonstrate their skills, experience and creativity:

- The **“Genius Thoughts”** is the competition of school projects in materials sciences and advanced technologies. Schoolchildren of 12+ age should submit a short description of their projects to win a chance to present it during the final stage of the Olympiad in Moscow.
- The **“Tutor’s”** is a competition for tutors of school research projects.
- The **“Simple about complexity”** is the competition for BSc, MSc and PhD students, young scientists who have already published their research results in high -

rank scientific journals and can also explain their results for publics as a popular illustrated paper. This is a part of the Universiade.

- The **National Student Team Contest** is a competition among bachelor and master students of higher school in Russia considering creative research tasks in English based on nanotechnology and nanomaterials subjects. The tasks are design to select the best **national team members** for participation in the [International Nano Olympiad \(INO\) contest on nanotechnology](#) as determined by annual regulations of INO. This is a part of the Universiade.

All the problems proposed for competitors deal with nanotechnology, materials science and engineering. Most of the tasks are focused on the problems of nanomaterials, optics and photonics, medicine and biotechnology, energy efficiency, formation of coatings and modifying of surfaces. The problems are assembled in four blocks – Biology, Chemistry, Mathematics, and Physics according to four corresponding school subjects – each block of 10 problems. All problems should be proposed in either Russian or English languages to maximize the number of countries involved. All problems of the on - line stage of the Olympiad are published at the official web-site of the Olympiad <http://enanos.nanometer.ru>.

*The dates of final contests: before 01 of April 2021.*

*Closing ceremony: 07 of April 2021 (preliminary).*

*"Nanograd" activity: July - August 2021.*

## **Benefits and restrictions**

The members of the Methodology Committee of the Olympiad are authorized by the Organizers. The committee consists of the chair, vice-chairs and members including specialists in interdisciplinary materials science, biochemistry, biophysics, physical chemistry, simulations, and engineering. The Methodology Committee is responsible for overall educational and examination program of the Olympiad, appeal procedure and final scores discussion, choice of winners according to final individual scores of the competitors. The members and the chair are obliged to maintain a professional discretion about any relevant information they receive during the Olympiad and must not assist any participants; they should keep the results secret until announced.

The Olympiad Jury consists of its Chair and Members. The chair and the members of the Jury are nominated by the Organizer. The Jury includes specialists in biology, chemistry, mathematics, physics in relation to nanomaterials and nanoengineering. The Jury is in charge of the actual competition and its supervision according to the regulations. The chair of the Jury calls and chairs the meetings of the Jury concerning the current competition, correcting and marking. The Obligations of the Jury are to discuss in advance the competition tasks, their solutions and the marking guidelines, give comments on problems and solutions; monitor the examination and its adequacy to the regulations, make a decision on the exclusion of a participant from the competition; correcting and marking of the examination papers and guarantee that all participants are judged by equal criteria;

participate in the appeal procedure. The Jury must not assist any participants and should keep the marking and the final scores secret until announced.

The Supervisory Board of the Olympiad includes representatives of Russian research and business organizations playing the leading role in nanotechnology R&D and commercialization. The Supervisory Board provides organizational oversight for the Olympiad. It is not empowered to make any decisions affecting the Olympiad results that would interfere with the duties of the Jury.

All applicants must register themselves for participation using the official site of the Olympiad as noted in official press releases. No other web-sites should be used for the registration of participants. Each competition has two stages: first one is on - line or distant, and the second (final) stage is traditionally organized at Lomonosov Moscow State University. Both the stages include registration of participants, fixed time to solve problems with fixed deadline for all, appeal procedure, and publication of official stage results. The number of the first stage participants invited as competitors for the second (final) stage are decided by the Organizers. Organizers assist participants with registration and uploading processes if any technical problems take place.

Participants invited for the final stage should carefully verify the accuracy of their personal information submitted including full names, date of birth, living country and city. After the registration for the final stage of the competition, all changes of submitted personal information are excluded. The registration of competitors performs by representative of the Organizers only. The registration is required for all participants independently on their age and home country. The examination consists of four independent sessions which correspond to four blocks of the problems. The examination sessions are organized in two or three days consequentially. Each schoolchildren competitor is expected as a participant of four examination sessions of the Olympiad. If the participant does not intend to come for the session, he/she should inform the Organizers before the beginning of the exam. The safety regulations announced by the Organizers are obligatory for all the participants. The Olympiad is a personal competition. No cell phones or other electronic devices are authorized. A pocket calculator is allowed only for biology, chemistry and physics sessions, but not for mathematics. The competitor is allowed to take a bottle of non-carbonated water to the examination room. The number of points for each subparagraph of the task is given in a package with exam tasks. Examination packages must not be signed anywhere by the competitor. After the session, all solutions must be impersonalized and personalized back only after the evaluation procedure. The personalization / impersonalization procedures have to be provided by the Organizers. Solutions of the competitors must be corrected and marked if they are impersonalized only. Organizers provide personalization of the results as soon as the Jury finished their evaluation. Each participant has a right to appeal to raise his/her points. The appeal is possible in one day, next one after the publication of the preliminary marking results, according to the Olympiad program. After the appeal procedure, any discussion about the final score is not allowed for the participants. Official results of the competition and the number of honor nominations and certificates are decided by the Organizers.



No participation fee is collected. Organizers may decide by themselves to cover travel costs of the participants to the designated airport / station or to the location where the competition is held while the accompanying persons are not normally included in the list of support. All costs incurred in the connection with the organized program, including the costs of accommodation in the nearest hostels of Lomonosov Moscow State University and participant package, are covered by Organizers. Standard participant package comprises a guide with the competition program, plan with marked key buildings of the Olympiad, a pen and a writing pad, participant badge as a pass to the key buildings during the competition.

According to decisions of the Jury, the best competitors of the Olympiad could be suggested as winners in various nominations and being awarded by certificates and prizes by the Organization Committee. Official results of the individual competition and a photo report from the Closing ceremony are to be published on the official web-site of the Olympiad. All awardees of the Olympiad receive official diplomas, gifts and prizes. The benefit of winners among the last – year schoolchildren consists in easy acceptance of their applications for leading Universities.

It is strongly prohibited to hide and use fake names for all the participants. All the participants must be polite and obey all the regulations of the Olympiad otherwise their participation will be officially canceled at any stage if violation of the rules happens.

## Useful Links and Contacts

Contact address – [enanos@nanometer.ru](mailto:enanos@nanometer.ru).

Official sites:

- Olympiad official site <https://enanos.nanometer.ru/>
- Nanotechnology society scientific popular site <http://www.nanometer.ru/>
- Moscow University <https://www.msu.ru/>
- Fund for Infrastructural and Educational Program <https://fiop.site/>,  
<https://www.rusnano.com/infrastructure>

Social media links:

- Facebook <https://www.facebook.com/enanos.nanometer.ru>
- VKontakte <https://vk.com/enanos>
- Instagram <https://www.instagram.com/enanos.nanometer.ru/>
- YouTube  
<https://www.youtube.com/channel/UCTFhQviwmOiCasYN26tTh7Q/videos>

Organizers are listed here <https://enanos.nanometer.ru/organizers.html>

The Olympiad Partners are given here <https://enanos.nanometer.ru/partners.html>



ФОНД ИНФРАСТРУКТУРНЫХ  
И ОБРАЗОВАТЕЛЬНЫХ  
ПРОГРАММ  
Группа РОСНАНО