All-Russia Olympiads for Schoolchildren on Technology

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Abstract: Stages and content of annual All-Russia Olympiad for schoolchildren on Technology have been described. Olimpiad consists of four stages: school, municipal, regional and final. Each stage includes testing of schoolchildren, creative tasks and practical work and, finally, presentation of a creative project.

Key words: technological education, All-Russia Olimpiad for schoolchildren, tests, creative task, practical work, presentation of a creative project

To identify and encourage talented pupils in Russian Federation 24 All-Russia Olympiads for schoolchildren are annually carried out in the following school subjects: Russian, English, German, French, Spanish, Chinese, Japanese, Astronomy, Geography, Physics, Chemistry, Biology, Art (World Fine Art), Computer Science and Information and Communication Technologies, Mathematics, Literature, History, Social Science, Economy, Ecology, Law, Physical culture, Health and Safety, Technology.

Each Olympiad has 4 stages: school (it is carried out no later than October 15 every academic year), municipal (carried out before December 25), regional (carried out before February 25) and final (carried out before April 30). The regional stage of every Olympiad is carried out in 2 days. The final stage of the Olympiad takes 6 days.

All-Russia Olympiads for schoolchildren on Technology have been carried out since 2000. While tens of thousands of schoolchildren participate in the school stage of the Olympiad, only about 200 schoolchildren of 9-11 grades participate in the final stage (in Russia school education lasts 11 years).

- The main aims of the All-Russia Olympiad for schoolchildren on Technology are:
- identification and development of creative abilities and interest in scientific (research) activity;
- promotion of scientific knowledge;
- promotion of school technological education and growth of its level;
- bringing closer contents and methods of material and information technologies in education;
- promotion of method of projects as the main means to disclose creative potential in children;
- identification and encouragement of the most talented schoolchildren;
- identification and encouragement of the most creative teachers of Technology;
- involvement of schoolchildren in creating concrete and practically important, socially significant projects aimed at development of technical and art creativity.

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The task of the All-Russia Olympiad on Technology is to identify and assess theoretical knowledge of talented schoolchildren in various sections of the subject "Technology", their abilities to use this knowledge, assessment of practical abilities of schoolchildren and their creative projects.

The All-Russia Olympiad for schoolchildren on Technology has two nominations: "Technics and Technical Creativity" and "Culture of Home and Decorative and Applied Arts". This Olympiad includes three rounds at each stage: the 1st round is testing schoolchildren in order to assess their knowledge and their abilities to apply this knowledge practically. About half of the tests are given in an open form (without offered answers) to check not only knowledge, but also ability of schoolchildren to formulate their thoughts.

At the school stage pupils of the 5th grade are given 10 tests, of the 6th grade, 15 tests, of the 7th grade, 20 tests, of the 9th, 10th and 11th grades, 30 tests.

At the municipal stage 25 tests are given to the 7th and 8th-grade pupils, 35 tests, for the 9th, 10th and 11th-grade pupils.

Taking into account development of technologies (laser technologies, nanotechnology, robotics, 3D-printers, CNC machines, "smart" houses, alternative energy, etc.) relevant questions should be included in the tests. Given this, the tests should include material from the following sections of the curriculum in "Technology" in the category "Technologies and Technical Creativity".

(1) Definition (content) of Technology.

The role of Engineering and Technology in the development of society.

Technosphere.

Production structure: requirements, resources, technological systems, processes, control, sale.

(2) History of Engineering and Technology

(3) Machine Studies.

(4) Material Studies: wood, metals, plastic

(5) Technology of wood processing

(6) Technologies of processing of metals

(7) Laser technologies

(8) Nanotechnologies

(9) Repair and construction works (technology of maintaining house)

(10) Art processing of materials

(11) Design

(12) Technical creativity

(13) Electrical equipment and electronics. Ways of generating, transmitting and applying electric power

(14) Alternative Energetics

(15) Information and communication technologies, CNC machines, 3D-printers, "smart" houses, automatic equipment, robotics.

(16) Drafting

(17) Family Economy

(18) Business basics

(19) Vocational guidance

(20) Production and environment

(21) Projects

Each correct answer to the test question is given 1 point, wrong or incomplete answer receives zero points. For 35 tests, the total number of points for the theoretical performance of tasks must not exceed 35.

In future, starting with the final stage of the All-Russia Olympiad on Technology in 2015, it is better to offer not 35 but 25 tests, with 10 tests to be replaced with the following creative task: to design in general the process of manufacturing products specified in verbal form. Dimensions either can be specified beforehand, or should be chosen. Schoolchildren should justify the order of stages, choice of material, shape and dimensions of the workpiece, the manufacturing process, the necessary equipment, the possibility of decorating products, if it's needed to perform a sketch by hand with dimensioning.

Assessment of implementation of creative tasks:

(1) Proposed manufacturing - 2 points;

(2) Sketch by hand with dimensions - 2 points;

(3) Justification of the choice of material, shape and dimensions of the workpiece – 1 point;

(4). Justification of the choice of manufacturing techniques – 2 points;

(5). Justification of the choice of equipment and tools needed – 2 points;

(6). Possible decoration products (carving, painting, etc.) – 1 point

Possible one-detailed products for nomination "Equipment and technical creativity": chopping board, chess pawn or castle; pointer, tolkushka.

Schoolchildren are given 1 hour to complete the task.

For a creative task a pupil can get 10 points, all in all for tests and creative task: 35 points.

This task, being rather challenging, can reveal technological development of schoolchildren.

Next, in the second round, schoolchildren are required to complete a practical task with construction of a certain selected product in the category "Technics and Technical Creativity" by choice: hand or machine woodworking, hand or machine metalworking, electrical engineering, perhaps introduction of practical work on robotics. The assessment of practical work does not exceed 40 points.

The third round of each stage of the All-Russia Olympiad for schoolchildren on Technology is connected with presentation of a creative project made by schoolchildren.

The following assessment criteria of creative projects were used in the nomination "Technics and Technical Creativity",

Assessment of the explanatory note of the project (to 10 points):

(1) General design

(2) Relevance. Formulating the problem and the project theme

(3) Collecting information on the project

(4) Analysis of prototypes

(5) Analysis of possible ideas. Selection of the optimal idea. Selection of manufacturing technology products

(7) Interdisciplinary communication. Information from other subject areas for the project

(8) Economic and environmental assessment of future product and technology of its manufacturing

(9) Development of design documentation, the quality of graphics

(10) Description of manufacturing

(11) Description the final version of the product

(12) Aesthetic assessment of the selected variant

(13) Economic and environmental assessment of the finished product

(14) Advertisement of the product

Product assessment (up to 25 points):

(1) The originality of design

(2) The quality of product

(3) Compliance of the product's design with the theme

(4) Practical significance

Assessment of presentation of the project (to 15 points):

(1) Formulating the problem and theme of the project

(2) Analysis of prototypes and studies of the selected ideas

(3) Description of technology of product's manufacturing

(4) Interdisciplinary communication

(5) Clarity

(6) The depth of knowledge and erudition

(7) Time of presentation

(8) Self-Assessment

(9) Answers to the questions

Total (up to 50 points)

All in all, participants can get up to 125 points. Duration of the first round (taking into account the description of process of preparation of the set product) is 1,5-2 astronomical hours, the second round — practical work, that is construction of a product — 3 astronomical hours with two 10-minute breaks. In the third round each pupil is given 10 minutes for presentation of his project.

Here are some examples, representing themes of the projects (nomination "Technics and technical creativity"), which got the best marks at the final stage of the Olympiad of 2014: projects of the 9th-grade pupils "A Universal Rack", "A Bus-Stop of Near Future", "Tricycle", "A Casket to Enjoy", "Panel-Triptych 'Bashkir Motifs'", projects of the 10-11th-grade pupils "An Electronic Microscope for Education and Research", "Machine for Utilizing Plastic Waste", "Thunderstorm Detector with Function of Disconnecting Household Appliances from the Power Supply Network".