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CONTENT AND ANALYSIS OF THE ORGANIZATION OF THE OLYMPIAD IN BIOLOGICAL SCIENCES IN THE 2023-2024 ACADEMIC YEAR (III stage)

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Annotation
This article covers information about the state and analysis of the organization of the Biology Olympiad. The purpose and objectives of the Olympiad and the methodology for solving some written work questions at stage III were also shown.

Keywords: continuous education system, Olympiad, Pearson, Fisher, x2 method, null hypothesis, chemistry, biology, physics, microsporatite, megasporatite, microspore, megaspore.

Introduction

The main goal of the Olympics is to identify talented, talented and talented young people in the fields of biology, chemistry, physics and computer science and Information Technology, increase interest in research activities in students, form skills for applying science and basic competencies, as well as acquired knowledge in practice, achieve the prevalence and popularity of scientific knowledge among young people, it consists in supporting talented young people and expanding the conditions for their intellectual development.

Main Part

Order of the president of the Republic of Uzbekistan "on measures to establish a continuous system of identification of talented youth and training of highly qualified personnel" dated May 3, 2019 PQ-4306, in order to ensure the implementation of tasks set out in presidential decisions on the development of Science in the fields of Mathematics, Physics, Chemistry and biology, the tasks of - On November 9, on the scale of the Republic of Karakalpakstan, regions and the city of Tashkent, the III (regional) stage of the Olympiad was held [1].

The main tasks of the Olympics are to create a system of sorting and supporting talented and talented students in the fields of Chemistry, Biology, Physics and informatics and information technology, to expand the opportunities and strengthen knowledge of talented young people to participate in the Olympics, and to further promote interest in science among peers on a Republican scale, to [2].

About 16,000 by Republic at this stage 9 - 10 - 11 graders participated. Under the current procedure, students who won the 3rd stage of the main Olympics were awarded a cash prize of 1980,000 for 1st place; 1320,000 for 2nd place; 990,000 for 3rd place.

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To encourage the winners of the III (regional) stage of the main Olympiad in this year, about 5.12 billion dollars were received from the Republican budget. Rs. This procedure was introduced from the 2021-2022 academic year by Resolution No. 562 of the Cabinet of Ministers, with 2.7 bn in the 2021-2022 academic year and 3.2 bn in the previous academic year. the sum was directed.

Students from all schools, academic lyceums and vocational schools in Tashkent participated in the Olympics. In Tashkent, the III stage of the Olympics was held at the secondary school No. 273 of Yunusabad district.

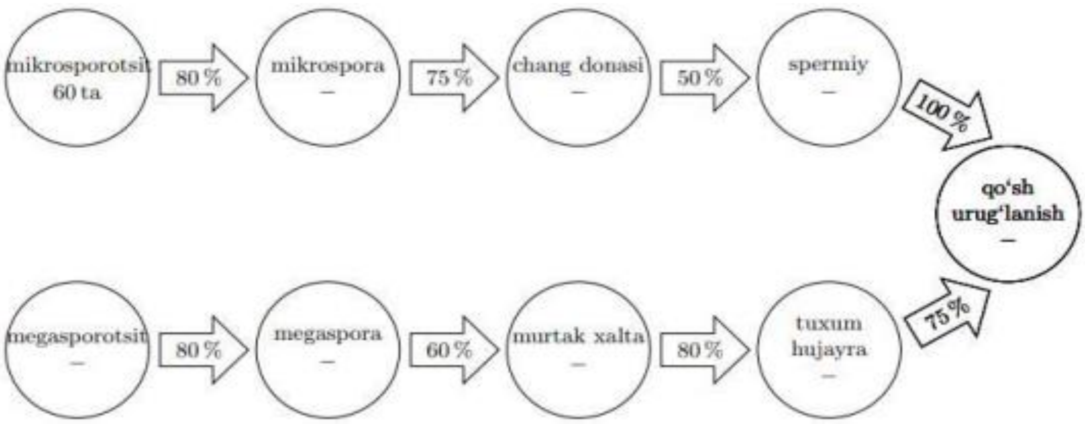
On November 4-5, 9th grade, on November 6-7, 10th grade (stage I of academic lyceums and vocational schools), on November 8-9, 11th grade (Stage II of academic lyceums and vocational schools), and on November 10, 9-10-11th grade (stage I and II of lyceums and vocational schools), the first stage of qualifying candidates for the national team participating in the prestigious international Olympiads took place [3].

The Olympics consisted of written work and test assignments. The written work consisted of 5 assignments, each assignment with different scores depending on the degree of difficulty, i.e. 1-2 assignments were awarded 7 points, 3-4 assignments were awarded 10 points, and 5 assignments were awarded 16 points, for a total of 50 points.

The Test assignments were 30 of which 20 were closed, 10 were open. The level of difficulty was considered when the Test assignments were scored – that is, the correct answer of each of the 1 – 10 test Questions was scored with a score of 0.9, the correct answer of each of the 11 – 20 test Questions was scored with a score of 1.5, and the correct answer of each of the 21-30 test Questions was 51 9th grade students, 75 10th grade students and 62 11th grade students participated in Phase III (for biology) of the Olympics in Tashkent [4].

Below we will dwell on the methodology for solving written work assignments at the Science Olympiads, which were held between the 9th grade and the 11th grade in biology.

Issue 1: (Class 9 Olympics. Phase III). The following scheme reflects the development and fertilization process of the wheat plant (2n=14) pollen granule and the Rye plant (2n=16) egg cell.



1. Using the above scheme, determine the number of fertilized eggs in the process of double fertilization.

2. Using the above scheme, determine the number of total powder granules that have matured in the powder.
3. Using the above scheme, determine the number of initial megasporocyte cells in the germ.
4. Using the above scheme, determine the total number of chromosomes in the endosperm cell formed during double fertilization.

The solution to the problem:

1. 1) 60 microsporacites ~~100 %~~
x microsporacite 80 % —— x = 48 microsporacite cells have become microspores
2) Considering the formation of 4 microspores from 1 microsporacite cell, 48 x 4 = 192 microspores were formed
3) 192 x 0.75 = 144 microspora dust grains
4) 1 microspora produces 1 pollen grain, 144 pollen grains from 144 microspora
5) 144 x 0.5 = 72 pollen grains converted to sperm
6) 1 pollen grain produces 2 spermi, 72 pollen grains produce 144 spermi
7) Of the 144 sperm produced, all involved in fertilization, 72 fertilized the central cell and 72 fertilized the ovum, which means that the number of eggs involved in double fertilization is 72.

2. The total number of pollen grains grown in changdon is 144 (done in Act 4 of Task 1

3. 1) The number of eggs involved in double fertilization is 72 and it accounts for 75% of the total egg cell. We find 100% of the egg cell.
72 : 0.75 = 96 eggs
2) 1 egg cell is formed from 1 murtak sac and 80% of the murtak sac was involved in the formation of 96 egg cells. We also find 100% of the murtak bag.
96 : 0.8 = 120 mortar bags
3) 1 mortar bag is formed from 1 megaspora and 60% of the megaspora was involved in the formation of 120 mortar bags. We find 100% of megaspora.
120 : 0.6 = 200 this megaspore
4) 1 megasporocyte cell produces 1 megaspora and 80% of the megasporocyte cell was involved in the formation of 200 megaspora. We find 100% of the megasporocyte cell.
200 : 0.8 = 250 megasporocyte cells

4. As can be seen from the above diagram, the spermatozoa of the wheat plant (2n=14), the rye plant (2n=16) formed a central and egg cell. The endosperm (3n=23) is formed as a result of fertilization of the central cell (2n = 16) by sperm (n = 7) [5].

Issue 2: (Class 11 Olympics. Phase III). In a pea plant, the yellow color of the grain (a) dominates over the green color (A), and the smoothness of the grain (B) dominates over the twisted (B). In the experiment, a green twisted pea with yellow smooth peas was interspersed. In F2, 3120 plants were obtained in the generation. Of these, 1,818 are yellow, smooth, 559 are yellow, twisted, 593 are green, smooth, 150 are green, twisted.
1. After comparing the observed results with the expected ones, determine the value of x^2 (5 points).

2. Using the Fisher table, determine the number of probabilities corresponding to the value x^2 (3 points).
3. Does the resulting null hypothesis* match? Explain your answer (2 points).

Note. Null hypothesis (H_0) – to negate, the number of x^2 that you calculate must be greater than the number of x^2 in the Fisher table, otherwise the results obtained will correspond to the null hypothesis (H_0).

The solution to the problem:

The difference between the experimental data and the theoretically obtained result may be different. In some cases, the difference may be small or accidental, while in some cases it may be large or clearly correct. Therefore, the theoretical results obtained and expected in the experiment will have to be determined by statistics. When identifying such problems, the x^2 method is more often used. This method was proposed in 1900 by the English mathematician K. Pearson introduced me to science. To solve the above problem, we will use the Pearson and Fisher tables. First, we can find the sum of x^2 using Pearson's table [6,7].

Table 1.

Data	Number of organisms				
	yellow, smooth	yellow, wrinkled	green, smooth	green, wrinkled	total
Received (p)	1818	559	593	150	3120
Expected ratio	9	3	3	1	16
Theoretically expected - q	1755	585	585	195	3120
Difference d = p - q	+63	-26	+8	-45	-
The square of the difference-d^2	3969	676	64	2025	-
Ratio - d^2/q	2,26	1,155	0,109	10,385	x^2=13,909

1. Comparing the observed results with the expected ones, we get the value x^2 – 13.909
2. We use the Fisher table to determine the number of probabilities corresponding to the value x^2. To do this, we first need to find the degree of freedom (n). The number of degrees of freedom is always one less than the number of phenotypic classes. If we denote the number of phenotypic classes as "n", then the number of degrees of freedom will be n'=n-1. In our above-mentioned problem, the number of phenotypic classes is 4 [8].

Hence the number of degrees of freedom n'= n - 1

$$4 - 1 = 3$$

Since the number of degrees of freedom in the 3rd row of the Fisher table is 3, then row 3 (4-1=3) is taken, the number at the intersection of probabilities 0.05 is determined, i.e. equal to 7,815.

3. The null hypothesis does not correspond to (H_0). The reason the calculated number of x^2 is greater than the number of x^2 in the Fisher table i.e. **13,909 > 7,815.**

Conclusion

At the 2021-2022, 2022-2023 and 2023-2024 academic year Olympiads, the level of written work questions, in particular, has become much more complicated. Written work questions are formulated almost on a par with the questions of prestigious international Olympiads. That is why students face difficulties in working out their tasks at different stages of the Olympiad (especially at stages III and IV).

To do this, students must master the basics of biology, such as metabolism and energy, biosynthesis of proteins, nucleic acids, photosynthesis, fertilization processes in plants and animals, the construction of phologenetic trees, enzymes used in genetic engineering, the x^2 method, as well as topics and laws of Hardy-Weinberg. It is also necessary to teach creative thinking, combining biology, chemistry, physics and mathematics.

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