ҚАЗАҚСТАН РЕСПУБЛИКАСЫ ОҚУ-АҒАРТУ МИНИСТРЛІГІ
«ДАРЫН» РЕСПУБЛИКАЛЫҚ ҒЫЛЫМИ-ПРАКТИКАЛЫҚ ОРТАЛЫҒЫ

IBO 2024 Kazakhstan

DARYN

ASTANA

NAZARBAYEV UNIVERSITY

FREEDOM BROKER


INTERNATIONAL
BIOLOGY
OLYMPIAD e. V.
IBO

Content


2024
Kazakhstan
IBO 2024


АШЫЛУ САЛТАНАТЫНАҢ РОЛИКТЕР
TEAM KAZAKHSTAN
2024
Kazakhstan


TEAM SLOVENIA


IBC 2024
Kazakhstan


TEAM ROMANIA

Dear Olympiad Participants and Guests,

Welcome to the International Biology Olympiad, which unites representatives from over 80 countries around the world!

The International Biology Olympiad (IBO) is one of the most prestigious and large-scale annual academic competitions for students. The Olympiad was first held in 1990, with only six countries participating. Since then, the number of participating nations has steadily grown, and today teams from nearly every country in the world take part in this global event.

More than 150 years ago, Kazakhstan's great poet and thinker Abai Kunanbayuly said, "A person's strength lies in their mind and knowledge." These words remain just as relevant today. Quality education is undeniably essential for both individual success and national prosperity.

I believe that many of you will become distinguished biologists of the future and make groundbreaking discoveries in the coming decades. Perhaps some of you sitting in this very hall will one day become Nobel Prize laureates.

Dear young friends,

Your participation in the 35th International Biology Olympiad is a testament to your exceptional intellectual abilities. Each of you has already achieved significant milestones in the field of science and is now on the path to even greater accomplishments.

We hope that through this Olympiad you will learn more about Kazakhstan, our traditions, and our hospitality, and that the friendships formed here will last long into the future.

Kazakhstan warmly welcomes each of you with great respect.

We wish you inspiration, curiosity, and victory!

Minister of Education of the Republic of Kazakhstan Gani Beisembayev

Logo

The logo of the 2024 International Biology Olympiad (IBO-2024), held in Kazakhstan, features the image of the saiga antelope — a nomadic animal native to the Kazakh steppe. Depicted in a dynamic and stylized manner, the saiga symbolizes resilience and vitality, reflecting the spirit and perseverance of young biologists participating in the Olympiad.

IBO 2024
Kazakhstan

Key Elements of the Logo:

1. Saiga Antelope

At the center of the logo is a saiga in motion, symbolizing the progressive nature of biological sciences. The animal's distinctive upward-curving horns and recognizable silhouette were purposefully emphasized for easy identification.

2. Yellow Steppe

The background represents the saiga's natural habitat and Kazakhstan's rich biodiversity, illustrated through the vast and vibrant Kazakh steppe.

3. Color Palette

The logo's colors reflect the connection between biology and the natural environment. Inspired by Kazakhstan's landscapes, the palette includes earthy browns, greens, and blues — representing soil, vegetation, and sky.

4. Modern Design

The logo features a modern, minimalist style to highlight the significance of the event while appealing to young biologists through contemporary aesthetics.

This logo expresses the essence of the International Biology Olympiad and symbolizes Kazakhstan as the 2024 host country through the image of the saiga. It evokes pride and excitement among participants and spectators alike.

Organizers and Partners

Center "DARYN"

The Republican Scientific and Practical Center "Daryn" is a subordinate organization of the Ministry of Education of the Republic of Kazakhstan. It is responsible for organizing all school Olympiads and project competitions across the country, including the National Biology Olympiad. "Daryn" also oversees the selection and training of Kazakhstan's national teams for participation in International Olympiads, including IBO.

In addition, "Daryn" serves as the lead organizer and executive body when Kazakhstan hosts International Olympiads.

During IBO 2024, the Daryn Center handled the full scope of organizational responsibilities, including:

- Reception and transportation of participants;
- Accommodation arrangements (hotels for jury members and students, NU dormitories for organizers, scientific committee members, and volunteers);
- Catering;
- Excursion programs;
- Organization of the Opening and Closing Ceremonies;
- Recruitment and management of volunteers;
- Procurement, transportation, and storage of equipment and materials for examinations;
- Design and production of branded materials (including the Yearbook);
- Creation and management of the official Olympiad website and social media accounts;
- And many other logistical aspects.

The entire Daryn team contributed to the successful implementation of IBO 2024. Special recognition is given to:

- **Gazhdebek Kuanyshevich Tursunov**, Director of the Daryn Center
- **Aigul Akimgereyevna Karkulova**, Deputy Director
- **Gulsara Mukash**, Methodologist, Olympiad Department
- **Gulnar Turarkhanovna Kalimzhanova**, Economist of the Center

In total, 52 employees from the "Daryn" Center and its affiliated organizations participated in IBO 2024 (they wore yellow or white uniforms). Their dedication and professionalism played a crucial role in the success of IBO 2024.


The Republican Scientific and Practical Center "Daryn" of the Ministry of Education of the Republic of Kazakhstan is a republican state-owned enterprise that provides guidance in the field of education on the identification and support of gifted children and talented youth in Kazakhstan.
ХИМИЯДАН 57-ШІ ХАЛЫҚАРАЛЫҚ МЕНДЕЛЕЕВ ОЛИМПИАДАСЫ
57 МЕЖДУНАРОДНАЯ МЕНДЕЛЕЕВСКАЯ ОЛИМПИАДА ПО ХИМИИ
57TH INTERNATIONAL MENDELEEV CHEMISTRY OLYMPIAD
Astana, Kazakhstan
2023
MISSION
The mission of the Republican Scientific and Practical Center "Daryn" is to identify, develop, and professionally support gifted children and talented youth in Kazakhstan.
The goal is to create a unified, modern system for identifying, developing, and realizing the potential and creative abilities of gifted children in Kazakhstan.

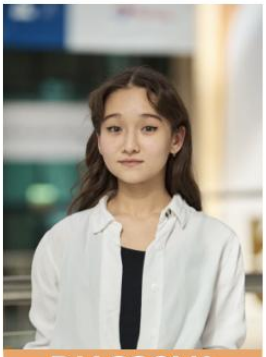
Scientific Committee

The Scientific Committee of IBO 2024 was responsible for all exam-related aspects of the Olympiad. This included the development and discussion of exam tasks, compilation of lists of required materials (laboratory supplies, paper, printers, laptops, and more), exam administration, evaluation of student answers, moderation of results, and other related tasks.

The committee began forming in the summer of 2022. Initially, it included Kazakhstan's current team leaders — Adlet Sagintaev and Ilyas Sakimov — as well as former team leaders Arnat Balabiev and Zhannat Koshenov. Additional members were invited later, based on mutual agreement.

Most members of the Scientific Committee were former participants of the National Biology Olympiad of Kazakhstan or alumni of past IBOs. At the time of the Olympiad, the majority were undergraduate or graduate students; some were working in research institutions. The committee also included one representative from the medical field and one from the education sector.

SCIENTIFIC COMMITTEE



DIASSOVA
Ansal

Kassym
Yerkin

Turtemir
Adilet

Orakov
Askerbek

Kussanova
Aigul

Polina
Len

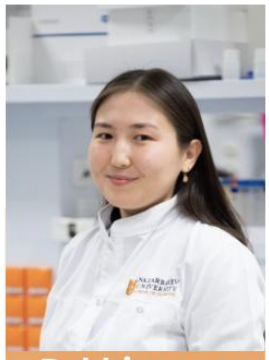
Akhmadi
Aizhan

Sagandyk
Sanzhar

Yerpasheva
Dana

Balabiyev
Arnat

Meirkhanova
Ayagoz



Rakhimgerey
Nargiz

SCIENTIFIC COMMITTEE

Sagintayev
Adlet

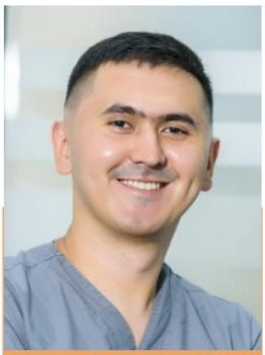
Sakimov
Ilyas

Otarbayev
Daniyar

Muratov
Yerasyl

Temirbekov
Yerasyl

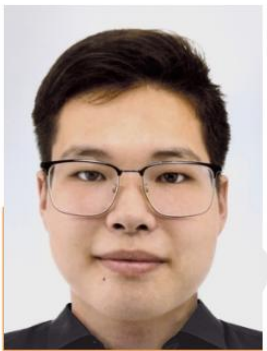
Zhalmagambetov
Bakhytbek



Zhumadil
Khafiz

Alikenova
Balzhan

Urkumbayev
Eldar



Dinmukhammed
Omar

Zhumagaliyev
Alikhan

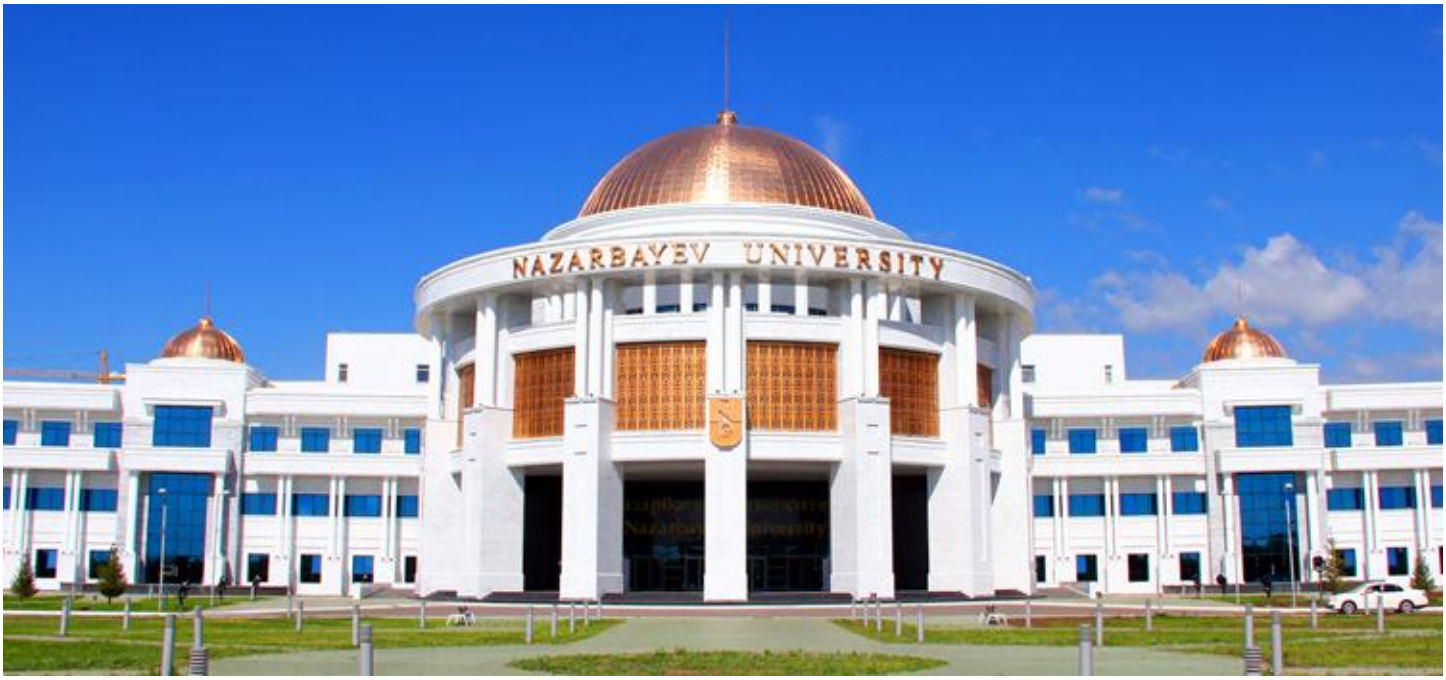
Nazarbekov
Alisher

Freedom Broker

Freedom Broker and its owner, Timur Turlov, provided invaluable support by funding the purchase of all laboratory equipment for the practical exams, as well as laptops, printers, and many other essential items.

Nazarbayev University

Nazarbayev University generously opened its facilities and served as the official venue for all Olympiad examinations. The university staff actively collaborated with and advised the Daryn Center throughout the preparation process. In addition, the university's carpentry and electrical teams prepared the exam halls and ensured they were fully equipped.



Accommodation / Hotels

The jury members (team leaders) were accommodated in two hotels: **Radisson Hotel Astana** and **Park Inn by Radisson**, located approximately 250 meters apart. All discussions and meetings of the International Jury were held in the Grand Hall of the Radisson Hotel Astana.

Students were accommodated in three hotels: **Wyndham Garden Astana**, **Hilton Garden Inn Astana**, and **Holiday Inn Express Astana**. Initially, accommodation for students was planned at Nazarbayev University dormitories; however, due to issues related to catering, this arrangement was reconsidered. Nonetheless, it was not feasible to accommodate all students in a single location.

Other Notable Partners Include:

- **QIYAL Creative Space**
- **LLP "Astana Venue Management" (Palace of Peace and Reconciliation)** – Support in Organizing Opening Ceremony
- **LLP "ArtLab Studio ALS"**
- **JSC "QazExpoCongress"** – Venue of the Closing Ceremony
- **IP "Lesnaya Ferma AQMARAL"** - Support in Organizing Excursions
- **"Kazakhstan Association of Agro and Rural Tourism" NGO** - Support in Organizing Excursions
- **LLP "USM Astana"**
- **LLP "Kazintertech SP"**

Special Mention

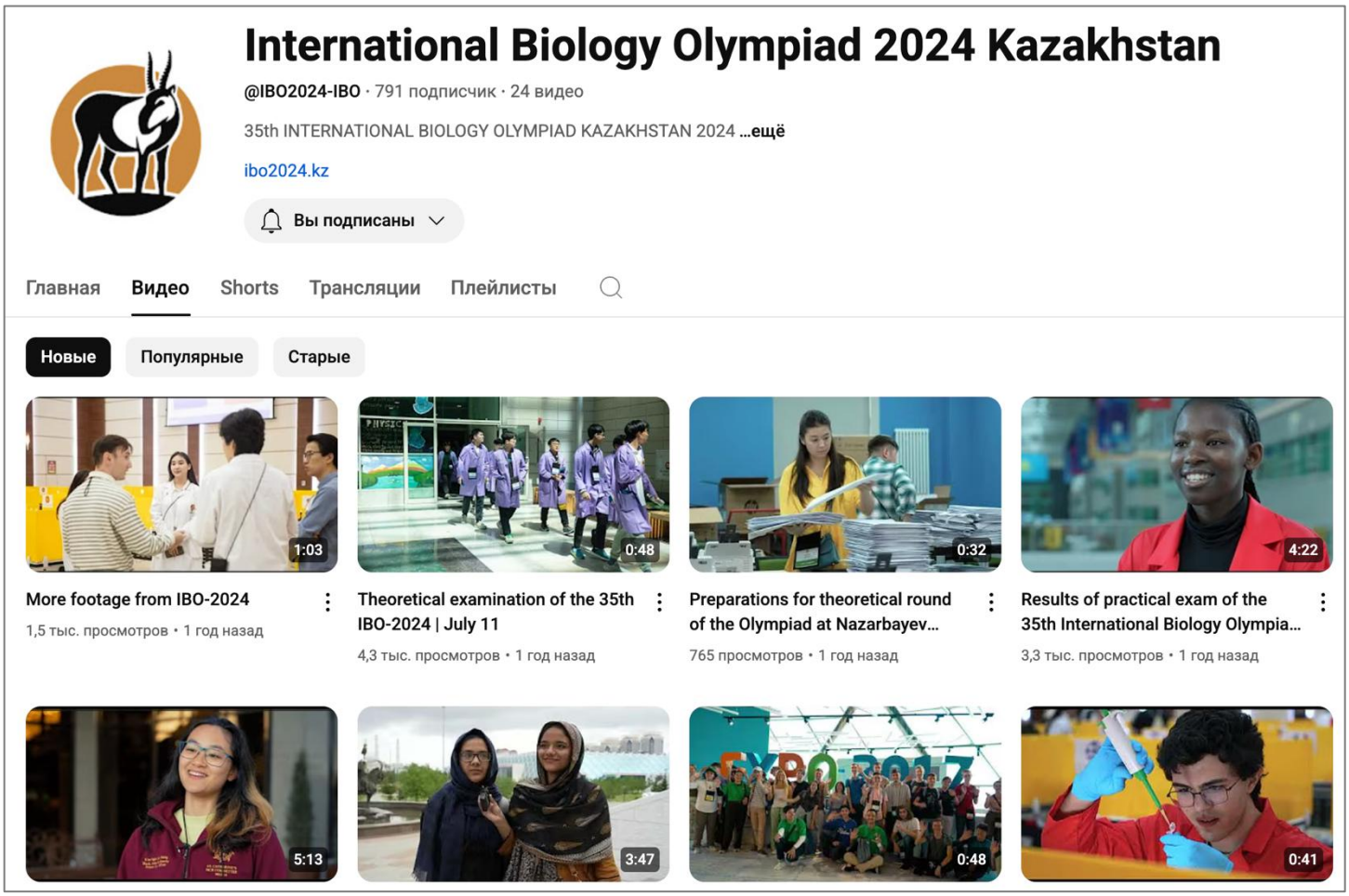
Deputy Minister of Education, Ms. Nataliya Vasilyevna Zhumadildayeva, was actively involved in various aspects of the preparation and organization of the IBO. She deeply cared about the success of the Olympiad and the well-being of the students.

Ms. Zhumadildayeva passed away on March 15, 2025, just two weeks short of her 60th birthday.

We extend our heartfelt condolences.

Olympiad Social Media Pages

During the Olympiad and for one year after its conclusion, the official website ibo2024.kz was active (now closed). However, the **YouTube channel** (@IBO2024-IBO) and **Instagram account** (IBO2024 Kazakhstan) are still operational. There, you can find engaging videos about the daily life of the Olympiad, the exams, excursions, the Opening and Closing Ceremonies, and much more.



Use of WhatsApp for Communication During IBO 2024

WhatsApp proved to be an extremely effective communication tool during IBO 2024. A general WhatsApp group was created that included almost all members of the International Jury (team leaders). To prevent clutter, only administrators were allowed to post messages in this group. It was used to share up-to-date information regarding the time and location of meetings, excursions, exam printing schedules, and other organizational matters.

In addition to the main group, individual WhatsApp groups were established for each participating country. These smaller groups included the team guide, a jury volunteer, and a representative from the “Daryn” Center. These country-specific groups significantly improved communication and coordination with each team.

Olympiad Schedule

First, a condensed version of the schedule is presented, followed by detailed versions—first for the jury, then for the students.

Day	Students		Jury members	
	Time	Events	Time	Events
6 July	all day	Arrival, Registration & Check-in		
7 July	09:00 - 16:00	Arrival, Registration & Check-in		
	16:00 - 17:00	Registration & Check-in	16:00 - 17:00	Intro to OLY-EXAM online platform
	18:00 - 21:00	**Opening Ceremony**		
8 July	09:00 - 20:00	Activities and Excursions	09:00 - 22:00	Experiment Discussion & Translation
9 july	all-day	**Practical Exams** 1st Exam: 09:00 - 10:30; 2 nd Exam: 11:30 - 13:00; 3 rd Exam: 15:30 - 16:30; 4th Exam: 17:30 - 19:00.	09:00 - 22:00	Theory Exams Discussion & Translation
10 July	10:00 - 20:00	Activities and Excursions	09:00 - 24:00	Theory Exams Discussion & Translation
11 July	09:00 - 18:00	**Theory Exams** 1st Exam: 09:15 - 12:30 2nd Exam: 15:00 - 18:15	09:00 - 19:00	Tour - Burabay
	20:00 - 22:00	Meeting of the jury and students		
12 July	09:00 - 20:00	Tour - Burabay	09:00 - 12:30	General Assembly
			13:00 - 18:00	Reviewing Scores, Moderation

			19:00 - 21:00	Educational Conference / KZ Biology Team
13 July	10:00 - 13:00	Social activities (group games, quests, etc.)	10:00 - 13:00	Excursions
	14:00 - 16:00	Preparation for Closing Ceremony		
	16:00 - 19:00	**Closing Ceremony**		
	20:00 - 22:00	Gala dinner for students and jury members		
14 july	All day	Departure		

IBO 2024
Kazakhstan

PROGRAM

FOR JURY AND SCIENTIFIC COMMITTEE MEMBERS

ASTANA, JULY 7-14, 2024

6 - July

ARRIVAL OF OLYMPIAD PARTICIPANTS

(Breakfast, Lunch and Dinner in places of residence)
(Park Inn by Radisson Astana and Radisson Astana Hotel)

During the day

7 - July

09:00 16:30	**Arrival and registration** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
16:30 17:00	**Transfer** *(Palace of Peace and Reconciliation)*
17:00 18:30	**Taking photos of the participants and SEATING ARRANGEMENTS in the ceremonial hall**
19:00 20:30	**Opening Ceremony** **(Palace of Peace and Reconciliation)**
20:30 21:00	**Transfer** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
21:00 22:00	**Dinner** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
22:00	**Free time** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*

8 - July

07:00 08:00	**Breakfast** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
08:00 12:30	**Discussion and translation of the practical exams** *(Radisson Astana Hotel)*
12:30 13:30	**Lunch** *(Radisson Astana Hotel)*
14:00 18:00	**Discussion and translation of the practical exams** *(Radisson Astana Hotel)*
18:00 19:00	**Dinner** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
19:30 20:00	**Voting on Final Versions of Practical Exams** *(Radisson Astana Hotel)*
20:00 06:00	**Translation of the final exam versions, their printing, verification, and approval by the jury members** *(Radisson Astana Hotel)*

9 - July

06:00 07:30	**Breakfast** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
07:30 12:00	**Discussion and translation of theoretical exams** *(Radisson Astana Hotel)*
12:00 13:00	**Lunch** *(Radisson Astana Hotel)*
13:00 19:00	**Discussion and translation of theoretical exams** *(Radisson Astana Hotel)*
19:00 20:00	**Dinner** *(Radisson Astana Hotel)*
20:30 21:30	**Voting on Final Versions of Practical Exams** *(Radisson Astana Hotel)*
21:30 06:00	**Translation of the final exam versions, their printing, verification, and approval by the jury members** *(Radisson Astana Hotel)*

10 - July

06:00 07:00	**Breakfast** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
07:00 12:00	**Discussion and translation of theoretical exams** *(Radisson Astana Hotel)*
12:00 13:00	**Lunch** *(Radisson Astana Hotel)*
13:00 19:00	**Discussion and translation of theoretical exams** *(Radisson Astana Hotel)*
19:00 20:00	**Dinner** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
20:30 21:30	**Voting on Final Versions of Practical Exams** *(Radisson Astana Hotel)*
21:30 06:00	**Translation of the final exam versions, their printing, verification, and approval by the jury members** *(Radisson Astana Hotel)*

11 - July

06:30 07:45	**Breakfast** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
07:45 11:00	**Transfer to Burabay, Forest farm «AQ MARAL»**
11:00 15:30	**ethno-aul: "Universe of nomads" (lunch 13:00 – 14:00)**
15:30 19:00	**Transfer to Astana**
19:00 20:00	**Dinner** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
20:00 20:30	**Transfer** *(Wyndham Garden Astana, Hilton Astana, Holiday Inn Express – Astana-Turan)*
21:00 22:00	**Meeting of the jury and participants** (in participants residences)
22:00 22:30	**Transfer** *(Park Inn by Radisson Astana , Radisson Astana Hotel)*
22:30	**Free time** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*

12 - July

07:00 08:00	**Breakfast** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
08:00 11:30	**General Assembly** *(Radisson Astana Hotel)*
12:00 18:00	**Moderation** *(Radisson Astana Hotel)*
13:00 14:00	**Lunch** *(Radisson Astana Hotel)*
18:00 19:00	**Dinner** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*
19:00 21:00	**Educational conference** *(Radisson Astana Hotel)*
21:00 22:00	**Free time** *(Park Inn by Radisson Astana, Radisson Astana Hotel)*

General Assembly and Schedule Adjustments

The General Assembly held on July 12 was originally scheduled to last four hours. However, due to an exceptional situation involving the Uzbekistan team, the session continued until dinner time. As a result, the moderation session had to be rescheduled for the evening and took place concurrently with the Educational Conference.

IBO 2024
Kazakhstan

PROGRAM

FOR COMPETITORS

ASTANA, JULY 7-14, 2024

6 - July

ARRIVAL OF OLYMPIAD PARTICIPANTS

(BREAKFAST, LUNCH AND DINNER IN THE RESIDENCES)
(Wyndham Garden Astana,
Hilton Garden Inn Astana,
Holiday Inn Express – Astana-Turan)

During the day

7 - July

09:00 16:30	**Arrival and registration**
16:30 17:00	**Transfer** *(Palace of Peace and Reconciliation)*
17:00 18:30	**Taking photos of the participants and SEATING ARRANGEMENTS in the ceremonial hall**
19:00 20:30	**The opening ceremony** *(Palace of Peace and Reconciliation)*
20:30 21:00	**Transfer** *(Wyndham Garden Astana,* *Hilton Garden Inn Astana,* *Holiday Inn Express – Astana-Turan)*
21:00 22:00	**Dinner** *(Wyndham Garden Astana,* *Hilton Garden Inn Astana,* *Holiday Inn Express – Astana-Turan)*
22:00	**Free time** *(Wyndham Garden Astana,* *Hilton Garden Inn Astana,* *Holiday Inn Express – Astana-Turan)*

8 - July

07:00 08:15	**Breakfast** *(Wyndham Garden Astana,* *Hilton Garden Inn Astana,* *Holiday Inn Express – Astana-Turan)*
08:15 09:00	**Transfer** *(Nazarbayev University)*
09:00 11:00	**Getting acquainted with the contest venue and equipment, and determining seating arrangements** *(Nazarbayev University)*
11:00 12:30	**Teams acquaintance** *(teambuilding, Nazarbayev University)*
12:30 13:00	**Transfer** *(Wyndham Garden Astana,* *Hilton Garden Inn Astana,* *Holiday Inn Express – Astana-Turan)*
13:00 14:00	**Lunch** *(Wyndham Garden Astana,* *Hilton Garden Inn Astana,* *Holiday Inn Express – Astana-Turan)*
14:30 18:00	**Transfer** **Excursion to «Baiterek» Monument, The National Museum**
18:00 18:30	**Transfer** *(Wyndham Garden Astana,* *Hilton Garden Inn Astana,* *Holiday Inn Express – Astana-Turan)*
18:30 20:00	**Dinner** *(Wyndham Garden Astana,* *Hilton Garden Inn Astana,* *Holiday Inn Express – Astana-Turan)*
20:002 2:00	**Free time** *(Wyndham Garden Astana,* *Hilton Garden Inn Astana,* *Holiday Inn Express – Astana-Turan)*

9 - July

06:30 07:45	**Breakfast** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
07:45 08:30	**Transfer** *(Nazarbayev University)*
09:00 13:00	**Practical exams** *Exam 1: 09:00 - 10:30* *Exam 2: 11:30 - 13:00* *(Nazarbayev University)*
13:10 13:30	**Transfer** *(Wyndham Garden Astana)*
13:30 14:30	**Lunch** *(«Wyndham Garden Astana» Hotel)*
14:30 15:00	**Transfer** *(Nazarbayev University)*
15:30 19:30	**Practical exams** *Exam 3: 15:30 - 17:00* *Exam 4: 18:00 - 19:30* *(Nazarbayev University)*
19:30 20:00	**Transfer** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
20:00 21:00	**Dinner** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
21:00 22:00	**Free time** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*

10 - July

07:00 09:00	**Breakfast** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
09:00 09:30	**Transfer** *(Nur Alem Museum of Future Energy)*
09:30 12:30	**Excursion to the "Nur Alem" Museum of Future Energy**
12:30 13:00	**Transfer** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
13:00 14:30	**Lunch** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
15:00 18:30	**Astana City Bus Tour**
19:30 20:30	**Dinner** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
20:302 2:00	**Free time** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*

11 - July

06:30 07:45	**Breakfast** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
07:45 08:30	**Transfer** *(Nazarbayev University)*
09:15 12:30	**Theoretical exams** *Exam 1* *(Nazarbayev University)*
13:00 13:30	**Transfer** *(Wyndham Garden Astana)*
13:30 14:30	**Lunch** *(«Wyndham Garden Astana» Hotel)*
14:30 15:00	**Transfer** *(Nazarbayev University)*
15:00 18:15	**Theoretical exams** *Exam 2* *(Nazarbayev University)*
18:30 19:00	**Transfer** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
19:30 20:30	**Dinner** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
21:00 22:00	**Meeting of the jury and participants** *(in residences)*
22:00	**Free time** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*

12 - July

06:30 07:45	**Breakfast** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
07:45 11:00	**Transfer to Burabay, Forest farm «AQ MARAL»**
11:00 15:30	**ethno-aul: "Universe of nomads"** *(lunch 13:00 – 14:00)*
15:30 19:00	**Transfer to Astana**
19:00 20:00	**Dinner** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
20:002 2:00	**Free time** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*

13 - July

08:00 09:30	**Breakfast** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
09:30 10:00	**Transfer** *(Riviera International School)*
10:00 12:30	**Leisure time activities** *(Riviera International School)*
12:30 13:00	**Transfer** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
13:00 14:30	**Lunch** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
15:00 15:30	**Transfer** *(QazExpoCongress)*
15:30 16:15	**Taking photos of the participants**
16:15 16:30	**Seating arrangement of the participants in the ceremonial hall**
17:00 19:00	**Closing ceremony** *(QazExpoCongress)*
19:00 21:00	**Gala Dinner** *(QazExpoCongress)*
21:00 21:30	**Transfer** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*
21:302 2:30	**Dinner , Free time** *(Wyndham Garden Astana, Hilton Garden Inn Astana, Holiday Inn Express – Astana-Turan)*

14 - July

DEPARTURE

During the day

Scientific Committee Activities

Weekly Activities (September 2023 – June 2024)

Theoretical Task Compilation and Editing: Weekly assembly and online editing sessions (≈2.5 hours per session) for theoretical exam tasks were conducted continuously from September 2023 to June 2024.

Communications with Steering Committees

Regular correspondence with the **IBO Steering Committee** regarding administrative meetings, organizational details, and task discussions (September 2023 - June 2024). These monthly meetings were extremely helpful both for the Scientific Committee and for the staff of the "Daryn" Center. We would like to express our sincere gratitude to the Steering Committee.

Zoom meeting with IBO-2023 organizers from UAE (September 2023): Consultations with **Subbu** on critical issues were extremely helpful in making the right decisions. In addition to this online meeting, Subbu also met with us in person in November in Astana during the AB Meeting, and he has supported us numerous times via WhatsApp and phone calls. We are deeply grateful to him!

Meetings and Visits

Site visits to Nazarbayev University for determining exam locations and student accommodations (September – October 2023).

Technical discussions with Nazarbayev University's volunteer club and technical staff regarding volunteer roles, exam hall setups, and IT infrastructure (April 2024).

Negotiations with Radisson Astana Hotel management regarding venue usage for meetings and subgroup discussions (April 2024).

Document Preparation and Translation

Translation of essential documents including the "Host Country Guide" (September 2023), "IBO Operational Guidelines" (November 2023), and contracts with International Olympiad Foundation (December 2023 – January 2024).

Creation and dissemination of normative guidelines for theoretical task authors (April 2024).

Platform Management (OLY-EXAM)

Regular online meetings with OLY-EXAM platform developers to customize platform features based on practical exam needs (February – June 2024).

Training sessions on platform usage for task authors and volunteer staff (May 2024).

We extend our deepest gratitude to **Daniel Isler** and **Sébastien Kasser** for their outstanding contribution to IBO 2024. Even before the Olympiad, they actively trained and advised members of the Scientific Committee. During the event itself, they worked tirelessly to ensure the flawless operation of the platform.

Volunteer Management

Recruitment and training of volunteers, including guides, practical exam assistants, and jury support teams (April – June 2024).

Preparation of detailed volunteer instructions and operational protocols (June 2024).

Jury and Subgroup Activities

Preparation and management of schedules for subgroup sessions and jury discussions (June 2024).

Detailed planning for logistics, discussions, translations, and task revisions during subgroup and jury meetings (June 2024).

Traditionally, the sub-group consists of 10 members. For IBO 2024, the following individuals were invited to join the sub-group:

1. Gerard Cobut – Belgium (member of the IBO Steering Committee)
2. Domen Vaupotič – Slovenia
3. Alexander Rubtsov – Russia
4. Evgeny Shilov – Russia
5. Sándor Bán – Hungary
6. Ronald Cruz – Philippines (future host)
7. Aditya David Wirawan – Indonesia
8. Christiane Mühle – Germany
9. Dayan Melisov – Kyrgyzstan
10. Niko Johansson – Finland

Theoretical Exams Finalization

Comprehensive review and refinement of theoretical tasks, addressing corrections and feedback through multiple editing cycles (May – June 2024).

Statistical analysis of theoretical exam tasks to ensure compliance with distribution standards (April 2024).

Logistical and Administrative Support

Booking and purchasing tickets were arranged for Scientific Committee members who study or work outside of Kazakhstan, as well as for international advisors (March 2024).

The invited international advisors were: **Alexander Lagonenko**, **Vasily Pankratov**, and **Dmitry Sandakov**. Their contributions during the task discussions prior to the Olympiad, throughout the sub-group meetings, and during the Olympiad itself were invaluable. They played a key role in helping the team make well-considered decisions during critical moments. We express our deepest gratitude to them.

Accommodation and meal planning were also carefully organized for all members of the Scientific Committee, including the international advisors (June 2024).

Official Correspondence and Documentation

Drafting and distributing formal invitations and informational letters to participating countries (October 2023 – June 2024).

Handling and responding to official correspondence received via the IBO 2024 official email (January – June 2024).

IBO cup

The IBO Cup was repaired and polished by the staff of the “Daryn” Center. As a result, it no longer wobbles and has regained its bright shine.

IBO 2024 Volunteers

At IBO 2024, volunteers were divided into three groups:

1. **Guides** – Each guide was assigned to accompany the student team of one country throughout the event.
2. **Practical Exam Volunteers** – These volunteers primarily assisted during the practical exams. Some were also involved in supporting the theoretical exams.
3. **Jury Volunteers** – These volunteers accompanied jury members and provided assistance during discussions, excursions, and other activities.

Volunteers were recruited through two channels:

- The Nazarbayev University Volunteer Club, which recruited among NU students;
- An open application form that was distributed to students of Suleyman Demirel University (Almaty) and biology teachers from BIL (Bilim-Innovation Lyceums).

A total of **168 volunteers** were recruited. Among them: 85 team guides (including a few reserves); 71 practical exam volunteers (20 each for Biochemistry, Molecular Biology, and Animal Anatomy and Physiology, and 11 for Bioinformatics); and 12 jury volunteers.

Accommodation and meals: Guides stayed in hotels with the students. Practical exam volunteers were accommodated in the dormitories of Nazarbayev University, while jury volunteers stayed at the Park Inn by Radisson hotel.

The following materials are provided:

1. *The questionnaire used for volunteer recruitment;*
2. *The instruction manual for team guides;*
3. *The instruction manual for practical exam volunteers (as an example, the instruction for the Animal Anatomy and Physiology exam volunteers is included);*
4. *Presentation Script for the Jury Volunteers' Briefing Meeting*

The questionnaire used for volunteer recruitment

Before you complete this form, please ensure you have read the information regarding IBO volunteers.
You may respond to the questions in Kazakh, English, or Russian.

1. Please enter your first and last name. *

2. Please enter your age. *

3. Please specify your gender. *
Male
Female

4. Please enter your phone number. *

5. Please enter your email address. *
Information about your background.

6.Are you currently studying or working? (Multiple responses possible)
- Studying for a bachelor's degree
- Studying for a master's degree
- Studying for a doctorate
- Working full time

7. Please provide the name of your educational institution and your field of study. / Please provide the name of your place of work and your role or position.

8.Do you possess fundamental skills in biology laboratory techniques? *
- Yes, I am proficient.
- Yes, I have basic knowledge.
- No, I do not have these skills.

9. How proficient are you in English? *
- Fluent
- Advanced
- Intermediate
- Basic
- I do not speak this language.

10. How proficient are you in Kazakh? *
- Fluent
- Advanced

- Intermediate
- Basic
- I do not speak this language.

11. How proficient are you in Russian? *
- Fluent
- Advanced
- Intermediate
- Basic
- I do not speak this language.

12. Please list any other languages you speak and indicate your proficiency level in each. *

13. Do you have experience volunteering, particularly at events related to science or education? If yes, please provide a brief description of your involvement.

14. What special skills do you possess? Please select all that apply: *
- Computer proficiency
- Medical knowledge or first aid skills
- Photography
- Video shooting
- Video editing
- Printer operation
- Public engagement skills
- other

15. Select the types of volunteer roles you are interested in (multiple choices allowed).*
- Student guide
- Practical exam assistant
- Jury support volunteer

16. If you selected the "student guide" role in the previous question, please specify which country's students you would prefer to guide.

17. (optional) Please explain why you are interested in volunteering for IBO 2024.

18. Please note that this is only an initial registration. The final decision regarding your volunteer application for the IBO will be made by the Daryn Center. You may be contacted by our staff for further information. If you do not hear from us by June 20, please consider your application unsuccessful.
- OK

The instruction manual for team guides

Who are the guides:

An IBO guide is a volunteer who accompanies students of one of the participating countries throughout the Olympiad, and provides them with comprehensive assistance, maintains good relations with students, monitors their physical and mental condition.

Who can become a guide: any person who has reached the age of 18 and speaks one or more foreign languages.

When approving candidates, they are interviewed and recommendations from the place of study and work are required. Also, the organizers may require a police clearance certificate. It is desirable that the candidate has already had a positive experience of working with schoolchildren.

It is important that guides are prepared for different scenarios and have appropriate training, including knowledge of basic safety principles and medical skills. In addition, they should have an open and tolerant attitude towards different cultures and be ready to support participants in different situations.

Languages:

Since the guide will constantly communicate with the students of a particular country, it is desirable for him to know a language that all team members understand.

Here is a list of IBO participating countries with their official and unofficial languages.

If for some countries it is not possible to find guides who know their language(s), then they are given a guide who knows English.

In addition, guides must also know Kazakh and/or Russian to communicate with the organizers.

Responsibilities of the guide:

1. Before the arrival of the team, study the personal data of the students of their country: names, surnames, age, gender, personal characteristics, food preferences, chronic or other diseases, allergies, medications, etc. (this data will be provided by staff of the Daryn Center)

2. Personally meet and see off the team at the airport.

3. Find out in advance from staff of the Daryn Center the location of the accommodation rooms of students in your country (to escort students to their rooms upon the arrival of the team), canteens and other places that may be needed by students (students can only be taken in permitted places).

4. Familiarize students with the schedule, venues of events and other important details.

5. Support in everyday matters:
Help with language barriers or cultural differences.
Providing information about transportation, local attractions and eating places.

6. Create a WhatsApp group with team leaders (jury members) of your country to keep in touch. They can be called upon in case of emergency, illness of the student, or other cases related to the health, safety and well-being of the students.

7. Under no circumstances should any information regarding the exams be passed from team leaders to students. Likewise, personal meetings between students and team leaders or any other unauthorized individuals are strictly prohibited.

8. Accompany students and team leaders during team registration.

9. Medical care:
Providing first aid if necessary.
Organization of medical care in case of illness or injury.

10. In case of depressive behavior of one of the students (isolation, constant drowsiness, aggressiveness, etc.), the guide must also contact the responsible employee of the Daryn Center.

11. Security:
Ensuring the safety of members during their stay.
Assistance in solving any situations related to security.

12. Accompaniment during cultural events:
Providing accompaniment to participants at cultural events or excursions. Assistance in organizing free time and leisure.

13. Until the end of the theoretical exams, the guide must make sure that none of his students uses phones, tablets or other devices. At the same time, the guide cannot enter the students' room without permission and unless absolutely necessary.
If such a case is detected, the guide is obliged to inform the staff of the Daryn Center.

14. In the event of a conflict or potential conflict situation between students of the same team or between students from different countries, the guide, in consultation with the responsible employee of the Daryn Center, must call the students to peace, harmony and mutual understanding by means of one-on-one conversations or conversations with the whole team.
In such cases, the guide should remind students that the IBO is out of politics, and that one of the main goals of the IBO is to establish friendships between students.

15. In conversations with students, guides should not bring up topics of politics and wars, as well as other topics that can lead to the students' experience.

16. Emergency situations:
Briefing on actions in case of emergencies.
Organization of evacuation if necessary.

The instruction manual for practical exam volunteers

As an example, the instruction for the Animal Anatomy and Physiology exam volunteers is provided.

Volunteer Guide

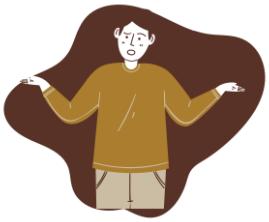
(for experimental & theoretical exam)

01 - Your roles and tasks

This unit describes your roles, functions and tasks during the IBO. Peculiarities might differ from section to section, pay attention to details.

02- Schedule

It is of highest importance to be on time for every event planned by your supervisor and assistants.



03- Code of conduct

Since Nazarbayev University is hosting IBO and providing accommodation for volunteers, it is important to get to know and follow university's policies.

04 - Accommodation, food & navigation

You will have several days before the experimental and theoretical exams, so use this time to familiarize yourself with campus, food serving points and the route from your rooms to the exam places.

05 - Why your help matters

Besides your responsibilities be also aware of the benefits of being a volunteer in this unique event.

Meet your team!
Animal anatomy & physiology

Leila Askarova
Supervisor of practical exam

Kamilya Sydykova
Assistant

Balnur Zhaisanbayeva
Assistant

Adina Zhumakhanova
Assistant

Bakhytbek Zhalmagambetov
Author of exam questions

Alikhan Zhumagaleyev
Author of exam questions

01 - Your roles and tasks

- Volunteering is an altruistic activity, which has the goal of providing help to others: a group, an organization, a cause, or the community at large, without expectation of material reward (Musick and Wilson, 2008, "Volunteers: a social profile").

- Volunteering makes a great impact in different fields, it contributes to both personal and community development, and helps people to grow as individuals and as a society.

- Volunteering in IBO 2024 helps to fill gaps in services, supports organizers from Ministry of Education & Science, assists in smooth and cohesive conducting of the olympiad and affects a creation of a positive image of Kazakhstan.

As a volunteer, you are expected to:

- Be reliable and punctual
- Be trustworthy
- Respect confidentiality
- Have a non-judgmental approach
- Carry out the specified job description
- Be accountable and accept feedback
- Be committed to the program
- Acknowledge decisions made by the staff or the organization
- Address areas of conflict with your supervisor
- Undertake training
- Ask for support when it is needed
- Stay safe on the job

01 - Your roles and tasks

- In the section "Animal Anatomy & Physiology" you will have one (or most probably several) of the following roles: a cleaner, a filler, a scanner, a conductor, a photo-maker, a utilizer, a proctor, and an appeal-supporter. Roles will be distributed on July 6.

- A cleaner collects the waste materials from the tables (biological waste material from the samples provided for the practical exam; used gloves, protecting gowns and napkins) in the autoclaving bags and cleans the pans and table surface with 70% ethanol solution

- A filler prepares the table for the next olympiad participant, he/she disinfects the table surface once again with 70% ethanol, and fills it with the new materials (exact list will be provided on July 6)

- A scanner helps an assistant with collecting exam papers, calculating the number of pages, transfering them to the scanning spots and back

- A conductor accompanies an organizer during the transfer of olympiad participants from Block 7 to Block 5 (Section of Bioinformatics)

- A photo-maker helps an assistant in taking photos for the Part I of the practical exam, transfering them to PC and renaming files

- A utilizer helps an assistant with transferring waste bags to the autoclaving lab room

- A proctor observes participants during the theoretical exam to avoid cheating and to accompany participants to the WC

- An appeal-supporter assists scientific committee members (supervisor, assistants and authors) during the appellation day (July 12)

02- Schedule

July 5: Check-In day
Spot: Qabanbay Batyr Ave 53, Astana (exact dormitory and room numbers TBA)
Arrival on campus, check-in, get to know your volunteer peers and team members

July 6: Training day I
Time: 9am
Spot: Block 7, Room 7e125/3 (Extension of Block 7)
Meet your team leaders, full training on biosafety & first aid, distribution of roles & tasks

July 7: Training day II
Time: 9am
Spot: Block 7, Room 7e125/3 (Extension of Block 7)
Rehearsal and practice, Q&A

July 8: Pre-exam Day
Time: 8:30am
Spot: Block 7, Room 7e125/3 (Extension of Block 7)
From 9am to 11am olympiad participants will move from section to section to see places allocated to their country teams, help them to find their tables
In the afternoon: preparation of tables for the next day, final rehearsal of your roles

July 9: Exam Day I
Time: 8am - 8 pm
Spot: Block 7, Room 7e125/3 (Extension of Block 7)
Do your best, strictly follow instructions of your assigned assistant and your supervisor

02- Schedule

July 10: Free day
Take your time to rest and enjoy summer Astana

July 11: Exam Day II
Time: 8am - 9pm
Spot: Block 7, Room 7e125/3 (Extension of Block 7)
You will be divided into two groups of 8 people and help in proctoring of theoretical exam
Group I from 8 am to 2pm
Group II from 3pm to 9pm
Time slots might change a little, check your messengers regularly for the most updated info
Help to pack the equipment

July 12: Appellation Day
Time: 12pm - 6 pm
Spot: TBA (Hotel outside of Campus)
5 appeal-supporters will join scientific committe members to assist in appellations
The rest of the team will have a free day

July 13: Final Day & Closing Ceremony
Time: 4pm - 7pm
Spot: Congress Center Expo (Exact location TBA)
Enjoy the concert

July 14: Check-Out & Departure
Make sure you haven't forgot your personal belongings, leave your rooms clean & tidy, pass the keys to the dormitory manager

03- Code of conduct

Since Nazarbayev University is hosting volunteers for practical & theoretical exams, it is highly important for all who will enter the campus and especially for those who will live in the dormitories to familiarize yourself with the policies and requirements of the university regarding your communication and behavior.

Our university is an environment that is safe and free from violence, harassment, fraud, theft, disruption and intimidation. NU is very strict on sexual assault, stalking, harassment and bullying. In Chapters 3 and 5 of the Student Conduct Code you can read more on the policies regarding the nonacademic misconduct and university properties (https://nu.edu.kz/media/upload/NU-Student-Code-of-Conduct.pdf). Any violation of these rules will lead to the immediate exclusion of the volunteer and report of his/her actions to the current place of study or work.

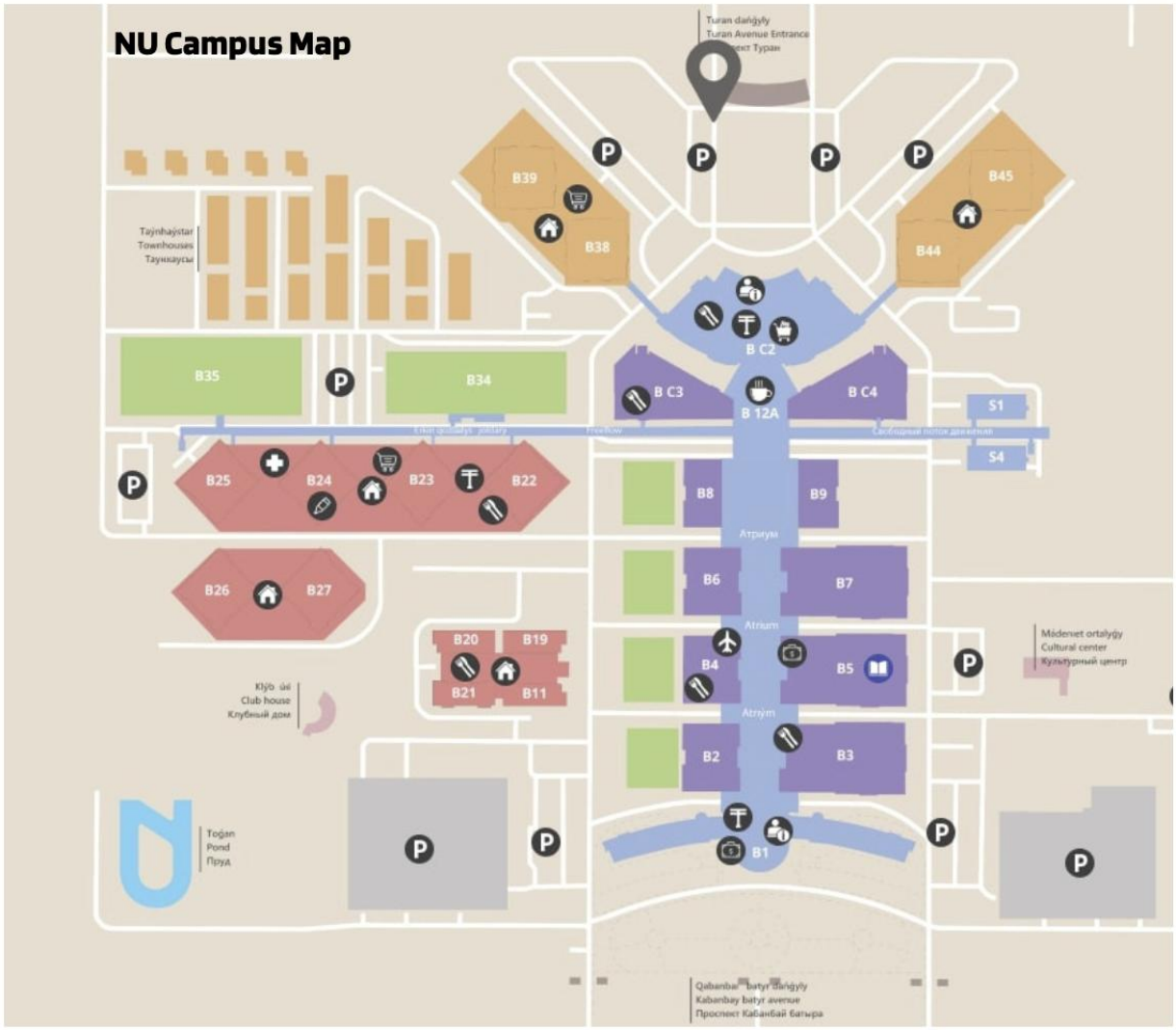
Remember that as an IBO Volunteer you represent our country and our academic community, your behavior affects the image of Kazakhstan that our guests will receive, keep and transfer to other people worldwide.

General rules:

- NU is free of smoking and alcohol (don't bring any alcohol-containing beverages to the campus; for smoking there are special spots outside of buildings, you are allowed to smoke only in those indicated areas, check them on map).
- Be kind, polite and patient. You are here to provide help and support.
- Don't stalk, bully, molest or make inappropriate comments.
- Avoid discussing sensitive topics (especially with international guests) related to politics, religion, gender, finances etc.
- **Don't discuss practical exam details with ANYONE until July 10, you will sign an NDA and are expected to keep it.**

04 - Accommodation, food & navigation

Your exact accommodation (dormitory and rooms numbers) and food-serving points TBA.
Tentative accommodation in B22 (D5 by new marking system).
Tentative food-serving point in Block C2,Cafe Kunde.
Exam location: Block 7. Room 7e125/3.



NU Campus Adress: Qabanbay Batyr Ave 53, Astana

You can reach it by taxi or by public transport:
From Airport: Bus 10
From Old Railway Station (Astana 1): Bus 10, 40
From New Railway Station (Nurly Zhol): Bus 50 with a change to Bus 10 on the 'House of Ministries'

05 - Why your help matters

As mentioned before your help plays an extremely important role in conducting IBO. The speed and accuracy of your movements, your full adherence to the rules and instructions of your supervisor, your commitment and enthusiasm will be the crucial factors for this event.

However, your participation as an IBO volunteer is not only important for the organizers, but is beneficial for you as well.

Benefits of being an IBO volunteer:

- it increases your social and relationship skills
- it allows to receive high quality training, develops or expands your professional practical skills
- it helps in building new connections and widens networks
- it boosts your CV!
- it might bring you new future internship possibilities and affect your career
- it improves self esteem, confidence and well-being

As a volunteer you have a right to:

- Receive a clear, comprehensive description of your roles ans tasks
- Be carefully instructed and appropriately assigned
- Receive training
- Be seen as a person and to be supported in your role
- Be safe on the job
- Not be exploited
- Be consulted on matters that directly or indirectly affect you and your tasks
- Receive feedback on your work
- Receive recognition for your contribution
- Have your personal information be kept confidential

Useful links

For navigation in Astana:
http://2gis.kz

For navigation on Campus:
https://nu.edu.kz/campus/infrastructure

NU Student Code of Conduct:
https://nu.edu.kz/media/upload/NU-Student-Code-of-Conduct.pdf

Basic Biosafety:
https://www.youtube.com/watch?v=Wyjn4WpxS90

Biosafety Training on CITI (if you have an access):
https://about.citiprogram.org/course/basic-introduction-to-biosafety/

Disposal of Biohazard Waste Materials:
https://www.youtube.com/watch?v=Fn3sDd4NekQ

Hand Washing Techniques recommended by WHO:
https://www.youtube.com/watch?v=IisgnbMfKvI

Basic First Aid:
https://www.youtube.com/watch?v=ea1RJUOiNfQ

Emergency Numbers:
101 Firefighting service
102 Police
103 Ambulance
112 Rescue

By any questions or issues
contact your supervisor.

Thanks for being with us and see you all soon!

Kind regards,

Presentation Script for the Jury Volunteers' Briefing Meeting

General information

- 78 countries (+2 observers)
- Students – 305
- Jury members – 265
- Exam venue – NU
- Jury members workplace – Radisson Hotel Astana
- Jury volunteers will stay at Park Inn by Radisson
- Schedule of IBO: ibo2024.kz (exams, venues, excursions etc.)

Who is who?

- Daryn
- Scientific committee
- Jury members
- Steering committee
- International advisors
- Oly-exam
- Bioinformatic platform
- Hotel stuff
- etc.

Oly-Exam

Daniel Isler of Oly-Exam:

1st level support (normally given on site) for the volunteers supporting the delegations for their translations etc.

They should be familiar with LaTex, be confident with using websites. Otherwise, no special knowledge is required.

For this training I would schedule 2 h.

Managing votes and feedback (backend, on site) for the Volunteers during the jury meetings.

Also, for this training I would schedule 2 h.

It is an easy task, but one has to be well prepared as the pressure is high.

Technical support during exam discussions:

(General Assembly)

- Provide microphones
- Answer questions or direct to someone who can help
- Distribute handouts etc.

Printing of exams:

- Print exams for the delegations
- Staple the sheets together
- Call the jury members for verification
- Monitor how they seal the envelopes
- Obtain their signatures
- Deliver all sealed envelopes to NU for the exams etc.

WhatsApp groups with the jury members of each country:

- Create separate groups for the jury members of each country (each volunteer handles 7–8 countries)
- Post important messages in the group as needed (questions, requests for information, etc.)
- Jury members can also ask questions in the group (responses should be coordinated through designated individuals)
- etc.

Moderation:

- Invite countries to the moderation sessions
- Maintain order during the process
- Help to Scientific Committee members

Excursions:

- Accompany the jury members on all excursions
- Ensure they board the buses for both departure and return trips
- Handle any related logistics

Some important notes:

- Be polite but firm with the jury when necessary
- Avoid discussing religion and politics with the jury members
- Regularly check the groups and keep your phones charged to stay available at all times
- Be prepared for periods where there may be no tasks to handle

Note: In the process the jury volunteers were divided into two groups of six people each. One group worked the night shift (from 6:00 PM to 8:00 AM), handling the printing, sealing, and delivery of exam papers to Nazarbayev University. The second group worked during the day, supporting the exam discussion sessions.


IBO 2024
Kazakhstan

Practical Exams

Preparation of Practical Exams

Work on the practical exams began in the summer of 2022. In August 2022, Adlet Sagintaev held online meetings with potential task authors, during which it was agreed that draft versions of the exams should be ready by December 2022.

As a result, the first drafts for the Molecular Biology, Biochemistry, and Animal Anatomy & Physiology exams were completed by March 2023. Immediately afterward, the authors began compiling detailed lists of laboratory materials required for each of the three practical exams.

Authors of the Biochemistry Exam Tasks:

- Daniyar Otarbayev, PhD student in Biomedical Engineering, UNIST (Ulsan, Republic of Korea)
- Alisher Nazarbekov, PhD candidate in Chemical and Biomolecular Engineering, KAIST (Daejeon, Republic of Korea), MSc in Chemical and Biomolecular Engineering
- Adilet Turtemir, Combined M.S. and PhD student in Biological Sciences, UNIST (Ulsan, Republic of Korea)

All three are alumni of the Bilim-Innovation Lyceum in Taraz, former IBO participants, and currently pursuing graduate studies in the Republic of Korea.

Author of the Molecular Biology Exam Tasks:

- Arnat Balabiyev, Senior Scientist at Nilogen Oncosystems (Tampa, Florida), PhD from Arizona State University; former IBO participant and graduate of the same Bilim-Innovation Lyceum in Taraz.

Lead Author of the Animal Anatomy & Physiology Exam Tasks:

- Bakhytbek Zhalmagambetov, Internal Medicine Specialist, MD; currently pursuing a Master's in Epidemiology (Surabaya, Indonesia); also former IBO participant.

From January to March 2023, Adlet Sagintaev and Ilyas Sakimov made multiple visits to the Daryn Center and the Ministry of Education to secure funding for laboratory materials and begin organizational preparations for IBO 2024. Their efforts were supported significantly by Zaure Baimenova (former Ministry official) and the late Gulmira Karimova.

Soon after, the newly appointed Director of the Daryn Center, Gazhdebek Tursunov, with the support of the newly appointed Minister of Enlightenment, Gani Beisembayev, reached an agreement with Mr. Timur Turlov (Freedom Broker) to provide financial assistance for the procurement of laboratory equipment.

Procurement and Logistics

Procurement responsibilities were entrusted to the company AT-TECH. Together with the exam authors, Adlet Sagintaev compiled a detailed list of the necessary equipment and reagents, including technical specifications, quantities, and descriptions.

By the end of May 2023, the finalized list was submitted to the Daryn Center, which forwarded it to AT-TECH. Procurement and deliveries funded by Freedom Broker began shortly thereafter. The ordered equipment arrived in Astana between October and December 2023.

Supervisors for Practical Exams

Since the authors of the three practical exams were based abroad and unable to participate actively in on-site preparation until the Olympiad itself, Sagintaev and Sakimov invited three specialists from Nazarbayev University in August 2023 to act as supervisors for the exams:

- Biochemistry Supervisor: **Aizhan Akhmadi**, PhD candidate in Life Sciences
- Molecular Biology Supervisor: **Dana Yerpasheva**, Laboratory Manager, MSc in Biological Sciences
- Anatomy & Physiology Supervisor: **Leila Askarova**, BSc in Biological Sciences, MD candidate, Research Assistant

Supervisors' Responsibilities (for their respective exams):

1. Editing and finalizing exam tasks
2. Receiving and testing laboratory equipment
3. Preparing exam rooms, reagents, equipment, and materials
4. Conducting test runs (simulated practical exams)
5. Consulting and training assistants and volunteers
6. Participating in task discussions within the IBO practical sub-group

7. Participating in exam discussions with representatives of all participating countries during IBO
8. Administering the exam across four participant streams
9. Evaluating participant responses
10. Handling appeals from team leaders regarding exam results

In August 2023, Sagintaev, Sakimov, and the three supervisors held an online meeting. During this session, Ilyas Sakimov shared insights from his experience as a practical exam inspector at IBO 2023 in the UAE, highlighting strengths and challenges in practical exam delivery.

At the same time, in August 2023, Adlet Sagintaev invited Alyamdar Askerov to develop the tasks for the Bioinformatics practical exam. Alyamdar, in turn, brought in Shamil Mureev. Both immediately became actively involved in the task development process. As a result, they were appointed co-authors of the Bioinformatics practical exam, with Alyamdar Askerov additionally serving as the supervisor for this exam.

Alyamdar Askerov, MSc in Biological Sciences, Nazarbayev University , biology teacher in "Riviera International School by Quantum", Astana, Kazakhstan.

Mureyev Shamil, BSc in Biological Sciences, Nazarbayev University, software engineer in Quantori, Astana, Kazakhstan

Assistants

Since the practical examinations in Biochemistry, Molecular Biology, and Animal Anatomy and Physiology involved manual checking of student answer sheets, and due to the moderation system introduced at IBO 2023, which required six moderation tables per examination (allowing simultaneous discussions with six countries), it was decided in advance to add assistants to supervisors and authors so that each examination team would consist of six members.

Assistants had access to the exam tasks, laboratory materials lists, and other confidential information. Therefore, similarly to authors and supervisors, they were required to sign a non-disclosure agreement (NDA).

Under the supervision of their respective supervisor, assistants were involved in the following stages:

- Exam Preparation
- Stress-testing of Exam Tasks
- Exam Administration
- Answer Sheet Evaluation
- Moderation

Thus, the final composition of the practical exam teams was as follows:

Biochemistry

1. Akhmadi Aizhan, Nazarbayev University, PhD candidate in Life Sciences.
2. Nazarbekov Alisher: KAIST, Daejeon, Republic of Korea. PhD candidate, Chemical and Biomolecular Engineering. Master of Science in Chemical and Biomolecular Engineering.
3. Otarbayev Daniyar, UNIST, Ulsan, Republic of Korea, PhD student in Biomedical Engineering
4. Turtemir Adilet, UNIST, Ulsan, Republic of Korea, Combined M.S and PhD student in Biological Sciences.
5. Polina Len, Nazarbayev University, Research Assistant, BSc Biological Sciences.
6. Kussanova Aigul, Nazarbayev University, Research Techologist at Core facilities, MSc Biological Sciences and Technologies.

Molecular Biology

1. Yerpasheva Dana, Nazarbayev University, Laboratory Manager, MSc in Biological Sciences.
2. Balabiyev Arnat,Senior Scientist at Nilogen Oncosystems (Tampa, Florida), Ph.D. Arizona State University
3. Meirkhanova Ayagoz, Nazarbayev University, Research Assistant, MSc Biological Sciences and Technologies.
4. Nargiz Rakhimgerey, Nazarbayev University, Research Assistant, Laboratory of Cell Growth Regulation, MSc in Biological Sciences and Technologies.
5. Janibekova Marina, National Laboratory Astana, Junior Researcher at Laboratory of Cell Motility, MSc Biological Sciences and Technologies.
6. Kanketayeva Zhansaya, Nazarbayev University, PhD student in Life Sciences.

Animal anatomy and physiology

1. Askarova Leila, BSc in Biological Sciences, MD candidate, Research Assistant at Nazarbayev University.
2. Zhalmagambetov Bakhytbek, Internal medicine specialist, MD. Master's program in Epidemiology, Surabaya, Indonesia.
3. Zhumagaleyev Alikhan, The Chinese University of Hong Kong, Hong Kong SAR, China. Bachelor of Biomedical Sciences.
4. Sydykova Kamilya, MSc in Biological Sciences, Laboratory Assistant at Biology department, Nazarbayev University.
5. Zhaisanbayeva Balnur, PhD, Research Assistant at Nazarbayev University.
6. Zhumakhanova Adina, BSc in Biological Sciences, MD candidate at Nazarbayev University.

Bioinformatics

1. Alyamdar Askerov, MSc in Biological Sciences, Nazarbayev University , biology teacher in “Riviera International School by Quantum”, Astana, Kazakhstan.
2. Mureyev Shamil, BSc in Biological Sciences, Nazarbayev University, software engineer in Quantori, Astana, Kazakhstan

Stress tests

1. Preparation for Practice Exam Stress Tests

On March 1, 2024, transportation was organized for the stress test of all practical exams, based on 6-7 participants in each of the four groups. It should be noted that all laboratory materials were stored in two special depots of the Daryn center.

Also on the spot, the route of movement of the groups of tested volunteers, the place of their rest and lunch were thought out (the venues were determined in advance).

Over the next two weeks, preparations for stress tests were carried out:

- Approbation of equipment and materials;

- Printing out tasks, answer sheets and signal cards;

- cultivation of bacterial culture;

- preparation of laptops and the establishment of special access to the Internet, etc.

2. Working with Volunteers for Stress Tests

The group consisted of 20 people, mainly from NU undergraduate and graduate students, as well as 2 NU PhD students, one ENU student and one employee of a medical organization (both former Olympians).

The number of participants in the stress tests was agreed with the Daryn center, whose employees were afraid of leaking tasks. That is why the number was significantly less than in the IBO 2023 stress tests. Also, all participants signed a non-disclosure agreement.

Unfortunately, the stress test was conducted for only four practical exams, since the tasks of the theoretical exams were not yet ready by that time.

The composition of the test takers was selected to replicate the corresponding levels of IBO participants. So, among the test-takers were those who have skills and experience in biological laboratories (15 people), they represent participants with a high level of training. There were also students with little or no experience in biolaboratories (5 people), they represent participants without training.

3. Stress tests

On March 16, Nazarbayev University held stress tests of the IBO practice exams. The tested volunteers were divided into four groups:

Exam time for each of the groups

	Molecular biology	Bioinformatics	Animal Anatomy and Physiology	Biochemistry
09:30 – 11:00	Group "A"	Group "B"	Group "C"	Group "D"
11:30 – 13:00	Group "D"	Group "A"	Group "B"	Group "C"
14:00 – 15:30	Group "C"	Group "D"	Group "A"	Group "B"
16:00 – 17:30	Group "B"	Group "C"	Group "D"	Group "A"

General schedule:

09:00 - 09:20 briefing;

09:30 - 11:00 First exam

11:00 - 11:30 Break

11:30 - 13:00 Second exam

13:00 - 14:00 Lunch

14:00 - 15:30 Third exam

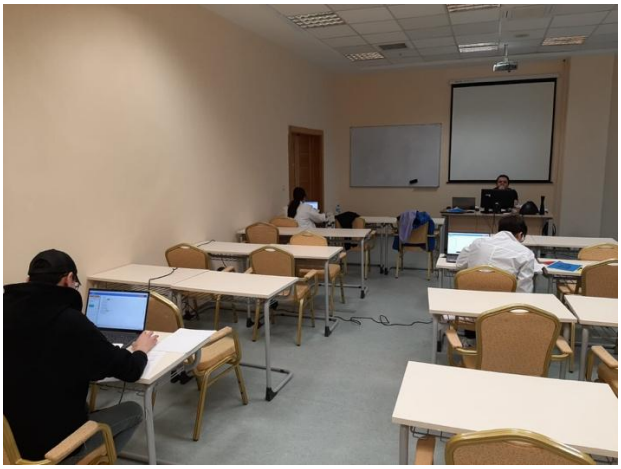
15:30 - 16:00 Break

16:00 - 17:30 Fourth exam

17:40 - 18:00 Feedback

Stress tests went according to plan, there were no delays or problems.






4. Feedback

After stress tests, the tested volunteers filled out a questionnaire that included questions for each of the exams (organizational moments, whether there was enough time, the complexity of the tasks, whether it is convenient to use the equipment, etc.).

The supervisors of each of the exams wrote reports in which they described in detail the details and nuances of the organizational part, as well as conclusions on the text of the tasks and the need for additional stress tests. Supervisors also checked the participants' answer sheets in order to identify which tasks all participants coped with and which no one coped with (in both cases, the tasks need to be changed or removed), and in order to identify the time it takes to check the work of one participant (this is necessary to identify the time to check the work of all participants).

As a result, all the supervisors noted that the stress tests turned out to be very useful: there were ideas for improving the tasks, recommendations for assistants and volunteers on the preparation of laboratory materials, there was an understanding of how volunteers and assistants would have to change materials between groups of students, and "risk zones" were identified.

Moderation

In Kazakhstan, this process is referred to as an *appeal*, so both terms may be used interchangeably throughout this document.

At IBO 2024, the moderation system introduced at IBO 2023 was implemented once again. For each of the three practical exams graded manually (Biochemistry, Molecular Biology, and Human Anatomy and Physiology), six tables were set up. Each table was staffed by a qualified representative of the respective exam—either a supervisor, task author, or assistant—who had the authority to adjust students' scores when deemed necessary. This system allowed up to six countries to be processed simultaneously. With each country allocated a 20-minute time slot, the entire moderation process could theoretically be completed in four and a half hours. Team leaders were not required to queue or wait, as they were provided with a detailed moderation schedule in advance.

In practice, however, many countries did not attend their scheduled moderation sessions at IBO 2024.

Additionally, two separate tables were assigned for the exams evaluated automatically—Bioinformatics and Theoretical Exams. These tables operated on a first-come, first-served basis without a fixed schedule.

Specific details and nuances of the moderation process for each exam are described in the respective exam reports below.

The following sections present individual reports from each of the exam supervisors and the report form inspector.

Animal Anatomy and Physiology

General Provisions and Stages of Preparation and Implementation of the Practical Round in the Section of Animal Anatomy and Physiology of the IBO

1. Editing of tasks
2. Consultation of assistants and volunteers
3. Preparation for the exams
4. Participation in subgroup discussions of the experiment tasks
5. Participation in the discussion of experiment tasks with representatives of participating countries (international jury members)
6. Conducting exams for four streams of participants
7. Evaluation of participants' answers
8. Handling of appeals from country team representatives
9.

According to Contract No. 545 dated October 2, 2023, for services related to the preparation and implementation of the IBO 2024 practical round (hereinafter referred to as IBO), the final stages of the process include the above-listed eight stages: task editing and refinement, discussions with the subgroup and international jury members, preparation of premises and equipment for the experimental round, as well as conducting the practical exam itself, checking the completed tasks, and handling appeals.

Editing of the practical round tasks was carried out from September 2023 to July 2024 by the Scientific Committee members: question authors Bakhytbek Zhalmagambetov and Alikhan Zhumagaliyev, and the practical round supervisor Leila Askarova.

Three scientific assistants and twenty volunteer students from biology faculties of leading universities in Kazakhstan were involved in the preparation and implementation of the practical round. All participants were properly instructed and signed a non-disclosure agreement regarding the structure, content, and details of the practical tasks. Preparation of the room and equipment took place from June 18 to July 8, 2024.

Discussions and editing of the tasks after consultations with the IBO subgroup and international jury members were conducted in two stages—on July 3 and July 8, 2024, at the Park Inn and Radisson hotels. As a result of the discussion, some task formulations were revised, additional markings for dissection trays were introduced, and the general instructions were updated. On July 8, 2024, after all corrections, the final version of the practical round tasks was approved by anonymous voting of the international jury members: 93% voted "for," 2% abstained, and 5% voted "against."

The IBO practical round on animal anatomy and physiology was held on July 9, 2024, at Nazarbayev University (NU), School of Sciences and Humanities (SSH), block 7, in room 7e.125/3 of the test center, from 09:00 to 19:30.

The exam was held in 4 streams:

- Group 4: 72 participants (09:00–10:30)
- Group 3: 73 participants (11:30–13:00)
- Group 2: 72 participants (15:30–17:00)
- Group 1: 73 participants (18:00–19:30)

Evaluation of participants' responses was done using a blind method (graders had access only to the participant ID number). Written answers were double-checked, and dissection works were triple-checked by the Scientific Committee: question authors, the supervisor, and scientific assistants.

After finalizing the results and scoring, all data (including photos of dissection works) were uploaded by the supervisor to the Oly Exams platform and made available for international jury members and team representatives on the morning of July 12.

On July 12, appeals were accepted from representatives of 76 participating countries between 15:00 and 21:00. The appeals were processed by the Scientific Committee, question authors, the supervisor, and scientific assistants. After moderation and correction of scores, all results were updated and made available to participating countries on the Oly Exams platform by 21:30.

1. Editing of Tasks

The editing of the tasks was conducted via online Zoom conferences from September 2023 to July 2024. The structure and details of the tasks were discussed under strict confidentiality from September 2023 to March 2024 only among the members of the Scientific Committee: authors B. Zhalmagambetov and A. Zhumagaliyev, supervisor L. Askarova, and heads of the Scientific Committee I. Sakimov and A. Sagintaev.

From May to July 2024, scientific assistants B. Zhaisangbayeva, A. Zhumakhanova, and K. Sydykova were involved in the task discussion and editing. A total of 17 online meetings were held, during which tasks in Part B were revised and completely replaced (instead of statistical problems, electrophysiology tasks were added). After the March 2024 stress tests, several tasks were also added to Part A (on the functions of eye structures identified by participants, as well as behavioral biology and hormonal responses to predator presence).

The Zoom meetings of the Scientific Committee took place on:

- October 21, 2023 – discussion of regulations, logistics, and equipment
- November 11, 2023 – interviews with scientific assistants and approval of their candidacies
- December 27, 2023 – discussion of received equipment and editing of Part A tasks
- February 10 and 17, 2024 – editing of Part A tasks
- February 18 and 25, 2024 – complete replacement and editing of Part B
- March 3, 2024 – general review and editing of all tasks

- April 6–7, 2024 – discussion of stress test results, inclusion of new tasks, and equipment procurement
- April 28, 2024 – editing of the updated Part A tasks
- May 31, 2024 – final proofreading and grammar editing of both parts
- June 1, 2024 – introduction of scientific assistants to the practical round
- June 9, 2024 – final editing of diagrams and illustrations
- June 27–29, 2024 – discussions with assistants on logistics, group assignments, and preparing for potential appeals

The final version of the animal anatomy and physiology practical round tasks was approved by the Scientific Committee and uploaded to the Oly Exams platform for subsequent review by the subgroup and international jury members. The main author of the tasks was B. Zhalmagambetov.

2. Consultation of Assistants and Volunteers

During the preparation period from May to June 2024, volunteers for the practical rounds were recruited through direct outreach among students from biological, biotechnological, biochemical, and medical faculties of leading universities in Kazakhstan. Out of 130 applications, 20 volunteers were selected by supervisor L. Askarova for the Animal Anatomy and Physiology section. These volunteers were second- and third-year students of Nazarbayev University (Astana), Suleyman Demirel University (Almaty), Astana International University (Astana), and L.N. Gumilyov Eurasian National University (Astana), all of whom had proper laboratory experience.

To facilitate better preparation for the practical round, improve understanding of the experimental logistics, and provide orientation on the NU campus, the supervisor created a Volunteer Guide specifically for the students. This concise manual described the functions, roles, rights, and responsibilities of volunteers, as well as the benefits and significance of volunteering in organizing such events. The guide included:

- A campus map,
- Key contact information of the supervisor and assistants,
- Links to training materials on biosafety,
- First aid procedures,
- Proper labeling and disposal of biohazardous waste,
- Short training courses from platforms like CITI Training and WHO on hand hygiene and biological lab safety.

The Volunteer Guide is attached to this report.

On July 6, 2024, a health, fire safety, and workplace safety training session was conducted on the NU campus. The structure and logistics of the practical round were explained. Volunteers were divided

into three groups under the guidance of assistants, with specific roles and duties assigned to each participant. Volunteers received lab coats with the IBO logo, caps, bags, and badges. All volunteers signed a non-disclosure agreement regarding the content and structure of the practical round tasks.

Image 1: Health and workplace safety briefing for volunteers.

On July 7, 2024, a team-building activity was organized to strengthen social ties and foster team spirit. A first rehearsal of the logistics for the practical round was conducted. Volunteers were also involved in the final setup of participants' desks. A separate briefing was conducted on etiquette and communication norms with Olympiad participants, jury members, and IBO organizers.

Image 2: Biosafety briefing for volunteers.

On July 8, 2024, practice sessions were held involving simulation of various scenarios (e.g., how to provide first aid, how to react to a fire alarm, how to properly escort participants to the restroom, etc.).

Consultation of scientific assistants took place via direct contact with the supervisor from March to July 2024. On June 28, 2024, the assistants underwent a general training session on sanitary norms and occupational health provided by NU's Department of Health and Safety. They also presented valid CITI biosafety certificates.

Each assistant was assigned to supervise between 3 to 7 volunteers, depending on the team's function:

- Balnur Zhaisangbayeva was responsible for preparing sterile equipment for each participant's desk (magnifying glasses cleaned with 70% ethanol and Kimwipe lint-free tissues, new dissection sets including forceps, sealed sterile scalpels, disposable plastic aprons, face masks, disinfected safety goggles, and stationery), as well as for ensuring confidentiality, secure transport, and scanning of the dissection work after the exam.
- Adina Zhumakhanova handled documentation (photographing dissection work in the correct position), file labeling, and transfer of electronic data to secure cloud storage for further evaluation, archiving, and review by country representatives.
- Kamilya Sydykova was responsible for the double disinfection of work surfaces using 70% ethanol after dissections and preparing them for the next group, sorting Class A and B medical

waste, placing sharp instruments (e.g., used scalpels and needles) into special sharps containers, as well as proper autoclaving and disposal of general and biohazard waste after the exam.

Image 3: Presentation of certificates to IBO practical round volunteers from the Animal Anatomy and Physiology section on July 10, 2024.

3. Preparation for the Exams

Between June 10 and June 28, 2024, the required equipment was received from the warehouse manager of RSE NCTC "Daryn," G.M. Dyussembayeva (a complete inventory is listed in the acceptance-transfer acts attached to this report). The equipment was stored from June 10 to June 28 in Laboratory 9.408, Block 9 of Nazarbayev University (NU), with access limited to the supervisors of the practical round. From June 28 to July 14, 2024, the equipment was moved to room 7e.125/2, reserved for the duration of the Olympiad and accessible only to the supervisor and assistants of the Animal Anatomy and Physiology section.

Room 7e.125/3 of the Test Center in Block 7 of NU's School of Sciences and Humanities was reserved for the entire duration of the Olympiad for conducting the animal anatomy and physiology practical round.

Image 4: Classroom 7e.125/3, Block 7, School of Sciences and Humanities, Nazarbayev University, designated for the practical round.

On June 28, 2024, desks and chairs were transported to Block 7, and divider panels were assembled. On June 29, the supervisor and assistants moved the desks into room 7e.125/3 and arranged them according to the electrification plan created by the supervisor in March 2024, ensuring 1 meter of spacing between desks and 90 cm between rows. The room was professionally cleaned.

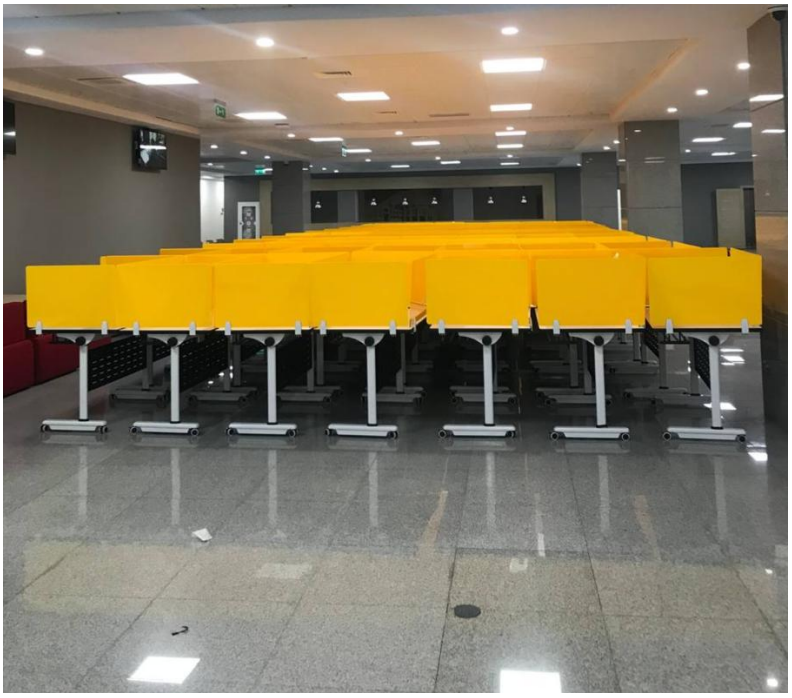


Image 5: Dividers and desks assembled in the test center hallway before transport to room 7e.125/3.

Image 6: Furniture arranged in room 7e.125/3 after setup.

On June 30 and July 1, 2024, the USM team installed power outlets at each desk. For safety, all cable routes were marked with yellow lines.

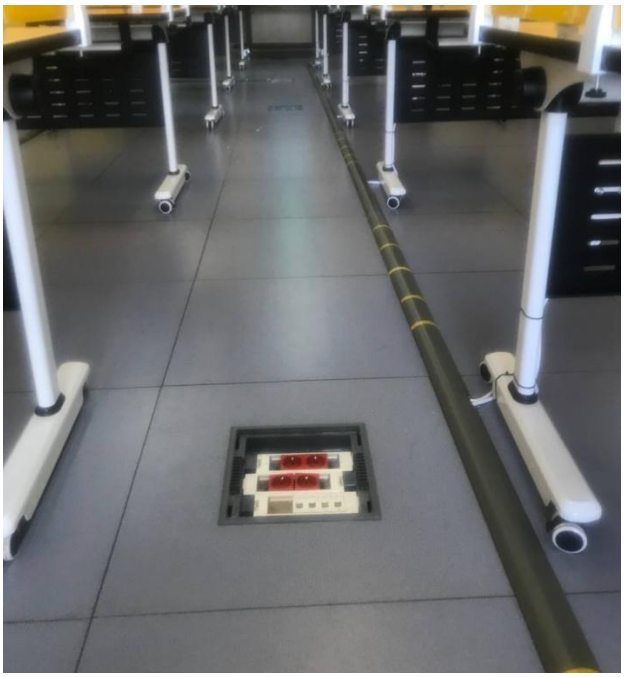


Image 7: Installation of electrical outlets.

On July 2–3, 2024, interactive boards were transported and assembled. On July 4, they were configured and synchronized for countdown timers by the supervisor, L. Askarova.

On July 5, ID number charts (according to seating assignments) and national flags were printed and attached to the desk dividers.

Image 8: Sticking participant ID numbers and country flags on dividers.

Between July 3 and 5, 2024, 5,000 tailor's pins were sorted by color and checked for quality and sharpness for the dissection of sheep eyes. 527 pins were painted black for colorblind participants. Dissection foam boards were labeled with Brady tape printers according to participant ID numbers. Special dissection trays were prepared for colorblind students containing only black pins and numbered flag-tags.

Additionally, 100 containers were labeled for biohazardous waste, household trash, and sharps. Each was lined with a 5-liter autoclave bag with specialized thermal tape for indicating successful autoclaving.

Desk lamps were equipped with bulbs and checked (2 defective bulbs were found).

On July 5, room 7e.125/2 was organized as a storage area. All equipment was labeled and inventoried by the supervisor.

Image 9: Sorting tailor's pins for Task A's dissection assignment.

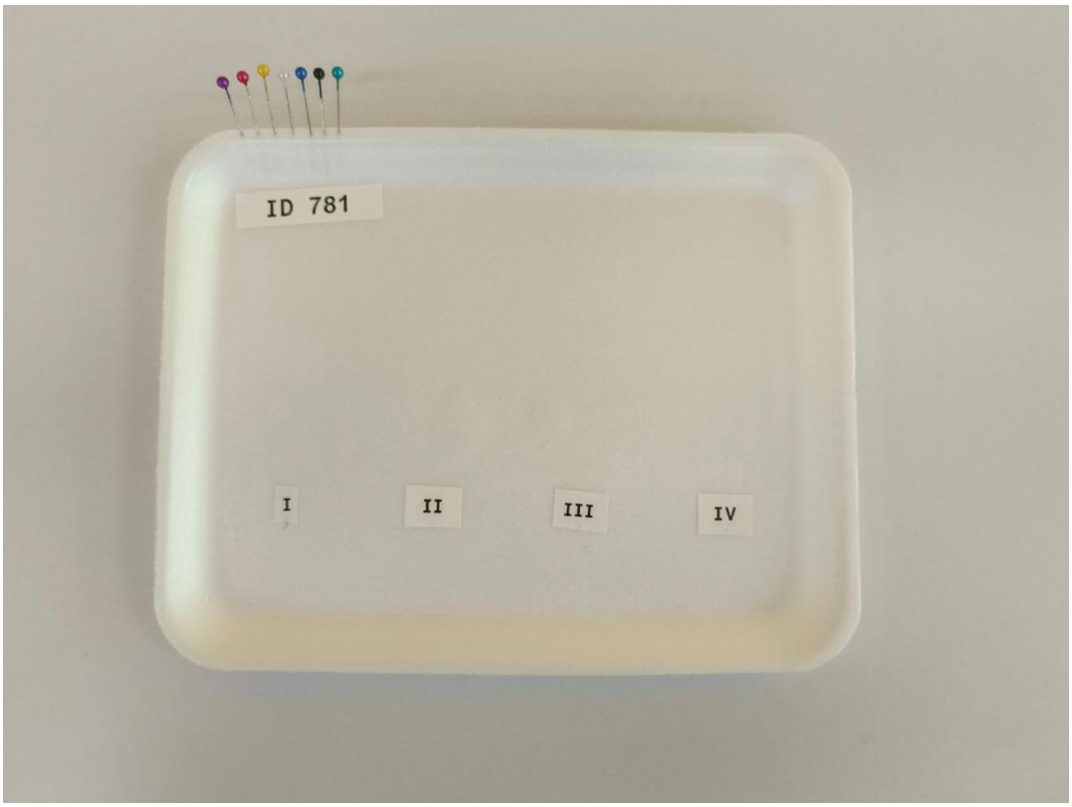


Image 11: Example of foam dissection board for sheep eye structures in Task A.1.

Image 12: 410 foam dissection boards were prepared in total.

A medical first aid kit was assembled by the supervisor and assistants. It included:

- 6 bottles of sterile saline,
- 180 antibacterial plasters,
- 20 packs of sterile bandages,
- 4 elastic bandages,
- 4 packs of tourniquets,
- 2 splints,
- 2 packs of cotton pads,
- 8 bottles of 2% hydrogen peroxide,
- Antihistamines, analgesics, antispasmodics, Panthenol, ammonia, valerian extract,
- A blood pressure monitor, stethoscope, and thermometer.

Image 13: First aid kit assembled by the Scientific Committee team.

On July 7, 2024, 70% ethanol was prepared by diluting 96% industrial alcohol with double-distilled water (13 liters of 96% alcohol + 4.83 liters of distilled water = 17.83 liters total). The preparation was done under a laboratory fume hood.

On July 8, ethanol was distributed into 80 plastic wash bottles—one for each participant's desk.

From July 6 to 8, volunteers were fully briefed. Scenario rehearsals and first aid training were completed. In the evening, all participant desks were disinfected again with 70% ethanol and fully set up for the exam. Desk lamps were installed and checked, timers were synchronized, signal cards placed, and clip holders for cards were fixed to the divider walls.

Image 14: Sample participant desk equipped for the experimental section of the anatomy and physiology practical exam.

The setup included:

- Desk lamp, cube timer, four signal cards, autoclave-lined waste bin with indicator tape, paper towel roll, 200ml ethanol wash bottle, dissection tray, 5x magnifying glass, safety goggles, plastic forceps, individually sealed sterile scalpel, disposable mask, polyethylene apron, foam board with pins for final sheep eye dissection submission, and stationery (ruler, pen, pencil).

The sheep eye sample was handed out at the start of the exam.

4. Participation in the Subgroup Discussion of the Experiment Tasks

On July 3, 2024, from 09:00 to 20:00, a discussion of the experiment tasks was held with the IBO Subgroup, followed by the correction of question wordings and task descriptions. Thanks to high-quality feedback and valuable comments from the subgroup members, several stylistic and punctuation changes were made to the task descriptions. Additional safety points were included in the dissection instructions, and minor grammatical inaccuracies were corrected. The supervisor and the question

authors also familiarized themselves with the Oly Exams platform's functionality, which later facilitated faster processing of comments during discussions with representatives of participating countries.

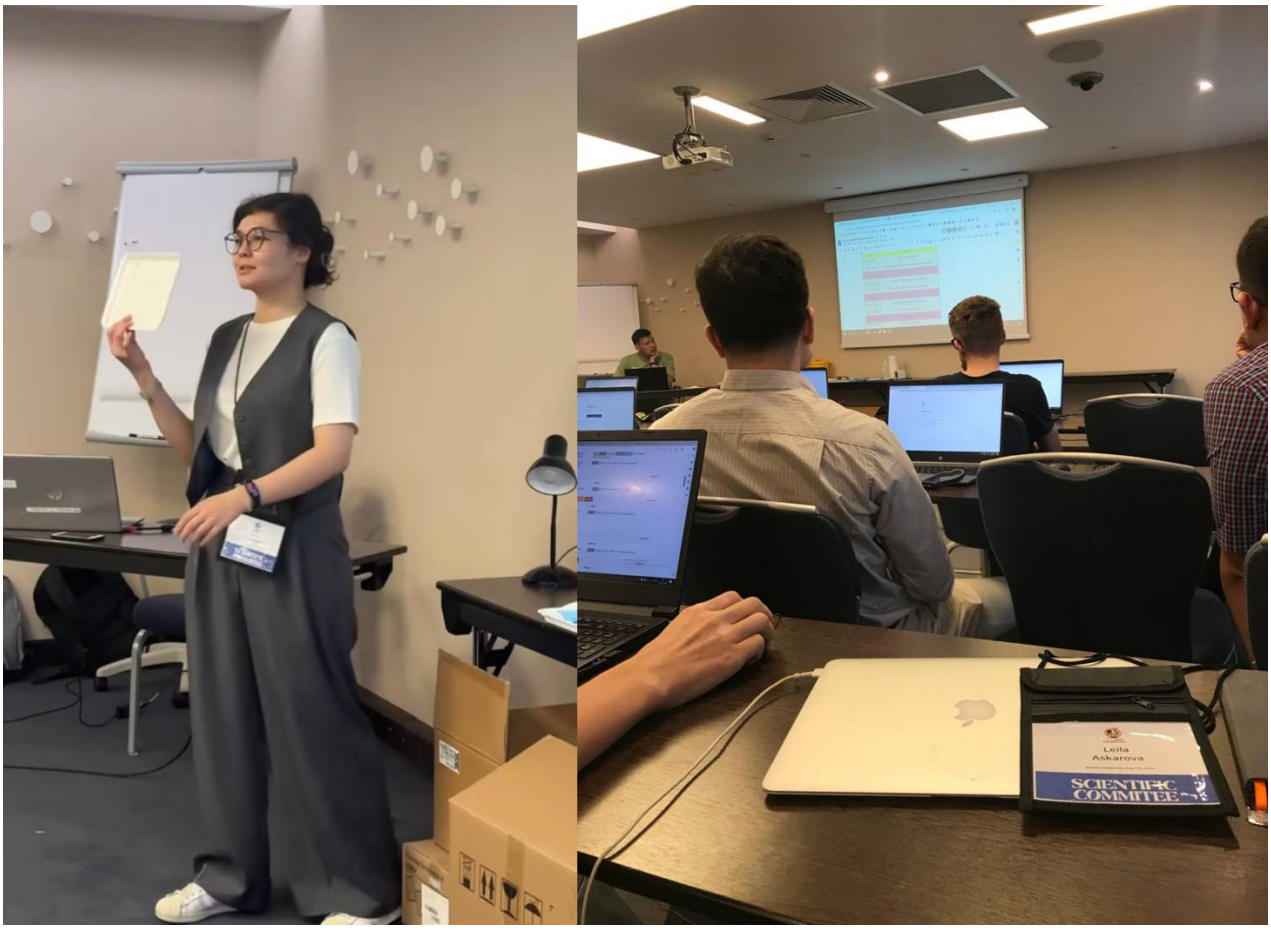


Image 15: Presentation by supervisor L. Askarova at the subgroup discussion on the experimental section of the practical round.

5. Participation in the Discussion of the Experiment Tasks with Representatives of Participating Countries (International Jury Members)

On July 8, 2024, from 09:00 to 20:30, the experiment tasks were discussed with approximately 300 international jury members. This discussion included the correction of task wordings and descriptions.

The supervisor and question authors presented the structure and content of the experimental section of the practical round to the jury members, demonstrated the equipment used, and showed examples of dissection work completed by participants during the stress tests held in March 2024.

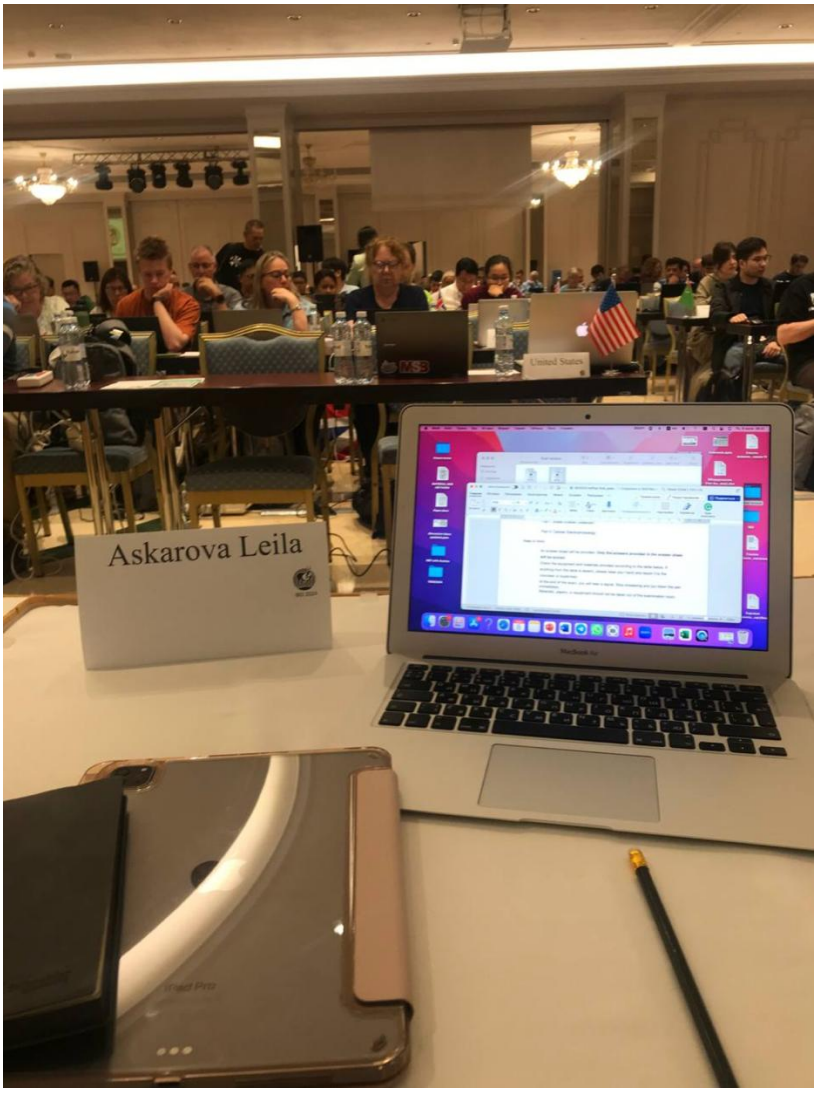


Image 16: Discussion of practical round tasks with country representatives.

During the discussion, 305 comments were received and processed via the Oly Exams platform. Most comments concerned the phrasing of statements and the correct terminology and definitions during translation. Based on a general vote of the international jury members, question 1.3.5 (regarding octopus vision specifics) was excluded, as it required deep factual knowledge of invertebrate anatomy.

On July 8, 2024, at 20:26, the final version of the Animal Anatomy and Physiology practical round tasks was approved by anonymous vote, with 93% voting in favor. The tasks were then sent for translation and subsequent printing.

6. Conducting the Exams for 4 Streams of Participants

The IBO practical round in Animal Anatomy and Physiology was conducted on July 9, 2024, at Nazarbayev University (NU), Block 7 of the School of Sciences and Humanities (SSH), in classroom 7e.125/3 of the Test Center, from 09:00 to 19:30.

The practical exam was held in four streams:

- Group 4: 72 participants (09:00–10:30)
- Group 3: 73 participants (11:30–13:00)
- Group 2: 72 participants (15:30–17:00)
- Group 1: 73 participants (18:00–19:30)

During each 1-hour break between groups, volunteers and assistants conducted complete disinfection of desks and equipment, and the classroom and adjacent rooms were ventilated.

- The average temperature in classroom 7e.125/3 during the exams was 21°C, with constant air convection.
- Classroom 7e.125/2, used for storing dissection materials throughout July 9, maintained a temperature of 18°C.

Samples for dissection were opened 30–40 minutes before each exam by A. Zhumagaliyev and L. Askarova. Each sheep eye was removed from formalin packaging, rinsed twice in 70% ethanol, placed in a 50 ml plastic lab beaker, and delivered to each participant on a dissection tray.

During all four exam streams, and in between, the supervisor maintained an official protocol, recording exam start and end times for each group as well as any incidents or technical issues.

Image 17: Group 1 participants completing practical tasks.

Group 4 (purple lab coats) started at 09:00 and finished at 10:30.

- At 08:55, participant ID 444 (Galymzhan Baktybai) requested an antihistamine, which was administered by a nurse and recorded in the medical log.
- At 09:05, participant Andrea Botero (ID 224) received exam materials with a different participant's ID due to a packaging error by her team leader.
- At 09:37, participant ID 444 from Kazakhstan reported that his answer sheet included question 1.3.5, which was not part of the final version due to a misprint.
- At 10:12, a participant from Saudi Arabia found that their answer sheet was missing true/false column headings, only showing a blank table. They were instructed to label the columns manually.
- At 10:30, participant Karl-Erik Volberg (ID 284) from Estonia stated he had forgotten to transfer his answers to the answer sheet.

Group 3 (green lab coats) started at 11:30 and finished at 13:00.

No incidents were recorded.

Image 18: Participant from Group 3 performing sheep eye dissection.

Group 2 (blue lab coats) started at 15:30 and finished at 17:00.

- At 15:22, participant ID 141 from Latvia requested medical attention for itchy mosquito bites. An antihistamine ointment was applied and logged in the medical journal.
- Two incidents occurred during the exam and were reported to independent observers. They are detailed in the official exam protocol (see attachment).
  - Participant ID 442 reported a defective dissection sample.
  - Participant ID 192 required eye irrigation with sterile saline.

Excerpt from the Exam Protocol:

On July 9 at 15:32, participant ID 442 (Dias Suleimenov, Kazakhstan Team) from Group 2 reported that the sheep eye sample lacked the structure that was supposed to be identified and marked.

Quote: "The spherical component fell out without any attachment. I marked the place where it is normally located with the designated color pin."

After the exam, he was given an additional 5 minutes to dissect a new sample.

At 16:45, participant ID 192 (Lawrence Luo, Canada Team) experienced eye irritation and requested medical help. After receiving aid, he resumed the exam and was given 2 minutes 35 seconds of extra time to finish.

Both participants remained in the classroom under observation by three independent inspectors to use their additional time.

Group 1 (red lab coats) began at 18:00 and ended at 19:30.

No incidents were recorded.

After the experimental section of the practical round, volunteers and assistants conducted a two-stage disinfection using 70% ethanol. Floors and walls were cleaned by the professional cleaning team using soap and chlorine solutions.

Medical waste (Class A and B)—used gloves, aprons, tissues, etc.—was sterilized in Systec V75 autoclave under protocol 4 for both solid and liquid waste, and disposed of in Block 7 of NU.

After evaluation of dissection works, all sharp instruments (needles and disposable scalpels) were disinfected with 70% ethanol and 5% sodium hypochlorite, then placed into leak-proof, puncture-resistant sharps containers for safe disposal by NU's Occupational Health and Safety Department.

Biologically hazardous waste, including sheep eye tissues preserved in formalin, was placed into autoclave bags and frozen at -80°C for later incineration by NU School of Medicine's Safety Department.

Foam dissection boards, which could not be autoclaved, were disinfected with 70% ethanol and 5% sodium hypochlorite, then discarded as general waste.

7. Evaluation of Participants' Answers

The evaluation of participants' dissection work was carried out on the evening of July 9, 2024, immediately following the experimental section. Each dissection task was reviewed three times using a triple-blind method by the question authors B. Zhalmagambetov and A. Zhumagaliyev, as well as the supervisor L. Askarova. The final scores, including points for each identifiable structure, were recorded in an Excel file accessible only to members of the Animal Anatomy and Physiology Scientific Committee.

Image 19: Example of a correctly completed sheep eye dissection.

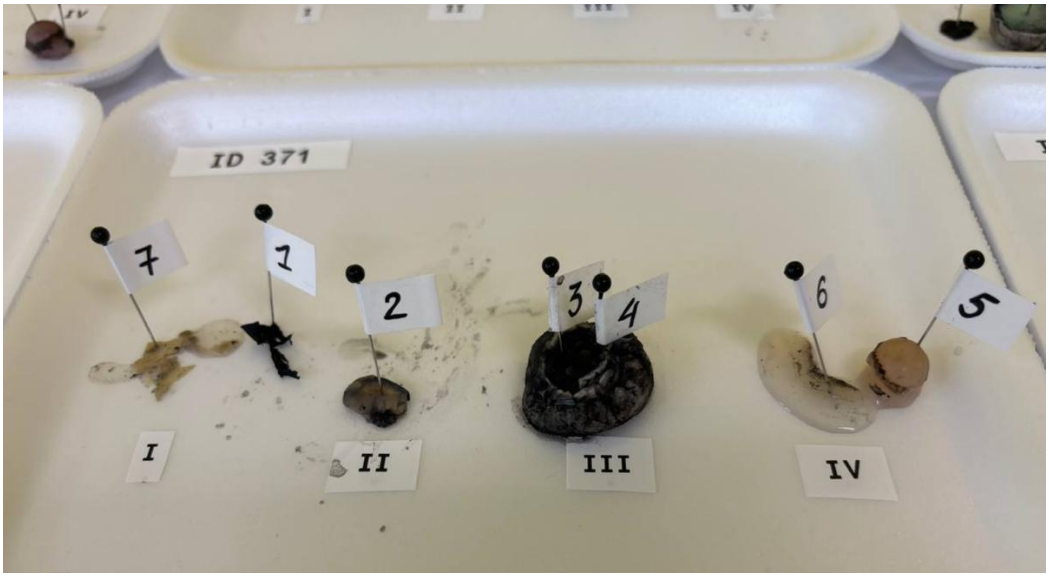


Image 20: Example of a dissection by a color-blind participant. No colored pins were used; instead, pins with numbered flags were applied, with each number corresponding to a specific structure.

The written answer sheets were evaluated on July 10, 2024, by the supervisor L. Askarova and assistants B. Zhaisangbayeva, K. Sydykova, and A. Zhumakhanova. On July 11, 2024, the entire Scientific Committee—including the supervisor, assistants, and question authors—conducted a second round of checking to eliminate any scoring errors or miscalculations.

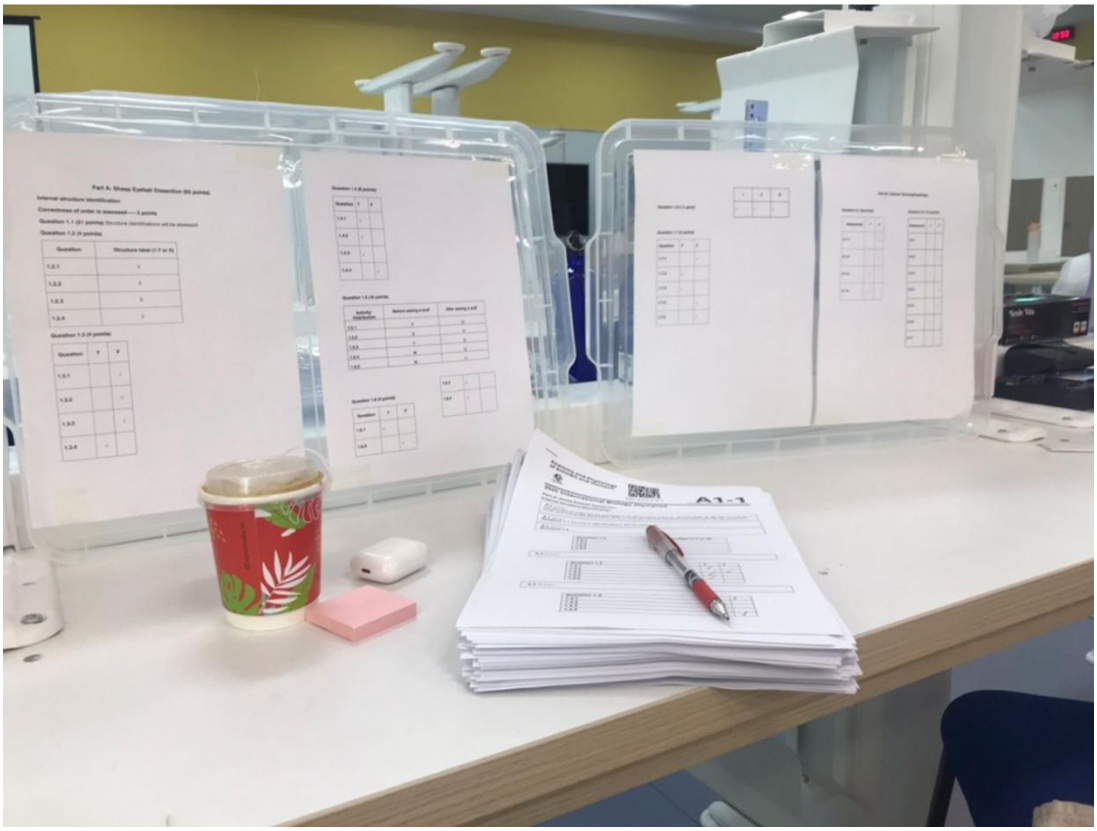


Image 21: Evaluation of participants' written responses.

Late at night on July 11, 2024, participants' total scores were uploaded to the Oly Exams platform. Due to the large file volume (over 1 GB) and the number of dissection work photographs, the data became available to participating countries at 16:00 on July 12, 2024.

8. Handling of Appeals from Team Representatives

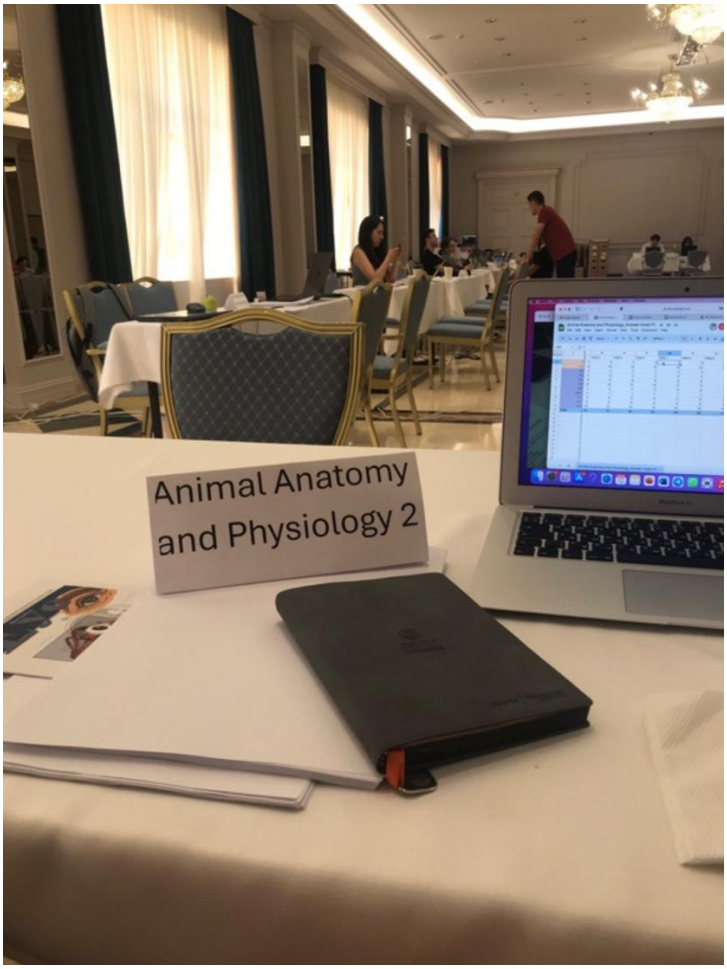


Image 22: Appeals table no. 2 for participating team representatives.

On July 12, 2024, from 15:00 to 21:00, the appeals process was held for team representatives. Score moderation was also carried out.

All members of the Scientific Committee of the Animal Anatomy and Physiology section were involved in the appeals:

- B. Zhalmagambetov
- A. Zhumagaliyev
- B. Zhaisangbayeva
- A. Zhumakhanova
- K. Sydykova
- L. Askarova

In total, 218 requests were reviewed. Most teams requested:

- To view photographs of dissection work, and
- To receive clarification on why points were awarded or deducted for specific eye structures.

The appeal process proceeded smoothly, without conflicts or incidents.

By 21:00, after the final participants had been moderated, all scores for the section were finalized on the Oly Exams platform and submitted for official confirmation by country representatives. On the morning of July 13, 2024, all results were approved and signed by the team representatives.

Report prepared by

Supervisor of the practical round of the

Animal Anatomy and Physiology section of the

International Biology Olympiad IBO 2024

Leila Serikovna Askarova

Reviewed and approved by

Scientific Assistants of the Animal Anatomy and Physiology section:

- *Balnur Armanovna Zhaisangbayeva*
- *Adina Talgatovna Zhumakhanova*
- *Kamilya Turashevna Sydykova*

July 23, 2024

Molecular Biology

1. Tasks editing

In the period from November 2023 to July 8, 2024, the tasks in molecular biology were edited. Significant corrections were made in the practical part of the tasks according to the experiments carried out on the cultivation of bacterial culture and plasmid isolation. Centrifugation cards were developed. The text and tasks were adjusted taking into account the time allocated for the exam.

2. Acceptance and testing of equipment

In the period from December 9, 2023 to February 2024, the acceptance of equipment and consumables for the IBO 2024 Olympiad was carried out. The report was submitted.

In the course of preparation for the Olympiad, the necessary items were also identified and purchased: microcentrifuge tubes, trays, racks for centrifuge tubes, washers, round labels for microtubes, bags and cartridges for inscriptions on test tubes.

3. Consultation of assistants and volunteers

During the preparation for the exams, 5 presentations were prepared for the training of assistants and volunteers.

Recruitment of volunteers was carried out by calling after they filled out the form. For the practical round of molecular biology, volunteers with experience in the laboratory and with equipment were selected. Volunteers were consulted daily on accommodation, meals, and other emerging issues.

Online and offline meetings were held with the assistants, where the tasks, expected results were explained and responsibilities were divided:

1) Zhansaya and Nargiz: bacterial cultures for OD and for plasmid isolation, filling into test tubes. Guys, you will be actively involved from the evening of July 6 to the morning of July 9. On July 7, you need to give out 4 time points (9:00 (0 hours), 12:00 (3 hours), 15:00 (6 hours) and 21:00 (12 hours). Then 24 hours at 9:00 the next morning, the 8th. Then, on July 8 at about 6 am, you need to make a starter culture, which will be ready in the evening of the same day. which must be issued on July 9. In the morning around 6-7 a.m. and place in the refrigerator, ready to use. A sufficient amount of LB media must be prepared in advance. It is also necessary to order shakers and prepare everything necessary for growing bacteria, such as flasks and so on. We need to close the common room for this period so that no one can actually change the shaker settings.
2) On the day of the exam (July 9), Zhansaya will take OD measurements for each group on a spectrophotometer, Nargiz will isolate 1 plasmid for reference. In general, during the exam, Zhansaya and Nargiz will observe the exam and will come if the students raise the "question" cards.
3) Marina: responsible for our 30 volunteers to make sure they are all present and follow the instructions. Dana will prepare a WhatsApp group with volunteers. If another helper needs

volunteers, you need to organize them accordingly. Make sure they use the centrifuge correctly. It is necessary to clean the tables after each group with volunteers, throw away the glasses for liquid waste (in the yellow container for volunteers), rinse with water and then ethanol, throw away all test tubes (prepare bags for autoclaving), wipe the table with ethanol if necessary. Replace all this with volunteers and Ayagoz. Bring ice with volunteers. Collect all the papers after they are completed (Dana, Marina). After the examination, all waste should be collected, liquid waste should be disposed of with bleach, and solid waste (tips, tubes, gloves, paper napkins) should be autoclaved.

4) Ayagoz: Responsible for all the equipment and things that are on the student's desk during the exam. Equip the students' tables with equipment and everything necessary. Spectrophotometers should be turned on in advance (July 9), since the warm-up time is 20-30 minutes, and check if they all work (it is better to check everything a week before the exam). Check all the things on the student's desk. Make sure that the ice has not melted and that all the tubes are on the table. The works will arrive shortly before the exam, and they must be immediately put on the table (Dana, Ayagoz). All equipment must be packed back and placed in the storage room. All cuvettes should be thoroughly rinsed, placed in the cuvette holder and packed with spectrophotometers. We need to leave cards on the table (toilet, water and question).

4. Exam Preparation

From June 1 to July 5, 2024

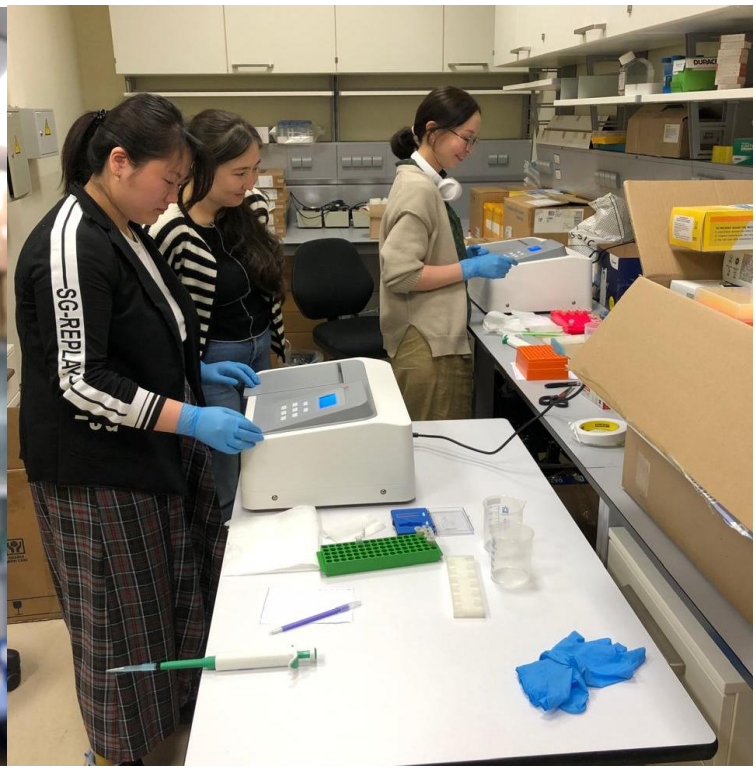
- Reception and accommodation of equipment for IBO practice tours 2024.
- Communication with Nazarbayev University regarding the use of equipment, reservation of premises and request for the necessary reagents.
- Conducting additional experiments to improve the protocol in the practical molecular biology tour
- Tube and bottle labeling
- Filling a mini-prep for plasmid isolation
- Equipment and pipette preparation
- Table arrangement
- Sticking Student Flags and Codes
- Arrangement of tables for volunteers
- Placing objects on the students' tables

Labeling of tubes was done according to the following scheme:

No.	Tasks	Labels	Amount	Quantity
1	Resuspension buffer	B1 (red label)	300 µL	310 tubes (1.5 ml)
2	Lysis buffer B2 (blue label)	B2 (blue label)	300 µL	310 tubes (1.5 ml)
3	Neutralization buffer	B3 (yellow label) on ice	500 µL	310 tubes (1.5 ml)
	We need to add ethanol to the neutralization buffer			
4	Wash buffer 1	W1 (green label)	300 µL	310 tubes (1.5 ml)
5	Wash buffer 2	W2 (orange label)	500 µL	310 tubes (1.5 ml)
6	DNA Elution buffer	E (white label)	70 µL	310 tubes (1.5 ml)
7	Spin columns	Spin column		310 tubes (2.0 ml)
8	Overnight bacteria culture (PI) for plasmid isolation	PI	2 ml	310 tubes (2.0 ml)
9	LB culture broth for blanking (labeled Blank)	Blank	2 ml	310 tubes (2.0 ml)
10	Bacteria culture for OD measurements (labeled with numbers 1-5)	1		310 tubes (2.0 ml)
11		2		310 tubes (2.0 ml)
12		3		310 tubes (2.0 ml)
13		4		310 tubes (2.0 ml)
14		5		310 tubes (2.0 ml)
15	ddH2O water	ddH2O	1500 µL	640 tubes (two tubes for each student)
16	Wash bottle with water	Distilled or Mili-Q Water		80 bottles
17	250-liquid waste beaker	Liquid waste		80 beakers
18	Solid waste bin yellow	Solid waste		80 bins
19	Clean 1.5 ml microcentrifuge tube for elution	Clean 1.5 ml tube		310 tubes (1.5 ml)
20	Clean 2 ml microcentrifuge tube for plasmid dilution	Clean 2.0 ml tube		320 tubes (2.0 ml)
1	waste bin yellow for volunteers to collect liquid waste	Waste		30 bins
2	Balance Step 1: 2 ml tube containing water	Step 1	2 ml	30 tubes (2.0 ml)
3	Balance Step 5: 2 ml tube containing water	Step 5	~850 µL	30 tubes (2.0 ml)
4	Balance Step 5: spin column containing water	Step 6	~800 µL	30 tubes
5	Balance Step 6: spin column containing water	Step 7	~200 µL	30 tubes
6	Balance Step 8: spin column containing water	Step 8	~400 µL	30 tubes
7	Balance Step 9: spin column containing water	Step 9	~40 µL	30 tubes
8	Balance Step 11: 1.5 tube with column containing water	Step 11	~30 µL	
9	50-liquid beaker with water	Water		30 beakers

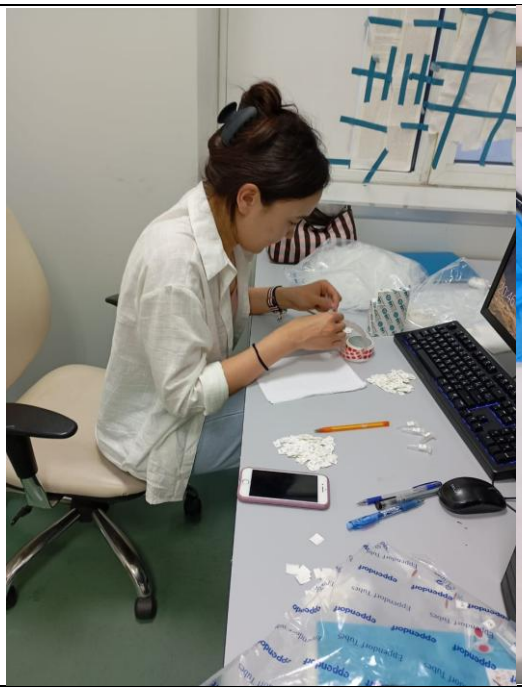
10	Micropipette for 20-200 ul			30 pieces
11	Tips for the 20-200 ul			30 pieces
12	Spray bottles with 70% ethanol	70% ethanol	250 ml	28 bottles
	Ice (C4.517, C4 2nd floor go right from the lift, 9th block turn left from the main lift, then turn left again, go down the corridor)			
1	Set up the lamps			80 pieces
2	Check pens and markers			160 pieces
3	Set up timers			80 pieces
4	Set up table clocks			80 pieces
5	On the centrifuge lid need to mask the wrong instructions			

- Conducting additional experiments to improve the protocol in the practical molecular biology tour



- Acceptance and placement of equipment and consumables


Tube and bottle labeling





eppendorf
eppendorf


5ml pipetes


13:56

Filling a mini-prep for plasmid isolation

Arrangement of tables and chairs

6 July

- Meeting with volunteers, presentations, explanation of the task and expected results (10:00 – 13:00);
- Presentation for volunteers on safety precautions;
- Introductory presentation on IBO 2024;
- Presentation on the practical tour of molecular biology;
- Collection of volunteer signatures on confidentiality;
- Training of volunteers to work on a centrifuge;
- Accompaniment of volunteers for accommodation, meals, trips.
- Cleaning of the room

Meeting with volunteers, presentations, explanation of the task and expected results

7 July

- Training of two groups of volunteers (10:00-12:00 and 14:00-16:00);
- Training of volunteers to work on a centrifuge;
- Preparation of tubes for balance;
- Cleaning of tables, including centrifuges;
- Preparation of the ballroom for the meeting of students on July 8;
- A clear distribution of roles (determine who operates the centrifuge (25), takes the students to the toilet (2), accompanies them during the request for a drink (2), volunteers who clean the tables, throwing away the test tubes, after each round (3), bring ice (instruct from where) (3), tips for filling (4)).
- Instruct volunteers on how to pack after the hands-on tour.
- Make new tubes for balances (elution volume is 40 µL!)
- Bring water in large bottles.
- Pour the bacterial culture (Nargiz and Zhansaya)
- Freeze Ice

8 July

- Students will come in groups from 9-11 am (Ayagoz and Marina).
- Show them a video on how to use pipettes.
- Show them a safety presentation.
- Students should try on gloves and choose their size so that on July 9th they already know which size is right for them.
- Students should come and look at their tables, find where they are sitting and see what is on the table.
- There should be no equipment in the exam room!
- After the students leave, put all the spare items on the table at the back of the ballroom.
- After the students leave, put spectrophotometers (plus quartz cuvettes) and centrifuges to the appropriate tables and check their performance.
- Place all buffers in the stands on each student table.
- Exhibit test tubes for balances to volunteers
- Place a 200 µL pipette with tip on the volunteer's table.
- Place a 100 ml glass with water.
- Double-check all student desks.
- Go to bed early and relax!

Ready-made apprentice's desk

Ready-made volunteer table

5. **Conducting test drives**

On March 16, 2024, a test drive was carried out, shortcomings were identified, work was carried out on errors, and the report was submitted.

6. **Participation in the discussion of the tasks of the experiment in a sub-group**

On July 3, 2024, a discussion was held on the tasks in molecular biology in the sub-group. During the discussion, important comments on the tasks were given and worked out.

7. **Participation in the discussion of tasks with representatives of the participating countries**

On July 8, 2024, a discussion of the tasks in molecular biology was held with representatives of the participating countries. During the discussion, important comments were given and worked out. 96% of the participants positively assessed the tasks and were sent for translation.

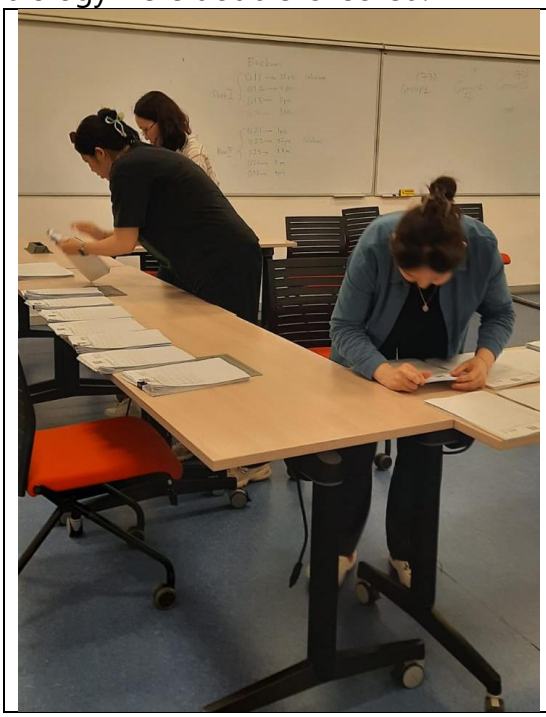
8. **Conducting exams for 4 streams of participants**

9 July

- Check that all volunteers have arrived on time;
- Turn on spectrophotometers and centrifuges (Ayagoz)
- Filling of bacterial culture for plasmid isolation (PI) (Nargiz and Zhansaya)
- Bring ice and place it in the ice container + B3 (Marina).
- Turn on the projector (Dana) and set up the Online Stopwatch https://www.online-stopwatch.com/full-screen-stopwatch/
- Lay out the envelopes on the students' tables (Dana, Arnat, Ayagoz)
- Check if all the reagents and things are on the table (Dana, Arnat, Ayagoz)
- Replacement of reagents on the student tables after each group (the row closer to the entrance is Dana, the middle row is Ayagoz, the back row is Marina)
- Collecting papers and putting them in an envelope (Dana, Arnat, Marina, Ayagoz)
- Scanning (Arnat, Togzhan and Diana)
- Cleaning tables after each group by volunteers. Rinse the ditch, wipe the table with 70% ethanol, arrange things in the original order on the tables.
- Accept the questionnaires and put them on the students' tables.
- Cleaning of equipment, all consumables and preparation of tables for the theory tour on July 11th.

9. Checking participants' answers

In the period from July 10 to July 11, 300 works of students of the practical round in molecular biology were double-checked.



10. Acceptance of an appeal on the exam from participating representatives

On July 12, 2024, the acceptance of appeals from the participating countries took place according to the schedule, from 12:00 to 22:00.

Supervisor of the Practical Tour in Molecular Biology

Erpasheva D.M. 16.07.2024

Bioinformatics

Introduction

Between September 2023 and July 2024, work was carried out to prepare the "Bioinformatics" practical exam for the International Biology Olympiad (IBO) 2024. This report describes the key stages, changes made, and results achieved.

Responsible Individuals

1. Alyamdar Askerov – MSc in Biological Sciences (Nazarbayev University), Biology teacher at Riviera International School. During the preparation and execution period, served as author and supervisor of the "Bioinformatics" practical exam.
2. Shamil Mureev – BSc in Biological Sciences (Nazarbayev University), Software Engineer at Quantori. During the preparation and execution period, served as author and supervisor of the "Bioinformatics" practical exam.

Stage I. Task Development (September 2023 – December 2023)

In September 2023, task development for the "Bioinformatics" practical exam began. First, to better understand the task format, the authors analyzed previous bioinformatics tasks from IBO 2023, IBO 2022, and IBO 2019.

By October, two tasks were created for IBO 2024:

- Task I: Public Health
- Task II: Gene Design

A technical limitation emerged: the absence of a system that could integrate bioinformatics tools with the ability to register participant responses during the Olympiad. This issue was raised with Scientific Committee Chairs Ilyas Sakimov and Adlet Sagintaev. It was decided to consult the organizers of IBO 2023 during the upcoming AB Meeting.

In October, the former organizers from the UAE recommended a platform that could potentially solve the issue. A meeting was held with representatives of the Olimpify platform, where its technical capabilities were demonstrated. The Scientific Committee approved the platform for IBO 2024 use.

A follow-up demonstration was arranged for the "Daryn" National Scientific-Practical Center. After evaluation, "Daryn" also approved the use of Olimpify at IBO 2024.

Stage II. Task Editing (December 2023 – May 2024)

After approval of the platform, existing tasks were refined to match its technical features. The first review with 10 Scientific Committee members recommended increasing the complexity, as the original tasks could be completed too quickly.

A new task was added:

- Task III: Statistical Ecology

Weekly meetings were held every Tuesday at 16:00 (Astana time) with platform representatives Periyakaruppan Krishnamoorthy (PK) and Naga Sai Varun (Varun). As a result, 7 new tools were integrated:

- Chi-square test
- Reverse translation
- Codon optimization
- Alpha-diversity analysis
- NMDS test
- PCA test
- PCoA test

The grading system was adapted to authors' needs, and all questions and resources were uploaded.

Multiple rounds of editing ensured scientific accuracy, robust grading, and clearer descriptions.

In late May, the supervisors exported all tasks into XML format and uploaded them to the OLY-Exam platform for translation.

Stage III. Stress test (March 13–16, 2024)

A participant group of Scientific Committee members in Astana was formed for the test. The exam was scheduled for March 16, with 4 rooms and a storage room secured at Nazarbayev University (NU).

- March 13: Equipment moved into NU storage.
- March 14–15: Laptop setup completed.
- March 16: Test drive conducted. Participants signed NDAs. One laptop was replaced due to software issues.

The test revealed minor task errors and tool bugs. After the test, an online survey (led by Ilyas Sakimov) showed highly positive feedback.

Further improvements were made:

- Platform tools and autograding system were updated.
- Tasks revised per feedback.
- A laptop setup checklist was created for “Daryn” IT staff.

Stage IV. Exam Preparation (May 20 – July 3, 2024)

Bioinformatics required 10 volunteers, not necessarily with biology experience. 11 final volunteers were confirmed (names listed in original report).

Supervisors recorded a video demo of the platform (3 of 14 tools, 9 question types) and uploaded it to YouTube. Delegation leaders received the link.

Olimpify created a universal login for all teams to explore the platform 3 weeks before the Olympiad.

A coordination meeting was held at NU with “Daryn,” NU, and the Scientific Committee.

The exam venue was the Aliya Room, Block 5. Setup steps:

1. Clearing existing equipment.
2. Installing 81 desks/chairs, partitions, dual sockets.
3. Setting up routers, receiving 94 laptops, mice, 4 interactive boards, 85 clocks, 83 desk lamps, and 400 cards.

- 78 participant desks prepared.
- 2 desks reserved for contingencies.
- 3 desks for medical staff, water, and chocolate distribution.

Each desk had a laptop, mouse, lamp, timer, and 4 cards (Restroom, Drinking Water, Technical Question, Other Queries). Each had a flag and participant info sheet (country, name, username, password).

Extra equipment: 17 laptops, 17 mice, 4 timers, 7 lamps, and backup cards.

Seven Wi-Fi access points were created. Speed and voltage tests were conducted — all satisfactory.

Directional signage was prepared for navigation.

By July 3, the room was fully ready. Supervisors greeted a platform representative at Astana Airport.

Stage V. Subgroup Task Discussion (July 3–5, 2024)

On July 3, authors arrived at the Park Inn hotel and familiarized themselves with the IBO subgroup review process.

- July 4, 09:00–09:30: Bioinformatics supervisors and the platform representative (PK) introduced the tasks. Then subgroup members independently read and commented.
- About 80 comments were received. Most were accepted and implemented (~60% on July 4, the remaining on July 5).
- All changes were updated on OLY-Exam.

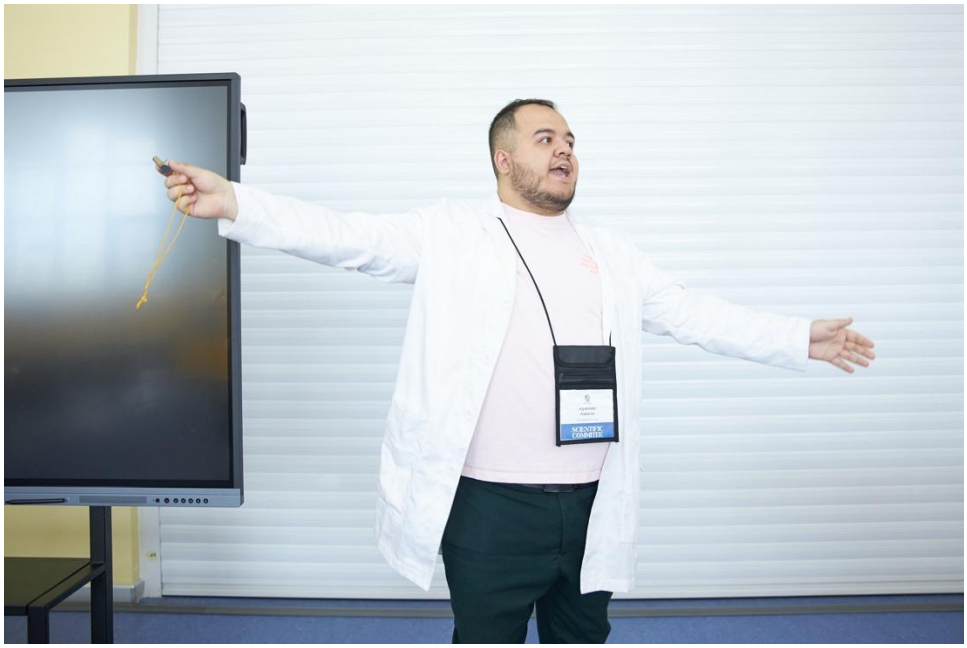
Stage VI. Volunteer Briefing (July 6, 2024)

A WhatsApp group was created for supervisors and volunteers. Volunteers were sent the IBO website link for context.

Volunteer duties (explained in a supervisor-led presentation):

1. Setup help (July 9 & 11)
2. Escorting students between rooms
3. Supervision in restroom areas
4. Monitoring academic honesty during exams
5. Equipment packing (July 10 & 11)
6. Maintaining entry security

A walkthrough tour of NU was conducted.



Stage VII. Discussion with Country Representatives (July 8, 2024)

- Askerov stayed at NU to help participants familiarize themselves with the room and equipment.
- Mureev presented the tasks to country representatives at the Radisson Hotel.

At 11:50, Askerov joined Mureev at Radisson. Task feedback was reviewed.

- ~90 comments were received and accepted.
- Most involved phrasing, clarity, or suggested improved formulations.
- Major change: implementation of three checkpoints to reduce follow-up errors.

By 20:30–21:00, the final exam version was ready.

A vote was held: 67 countries in favor, 0 opposed.

Final version was distributed to delegates for translation. Platform was updated accordingly and re-tested by supervisors.

Stage VIII. Conducting Exams for Four Participant Groups (July 9–11, 2024)

At 07:00 on July 9, supervisors and platform representatives PK and Varun arrived at the venue and began preparing the start screens on laptops.

Four laptops were replaced due to incorrect settings or missing software (installation oversight by supervisors).

Printed copies of exam tasks were received, and materials for the first session were arranged.

Each participant group was accompanied by "Daryn" Center staff and exam volunteers to the venue.

For bioinformatics, each group entered 5–7 minutes before start time.

Until the whistle signal, participants were not allowed to touch anything on their desks.

After the signal, the exam began.

During the exam, all participant questions related either to task content or platform functionality.

To maintain fairness, such questions were not answered.

After each session, exam envelopes were collected from desks, and laptops were manually reset by supervisors for the next stream.

After the second and fourth sessions, sealed envelopes were delivered by supervisors to the headquarters (room 9.105).

Technical Summary:

- Sessions 1, 2, and 4 ran without any issues; all laptops worked as expected.
- In session 3, three laptops (UAE, Bangladesh, Belarus) lost Wi-Fi connection. Devices were replaced, and lost time (1–3 minutes) was compensated.

Major Incident (Session 3):

~30 minutes after the session began, over 40 participants experienced a platform error that prevented them from continuing.

Varun identified the issue: a page refresh was needed.

Askerov instructed all participants to refresh their pages, and the exam resumed.

All participants in session 3 were granted 2 extra minutes as compensation.

However, for 9 participants (from Azerbaijan, Bangladesh, Estonia, Finland, India, Croatia, Kazakhstan, Costa Rica, and Czech Republic), the system ended automatically at the original time without adding the extra 2 minutes.

After the official end, all other participants exited the room. For these 9 students, the only way to continue was manual reactivation, which only Varun could do.

He reactivated participants one by one for 3 extra minutes each, which took about 25 minutes total.

This delay did not affect the start time of the next session.

All exams were completed **according to the original schedule**.

On the morning of July 10, laptops and mice were collected, packed, and handed over to “Daryn” staff for transport.

Supervisors met those responsible for the theoretical exam and briefed volunteers on their duties for July 11.

The theoretical round took place on July 11, after which all remaining equipment was packed and prepared for transfer.

Stage IX. Evaluation of Answers and Appeals (July 10–12, 2024)

On July 10, bioinformatics exam results were exported.
Data was verified, and no issues were found.

Results were submitted to the OLY-Exam platform for countries to review (each team could see only its own results) and shared with Practical Exams Chair Adlet Sagintaev.

Appeals (July 12, Radisson Hotel)

Only country jury members could submit appeals.

As a result of appeals, 15 participants received score adjustments:

1. 2 participants (Canada, South Africa):
   +1 point each due to unclear units of measurement in the printed version.
2. 1 participant (Russia):
   +1 point for a poorly worded question.
3. 12 participants (China, Hong Kong, Italy, South Korea, Mongolia, Russia, Singapore, Thailand, Taiwan, USA):
   +3 points each due to a supervisor input error in the platform answer key.

Many other countries raised concerns about follow-up dependency errors in task design and requested extra points.

However, the supervisors denied these requests, citing that the grading system had been publicly presented on **July 8** and **no objections** were raised at that time.

Situation with Indian team

Indian representatives argued that participants in session 3 were not given enough time and demanded extra points.

Supervisors refused, stating that 3 minutes (not 2) had been granted to all 9 affected participants.

The disagreement was unresolved and escalated to the IBO Committee, which ultimately settled the matter.

Report prepared by:

Alyamdar Askerov
Shamil Mureev
Date: July 16, 2024

Biochemistry

1. Overview

The International Biology Olympiad (IBO) 2024, hosted in Astana, Kazakhstan, required extensive preparatory work, rigorous execution, and thorough evaluation procedures. This report consolidates the contributions of Ayzhan Akhmadi, Aigul Kusanova, and Polina Len to the successful implementation of the biochemistry practical examination.

2. Preparation of Practical Examination

Preparations commenced significantly in advance, with the development and optimization of practical tasks initiated through stress tests conducted on March 16, 2024, by Polina Len. The complexity, time requirements, and instructions were refined through multiple iterations involving proofreading and translation checks to ensure clarity and accuracy.

3. Task Editing

The editing of the tasks was carried out jointly with the task authors through online meetings and correspondence. The editing began on March 25, after the stress tests were conducted.

My main tasks included: optimizing the practical exam tasks, preparing several images for the tasks, and preparing task cards.

Dates of meetings and discussions with the authors:

- March 26: duration approximately 2 hours
- April: setup of pH meters and optimization of titration procedures
- May 9: duration approximately 2 hours

Correspondence with author Daniyar Otarbayev on optimizing the second part of the biochemistry task:

(WhatsApp dialogue translated and summarized with timestamps preserved for accuracy)

- **April 23–May 1, 2024**:
  - Discussion of pH values for amino acids before titration (alanine pH 1.5, arginine pH 1.3)
  - Correction of concentrations (NaOH 0.3 M, alanine 0.15 M, arginine 0.1 M)
  - Verification of curve clarity at various starting pH levels
  - Agreement to proceed with pH 1.5 for both amino acids
  - Confirmation through photos and titration results
  - Testing and adjustments to titration volumes (e.g., 19 mL vs 20 mL, final volume 21 mL)
  - Final confirmation that titration tasks were functional and appropriate
- **May 9, 2024**:
  - Bradford assay results submitted via Excel file
  - Confirmation from Daniyar that all looks good

4. Materials and Solutions Preparation

Aigul Kusanova and Polina Len contributed significantly to preparing experimental setups. Labels were printed and affixed to various containers, including tubes and beakers for substances such as distilled water (dH2O), dye reagent, samples, bovine serum albumin (BSA), and other essential compounds. Solutions, including dH2O, BSA, and reagents, were carefully prepared and dispensed into appropriately labeled vessels.

5. Logistics and Setup

The logistics phase involved intensive labor, including receiving and arranging equipment and furniture at Nazarbayev University. The setup required arranging laboratory benches, unpacking and setting up hundreds of pieces of equipment, and calibrating pH meters. Additionally, all solutions, including NaOH, alanine, and arginine, were prepared in large volumes (approximately 20 liters each) and distributed into test tubes.

6. Consultation of Assistants and Volunteers

Volunteer and assistant consultation began in June 2024.
I first called all volunteers to find out their arrival dates and availability.

Volunteers arrived and moved into the Nazarbayev University dormitories on July 5.
On July 6, an introductory briefing was conducted with them, covering:

- Campus rules of Nazarbayev University
- Their duties during the exam
- Signing of the IBO2024 confidentiality agreement

From July 5 to July 14, I continuously supported all volunteers and assistants with guidance on:

- Food arrangements
- Task responsibilities

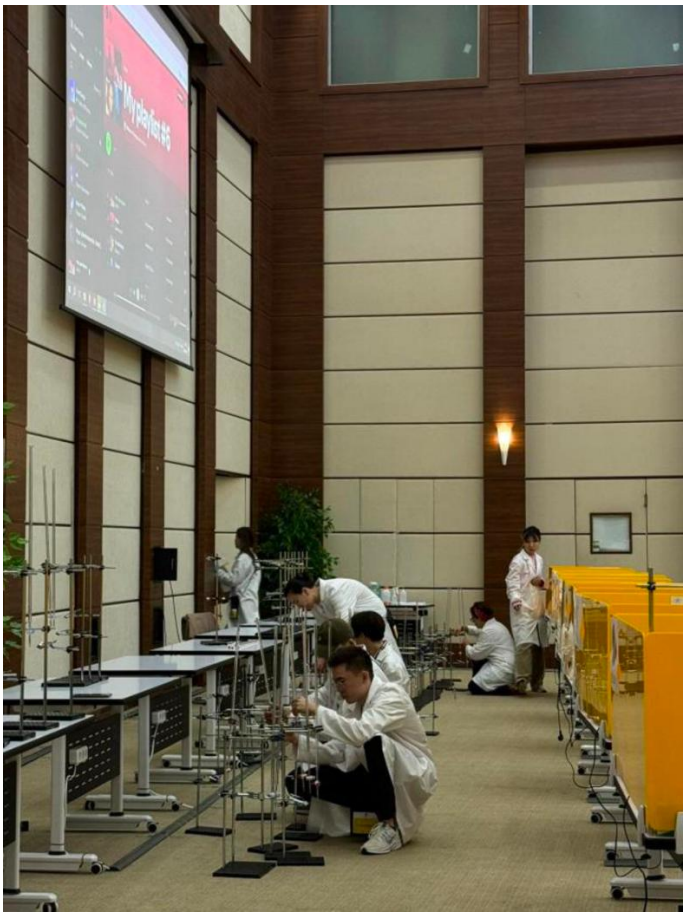

COLOMBIA

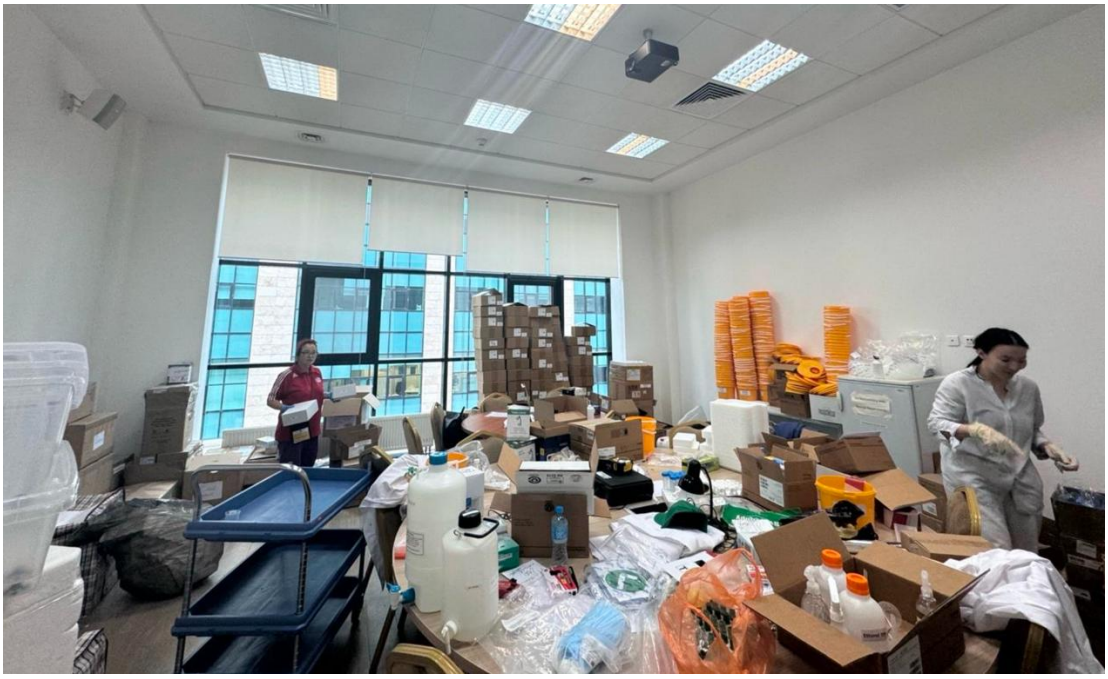
7. Exam Preparation

Preparation for the exam began in June 2024.

Key steps included:

- Receiving and organizing all equipment and furniture delivered to Nazarbayev University (3 working days)
- Transferring two refrigerators to the headquarters near the ballrooms (1 working day)
- Arranging exam room tables (3 working days)
- Printing all labels on a portable printer (4 working days)
- Labeling of test tubes (4 working days)
- Labeling tables with flags and numbers (1 working day)
- Unpacking 80–100 units of all equipment (7 working days)
- Calibration of pH meters (2 working days)
- Preparation of 20 liters of NaOH, arginine, and alanine solutions, including titration (2 working days)
- Dispensing all solutions into test tubes (4 working days)





8. Participation in the Discussion of the Experiment Tasks in the Subgroup

9. Participation in the Discussion of the Tasks with Country Representatives

10. Conducting Exams for Four Participant Streams

The biochemistry practical examination was conducted on July 9, 2024, across four sessions lasting 1.5 hours each. Kusanova and Len led safety briefings, supervised the exam sessions, monitored adherence to protocols, answered participant inquiries, and managed unexpected issues. They meticulously prepared workstations between sessions, including reagent replenishment and equipment setup.

11. Evaluation and moderation

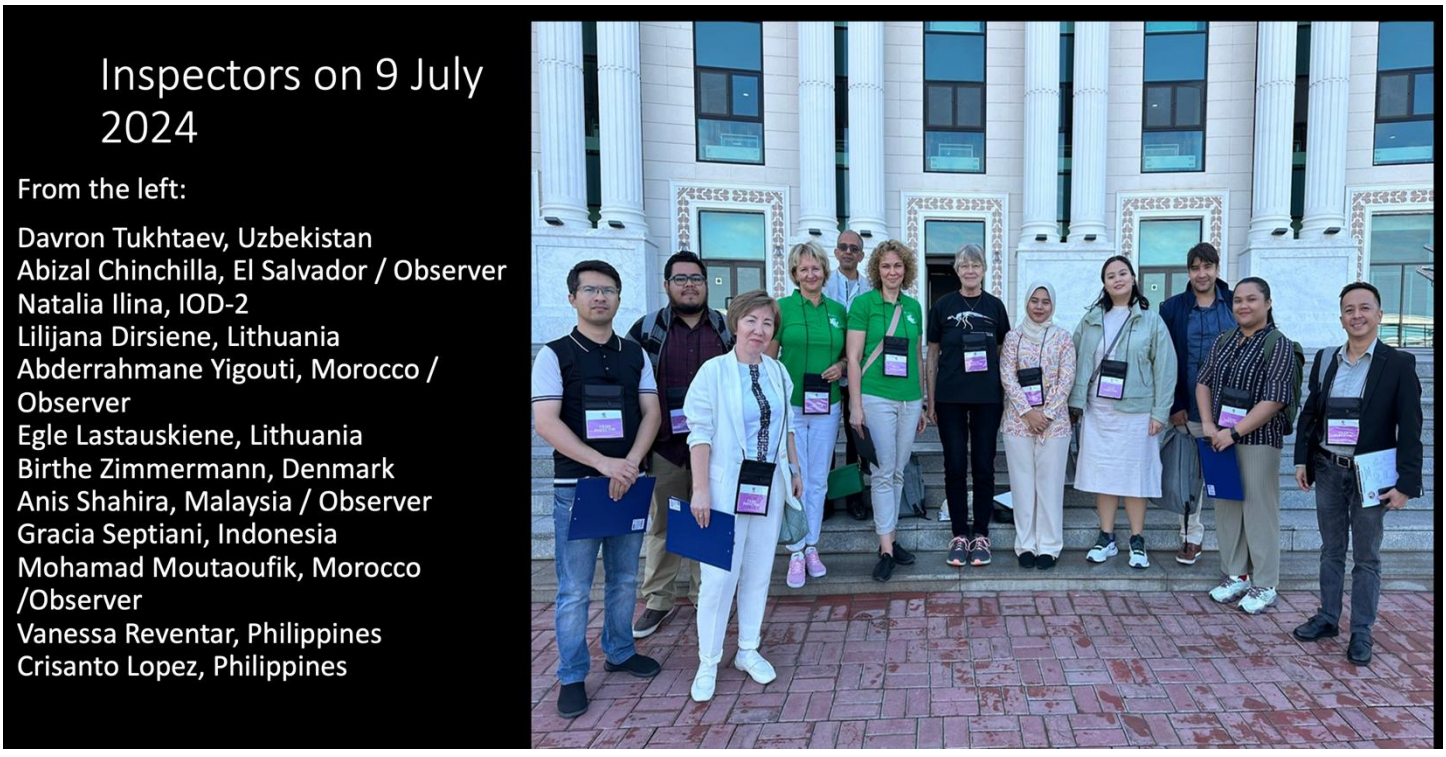
Evaluation of participant responses took place from July 10-11, 2024. Each assistant performed double-checking to ensure accuracy in scoring, following a predefined marking scheme. Results were entered into the official platform by July 11. On July 12, Akhmadi, Kusanova, and Len facilitated the moderation session, addressing appeals and providing detailed feedback to trainers and jury members.

12. Post-Examination Procedures

Final stages included comprehensive cleaning and restoration of the examination spaces for subsequent theoretical activities. Equipment and materials were collected and prepared for transfer to the "Daryn" organization on July 13-14, 2024.

Aizhan Ahmadi
Ten Polina
Kusanova Aigul
Supervisor of Practical Rounds
July 14, 2024

Report from ”Inspectors´ Corner” on practicals 9 July



Four labs with space for 80 competitors each

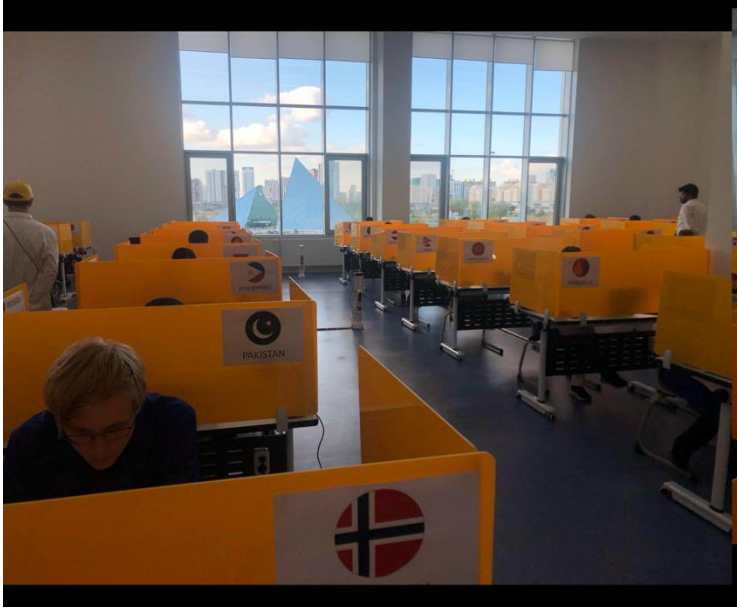
Excellent light and huge screens counting down

WWW. ONLINE-STOPWATCH. COM

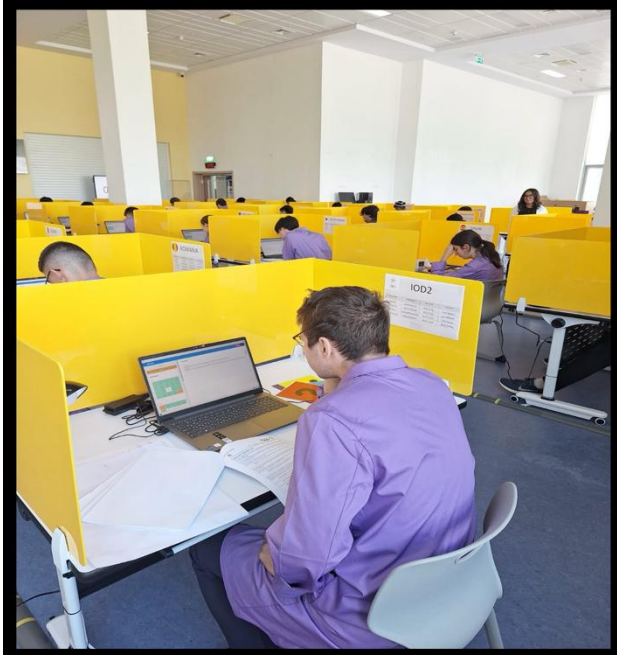
Animal anatomy and physiology – count down to begin exam

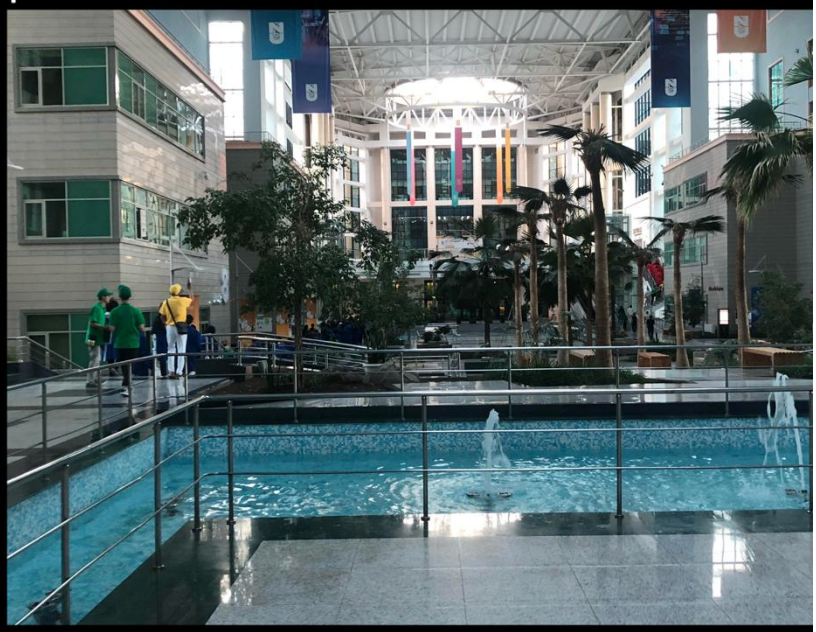
Only minor incidents during Animal Physiology (3) –all solved quickly and smoothly

BioInformatics – Total silence and nice vues

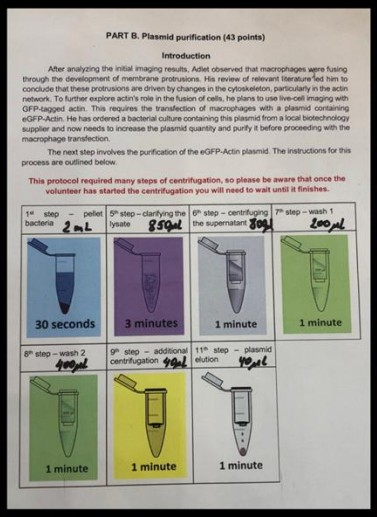


BioInformatics – No problems at all ☺





Molecular Biology – one volunteer per three students doing the spinning down of DNA



PART B. Plasmid purification (43 points)

Introduction

After analyzing the initial imaging results, Adiet observed that macrophages were fusing through the development of membrane protrusions. His review of relevant literature led him to conclude that these protrusions are driven by changes in the cytoskeleton, particularly in the actin network. To further explore actin's role in the fusion of cells, he plans to use live-cell imaging with GFP-tagged actin. This requires the transfection of macrophages with a plasmid containing eGFP-Actin. He has ordered a bacterial culture containing this plasmid from a local biotechnology supplier and now needs to increase the plasmid quantity and purify it before proceeding with the macrophage transfection.

The next step involves the purification of the eGFP-Actin plasmid. The instructions for this process are outlined below.

This protocol required many steps of centrifugation, so please be aware that once the volunteer has started the centrifugation you will need to wait until it finishes.

1st step – pellet bacteria 2 mL	5th step – clarifying the lysate 850µl	6th step – centrifuging the supernatant 800µl	7th step – wash 1 200µl
30 seconds	3 minutes	1 minute	1 minute
8th step – wash 2 400µl	9th step – additional centrifugation 400µl	11th step – plasmid elution 40µl	
1 minute	1 minute	1 minute	

Room temp. 18 degrees. Some noise from ”bipping” machinery and centrifugation

Count down: screens visible from all corners of the lab

Biochemistry – lots of volunteers and assistants in the lab, all very well instructed ☺

Safety had been instructed: Labcoats – aprons – goggles – closed shoes – hair under control

Inspectors' Conclusion : A perfect organisation!

Worth noting:
The well equipped and spacy labs – 80 competitors in each lab

Plenty of volunteers and organisers present (green and yellow T-shirts) always polite and helpful

Scientific experts were present in the lab – always quick in response

The clocks = huge screens were visible from all corners of the lab

Refreshments were given during breaks – water and chocolate

Trasportation by bus and with police escorte back and forth

CONGRATULATIONS : A PERFECT 35. IBO 2024 IN ASTANA, KAZAKHSTAN

Theoretical Exams

The theoretical component of the competition consisted of two exams (Part A and Part B), each comprising 50 theoretical tasks. The duration of each exam was 3 hours and 15 minutes.

All theoretical questions were required to be original and authored specifically for the Olympiad (the use of tasks from other competitions was strictly prohibited). These questions were designed to assess participants' understanding, data analysis skills, and ability to apply biological knowledge. Emphasis was placed on questions requiring comprehension through inductive reasoning, data interpretation, and critical thinking.

The distribution of questions across biological topics followed these proportions:

1. **Cell Biology** (structure and function of cells and their components; microbiology; biotechnology) – 20% of the questions
2. **Plant Anatomy and Physiology** (mainly seed plants) – 15%
3. **Animal Anatomy and Physiology** (mainly vertebrates and humans) – 25%
4. **Ethology** – 5%
5. **Genetics and Evolution** – 20%
6. **Ecology** – 10%
7. **Biosystematics** – 5%

Each theoretical question in the IBO 2024 exams consisted of four statements. Participants were required to evaluate each statement as either **true** or **false**. A *regressive scoring scale* was used to minimize the impact of random guessing. The points were allocated as follows:

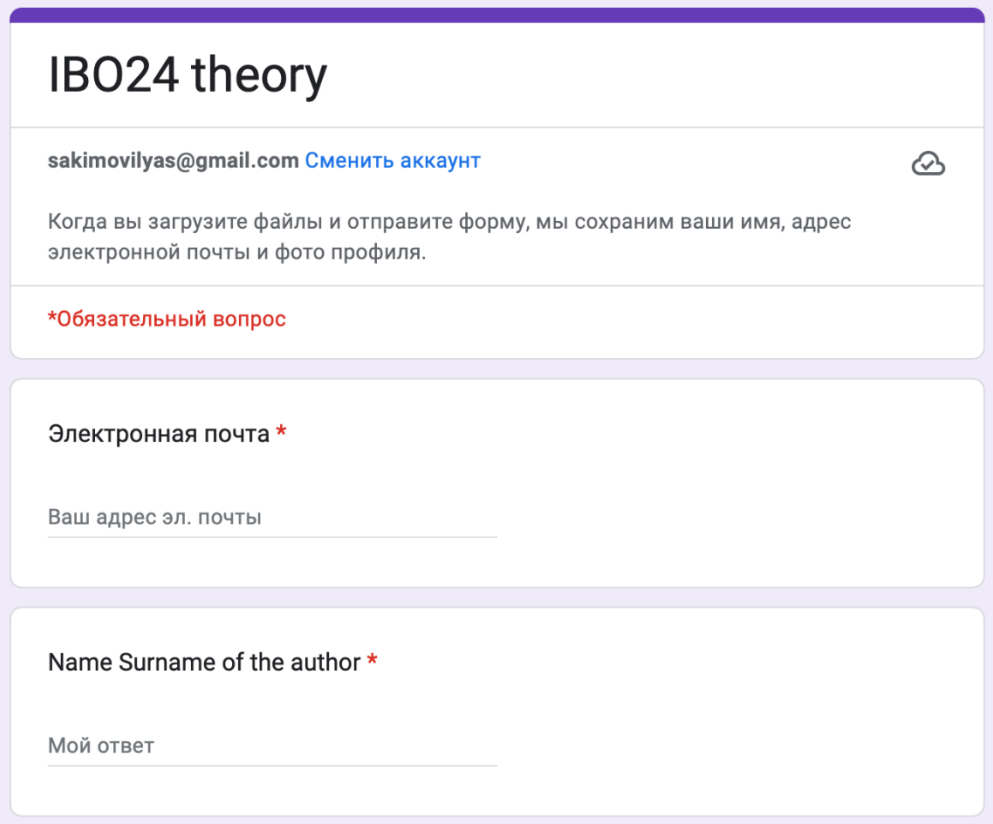
- **1.0 point**: all four statements correctly evaluated
- **0.6 points**: three out of four statements correctly evaluated
- **0.2 points**: two statements correctly evaluated
- **0 points**: one or none of the statements correctly evaluated

This scoring system encouraged accuracy and discouraged guessing, while allowing partial credit for partial understanding.

Task Collection Process

In the summer of 2022, immediately after IBO 2022, the team leader of Kazakhstan's national team, **Adlet Sagintaev**, initiated the collection of tasks for the theoretical exams. He created a Google Form titled *"IBO24 theory"* to gather question submissions and distributed it among former IBO participants and previous coaches of the national team.

Questions included in the "IBO24 theory" Google Form:



Question topic *

- ◯ Cell and molecular biology
- ◯ Plant anatomy and physiology
- ◯ Animal anatomy and physiology
- ◯ Ethology
- ◯ Genetics and Evolution
- ◯ Ecology
- ◯ Biosystematics

Question text (ENGLISH) *

Мой ответ

Текст вопроса (РУССКИЙ) *

Мой ответ

Question image 1 (if applicable)

Добавить файл

Question image 2 (if applicable)

Добавить файл

Question image 3 (if applicable)

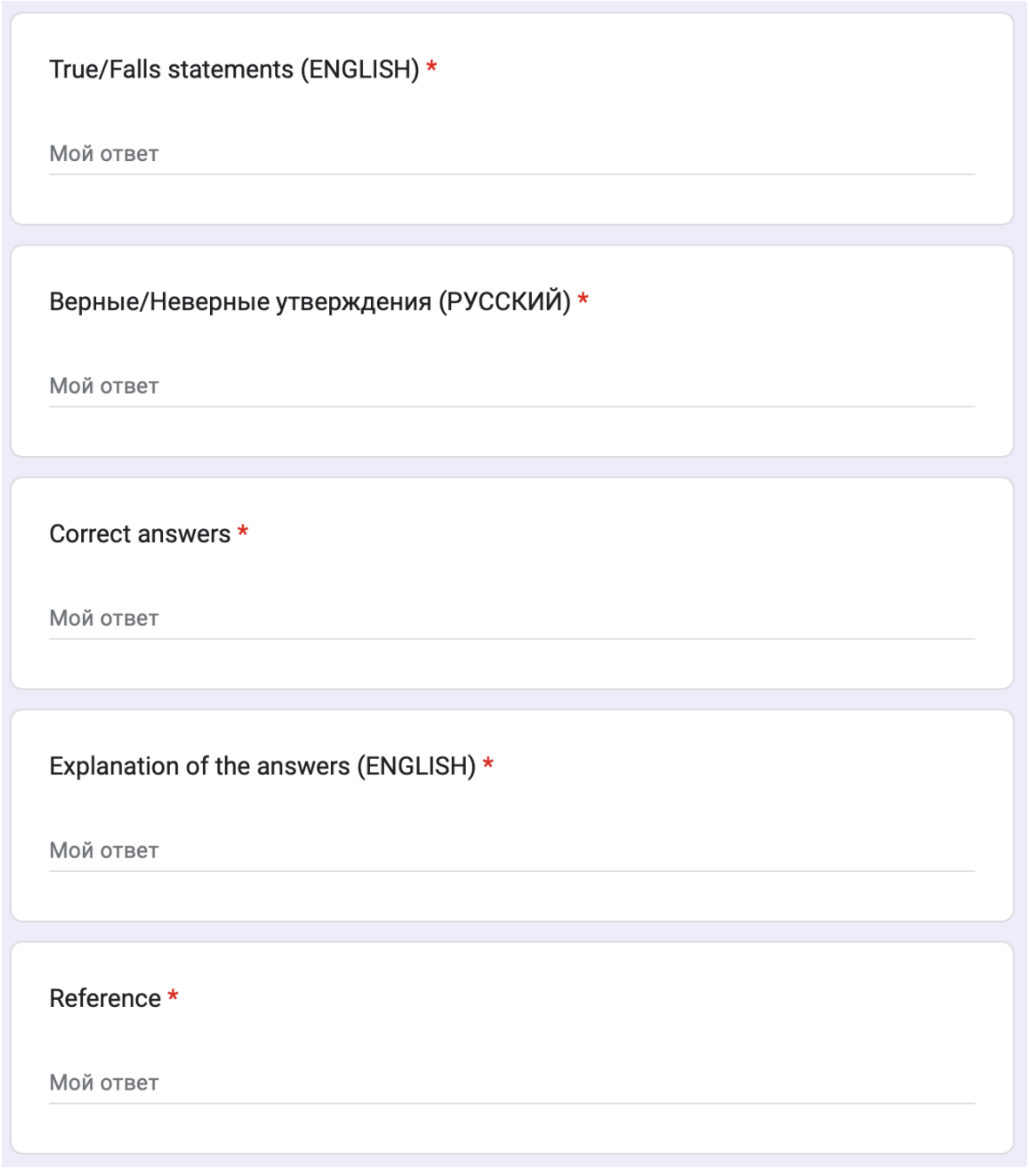
Добавить файл

Question image 4 (if applicable)

Добавить файл

Question image 5 (if applicable)

Добавить файл



The first task was submitted through the form on **July 31, 2022**. In total, **134 tasks** were submitted, with the last one received on **May 28, 2024**.

In **July 2023**, Adlet Sagintaev brought together contributors in a dedicated **Telegram group**. The group included:

- Former IBO participants
- Current and former national team leaders
- Jury members from national and regional Olympiads
- Past winners of national Olympiads
- Other qualified individuals

Participants were briefed on how to properly develop Olympiad-style questions, including the required structure and content. Relevant **IBO regulatory documents** on theoretical exam preparation were shared in the group for guidance.

In **August 2023**, a list of official task authors was compiled. On **August 12**, an online meeting was held with all authors, attended by **Gazhdeumbek Tursunov**, the director of the "Daryn." The agenda of the meeting included:

1. Welcome speech by Director Tursunov
2. Remarks from the Daryn Olympiad Department:
    - Organization of the Scientific Committee
    - Contracting authors for task development
3. Q&A between authors and Daryn representatives
4. Presentation by Adlet Sagintaev:
    - Task development strategy for IBO theoretical exams (the content of this section is presented below)
5. Reports from Scientific Committee leaders:
    - Workflow organization
6. General discussion on improving the Committee's operations

It was agreed that **weekly editing sessions** of submitted tasks would begin in the first week of September.

Contents of the Presentation "Recommendations for Question Development"

What a Good Exam Should Look Like

- The final score distribution should approximate a normal distribution, with the average (or preferably the median) around 50%.
- The purpose of the exam is to maximally differentiate students across the entire scoring range. There should not be a situation where all students score either very high or very low.
- The two theoretical exams should have a high correlation coefficient with each other. However, a correlation with the practical exam is not strictly necessary, as different types of skills are being assessed.

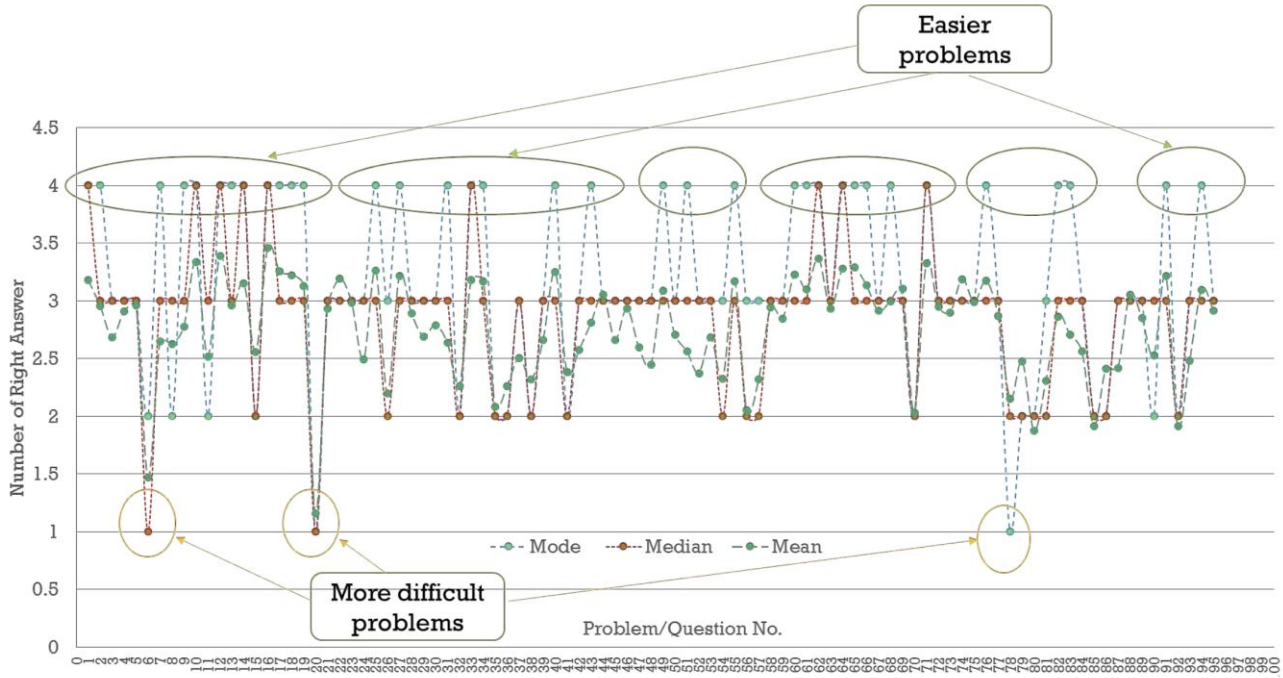
Key Principles of a Good Exam Question

- Theoretical explanations and statements should be as brief as possible.
- **One question – one idea**.
- Avoid double negatives.
- Use imprecise or extreme wording with caution.
- Avoid overlapping topics across questions (not critical during drafting, but two questions on the same topic should not be included in the final exam).
- Do not include questions that require a correct answer to a previous question (although this may be acceptable within a single multi-part question).

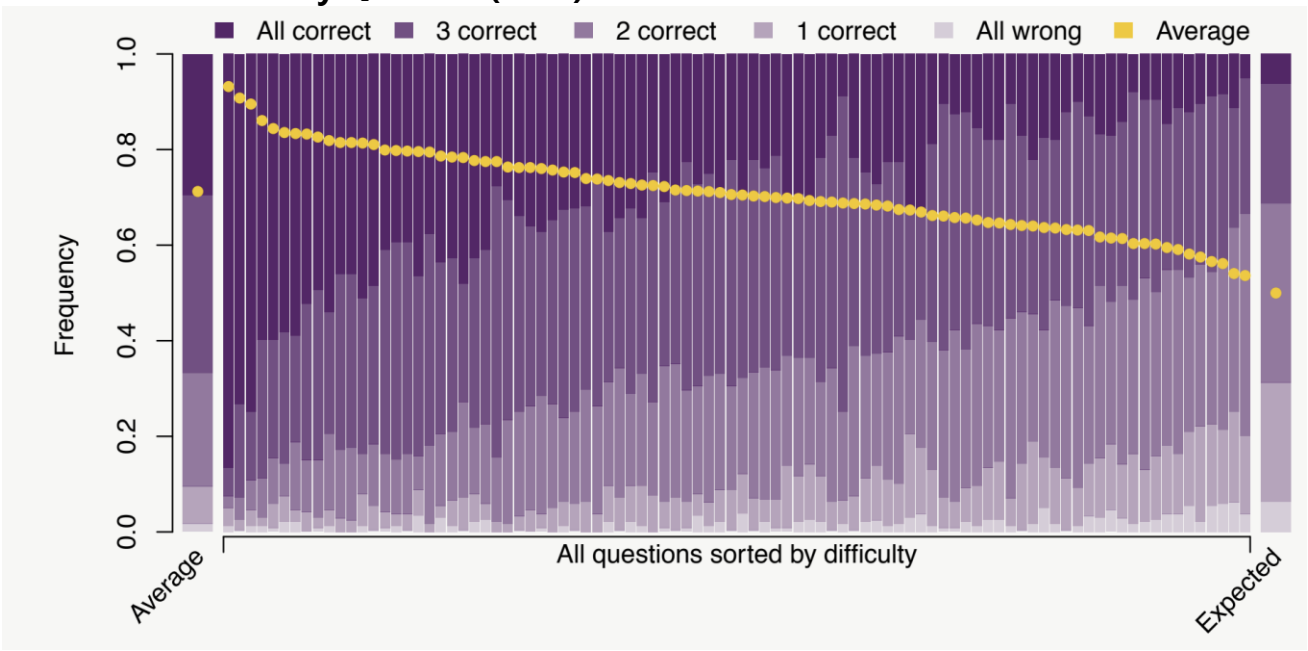
Content Requirements for a Good Question

- Participants should require only minimal theoretical knowledge; all information needed to draw correct conclusions must be provided in the figure and accompanying text before the question.
- All terms should be clearly explained, preferably within the question itself (e.g., in 2017, all terms and definitions were provided at the beginning of each round).
- The assessment should focus on understanding core principles and biological concepts (such as physiological mechanisms, the concept of natural selection, etc.).
- Do not confuse the level of difficulty with the level of required prior knowledge.

Score Distributions for Individual Questions (2014)



Score Distributions by Question (2013)

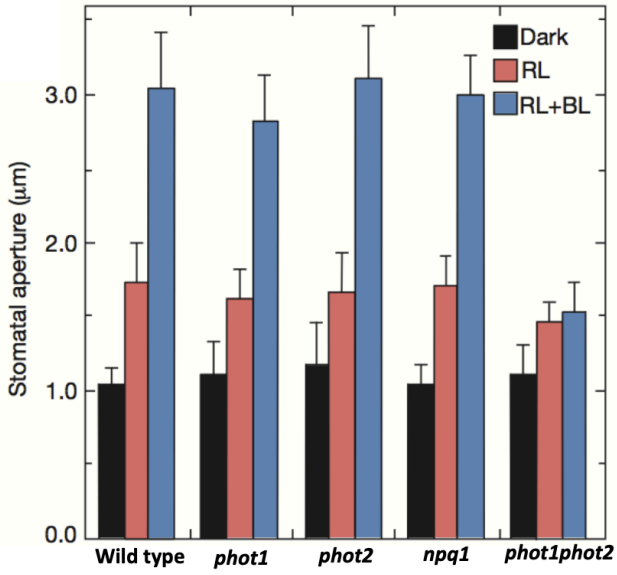


Conclusion from Two Charts

- On average, students should score 2 to 3 out of 4 correct statements per question.
- Questions where students consistently score 4 or only 1 out of 4 are considered too easy or too difficult, respectively.
- The main conclusion is that student differentiation occurs not because the exam contains questions of varying difficulty, but because the individual statements within each question differ in difficulty.
- Nonetheless, the overall difficulty level of all questions remains approximately equal.

Example of an Easy Question (4/4)

16. An experiment was conducted to study the effect of darkness, red light (RL) and combination of red and blue light (RL+BL) on stomatal aperture. Mutant *phot1* and *phot2* do not express phototropin, while mutant *npq* does not accumulate zeaxanthin. Stomatal apertures less than 1.25 μm are considered closed, while apertures greater than 2.0 μm are considered opened more widely.



Indicate if each of the following statements is true or false

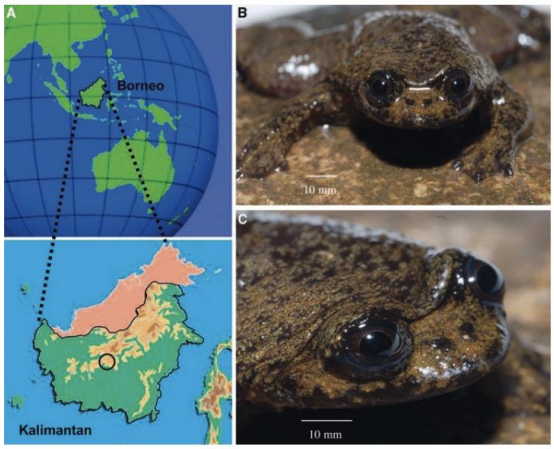
A. Stomatal apertures are closed if treated in darkness and slightly opened in red light illumination.
B. Blue light significantly increases stomatal aperture size in all tested plants.
C. It is likely that the blue light receptor is active in mutant *npq*.
D. The fact that single *phot* mutants respond to blue light and double mutants do not, suggests that *phot1* and *phot2* act redundantly as blue light receptors to mediate stomatal apertures.

What makes it easy: all statements are direct conclusions from the graph.

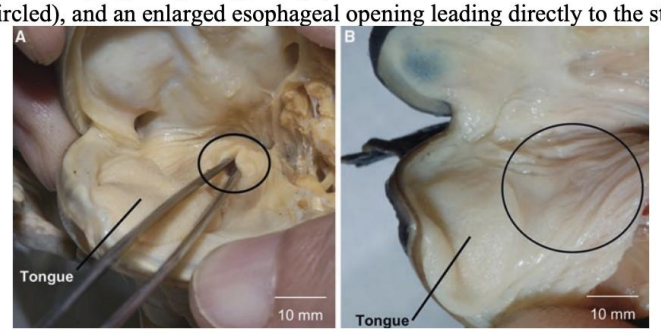
- **A.** Clearly visible in the graph.
- **B.** *phot1phot2* RL+BL and RL have overlapping standard errors → no significant difference.
- **C.** RL and RL+BL show a significant difference.
- **D.** A complete and logical explanation is already provided; the student only needs to agree (possibly, the statement would be more difficult without the first part).

Example of a Difficult Question (1/4)

20. *Barbuourula kalimantanensis,* an indigenous flat frog was found in Kalimantan, Indonesia in 2008 (A). The morphology of the frog (B,C) is shown below.



Comparison of (A) Typical frog mouth and pharynx (*Rana catesbeiana*), showing glottis (circled), tongue, and esophageal opening, and (B) *Barbourula kalimantanensis* showing tongue, lack of glottis (circled), and an enlarged esophageal opening leading directly to the stomach.



Indicate if each of the following statements is true or false.

A. The frog is more likely to have stereoscopic vission as compared to ponds frog (*Rana sp*).
B. Skin of this exceptionally flat frog is the only respiratory organ in and gas exchange occurs in the blood vessels located on the skin surface.
C. *Barbourula kalimantanensis* is expected to have a low metabolic rate.
D. *Barbourula kalimantanensis* most probably lives in fast flowing cold water, often close to waterfalls.

- **A.** Eyes face the same direction → stereoscopic vision
- **B.** Glottis leads to the trachea → it is absent → no trachea → no lungs
- **C.** No lungs → low oxygen levels → low metabolism
- **D.** Gas exchange occurs only through the skin → oxygen level is always low → requires maximally oxygen-rich environment → pO_2 increases as temperature decreases → cold water and waterfalls (natural aeration) provide optimal conditions

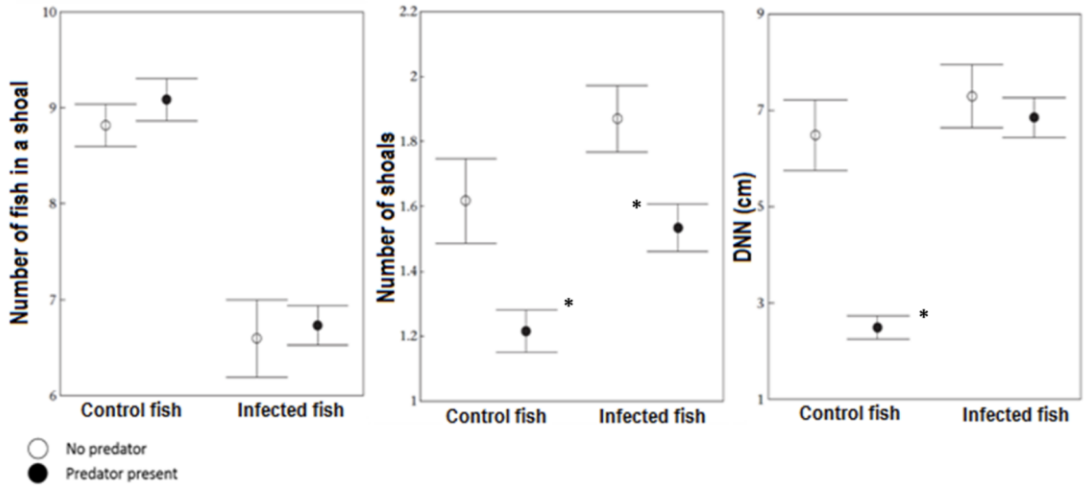
Why this question is difficult:

- The difficulty of the statements is uneven.
- There is a clear dependency between statements: one cannot answer **D** without **C**, and **C** depends on **B**.

This dependency is not prohibited, but it increases the overall complexity of the question.

Example of a Well-Balanced Question

48. Shoaling, a group of conspecifics, is a common antipredatory adaptation in several fish species. The advantages of shoaling include increased vigilance, lower individual risk of capture and confusion of predators. However, parasitic infections may alter shoaling behaviour by impairing sensory and motor systems and reducing the net benefit of shoaling. The effect of parasitic infection on shoaling behavior was investigated by measuring the number of fish in a shoal, number of shoals, and DNN or Distance to Nearest Neighbour within a shoal.



(*) Indicate significant value

Indicate if each of the following statements is true or false.

A. Infected fish tend to form smaller shoals.

B. The tendency of fish to aggregate and form fewer shoals, when they encounter predators, is independent of infection.

C. Infected fish are more likely to be detected by predator because they form larger number of shoals.

D. The confusion effect of shoaling is less effective with infected fish.

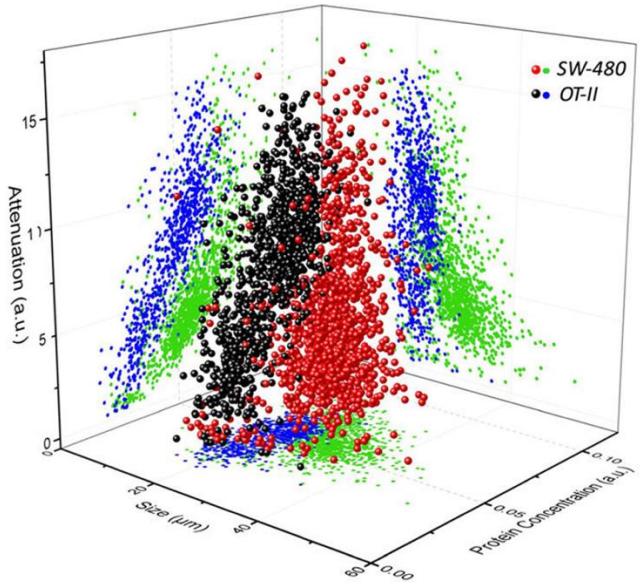
- **A.** Direct conclusion from the graph.
- **B.** There is a significant difference with and without the predator → control and infected fish must be compared separately.
- **C.** Schooling behavior is a defense mechanism against predators → infected fish perform this behavior less effectively → more vulnerable to predation.
- **D.** Infected fish form looser schools → high school density likely confuses predators → infected fish are worse at achieving this effect.

Why this is a well-designed question:

- The first two statements are relatively simple, while the last two are more complex.
- As a result, students with different levels of understanding will score differently, making the question effective for differentiating between students.

Graphs, Charts, and Figures

- Main requirements: easy to read and interpret; should not require specialized knowledge (it's best to avoid using highly technical or uncommon graph types).
- Necessary information must be clearly visible.
- Number of different charts should generally not exceed four (preferably fewer).



In this example, a 2D section of the graph could be shown (or any other clearer way to visualize the data).

General Conclusions

- With careful reading and reasoning, the questions become fairly clear and straightforward — however, the main factor contributing to difficulty is the time constraint: 3.6 minutes per question, with 50 questions in a row.
- The sample questions were taken from the 2013 and 2014 exams, as statistical data is available only for these years.
- This format was first introduced in 2013, so students in the early years were not well prepared for such exams.
- In more recent years, student performance has improved, and the questions have become more complex than those shown.
- The difficulty level of the 2018 questions differs significantly from the others.

Sources for Question Development

- Any sources may be used, provided they are properly cited
- Books, articles, reviews, and other materials
- It was decided that each theoretical exam should include one difficult statement, two of medium difficulty, and one easy statement. However, the author's subjective assessment of a statement's difficulty often did not align with the editors' evaluations:

Meetings of Theoretical Task Authors and Editors

As most of the authors of the theoretical tasks were located outside Kazakhstan, it was decided to hold weekly editorial meetings via Zoom. A poll was conducted to determine the most convenient time for the majority of participants, which turned out to be **Saturdays at 18:00 Astana time**.

At each meeting, between **6 to 10 tasks** were reviewed. Each meeting was attended by **5 to 10 participants**, primarily consisting of task authors. Participation was voluntary, and different authors joined at different weeks depending on their availability.

At least two days before each meeting, Ilyas Sakimov sent out a poll in the Telegram group to determine who would be participating in the upcoming Saturday session. Then, he sent participants a specially prepared Google document containing the tasks to be discussed (the document was available only for participants). This allowed participants to leave comments, and respond to others' comments. Thus, the task review process effectively began online, two days prior to each Zoom meeting. This approach significantly saved time and made the sessions more efficient, as participants did not need to spend time familiarizing themselves with other authors' tasks during the meeting itself.

During the Zoom meetings, **the moderator** (typically Ilyas Sakimov) navigated through the comments one by one. Participants then discussed each comment—agreeing or disagreeing, suggesting improvements, or proposing alternative solutions. At the end of the discussion for each task, the moderator asked whether there were any further suggestions or comments.

In total, 40 editorial meetings were held (not including the third round of revisions). The first meeting took place on September 2, 2023, and the last one on June 1, 2024. Each session lasted 1.5 to 3 hours, with approximately half a day spent preparing for each one.

In total:

- **Over 120 hours** were spent on live task discussions.
- Each participant dedicated approximately **200 hours** to preparation.

A detailed report was prepared for each Zoom meeting, and a video recording of the session was made and archived.

First Round of Edits

During the first round, **130 tasks** submitted through the "IBO24 theory" Google Form were reviewed. These were discussed over the course of **26 meetings**, concluding on **February 24, 2024**.

Only **4 tasks were deemed completely unsuitable**. The rest received numerous comments and recommendations for improvement. Authors were expected to revise their tasks before the second round of edits.

Second Round of Edits

On **March 9**, the Scientific Committee began the second round of editing, reviewing the updated versions of the tasks from the first round. Several new tasks submitted after the first round were also included.

Goals of the second round:

- Final discussion of each task (to check if revisions had been made according to previous feedback)
- Final edits and refinements
- **Rating each task**:
    - **A** – must be included in the final version of the exam without additional changes
    - **B** – may be included if additional tasks are needed / minor changes are needed
    - **C** – needs revision; cannot be included without changes / major changes are needed
    - **D** – removed; definitely will not be included in the final version

In addition to the rating, another selection criterion was the word count of the question. If a question exceeded 200 words, the author was strongly advised to revise and shorten the text, regardless of the rating it had received.

For this round, **Yerasyl Temirbekov** organized the tasks into Google documents based on topic sections ("cell biology", "Genetics anf evolution" etc). Additionally, dedicated Telegram groups were created for each topic, where authors could seek advice, clarify comments, and vote on statements or revisions.

Second Round Results:

- **71 tasks** received rating **A**
- **29 tasks** – rating **B**
- **9 tasks** – rating **C**
- **11 tasks** – rating **D**

Detailed information for each task was transferred to a Google Sheets table, which allowed moderator Ilyas Sakimov to monitor the distribution of tasks by topic and rating. Based on this information, he could request authors to pay attention to specific sections or revise their tasks according to the comments provided.

# of t	Topic	Author	# of words	Rating	New Rating	Part	Notes
3	Animal anatomy and physiology	Yerassyl Temirbekov	184	A	A	A	
4	Animal anatomy and physiology	Dinmukhammed Omar	214	A	A	A	
6	Animal anatomy and physiology	Daniyar Otarbayev	209	A	A	B	
7	Animal anatomy and physiology	Daniyar Otarbayev	195	A	B	B	Ут B/C *
8	Animal anatomy and physiology	Yerassyl Muratov	129	D	D	A or B	
9	Animal anatomy and physiology	Yerassyl Muratov	185	C	D	A or B	*
10	Animal anatomy and physiology	Sanzhar Sagandyk	199	B	B	A	
11	Animal anatomy and physiology	Balzhan Alikenova	167	A	A	A	
12	Animal anatomy and physiology	Kassym Yerkin	132	C	D	A or B	*
14	Animal anatomy and physiology	Anuar Aitbayev	184	C	D	A or B	*
15	Animal anatomy and physiology	Khafiz Zhumadil	206	B	A	A	
16	Animal anatomy and physiology	Balzhan Alikenova	211	B	A	A	
18	Animal anatomy and physiology	Balzhan Alikenova	202	A	A	A	
19	Animal anatomy and physiology	Balzhan Alikenova	197	A	B	A	Ут A/C *
20	Animal anatomy and physiology	Daniyar Otarbayev	168	B	B	B	Ут C/Д *
21	Animal anatomy and physiology	Bakhytbek Zhalmagambetov	189	A	A	B	
22	Animal anatomy and physiology	Bakhytbek Zhalmagambetov	198	B	A	B	
23	Animal anatomy and physiology	Bakhytbek Zhalmagambetov	206	A	A	B	
24	Animal anatomy and physiology	Bakhytbek Zhalmagambetov	203	A	A	B	
25	Animal anatomy and physiology	Daniyar Otarbayev	172	A	A	B	
26	Animal anatomy and physiology	Bakhytbek Zhalmagambetov	211	B	A	B	
27	Animal anatomy and physiology	Bakhytbek Zhalmagambetov	202	B	A	B	
28	Animal anatomy and physiology	Alikhan Zhumagaleyev	184	A	A	B	
29	Animal anatomy and physiology	Alikhan Zhumagaleyev	209	A	A	B	
30	Animal anatomy and physiology	Yerassyl Temirbekov	176	A	B	A	
31	Animal anatomy and physiology	Ilyas Sakimov	187	B	B	A	*
32	Animal anatomy and physiology	Yerassyl Temirbekov	168	A	A?	A	
33	Animal anatomy and physiology	Yerassyl Temirbekov	212	A/B	A/B?	A	Формула
34	Animal anatomy and physiology	Yerassyl Temirbekov	187	A/B	A/B?	A	
1	Animal anatomy and physiology	Zhanat Koshenov		D			

Following the second round, all authors whose tasks had passed through both editing stages were instructed to **finalize their tasks** according to the guidelines provided by the Scientific Committee.

Standard Guidelines for Theoretical Exam Tasks

These guidelines have been developed for authors of theoretical tasks for IBO 2024. Authors must adhere to them during the final formatting of their tasks.

1. Russian Version

Remove all Russian-language versions of the text. Before deleting, please review any comments linked to the Russian content. If there are important notes, you may save them separately before removal.

2. Tables

All tables must be titled above the table using the following format:
"Table 1. Description text"

Example:

Table 1. Phototropic responses of plants to different colors of light

Test Group	Direction of Light	Percent of Plants Showing Phototropism
Group 1 (red light)	North	98
	South	99
	East	98
	West	96
Group 2 (green light)	North	4
	South	8
	East	5
	West	5
Group 3 (blue light)	North	65
	South	58
	East	65
	West	62
	North	100

3. Figures

All images, graphs, diagrams, and other visual elements must be captioned below the image using the format:

"Figure 1. Description text"

Example:

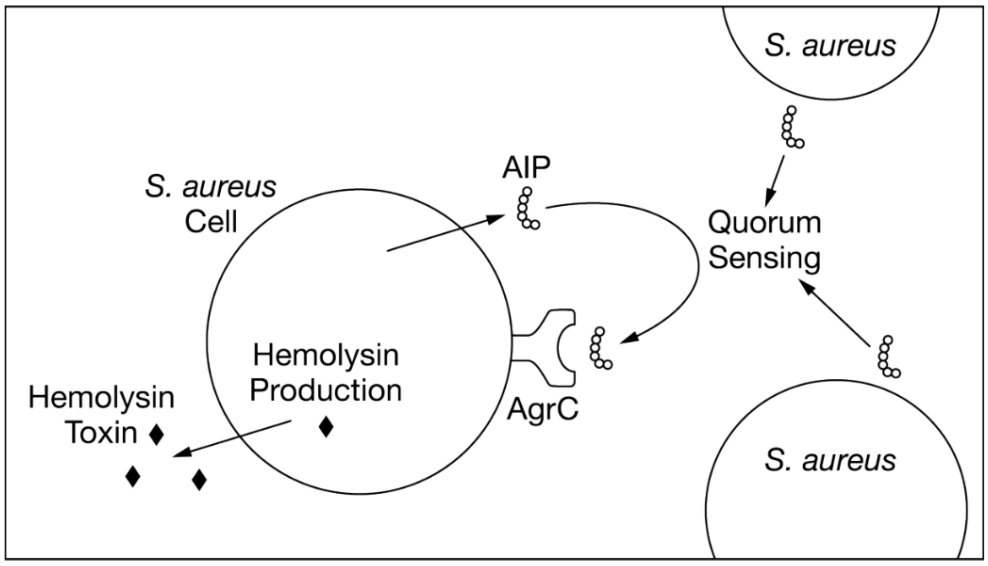


Figure 1. AIP cascade producing hemolysin toxin

If there are multiple images, number them sequentially: "Figure 2.", "Figure 3.", etc.

When referring to a figure in the main body of the question, insert a reference such as "(Figure 1)", and below the actual image simply write "Figure 1" without repeating the description.

All images must be of high quality.

4. Word Count

The total word count must **not exceed 200 words** (including the question text, figure captions, and statements). This is a critical rule that must be strictly followed. Why is it important?

a) Students must read and answer 50 tasks within three hours — excessive word count increases cognitive load.

b) All theoretical questions will be translated by national delegations within 48 hours. The more text (including figure descriptions), the longer the translation takes, increasing the risk of delayed exam printing.

5. Species Names

Taxonomic (Latin) names — such as species names — must be written in *italic* font.

6. Topic Assignment

Ensure that each question matches the declared section of the syllabus. For instance, a task focused entirely on gene function should not be placed under "Animal Anatomy and Physiology."

7. Statements

Each task must contain **only four** statements. Label them with letters (not numbers): **A.**, **B.**, **C.**, **D.** — using a period after each letter, not a bracket.

Example:
A. Difference in oxygen consumption…
B. Differences in extracellular pH values…
C. The tumor microenvironment is typically…
D. Presumably, the individual…

If you currently have more than four statements and are unsure which to keep, consult in the Telegram group created for the second round of editing.

8. Instruction Before Statements

Include the following standard instruction before the statements:
"On your answer sheet, indicate 'T' for true statements and 'F' for false ones."
This applies to most tasks unless the format requires specific wording, such as:

- "Indicate if each of the following statements about posttranslational modification of eukaryotic proteins is true or false."
- "On the answer sheet, indicate 'T' if the temperature rises following the specified treatment, and 'F' if it falls."

9. Grammar and Style Check

Carefully check the text for grammar and style errors. Pay attention to underlined autocorrections.
Ensure that there is always a space after periods, commas, and brackets.
Double-check the correct use of articles **"the"** and **"a/an."**

To improve the scientific tone and clarity of your text, you may use ChatGPT with a properly framed prompt. For example:

"Imagine you are reviewing questions for a pre-university level multiple-choice true or false exam. In the following prompts I will send you crude versions of my questions and would like you to provide an improved version. Do not change the meaning or add anything and keep it in a scientific style."

This approach yields significantly better results, especially when prompted in English, as most training data is English-based.

Third Round of Editing

In June 2024, a dedicated working group was formed from members of the Scientific Committee to carry out the third round of editing. The objectives of this working group were as follows:

1. **Final Review of Tasks**

To conduct a final review of all tasks to ensure that revisions had been made in accordance with previous editorial feedback and the official formatting guidelines.

If any required changes were not implemented, members of the working group were responsible for contacting the respective authors and coordinating the completion of their tasks. In cases where authors were unable to finalize their tasks due to valid reasons, the working group members completed the revisions themselves.

2. **Upload Supervision**

To oversee the uploading of all tasks to the OLY-EXAM platform (details about this platform are provided in a later section).

3. **Formation of Pre-Final Task Packages for Theoretical Exams**

To select and compile the pre-final sets of tasks for Part A and Part B of the theoretical exams. Each selected task was assigned a number based on the sequence of subject sections.

The pre-final versions were those presented to the IBO Subgroup for expert review and evaluation.

To effectively carry out these tasks, the working group members were divided into pairs, with each pair responsible for one or two subject areas:

Plant Anatomy and Physiology, Ecology – Ilyas Sakimov and Eldar Urkumbayev
Cell Biology – Adlet Sagintaev and Yerasyl Temirbekov
Genetics and Evolution, Biosystematics – Daniyar Otarbayev and Erkin Qasym
Animal Anatomy and Physiology, Ethology – Dirmukhammed Omar and Alikhan Zhumagaliyev

To finalize the selection of tasks for the theoretical exams, a Zoom meeting was held with all working group members. During the meeting, each pair presented the tasks they believed should be included in the pre-final versions, along with any tasks considered debatable. A brief description of each disputed task was provided, followed by a vote.

Based on the voting results, the pre-final versions of the theoretical exams were compiled and subsequently submitted to the Subgroup members for review.

OLY-EXAM Platform

The OLY-EXAM online platform has been used by IBO jury members since 2019, with even earlier implementation in other international science Olympiads such as IPhO and IChO.

Main Functions of the OLY-EXAM Platform:

1. **Multilingual Translation of Exam Tasks**

The platform includes integrated Google Translate functionality and uses a LaTeX-based format that facilitates the translation of tables, formulas, diagrams, and other complex elements into virtually any language.

2. **PDF Generation and Printing for Delegations**

Each national delegation can generate a PDF version of the exam in their preferred language and submit it for printing directly through the platform. Once submitted, the file is placed in a printing queue.

3. **Task Discussion**

OLY-EXAM allows users to leave comments on any part of a task—whether it be the main question, figure, statement, equation, etc. These comments can receive replies, as well as "likes" or "dislikes." As a result, discussions about tasks begin online even before the in-person jury meetings.

4. **Voting**

The platform supports online voting when needed. This is primarily used for final approval of exam versions and organizational decisions, such as those made during the General Assembly.

5. **Moderation Process**

For exams that are manually graded, OLY-EXAM is used for delegation appeals. Each delegation's account displays the scanned answer sheets of their students before final review by the Scientific Committee. Delegations also have access to the answer keys and their students' results. If a delegation believes that there is a discrepancy in scoring, they can present their case during the appeals process via the platform.

At IBO 2024, the platform was represented by **Daniel Isler** and **Sebastian Kaser** from Switzerland. Prior to the Olympiad, three Zoom meetings were held with them:

- an introductory session,
- a training session on task uploading,
- and a session on how to manage discussions during the subgroup stage and the Olympiad itself.

5.2 Translating Text Within Figures

At previous IBOs using the OLY-EXAM platform, text embedded within images—such as graphs, diagrams, and structures—was **not translated**. Instead, task authors used **universal symbols or letters** within figures and provided corresponding **legends** below each figure.

For example, the X-axis might be labeled as "A" and the Y-axis as "B", with a legend stating:
A – Enzymatic reaction rate, μM/sec.
B – Time, min.

This method posed difficulties when figures contained many elements. Students had to constantly shift between the complex legend and the image, making the task visually cumbersome and space-consuming.

After discussions with the OLY-EXAM team, the Scientific Committee found a way to enable translation of text **directly within images**. Authors of both theoretical and practical tasks were thus given two options:

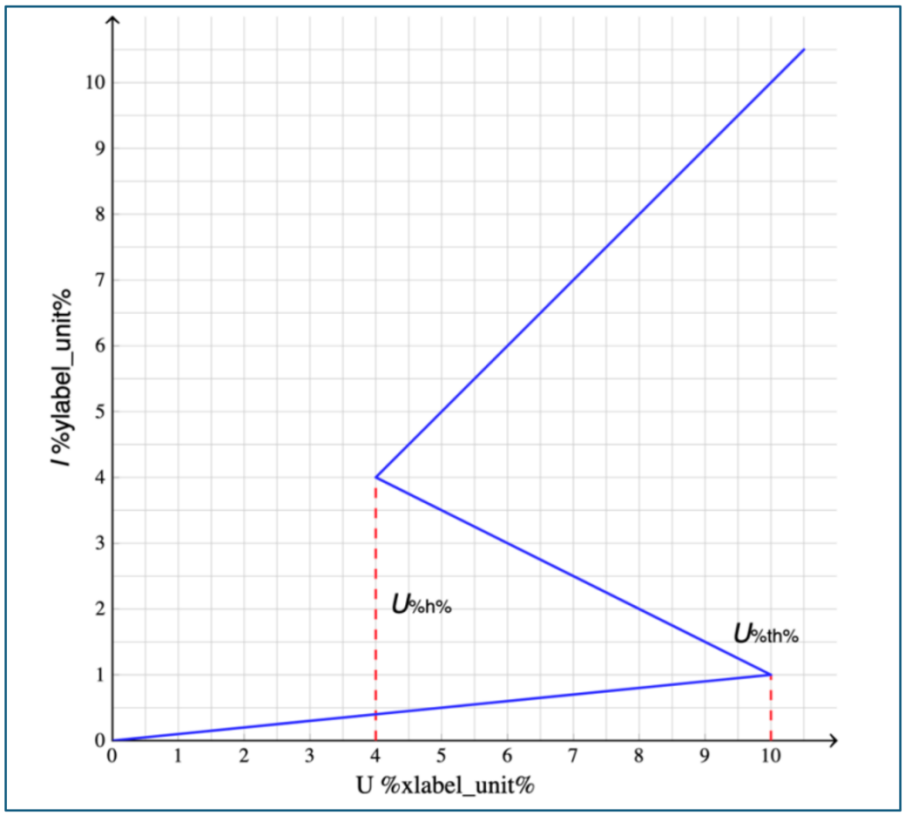
Option I: Direct Translation of Embedded Text

To allow for this, the figure must be converted into **SVG format**. (Note: Google Docs does not support SVG, so such images must be stored in separate files.)

From the OLY-EXAM representative:

"Also I have attached an example of how a translatable figure should look like: at least twice as much spacing around the translatable text, the translatable parts surrounded with % and without spaces or special characters (e.g. %some_label%) and in svg format with editable text (you need to be able to open it in an svg editor and edit the text). If there are figures that cannot meet these requirements, please switch back to a label and translatable text in the caption."

Example:



Advantages of this option (translating embedded text in images):

- It is more convenient for IBO participants and anyone reading the tasks, especially when figures contain many labeled elements.

Disadvantages of this method:

- Requires at least twice as much space around the text in the image to accommodate translations into longer words in other languages.
- Since this function has rarely been used on OLY-EXAM (and never before at IBO), there is a risk that the platform might encounter technical issues at a critical time (e.g., right before the theoretical exams).
- Authors must manually convert images to SVG format and insert translatable text. For those interested in using this method, some authors volunteered to demonstrate the SVG conversion process and how to edit embedded text. If needed, a Zoom training session could be organized.

Alternative Method: Using Symbols in Figures

Option II: Move all descriptions from the image into the figure caption (using Symbols in Figures). In this approach, all textual elements inside the figure are replaced with symbols, such as:

- Latin letters (A, B, C, D, etc.)
- Numbers
- Roman numerals
- Other visual markers

Then, a legend below the figure explains each symbol.

Examples:

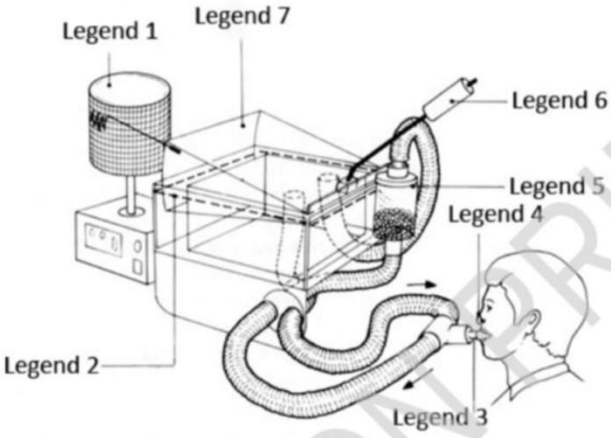


Рисунок 1. Legend 1 = Кимограф (графически регистрирует механические движения во времени). Legend 2 = Уровень воды. Legend 3 = мундштук. Legend 4 = зажим для носа. Legend 5 = поглотитель углекислого газа. Legend 6 = Противовес. Legend 7 = камера спирометра.

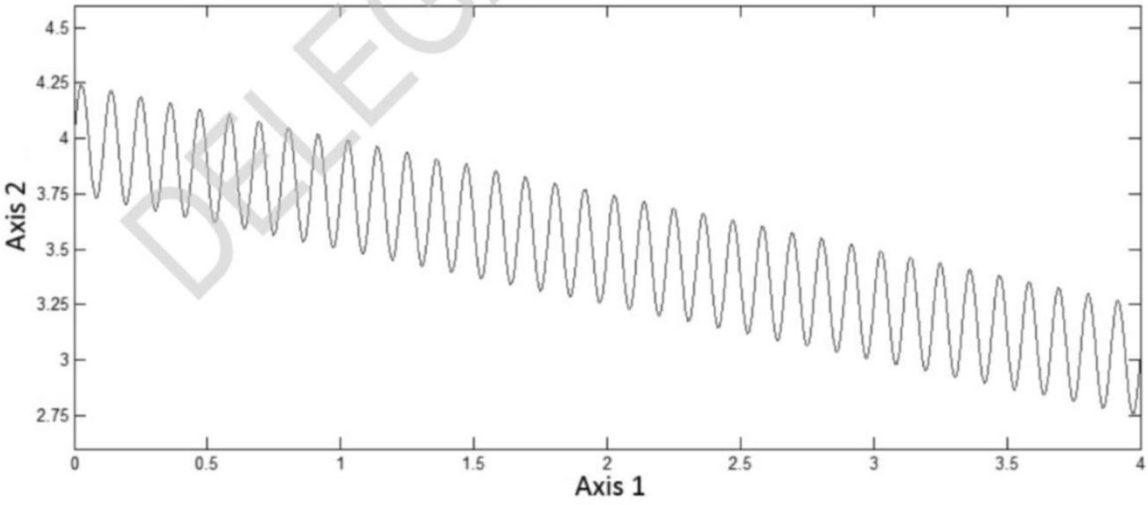


Рис.2. Спирометрический эксперимент. Axis 1 = время (мин). Axis 2 = объем спирометра (л).

Advantages of this method:

- Less technical work is required with the image files.
- Symbols occupy minimal space within the figure itself.

Disadvantages:

- If the figure contains many labeled elements, it becomes inconvenient and time-consuming for students to repeatedly switch between the figure and the legend.

Conclusion:

Most authors opted for the first method (embedded text with translation support), while a few chose the second method (symbol labeling with explanatory legend).

5.3 Uploading Tasks to OLY-EXAM

To facilitate the uploading process, Daniel Isler created special author logins on the OLY-EXAM platform for members of the Scientific Committee and provided detailed instructions on how to enter theoretical exam tasks.

At the request of the Scientific Committee, Daniel organized the theoretical exams on the platform by separating them into subject sections, enabling easier navigation.

Each task was uploaded by its respective author, and the overall process was supervised by Ilyas Sakimov.

Most of the tasks were successfully uploaded before June 15.

5.4 Working with Comments and Voting on OLY-EXAM

During the Subgroup stage and task discussions at the Olympiad, members of the Scientific Committee regularly reviewed comments left by jury members on OLY-EXAM. They responded to feedback and, when necessary, created new task versions that incorporated required changes.

In addition, prior to the Olympiad, Daniel trained two committee members — Askarbek Orakov and Erkin Qasym — on how to create new versions of tasks and initiate voting within the OLY-EXAM platform.

This training enabled the Scientific Committee to independently manage exam discussions, publish updated versions, and conduct official votes for finalizing the exam versions.

Use of Answer Sheets and the Scoring System

Each of the two theoretical exams (Part A and Part B) consists of 50 tasks. Each task includes four statements that students must evaluate as either true or false.

This means that for one exam, each student must make 200 decisions, and for both exams combined, 400 decisions.

It is evident that manual grading of theoretical exams would require an excessive amount of time. In such a case, the results would not be ready in time for the Closing Ceremony — a problem that occurred at one of previous IBOs 2019. The Scientific Committee of that Olympiad had intended to complete the grading manually but failed to do so in time, and the results were not available at the Closing Ceremony.

In light of this failure, all subsequent IBOs have used automated answer sheet processing for theoretical exam evaluation.

Upon the recommendation of the Department of IT and Digitalization at the Center “Daryn”, a custom answer sheet was developed specifically for the IBO 2024 theoretical exams. The design was based on templates used by Daryn for entrance exams to schools for gifted students.

Since completing such a sheet can be time-consuming, the Scientific Committee sent advance instructions to all delegations two weeks prior to the Olympiad. The email included the actual answer sheet template and detailed instructions, with a request that students practice filling them out beforehand.

Additionally, to compensate for the time needed to properly complete the answer sheets, the committee decided to add 15 minutes to each theoretical exam.

As a result, each theoretical exam lasted 3 hours and 15 minutes.

However, since not all countries distributed the answer sheets to their students in advance, the Scientific Committee made the decision during the Olympiad to print the answer sheet instructions in all official delegation languages and to distribute them to the students one day before the theoretical rounds, using the student guides.

The instructions are presented on the two pages following the answer sheet in this report.

ANSWER SHEET

THEORY EXAM A

ID №										
	1	2	3	4	5	6	7	8	9	0
	1	2	3	4	5	6	7	8	9	0
	1	2	3	4	5	6	7	8	9	0

LAST AND FIRST NAME (IN LATIN)

COUNTRY OR REGION (IN LATIN)

answers

	A	B	C	D
1	T	T	T	T
	F	F	F	F
2	T	T	T	T
	F	F	F	F
3	T	T	T	T
	F	F	F	F
4	T	T	T	T
	F	F	F	F
5	T	T	T	T
	F	F	F	F
6	T	T	T	T
	F	F	F	F
7	T	T	T	T
	F	F	F	F
8	T	T	T	T
	F	F	F	F
9	T	T	T	T
	F	F	F	F
10	T	T	T	T
	F	F	F	F
11	T	T	T	T
	F	F	F	F
12	T	T	T	T
	F	F	F	F
13	T	T	T	T
	F	F	F	F
14	T	T	T	T
	F	F	F	F
15	T	T	T	T
	F	F	F	F
16	T	T	T	T
	F	F	F	F
17	T	T	T	T
	F	F	F	F
18	T	T	T	T
	F	F	F	F
19	T	T	T	T
	F	F	F	F
20	T	T	T	T
	F	F	F	F
21	T	T	T	T
	F	F	F	F
22	T	T	T	T
	F	F	F	F
23	T	T	T	T
	F	F	F	F
24	T	T	T	T
	F	F	F	F
25	T	T	T	T
	F	F	F	F
26	T	T	T	T
	F	F	F	F
27	T	T	T	T
	F	F	F	F
28	T	T	T	T
	F	F	F	F
29	T	T	T	T
	F	F	F	F
30	T	T	T	T
	F	F	F	F
31	T	T	T	T
	F	F	F	F
32	T	T	T	T
	F	F	F	F
33	T	T	T	T
	F	F	F	F
34	T	T	T	T
	F	F	F	F
35	T	T	T	T
	F	F	F	F
36	T	T	T	T
	F	F	F	F
37	T	T	T	T
	F	F	F	F
38	T	T	T	T
	F	F	F	F
39	T	T	T	T
	F	F	F	F
40	T	T	T	T
	F	F	F	F
41	T	T	T	T
	F	F	F	F
42	T	T	T	T
	F	F	F	F
43	T	T	T	T
	F	F	F	F
44	T	T	T	T
	F	F	F	F
45	T	T	T	T
	F	F	F	F
46	T	T	T	T
	F	F	F	F
47	T	T	T	T
	F	F	F	F
48	T	T	T	T
	F	F	F	F
49	T	T	T	T
	F	F	F	F
50	T	T	T	T
	F	F	F	F

answers

answers

answers

answers

PLEASE NOTE,
USE ONLY BLACK INK PEN!

CHARGE PERSON

General Instructions for Theory Part A

Date: July 11th, 2024

Time Allowed: 3 hours and 15 minutes **(NO additional time)**

The **Theory Part A exam** consists of **50** tasks across the following topics:

- **Biosystematics:** Q1-3
- **Cell and Molecular Biology:** Q4-12
- **Ecology:** Q13-17
- **Ethology:** Q18-19
- **Genetics & Evolution:** Q20-29
- **Plant Anatomy and Physiology:** Q30-37
- **Animal Anatomy and Physiology:** Q38-50

Supplementary figures are provided in the **Appendix**.

Each question is worth a maximum of 1.0 point. Marking is done based on the scheme below:					
Number of correctly identified statements	0	1	2	3	4
Points	0	0	0.2	0.6	1

Please keep in mind:

Instructions

You can use the question paper for your notes and rough work, we do not assess it.

An answer sheet is provided. **Only answers recorded on the answer sheet will be scored.** The sheet includes several fields that need to be filled out. Follow the instructions below for filling out the answer sheet:

In the "Last and First Name" field, write your last name (family name) and first name in English (if both do not fit, write only your last name).

In the "Country or Territory" field, write the country or territory you represent at the IBO in English.

In the "ID№" field, first enter the three digits of your personal ID number in the leftmost column (from top to bottom), then shade the corresponding digit in the row to the right of each digit of the ID number.

The largest field, "Answers," contains 50 questions, each with four statements labelled A, B, C, and D. Each statement has two squares: the "T" square indicates true, and the "F" square indicates false.

Ensure that the squares in the "ID№" and "Answers" fields are completely shaded with no unshaded areas remaining and without going outside the boundaries. Marks like "+", "x", checkmarks, or circles will not be read. Black squares must be shaded with a black pen (using a red pen or pencil is strictly prohibited).

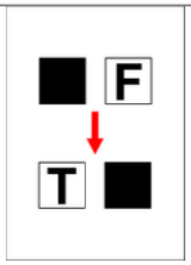
Do NOT fill out the "charge person" field and do NOT shade any fields that are not specified above. Black squares in the corners SHOULD NOT be shaded/corrected as it will interfere with the scanning process.

Communication with Organizers

You are provided with four types of cards for assistance during the exam:

- **Drinking Water (Blue):** Raise this card if you need water.
- **Washroom (Yellow):** Raise this card if you need to use the washroom.
- **Correction (White):** Raise this card if you made a mistake on your answer sheet and want to fix it.
- **Other Queries (Red):** Raise this card if you have any other questions.

If you make a mistake on your answer sheet, use the "Correction (White)" card to request a correction pen. Using the correction pen, recolor the wrongly shaded area into white without going outside the boundaries. **You cannot ask for correction in the last 10 minutes.** (Note: Overuse of the correction pen may cause scanning errors, **try to put in the answers once you are fully confident**)

Drinking water	Washroom	Correction	Other queries
			

During the Exam

At the beginning of the exam, a whistle signal will let you know to open the exam papers and start writing.

15 minutes before the end, please start filling out the answer sheet if you have not already. We **do not provide** extra time to put your answers on the answer sheet.

At the end of the exam, a whistle signal will indicate when to stop writing and put down your pen **immediately**.

Continuing to write after the whistle signal will result in **disqualification**.

No materials, papers, or equipment should be taken out of the examination room.

For the theoretical exam answer sheets, the Scientific Committee proposed the use of a three-digit code to identify each student.

- The first two digits represented the country code (starting from 10),
- and the last digit indicated the individual student number (1, 2, 3, or 4).

This coding system was developed by the National Center “Daryn”, and representatives of the OLY-EXAM platform created a special translator tool to match these codes with the student IDs used on their online system.

In addition, the Department of IT and Digitalization of the “Daryn” developed a custom software application that processed the answer sequences scanned from the answer sheets and automatically calculated the scores for each student.

Subgroup Meetings

The **Subgroup** (also referred to as the *sub-jury group*) is a panel of ten jury members, each an expert in a distinct field of biological science, who are invited by the host country several days before the Olympiad to conduct a **preliminary review of all exam tasks** (both theoretical and practical).

By tradition, the subgroup consists of ten members.

For **IBO 2024**, the following experts were invited to Astana as subgroup members:

1. Gerard Cobut – Belgium
2. Domen Vaupotič – Slovenia
3. Alexander Rubtsov – Russia
4. Evgeny Shilov – Russia
5. Sándor Bán – Hungary
6. Ronald Cruz – Philippines
7. Aditya David Wirawan – Indonesia
8. Christiane Mühle – Germany
9. Dayan Melisov – Kyrgyzstan
10. Niko Johansson – Finland

Each subgroup member also served as a jury member for their respective delegation.

IBO 2024 Subgroup Schedule

The subgroup meetings for IBO 2024 took place from July 3 to July 6 in Astana, at the Park Inn by Radisson hotel.

All task authors, editors of both theoretical and practical exams, a representative from OLY-EXAM, and members of the National Center "Daryn" attended these meetings.

Subgroup Schedule – July 3

Time	Activity
09:30 – 10:00	Introduction
10:00 – 10:30	Introduction to the Animal Anatomy & Physiology experiment
10:30 – 11:00	Coffee Break
11:00 – 12:00	Task Review – Animal Anatomy & Physiology
12:00 – 13:00	Discussion – Animal Anatomy & Physiology
13:00 – 14:00	Lunch
14:00 – 14:30	Introduction to the Biochemistry experiment
14:30 – 15:30	Task Review – Biochemistry
15:30 – 16:00	Coffee Break
16:00 – 17:00	Discussion – Biochemistry

Time	Activity
17:00 – 17:30	Introduction to the Molecular Biology experiment
17:30 – 18:30	Dinner
18:30 – 19:30	Task Review – Molecular Biology
19:30 – 20:30	Discussion – Molecular Biology

Subgroup Schedule – July 4

Time	Activity
09:00 – 09:30	Introduction to the Bioinformatics experiment
09:30 – 10:30	Task Review – Bioinformatics
10:30 – 11:00	Coffee Break
11:00 – 12:00	Discussion – Bioinformatics
12:00 – 12:30	Introduction to Theoretical Exams
12:30 – 13:30	Lunch
13:30 – 15:30	Task Review – Theory: Cell Biology
15:30 – 16:00	Coffee Break
16:00 – 18:00	Discussion – Theory: Cell Biology
18:00 – 19:00	Dinner
19:00 – 20:30	Continued Discussion – Theory: Cell Biology

Subgroup Schedule – July 5

Time	Activity
09:00 – 11:00	Task Review – Theory: Genetics & Evolution
11:00 – 11:30	Coffee Break
11:30 – 13:00	Discussion – Theory: Genetics & Evolution
13:00 – 14:00	Lunch
14:00 – 16:00	Task Review – Theory: Biosystematics, Ethology, Ecology
16:00 – 16:30	Coffee Break
16:30 – 18:00	Discussion – Theory: Biosystematics, Ethology, Ecology
18:00 – 19:00	Dinner
19:00 – 20:30	Continued Discussion – Theory: Biosystematics, Ethology, Ecology

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Subgroup Schedule – July 6

Time	Activity
09:00 – 11:00	Task Review – Theory: Animal Anatomy & Physiology
11:00 – 11:30	Coffee Break
11:30 – 13:00	Discussion – Theory: Animal Anatomy & Physiology
13:00 – 14:00	Lunch
14:00 – 16:00	Continued Discussion – Theory: Animal Anatomy & Physiology
16:00 – 16:30	Coffee Break
16:30 – 18:00	Task Review – Theory: Plant Anatomy & Physiology
18:00 – 19:00	Dinner
19:00 – 20:30	Discussion – Theory: Plant Anatomy & Physiology

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Outcomes of the Subgroup Meetings

Throughout the subgroup sessions, numerous comments were received on the theoretical tasks — typically between 1–2 and 6–7 per task.

While many comments focused on improving formulations or correcting typographical errors, others addressed content-related issues, including statements, illustrations, and figure descriptions. There were also suggestions related to correct answers and justifications.

According to the subgroup, the theoretical tasks were challenging, yet also creative and engaging. The overall quality of the work by the task authors was highly praised.

As a result of the discussions, two theoretical tasks were replaced with reserve tasks.

IBO 2024 Exams Discussions

The overall schedule of IBO 2024 was developed based on the recommendations of the IBO Steering Committee. The official schedule is available at the following link.

On July 8, 9, and 10, all jury members (team leaders) worked on the exam materials. This process included:

1. Reading and commenting on the exam tasks via the OLY-EXAM platform;
2. Discussing the tasks, primarily focusing on the comments left;
3. Voting on the final versions of the exams;
4. Translating the exam questions;
5. Sending the finalized tasks for printing;
6. Reviewing and sealing the envelopes with the exams.

- On **July 8**, the jury members focused on the four practical exams, as students were scheduled to take these tests on **July 9**.
- On **July 9**, the jury worked on the theoretical exam "Part A."
- On **July 10**, the focus was on the theoretical exam "Part B."

Schedule of Exam Discussions – IBO 2024

Venue: Radisson Hotel

Participants: Over 260 jury members (team leaders), around 25 members of the Scientific Committee, approximately 10 representatives from the Republican Scientific-Practical Center "Daryn," 2 representatives from OLY-EXAM, and 12 volunteers.

July 8

Time	Activity
08:00–08:30	Introduction of the Scientific Committee and Wi-Fi setup / OLY-EXAM troubleshooting / Sub-group report
08:30–09:00	Introduction to the Biochemistry practical exam
09:00–09:30	Introduction to the Animal Anatomy and Physiology practical exam
09:30–10:00	Introduction to the Bioinformatics practical exam
10:00–10:30	Introduction to the Molecular Biology practical exam
10:30–12:30	Reading and Commenting on Exam Tasks via OLY-EXAM (*Comment submission deadlines on OLY-EXAM:* • For Anatomy and Physiology and Biochemistry – 13:30 • For Molecular Biology and Bioinformatics – 16:00)
12:30–13:30	Lunch
13:30–15:30	Discussion of "Anatomy and Physiology" (Main Jury Hall) Discussion of "Biochemistry" (Aktau Room)
15:30–16:30	Announcements of changes and voting on final versions of "Anatomy and Physiology" and "Biochemistry"
16:30–18:30	Discussion of "Molecular Biology" (Main Jury Hall) Discussion of "Bioinformatics" (Aktau Room)
18:30–19:30	Dinner
19:30–20:30	Announcements of changes and voting on final versions of "Molecular Biology" and "Bioinformatics"
20:30–06:00	Translation of final exam versions, printing, verification, and approval by jury members

July 9

Time	Activity
07:00	Publication of Part A of the Theoretical Exam on OLY-EXAM
07:00 – 12:00 (you may arrive later, but allow yourself sufficient time)	Reading and commenting on Part A of the theoretical exam via OLY-EXAM (Comment submission deadlines:• For Biosystematics, Cell Biology, Ecology – 13:00• For Ethology, Genetics & Evolution, Plant Anatomy and Physiology – 15:00• For Animal Anatomy and Physiology – 17:00)*
12:00 – 13:00	Lunch
13:00 – 15:00	Discussion of comments: Biosystematics, Cell Biology, Ecology
15:00 – 17:00	Discussion of comments: Ethology, Genetics & Evolution, Plant Anatomy and Physiology
17:00 – 19:00	Discussion of comments: Animal Anatomy and Physiology
19:00 – 20:00	Dinner
20:00 – 21:30	Voting on the final version of the Theoretical Exam Part A
21:30 – 06:00	Translation and printing of Part A of the theoretical exam. Verification of printed exams by jury members and sealing of exam envelopes. This may be completed by 23:00 on July 9 or by 07:00 on July 10.

July 10

Time	Activity
Throughout the day	Verification of printed Part A of the theoretical exam by jury members and sealing of exam envelopes
08:00 – 11:00	Reading and Commenting on Theoretical Exam Part B via OLY-EXAM (Comment submission deadlines on OLY-EXAM: For Biosystematics, Cell and Molecular Biology, Ecology – 12:00 For Ethology, Genetics and Evolution, Plant Anatomy and Physiology, and Animal Anatomy and Physiology – 14:00)
11:00 – 12:00	Reports from practical exam inspectors
12:00 – 13:00	Discussion of comments: Biosystematics, Cell & Molecular Biology, Ecology
13:00 – 14:00	Lunch

Time	Activity
14:00 – 17:00	Discussion of comments: Ethology, Genetics & Evolution, Plant Anatomy & Physiology, Animal Anatomy & Physiology
18:00 – 19:00	Dinner
19:30 – 20:30	Voting on the final version of the Theoretical Exam (Part B)
20:30 – 06:00	Translation of Theoretical Exam (Part B), Printing, Verification, and Approval by Jury Members (*Strict deadline for jury members to sign – **06:00**)

Summary of the Process

All stages of the exam work—including reading, discussions, voting, and printing—were completed strictly on schedule. There were few comments, and most were minor—such as wording edits, typo corrections, or technical fixes.

Only one task underwent significant changes, which were handled by a small ad-hoc working group of 6–7 jury members from different countries.

Most jury members noted that the theoretical exam tasks were challenging yet feasible, effectively assessing students' scientific competencies, skills, and data analysis abilities.

Importantly, not a single theoretical exam task presented to the jury at IBO 2024 was removed.

Printing of Exam Papers

The printing of exam papers is a critical and highly responsible stage of every IBO, as the final versions of the exams are approved the night before the actual exam sessions. After approval, delegations begin translating the exams and then submit their versions for printing via the OLY-EXAM platform.

In practice, many delegations that require translation begin this process as soon as they start reading the exam papers. If any changes are made to the tasks afterward, they only update the relevant sections that were revised during the discussion phase. OLY-EXAM facilitates this by clearly showing differences between the various versions of the exam tasks.

Delays are not uncommon at IBOs—either due to prolonged discussions (especially when many edits are made) or slow printing processes. However, at **IBO 2024**, all stages, including printing, were completed on time and without issues.

To ensure fast printing, the **"Daryn"** center procured more than **11 large color printers** (!). This made pronting process very fast.

In addition, **12 volunteers** were assigned to assist with jury coordination. Ilyas Sakimov conducted detailed briefings with these volunteers on July 7, 8, and 9, including specific instructions related to the printing process.

Key responsibilities and procedures included:

1. Monitoring the Submission of Print Versions

- On the nights of **July 8–9** and **July 10–11** (the nights before the exams), volunteers monitored the OLY-EXAM platform to check which countries had not yet submitted their exam versions for printing.
- If representatives of these countries were present in the jury hall, volunteers reminded them to submit.
- If they were absent and the 04:00 deadline approached, volunteers attempted to contact them via WhatsApp or by calling their hotel room.
- On the **first night**, several countries delayed submission, including:

Chinese Taipei (Taiwan), Denmark, Estonia, Georgia, Hong Kong, Hungary, Indonesia, Iran, Japan, Lithuania, Pakistan, Philippines, Slovakia, Sri Lanka, Ukraine, United Arab Emirates, Uzbekistan.

- On the **second night**, all countries submitted their print versions before the 04:00 deadline.

2. Distribution, Verification, and Sealing of Exams

- After printing, volunteers placed each version with its designated envelope, prepared in advance by the Daryn Center staff.
- By **06:00**, all delegations were required to verify their printed exams, place them in envelopes, seal them, and sign a confirmation table.
- If any delegation failed to show up by 06:00, volunteers were instructed to contact them via WhatsApp or by phone.
- On both nights, **all delegations completed the sealing process on time**.

3. Organization and Transport of Exam Packages

- After sealing, volunteers organized the envelopes into boxes according to:
  - The name or location of the exam session;
  - The student group number, as indicated by the third digit of each student's personal code.
- For all exams, **official English versions** were printed for every student by default. These were not sealed in envelopes but were placed directly on student desks in exam rooms.
- Even English-speaking countries submitted print versions via OLY-EXAM due to the platform's requirements.

4. Final Delivery

Between **06:00 and 07:00** on exam days, all boxes containing exam papers were transported to **Nazarbayev University** for administration.

There were **no complaints** regarding the printing process or the quality of the printed exams.


Mol - Bio (2)
Mol - Bio (3)
Mol - Bio 4

Administration of the Theoretical Exams

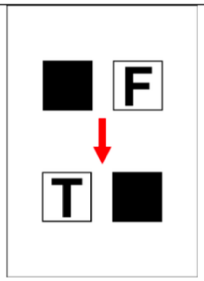
On **July 11**, both Part A and Part B of the theoretical exams were held at Nazarbayev University. Below is a summary of the day's logistics and arrangements for the students:

Locations and Responsibilities

- The theoretical exams were conducted in the same venues as the practical exams.
- Student groups were assigned to the same locations as during their first practical exam on **July 9**.
- Ilyas Sakimov pre-assigned authors of the theoretical exams to be responsible for each location.

Volunteer Coordination and Venue Preparation

- Ilyas Sakimov arranged with the supervisors of all four practical exams to have their volunteers assist during the theoretical exams on July 11.
- He also asked supervisors to:
  - Remove all lab equipment and materials from exam rooms,
  - Clean the rooms,
  - Place four cards on each student's desk (used for requests during the exam).

Drinking water	Washroom	Correction	Other queries
			

- Volunteers brought whistles for signaling the start and end of exams and launched countdown timers on the display screens.

Key Organizational Notes from the Scientific Committee

1. **Color Blind Students:**

It was discovered that two students (from **India** and the **UK**) had red-green color blindness, which was not disclosed in the registration forms.

   - The leaders of both delegations requested color adjustments in four questions, which were implemented.
   - Each of these students was assigned a volunteer who could name the colors aloud if needed.
2. **Printed Instructions:**
   - Printed exam instructions were distributed to all students one day before the theoretical exam.
3. **Calculator Availability:**
   - All students received calculators upon registration, as done in IBO 2023.
   - Each exam location also had 20–30 spare calculators in case students forgot theirs.
4. **Correction Tools:**
   - Each room had 40 correction pens.
   - Volunteers carried them and distributed them to students who raised a special card.
5. **Baggage Policy:**
   - As with practical exams, students were not allowed to bring backpacks into exam rooms.
   - Bags were to be left on buses or outside the exam halls.
6. **Restroom Escort Protocol:**
   - The same escort system used for practical exams was maintained, with volunteers already trained for this role.
7. **Health-Related Exam Interruption Protocol:**

- A specific procedure was established for cases where a student could not continue **Part A** due to a health issue:
  - If a student lost **less than 30 minutes**, they could continue the exam afterward with that time added.
  - If more than **30 minutes** were lost, the student would stop and rest, attend lunch, then take **Part B** with everyone else, and make up for the lost time **after Part B**.
  - One of the volunteers would accompany them during the break.

8. **Post-Exam Procedures:**
   - After each exam, responsible Scientific Committee members:
     - Checked answer sheets for completeness and accuracy,
     - Collected all question booklets and sealed them in envelopes.
9. **Access Control:**
   - During exams, only members of the Scientific Committee, inspectors, and Daryn staff were allowed to enter the exam rooms.

Execution

- Both exams began and ended exactly on schedule.
- No incidents or issues occurred during either session.

Scanning of Answer Sheets, Scoring, and Moderation

Scoring Process

After the theoretical exams on **July 11**, starting from **18:15**, all answer sheets and question booklets were delivered to the temporary headquarters of the Olympiad at **Nazarbayev University**. Maksat Aubakirov from the "Daryn" Center verified the correctness of the filled-in answer sheets and scanned them. Although a few sheets were filled out incorrectly, the fields "Last and first name" and "Country or Region" allowed for quick identification.

To automate scoring, Maksat Aubakirov and Erzhan Shaniyev developed a custom program that read students' responses (marked as "T" for true and "F" for false) and assigned scores based on a regressive scoring scale:

- 4 correct statements → 1.0 point (maximum per question)
- 3 correct statements → 0.6 points
- 2 correct statements → 0.2 points
- 1 or 0 correct statements → 0 points

Answer keys were provided by members of the Scientific Committee.

Each student's scores for Part A and Part B were compiled by Maksat Aubakirov and forwarded to the OLY-EXAM team, who then matched the three-digit theoretical exam codes to the encrypted student IDs used on the OLY-EXAM platform. He also submitted the scanned answer sheets.

As a result, by the **next morning**, every jury member had access to:

- The theoretical exam scores of their students,
- Scanned answer sheets,
- Previously published answer keys (available during the theoretical exam discussions),

This allowed each delegation to independently verify the scores of their students and compare them with the official results.

Appeals (Moderation)

On **July 12**, during the morning General Assembly, some jury members requested to discuss concerns regarding the **answer sheet format**, specifically that the volume of responses required (200 entries per exam) left some students without enough time to fully complete the sheets.

In response, the Scientific Committee issued a written clarification emphasizing the following:

- All countries had received the answer sheet templates and instructions two weeks before the Olympiad, with a recommendation to train students in advance.
- Students were again provided with printed instructions one day before the theoretical exams.

- Due to time constraints (scanning, verification, diploma printing, and closing ceremony preparations), manual rechecking of answer sheets was not feasible.
- Rechecking would be unfair to students who spent time carefully completing their answer sheets, and to countries that had properly prepared their teams.
- Some complaints were made after prohibited post-exam interactions between jury members and students.
- A unanimous agreement had been reached earlier during the Olympiad: only answers fully marked in the official answer sheets would be accepted.

The committee stressed that, while respecting the perspectives of all countries, they could not accommodate the preferences of individual jurors at the expense of fairness and procedural integrity.

During the General Assembly, only the representative from the UK raised a concern about answer sheets, which was resolved quickly.

During the official moderation session that followed, only Canada and Turkey raised further issues. Their concern was that in some cases, partially filled answer sheets were accepted, while in others they were not.

The Scientific Committee responded by referring to the official exam instructions, which clearly stated that all answer fields must be fully completed to ensure reliable scanner reading.

Statistics on Authors, editors and Content Sections

Number of Tasks by Section (Final Version of Theoretical Exams)

Section	Number of Tasks
Animal Anatomy and Physiology	25
Biosystematics	5
Cell and Molecular Biology	20
Ecology	10
Ethology	5
Genetics and Evolution	20
Plant Anatomy and Physiology	15

Authors

#	Name	Background & Institution	# of Questions	Sections Covered
1	Daniyar Otarbayev	PhD student, Bioengineering, UNIST (Ulsan, South Korea); IBO 2015 participant, 2016 bronze medalist	24	Animal Physiology (4), Cell & Molecular (7), Ecology (1), Genetics & Evolution (6), Plant Physiology (6)
2	Yerasyl Temirbekov	Undergraduate, HKUST (Hong Kong); IBO 2022 silver medalist	18	Animal Physiology (5), Cell & Molecular (4), Ecology (4), Ethology (1), Genetics & Evolution (4)
3	Bakhytbek Zhalmagambetov	Physician, MD, Epidemiology MSc, Surabaya, Indonesia; IBO 2008 participant	11	Animal Physiology (6), Ethology (3), Genetics & Evolution (1), Plant Physiology (1)
4	Dinmukhammed Omar	Undergraduate, NTU (Singapore); IBO 2022 & 2023 silver medalist (youngest author, born 2006)	10	Animal Physiology (1), Biosystematics (3), Ecology (2), Genetics & Evolution (3), Plant Physiology (1)
5	Balzhan Alikenova	Undergraduate, CUHK (Hong Kong)	7	Animal Physiology (4), Cell & Molecular (3)
6	Eldar Urkumbayev	Undergraduate, MIT (USA)	7	Ecology (1), Plant Physiology (6)

#	Name	Background & Institution	# of Questions	Sections Covered
7	Khafiz Zhumadil	Medical consultant, Astana; IBO 2013 participant, 2014 bronze medalist	5	Animal Physiology (1), Biosystematics (1), Genetics & Evolution (3)
8	Ilyas Sakimov	Educational specialist, BIL Foundation	4	Animal Physiology (1), Biosystematics (1), Genetics & Evolution (1), Plant Physiology (1)
9	Yerasyl Muratov	Medical student, University of Debrecen (Hungary); IBO 2020 participant	4	Ecology (1), Ethology (1), Genetics & Evolution (2)
10	Alikhan Zhumagaleyev	Undergraduate, CUHK (Hong Kong); IBO 2022 silver medalist	4	Animal Physiology (2), Cell & Molecular (1), Ecology (1)
11	Alisher Nazarbekov	PhD student, Bioengineering, KAIST (Seoul, South Korea); IBO 2016 & 2017 bronze medalist	2	Cell and Molecular Biology (2)
12	Adlet Sagintaev	PhD student, Medical University of Graz (Austria)	1	Cell and Molecular Biology
13	Adilet Turtemir	Master's student, UNIST (Ulsan, South Korea); IBO 2018 & 2019 bronze medalist	1	Cell and Molecular Biology
14	Ansal Diasova	Undergraduate, Nazarbayev University (Astana)	1	Cell and Molecular Biology
15	Sanzhar Sagandyk	Undergraduate, UNIST (Ulsan, South Korea)	1	Animal Physiology

Of the 15 authors:

- **8** are undergraduate students (recent high school graduates),
- **1** is a master's student,
- **4** are PhD students,
- **1** works in medicine,
- **1** works in education.

Many of these authors not only contributed tasks for the theoretical exam but also actively participated in numerous editing meetings, where they played a key role in refining each other's questions. They provided support, constructive feedback, and alternative suggestions to improve the overall quality of the exam. In addition, there were several participants in the editing sessions who did not submit any questions themselves.

Below is a list of individuals who participated most frequently in the editing meetings (a total of 40 such meetings were held):

Yerasyl Temirbekov: 37 participations
Ilyas Sakimov: 36 participations
Yerasyl Muratov: 30 participations
Dinmukhammed Omar: 25 participations
Bakhytbek Zhalmagambetov: 24 participations
Daniyar Otarbayev: 23 participations
Eldar Urkumbayev: 22 participations
Alikhan Zhumagaleev: 18 participations
Adlet Sagintayev: 17 participations
Alisher Nazarbekov: 17 participations
Nurlybek Suleymanov: 15 participations
Sanzhar Sagynbyk: 12 participations
Kasym Yerkin: 10 participations
Askarbek Orakov: 10 participations
Alyamdar Askerov: 8 participations
Adlet Turtemir: 6 participations
Ansal Diasova: 4 participations
Khafiz Zhumadil: 3 participations
Anuar Aitpayev: 3 participations
Anna Zavalishina: 2 participations
Azamat Aydanov: 2 participations
Shamil Mureyev: 1 participation
Kuat Kasymbek: 1 participation

Additional Contributions

- Some committee members whose questions didn't reach the final exams but who contributed significantly during subgroup meetings and the IBO itself include **Askarbek Orakov** and **Qasym Erkin**.
- **Three international advisors** provided expert support during question development and discussion:
    - **Alexander Lagonenko** (Molecular Biology),
    - **Vasiliy Pankratov** (Genetics & Evolution),
    - **Dmitriy Sandakov** (Animal Physiology & Ethology).

Kazakhstani Content in Theoretical Exam Tasks – IBO 2024

When approximately 30–40 tasks had been submitted through the online form, the chief editor, Ilyas Sakimov, observed that there was a noticeable lack of so-called *Kazakhstan-specific content*—that is, questions related to local species, ecosystems, diseases, or other topics connected to Kazakhstan. That's why some authors intentionally integrated Kazakhstan-related content, including references to native species, local ecosystems, and scientific contributions from the region. Below is a list of such tasks, each featuring a Kazakhstani component:

#	Exam Part & Task	Author	Section	Kazakhstani Component
1	Part A, Task #1	Dinmukhammed Omar	Biosystematics	Highlights the rich **tulip diversity** found in Kazakhstan. Fittingly, the first question focuses on local flora.
2	Part A, Task #13	Eldar Urkumbayev	Ecology	Describes **legume survival** in nitrogen-poor steppe soils, characteristic of Kazakhstan's ecosystems.
3	Part A, Task #39	Balzhan Alikenova	Animal Anatomy & Physiology	Discusses lung hyperventilation in **snow leopards (Panthera uncia)** living in Kazakhstan's mountain regions.
4	Part A, Task #43	Ilyas Sakimov	Animal Anatomy & Physiology	Examines skull structure of **saiga antelope (Saiga tatarica)**, a species native to Kazakhstan.
5	Part B, Task #2	Ilyas Sakimov	Biosystematics	Features a phylogenetic tree of the **maral (Cervus elaphus)**, relevant to Kazakhstan's fauna.
6	Part B, Task #14	Dinmukhammed Omar	Ecology	Focuses on faunal restoration efforts in the remains of the **Aral Sea**, a major regional environmental issue.
7	Part B, Task #16	Yerasyl Muratov	Ecology	Explores ecological niche competition involving **Stipa capillata**, a dominant steppe grass in Kazakhstan.
8	Part B, Task #38	Daniyar Otarbayev	Plant Anatomy & Physiology	Investigates embryo development in **wheat (Triticum aestivum)**, based on research by Bauyrzhan Smailov, a Kazakhstan team-leader on IBO 2024.

These tasks reflect Kazakhstan's biological richness and emphasize the country's scientific contributions to the international biology community

Analysis of Theoretical Exam Questions

Psychometric Analysis of Theoretical Exam Questions

A detailed psychometric report for both Part A and Part B of the theoretical exams is available via the following links:

- **[Part A]**
- **[Part B]**

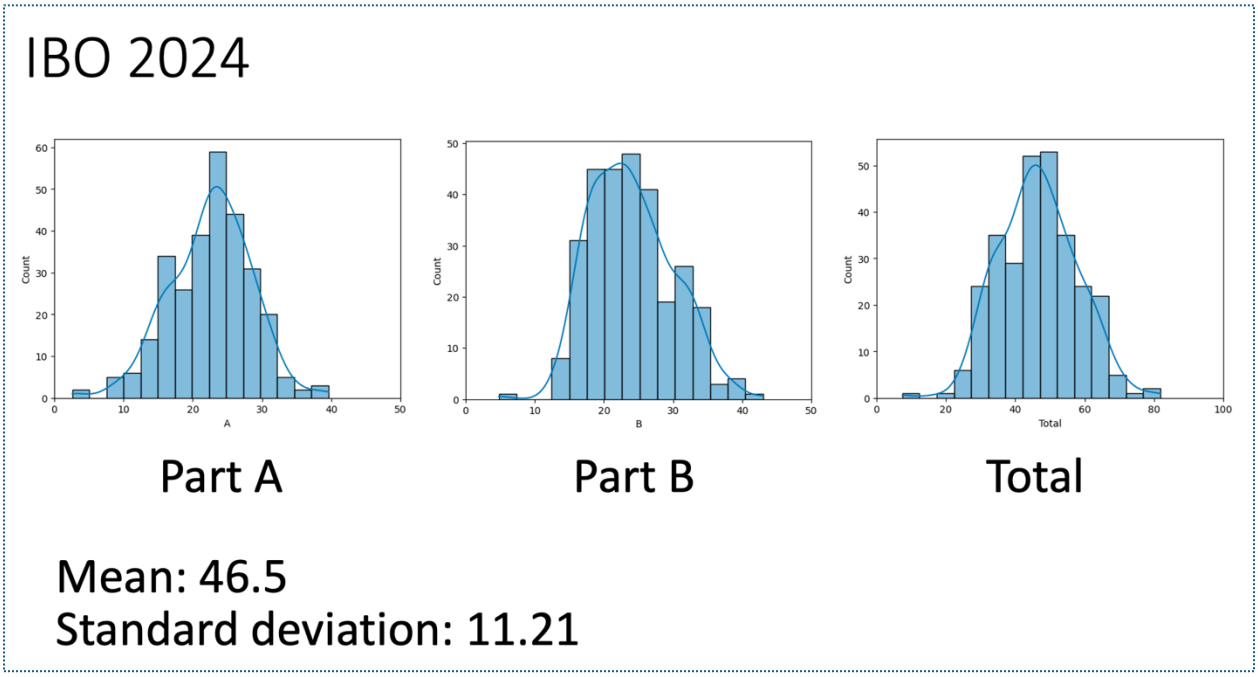
Below is a summary of the most important findings from that analysis:

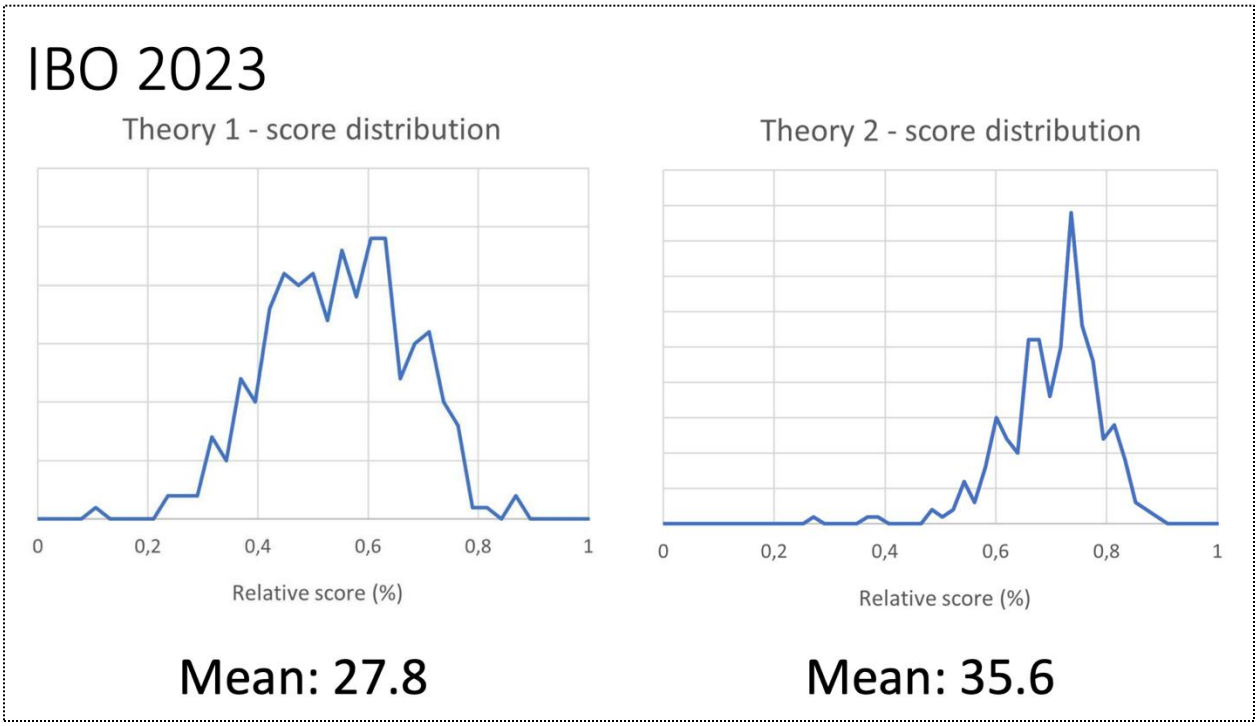
1. Number of Participants

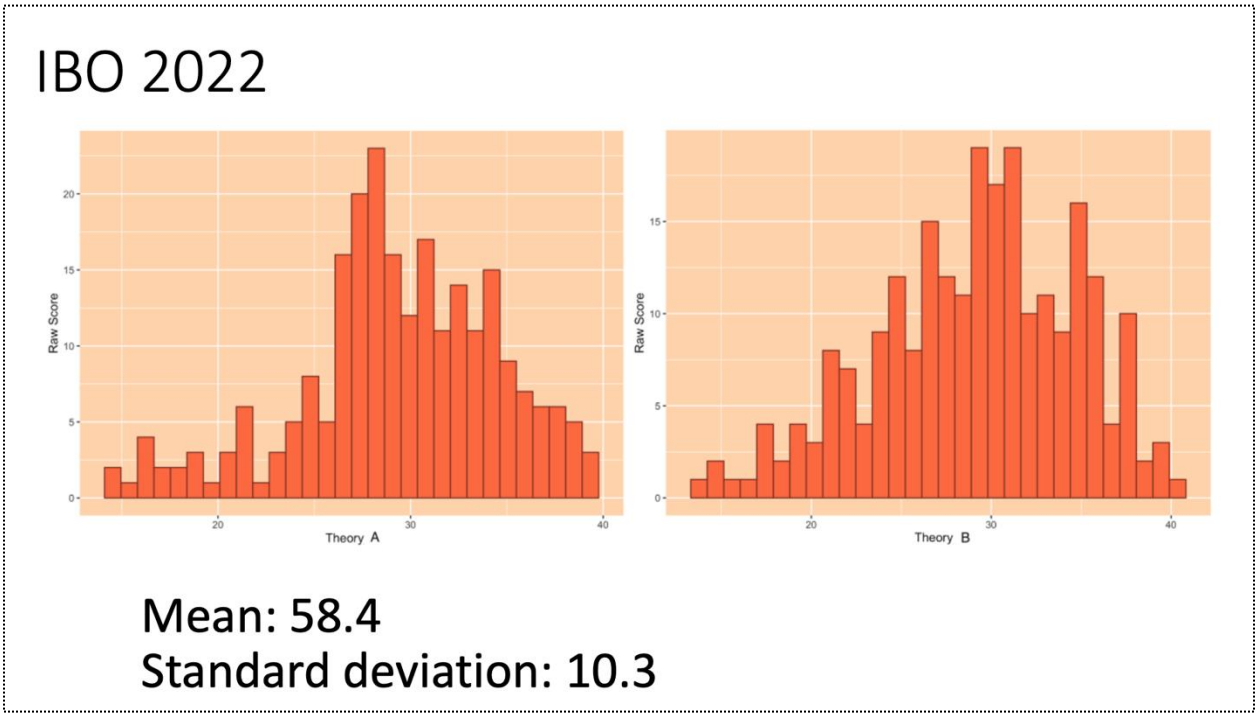
A total of 290 students took each of the two theoretical exams.

2. Mean Scores and Standard Deviations

The following charts illustrate the mean scores and standard deviations of students' results across the last three IBOs, enabling comparative performance analysis over time.







3. Test Reliability

The reliability coefficient for both exams was 0.88, indicating high reliability.

A value above 0.70 is generally considered acceptable; 0.88 means that 88% of the variance in students' scores reflects real differences in ability, not measurement error.

This confirms that both exams successfully differentiated students based on ability.

4. Point-Biserial Correlations

The point-biserial correlation measures how well each question correlates with total student performance (excluding that question).

Low values suggest that a question does not effectively distinguish between high- and low-performing students.

Questions with the lowest point-biserial values:

- Part A: Questions 1 and 12
- Part B: Questions 5, 16, and 24

5. Easiest and Hardest Questions

- Hardest question:
  - Question 12 in Part A
  - Other notably difficult items: Questions 9 and 50 (Part A)
- Easiest question:
  - Question 4 in Part A
  - Other easy items: Question 13 (Part A), and Questions 19 and 26 (Part B)

6. Wright Maps (Item-Person Maps)

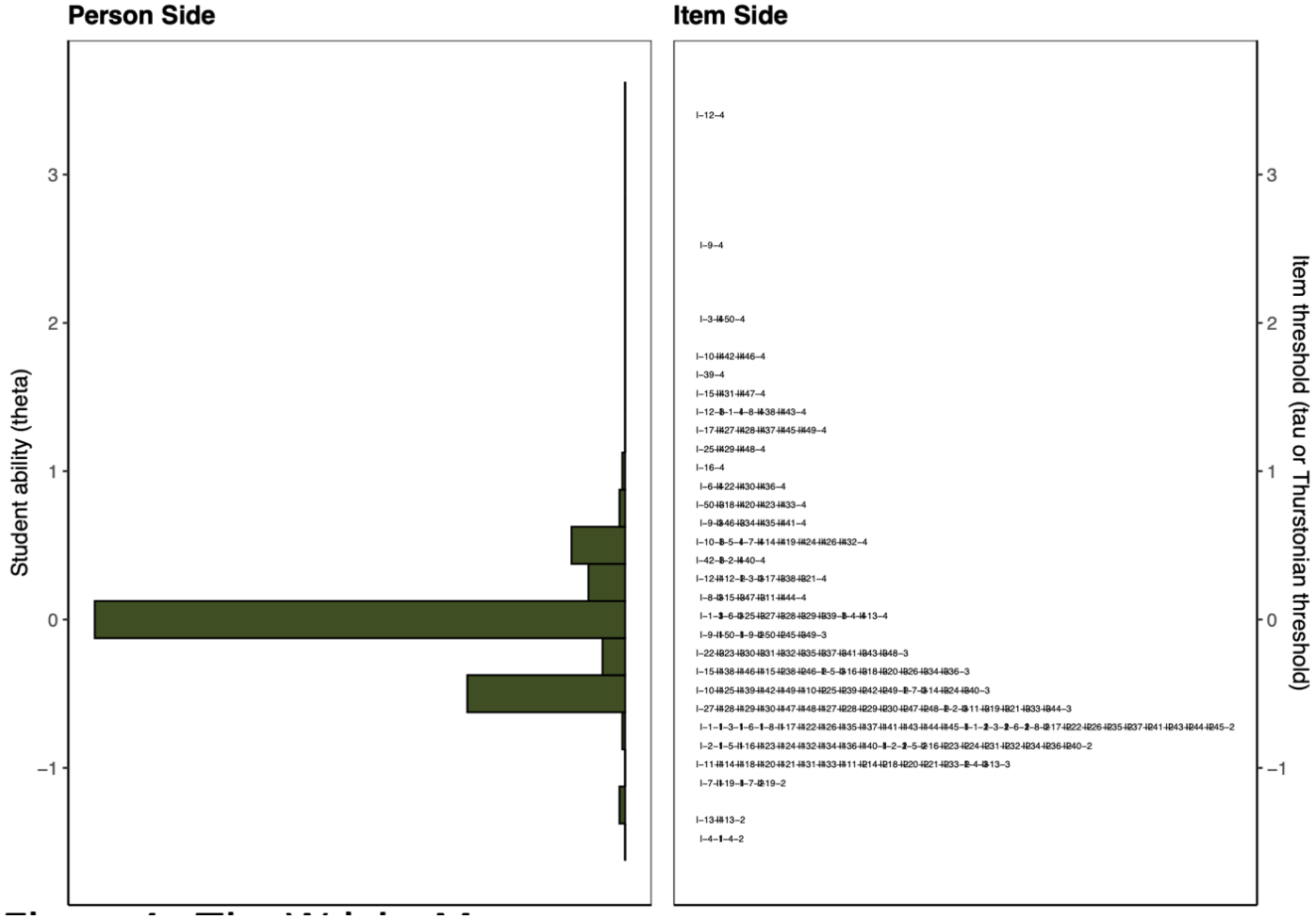
A Wright Map is a psychometric visualization tool that displays both:

- On the left: the distribution of student abilities (higher = stronger students)
- On the right: the difficulty of test questions (higher = harder questions)

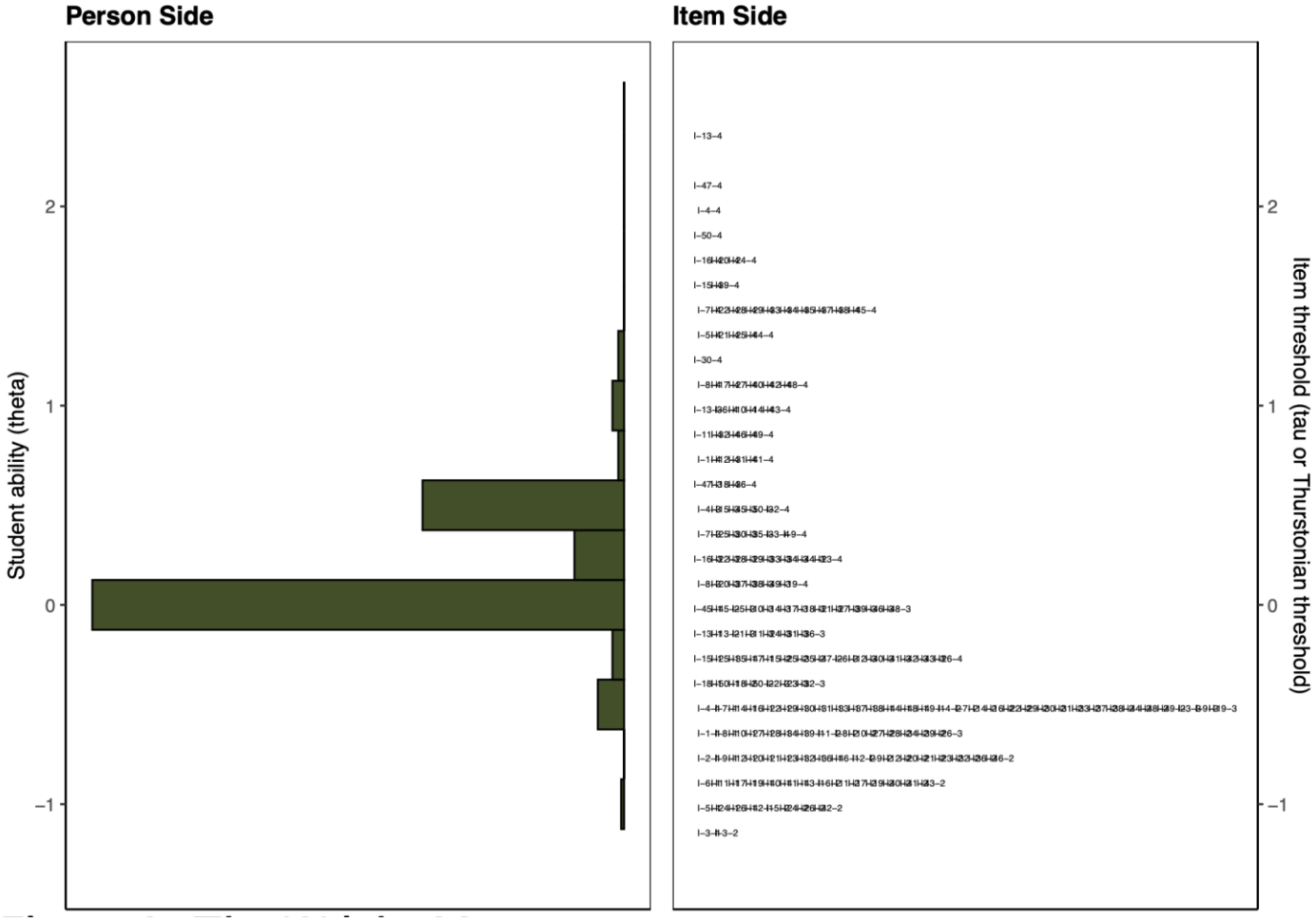
This allows direct comparison between student ability and question difficulty.

Ideally, the questions' difficulty levels should align well with the abilities of the tested group. If most questions are above the students' level, the test may be too hard; if below, too easy.

Part A Wright Map: Showed appropriate alignment of question difficulty with student ability, validating the test's design.



Part B Wright Map: Also demonstrated a generally good match, though a few items appeared either too simple or too difficult for most students.



These maps are crucial for evaluating the validity and fairness of assessments and for refining future test design.

Opinions on the Theoretical Exams
Feedback from International Jury Members

After the Olympiad, an anonymous survey was distributed via the WhatsApp group for all IBO 2024 jury members. A total of 32 members responded.

Question 1:

"How would you rate the theoretical exam tasks?"

- 62.5% (20 respondents): Met my expectations
- 34.4% (11 respondents): Exceeded my expectations
- 3.1% (1 respondent): Did not meet my expectations

→ 31 out of 32 respondents (97%) gave a positive evaluation.

Question 2:

"What are your impressions of the theoretical exam tasks?"

22 respondents provided feedback (multiple answers allowed). The comments were grouped into categories:

Response Type	**# of Mentions**
High quality / Excellent / Good tasks	10
Challenging but interesting / Creative / Original	9
Assess understanding and skills application	6
Filling in the answer sheet took too long	2
Too little biological knowledge was tested	1
Too focused on medical content in animal physiology, not enough physiology	1
Very difficult	1
Time-consuming	1

Conclusion:

Jury members from various countries were largely satisfied with the quality, originality, and creativity of the exam tasks. They emphasized that the questions effectively tested students' ability to apply knowledge, competencies, and skills.

Feedback from Members of Team Kazakhstan

The following are responses from Kazakhstan's IBO 2024 student team regarding the theoretical exams:

Student 1:

The theoretical round was tough… but excellent in every way.
I was happy to see that some tasks were based on the work of our local scientists or on certain ethnic themes.
I hope the same people will continue contributing to our national olympiads.

Student 2:

The theory seemed quite difficult. Clearly harder than last year's IBO theory, and very original.
The shading of answer options is a good way to make students concentrate fully 😀

Student 3:

The theory tasks were diverse, challenging, and original.
I really appreciated the inclusion of Kazakhstani topics, like the Aral Sea.
The questions required deep analysis and knowledge across multiple biology fields.
At the end of the round, you felt pleasantly exhausted — a feeling that only comes after solving really good problems.

Student 4:

The questions were amazing, though very lengthy.
Compared to past years, there were more graphs and the tasks were harder.
But overall, they were very creative.
When I discussed the question quality with international students, many of them also appreciated how creative the questions were.

Overall Summary:
Both international jury members and Kazakhstani students **highly praised** the theoretical exams at IBO 2024 for their **difficulty**, **creativity**, and **scientific depth**. Special appreciation was given to the **inclusion of local Kazakhstani content**, and students felt the exams were not only academically rigorous but also intellectually rewarding.

Recommendations for Future Hosts

These recommendations reflect the subjective opinions of two members of the IBO 2024 Scientific Committee (Adlet Sagintaev and Ilyas Sakimov) and may contain inaccuracies (although we believe they do not 😊).

1. **Grading of Theoretical Exams**

Automated grading of student answers significantly speeds up the process. Without it, a large number of staff or time would be required (although automation limits the variety of question types).

We strongly recommend an automated grading, but do *not* recommend using paper answer sheets for several reasons:

- Students spend a lot of time filling in bubbles.
- Scanner sensitivity must be finely tuned; for example, partially filled bubbles were accepted for some students but rejected for others.

We recommend using specially developed computer-based programs where each student answers using a mouse. This approach carries technical and financial risks, but it is still preferable to having students shade 200 answer boxes by hand.

2. **Conduct realistic stress-tests of all exams.**

This is essential and should be repeated if necessary. The benefits of such tests are described in the “Practical Exams” section.

3. **Take all feedback seriously during exam discussions**
(both in the Sub-group and at IBO).

Authors tend to defend their work and may struggle to view it with fresh eyes. Authors should always keep this in mind.

4. **Maximize hands-on activities in practical exams.**
Minimize theoretical content wherever possible.

5. **Ensure all students are accommodated in the same hotel.**

At IBO 2024, students stayed in three different hotels, which made it harder for them to socialize with participants from other accommodations.

6. **Always order more food than needed.**

In the initial days, jury hotels experienced food shortages, even though the correct number of guests had been reported by the "Daryn" center. After several incidents, hotels began preparing 10–15% more food, which resolved the issue.

7. **Completely separate the teams for practical and theoretical exams.**

At our Olympiad, some authors worked on both exam types. Due to the high workload, they were delayed in reviewing comments and could not fully support the practical teams during answer sheet review and other tasks, as they were involved in theoretical discussions.

8. **IBO rules**

Require all exam and organizing personnel to familiarize themselves with IBO rules and key documents (IBO Operational Guidelines v.5, Guidelines for the host country and others)

Consider having them sign a form confirming they understand and will comply with the IBO regulations.

9. **Handle the ranking and medal distribution with great care.**

It is advisable for several people—ideally from the Steering Committee, the host country, and possibly others—to be involved. Double-checking is strongly recommended.

10. **Appoint a dedicated person to monitor the large screen during Jury and General Assembly meetings.**

Their sole responsibility should be to ensure the screen works properly and remains connected at all times.

11. Prevent students from consuming alcoholic beverages.

Although this is likely not a common occurrence at Olympiads, we believe it is worth mentioning. At IBO 2024, following a joint dinner for students and jury members, students from one delegation became severely intoxicated. They required medical attention and had to be supervised overnight by their team leaders and medical staff. The question of how these students gained access to alcohol remains unresolved, as the organizers and team leaders of that country provided differing accounts.

12. Scientific Committee members (authors) attended previous Olympiads.

At IBO 2023, the Kazakhstani delegation included 11 members, among them authors of both theoretical and practical exams, as well as representatives from the "Daryn" Center. Their participation provided invaluable experience with all stages of the process—exam discussions, administration,

moderation, and more. As a result, these individuals were much more confident contributors to discussions at IBO 2024.

13. "Authors as all-rounders."

Many exam authors are university faculty members, researchers, or domain-specific experts, which ensures a high level of subject expertise. However, we also believe it is crucial to involve individuals who are equally well-versed in multiple areas of biology. Former IBO or national biology Olympiad participants often possess such broad expertise. Having these "all-rounders" makes it possible to create tasks for underrepresented areas "on demand." For example, at IBO 2024, Plant Anatomy and Physiology was identified as a gap in the theoretical exams. Once this was highlighted, authors promptly developed additional questions to reach the required number.

14. Reviewing printed versions of the exams.

At IBO 2024, during the printing and sealing of exam papers, jury volunteers ensured that jury members did not write on the exam sheets (clear instructions had been provided in advance). Nonetheless, several printed exams were found to contain handwritten notes from jury members. In one case, volunteers verified via an online translation tool that the text was a harmless good-luck wish. In other cases, where the meaning was unclear, volunteers erased the text. The jury members insisted that the notes were unrelated to the exam. We believe that maintaining this verification procedure at future IBOs is important.

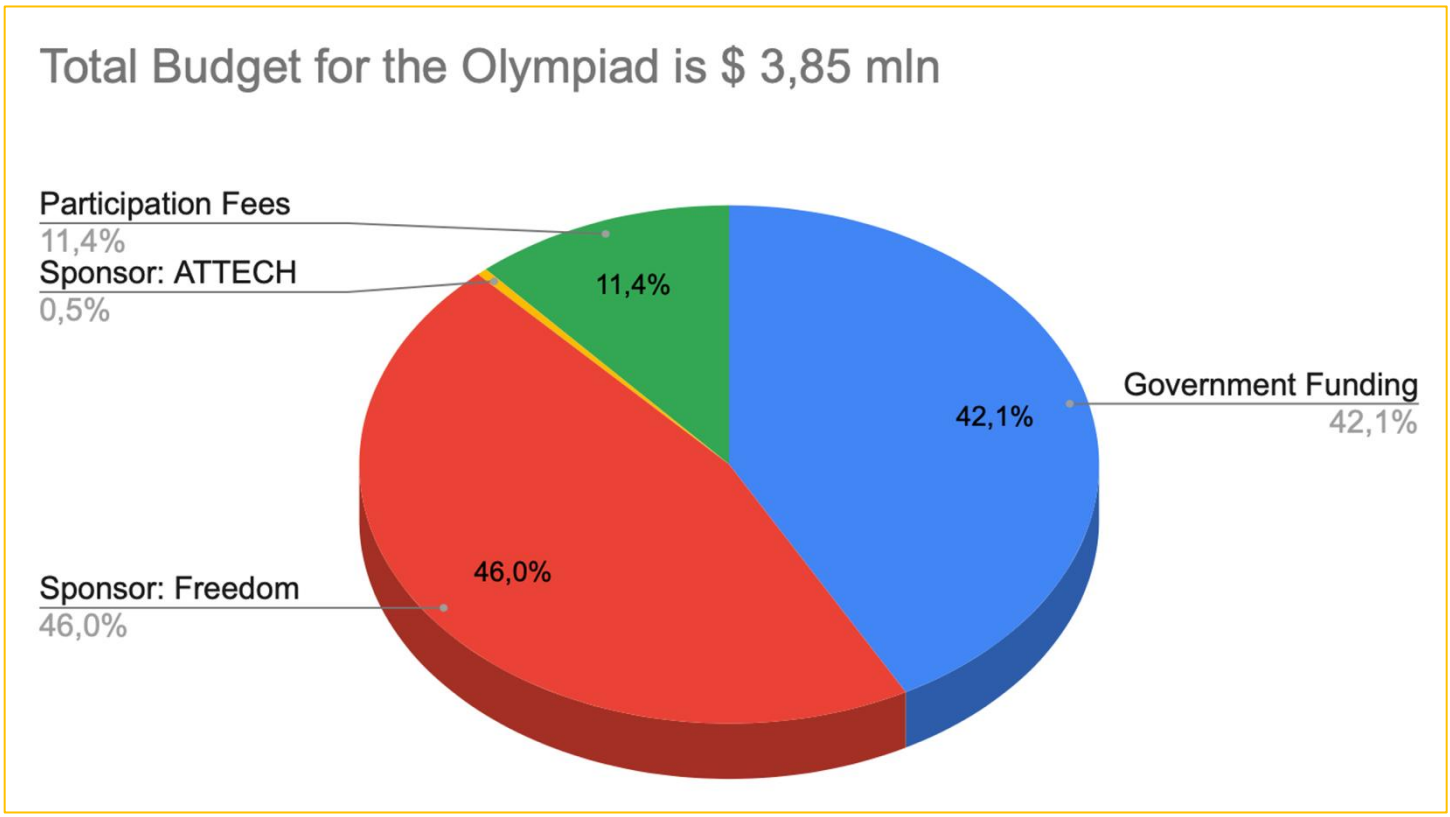
15. Attendance of the previous host at the AB Meeting.

Unfortunately, Kazakhstani representatives were unable to attend the AB Meeting in the Philippines in October 2024 due to bureaucratic restrictions—government funding is only provided if there is a direct benefit for Kazakhstan. Recognizing that the next host can greatly benefit from the experience of the previous host, we propose considering ways to support the previous host's participation in the AB Meeting. This support could potentially come from the upcoming host or from the IBO Office. Since government funding requires a clear justification of national benefit, alternative funding options would help ensure the valuable transfer of knowledge to future organizers.

We wish all future hosts patience, resilience, and success in preparing for and running this Olympiad. May your IBO be well organized and continue to embody the true spirit of the IBO community.

Sources of Funding and Expenditure Overview

Sources of the Olympiad Budget



Olympiad Expenses