BDOAA Prepatation Guide

Sheikh Hasin Abrar Alvi

1 Introduction

Hello. I'm Sheikh Hasin Abrar Alvi, a member of the Bangladesh team at the International Olympiad on Astronomy and Astrophysics (IOAA 2024). In this guide, I'm sharing my insights, strategies, and resources to help aspiring students study astronomy and prepare effectively for future Olympiads in Bangladesh.

2 Bangladesh Olympiad on Astronomy and Astrophysics

Bangladesh Olympiad on Astronomy and Astrophysics Committee (BDOAAC) is recognized as the National Olympiad Authority that organizes the regional and national olympiads on astronomy and astrophysics (A&A), hosts the national A&A camp in Bangladesh, and sends students to the International Olympiad on A&A (IOAA).

3 Catagories

Senior Category: Students of Grades 9–12, within the age limit defined by the IOAA, are eligible to participate in the Senior Category.

Qualified participants from this category represent Bangladesh at the International Olympiad on Astronomy and Astrophysics (IOAA).

Junior Category: Students of Grades 5–8, within the age limit defined by the IOAA, are eligible to participate in the Junior Category.

Qualified participants from this category can compete in the International Olympiad on Astronomy and Astrophysics Junior (IOAA Jr).

4 Stages

Bangladesh Olympiad on Astronomy and Astrophysics consists of 3 main rounds conducted between January and May each year.

Stage 1: Regional Round

This is the first stage of the Bangladesh Olympiad on Astronomy and Astrophysics (BDOAA). The regional round is held across five divisional districts: **Dhaka**, **Rajshahi**, **Chattogram**, **Sylhet**, **Bogura**, and also **Dinajpur**.

Before appearing in the regional round, students should have a strong understanding of the following topics:

- Gravitation
- Celestial Mechanics
- Positional Astronomy (Horizontal and Equatorial Coordinate Systems)
- Radiation Laws
- Thermodynamics of Ideal Gases

- Solar and Lunar Eclipses, Phases of the Moon, and their Geometry
- Constellations

Instructions for the Candidate

- For all questions, the process involved in arriving at the solution is more important than the final answer. Valid assumptions and approximations are perfectly acceptable.
- The examination consists of 10 Multiple Choice Questions (MCQs), 2–3 Medium Questions, and 1 Observational Question.
- Students may use a non-programmable scientific calculator.

Stage 2: National Round

Students selected from the Regional Round can participate here.

You should have a solid understanding of topics in the IOAA syllabus before the National Round. However, theoretical knowledge alone is not enough. You need strong problem-solving skills.

To prepare effectively, the best resources are the IOAA Book and past National Round questions. Be sure to solve all the A and B type problems in the IOAA Book thoroughly, and also familiarize yourself with the C type problems to gain a broader perspective.

Past National Round questions are extremely helpful for understanding the type and range of questions typically asked. If you encounter a topic you're unfamiliar with, turn it into a learning moment and improve your overall preparation.

Exam Instructions:

- The exam typically lasts 2 hours.
- While there is no strict format, the exam generally includes: 1 short problem, 2 medium problems, 1 long problem, and 1 observational question with a star map.
- Approximately the top 20 students from both categories advance to the next stage.

Stage 3: Camp and Team Selection Test

The top 20 students from each category participates in the camp and subsequently sits for the team selection test. You will be given assignments and problems to solve throughout the camp.

The Team Selection Test consists of three parts: **Theory**, **Observation**, and **Data Analysis**. Among these, the **Theory** round is the most important, so focus on it the most during the camp. The theory exam lasts approximately 3 hours and includes problems similar to those in the IOAA. For the **Observation** part, you need a thorough understanding of the night sky, including constellations, stars, deep sky objects, as well as coordinate systems and related calculations. This part might seem challenging at first, but it ultimately becomes enjoyable. The best resource for preparation is Star Map 101 by Fahim Rajit. The observation exam typically lasts around 2 hours and 30 minutes, and the questions are primarily based on star maps. For **Data Analysis**, you will be required to plot graphs containing many data points. Guidance and instructions will be provided during the camp. It is essential to practice this skill regularly to develop both speed and accuracy. Reviewing past IOAA Data Analysis papers is a great way to become familiar with the types of questions you may face.

Top 5 students in the Team Seleciton Test would be selected to represent Bangladesh in IOAA and IOAA Jr respectively.

5 Resources

Bangla Books

জ্যোতির্বিজ্ঞানের যতকিছু, অলিম্পিয়াড ও অন্যান্য (২০২৫) by BDOAA academic members is the first academic book in Bangla tailored specifically for astronomy Olympiads and related topics (2025). This book is authored by **Fahim Rajit Hossain** and is extremely handy for students preparing for Olympiads. It provides clear explanations, example problems, and practical tips, making it an essential resource for building a strong foundation in astronomy.

Other books that can help you prepare:-

- আব্দুল জব্বার স্যার এর 'তারা পরিচিতি'
- আ সা মোঃ নুরুজ্জামান এর 'গাণিতিক জ্যোতির্বিজ্ঞান'
- 'জ্যোতির্বিজ্ঞান ও জ্যোতির্পদার্থবিজ্ঞান – লক্ষ্য যখন অলিম্পিয়াড' (২০১৯) অনুপম প্রকাশনী

English Books

If you're aiming for **IOAA**, these books are essential. Make sure to complete them thoroughly and practice solving the problems they include.

- ***Fundamentals of Astronomy: A Guide for Olympiads*** by *Flavio Salvati* — A great starting point for beginners. It covers IOAA-relevant topics with clear explanations, simplified formulas, and introductory problems. However, studying only this book is not enough for full preparation.
- ***A Problem Book in Astronomy and Astrophysics*** by *Aniket Sule* : A compilation of past IOAA problems with detailed, high-quality solutions. This is a **must-have** for anyone serious about Olympiad-level preparation.
- ***Star Maps 101 and Practices*** by *Fahim Rajit Hossain* : The go-to book for mastering the **Observation** part. It introduces you to the night sky, constellations, and coordinate systems, while also providing practical exercises and problems to strengthen your observational skills.
- ***Astronomy: Principles and Practice*** by *Roy and Clarke*

Other Resources

- **Stellarium Mobile App and Desktop App** — A planetarium software that displays a realistic 3D view of the night sky, showing stars, planets, and deep-sky objects as seen with the naked eye, binoculars, or a telescope.
- **USAAAO Handouts**:A collection of handouts designed for **USAAAO** and **IOAA** preparation, covering key theoretical and problem-solving topics.
- **NDESC Interstellar Handouts**: The work is ongoing, and soon all topics will be available in both **English** and **Bangla**.
- **AO Guide** : A free, comprehensive, and structured guide built entirely for Astronomy Olympiad preparation.

6 Conclusion

Success in astronomy Olympiads comes not just from memorizing formulas or learning theories. It requires strong problem-solving skills and a willingness to tackle challenging questions head-on. The more you practice, the sharper your problem-solving abilities become, and the better prepared you are to handle Olympiad questions.

There is a quiet magic in looking up at the night sky. The stars, scattered across the darkness, remind us of the vastness of the universe. Astronomy Olympiads provide a platform to explore this wonder through scientific reasoning and inquiry. May this journey be one of curiosity, discovery, and a deeper appreciation for the Universe.