Astronomy Olympiad Archive

This archive includes all major Olympiads, as well as some more obscure competitions. I try to update it monthly. Because it's my personal archive, it contains items which are not exam papers, such as problem sets, statistics, and Olympiad results. I've left the results files in for the benefit of students, as they indicate the difficulty of the problems and allow for meaningful self-assessment.

The archive is somewhat skewed towards Eastern European competitions, but translation software goes a long way. Notably, the archive includes a decent attempt to collect all Bulgarian Olympiad papers in one place. Since people seem unwilling to make the IAO selection round papers public, some gaps remain.

Indeed, for any Olympiad, if you spot any gaps more than a year old and you can fill them in, please email me!

Here are descriptions for some of the competitions in the archive:

- `IOAA` – International Olympiad on Astronomy and Astrophysics. Large syllabus with lots of formulae to learn, but the majority of the problems boil down to standard algorithms. However, one faces serious time pressure – a theory exam of ~15 lengthy problems in 5 hours, and the data analysis exam might be even worse. For the observational round you'll need to memorise a lot of objects and coordinates. Often this round has multiple components – naked eye, star charts, planetarium, and whatever else people can think of. There's also a fun low-stakes team competition. As with IPhO, the problems are the responsibilty of the host country, so the quality and the difficulty vary dramatically. Some of the older papers are terrible, but everything from 2016 onwards should be alright.

- `IAO` – International Astronomy Olympiad. This competition was founded much earlier than IOAA, but for various reasons it has fallen into obscurity. There are limits on age and number of appearances, and the syllabus is respectively shorter. Within that syllabus, however, one may get trickier problems than in IOAA! The theoretical round belongs to the Russian tradition (5 hours for ~5 problems). Practical rounds mostly involve measurements and graphing, with less number crunching than in IOAA. For the observational round, memorisation doesn't matter as much as skills with a telescope and basic orientation. However, the IAO has some faults that are hard to overlook. Problems are sometimes copied word-for-word from previous papers. The official solutions are kept under wraps, and finding them online is quite difficult. Results are rarely published. In the theoretical round participants are asked to draw polar bears or penguins and get marks if the picture is nice enough. And so on.

- `USAAAO` – US National Olympiad. This is a young competition which seems to be run entirely by volunteers. The format is similar to IOAA in that there are both short and long problems, but here you only have 2.5 hours. This is emphatically not enough; there is insane time pressure and exam technique matters a lot. The problems themselves are a mixed bag. Some have errors or are simply tedious, while others are very difficult but well-balanced. There are few online resources for practicing advanced topics, so those problems are worth checking out.

- `BAAO` – British National Olympiad. Here the participants are given three very long problems for three hours. The problems are designed to be approachable even by students with little background in astronomy, but at the same time they manage to incorporate a greater variety of topics compared to IOAA. There's interesting astrophysics here that you wouldn't see in digestible form anywhere else. Eventually, the UK came to be the top team at IOAA, so the management must be doing something right. For one, they seem to be very receptive to student feedback.

- `ru` – Russian National Olympiad. Personal favourite. Not that many problem topics, but treated very creatively, and it's mostly the work of one man. Short problem statements, but the amount of thinking you need to do means you're still pressed for time. Your spatial visualisation ability will be stretched to the limit, but solving these problems correctly will give you feelings of power.

Apart from the usual fare, this Olympiad features a "Blitz Test", which is a general knowledge quiz coupled with a few qualitative theoretical questions. The IOAA team selection tests are managed by a separate(-ish) group of people, and the style there differs significantly. Still very difficult problems, but less geometry, and they span all the IOAA syllabus and beyond; there are no publicly available solutions (boo!).

- `mos` – Moscow Olympiad. I think of it as a toned-down version of the Russian Olympiad, i.e. similar problem style, but not as hard. Features some interesting qualitative questions. There is also an observational round in a planetarium.

- `spb` – Saint Petersburg Olympiad. Infamous for its ban on calculators. The idea behind this isn't to teach arithmetic, but rather to teach students how to approximate well. It's possible to take part even if you're outside Russia as long as you can manage navigating their website! Very short problem statements, but it's far from easy. Quite astrophysical compared to the other Olympiads in Russia – I've seen gravitational redshift, accretion disks, Eddington limit, and the like come up.

- `bg` – Bulgarian National Olympiad. There are similarities to Russian-style and Western-style Olympiads. This makes the problems here a good entry point to both. The problems are mostly standard, though something inspired comes up once in a while. There's also a multiple choice test which I have ambiguous feelings about – there's a good rationale behind it, but the execution is lacking. The older papers suffer from occasional open-ended questions where your answer can either be a single word or a whole litany, and you don't know which of these is expected of you.

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