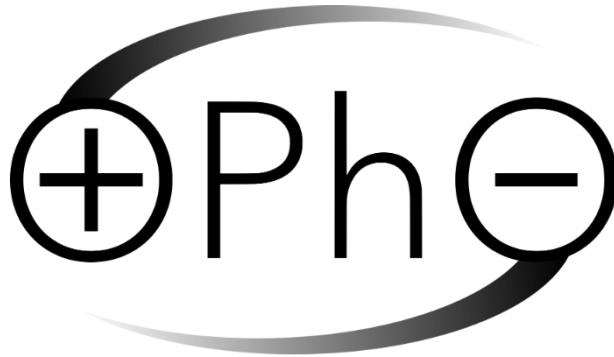


# 2020 Online Physics Olympiad (OPhO): Rules and Information



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## 1 Introduction

The Online Physics Olympiad (OPhO) is one of the largest online run physics olympiads in the world. This contest is a team based contest with each team consisting of 1-3 high school students. Undergraduate students in university may also participate, but they will be in a separate division and are not able to qualify for prizes.

## 2 Open Contest

Thegch consists of 50+ numerical questions from various categories in physics including mechanics, electromagnetism, thermodynamics, relativity, waves, astrophysics, and optics. Teams will work to compete over the course of five days to qualify for the *Invitational Contest*, which will be held the following week. Please see Section 3 for more details. Competitors will submit their solutions via an on-line submission portal. Difficulty of the contest will be ranging from AP Physics to IPhO.

### 2.1 Submission Portal

On the submission portal (<https://opho.physoly.tech/login>), each contestant has three times to submit their answer. Note that correct answers will immediately be logged by the program. Most importantly, **for any decimal answers, please round your answer to three significant digits!!!** Each team will receive their login ID and password a week before the start of the competition.

### 2.2 Scoring

The base score for each problem is dependent on the difficulty which in turn is decided by the number of people who successfully answered it. Each incorrect attempt will decrease the base score and teams will be awarded bonus points for correctly solving it quickly.

The scoring mechanism is heavily based off of the one used at HMMT (Harvard-MIT Mathematics Tourney):

$$w(n, N) = (0.9)^{i+j} [\exp(n/40) + \max(5.5 - \lfloor \ln N \rfloor, 2)],$$

where  $i \in \{0, 1, 2\}$  (represents whether a team got it on the first try, second try, or third try) and  $j \in \{0, 1, 2, 3, 4\}$  (represents what day of the competition the team got the question on). Additionally,  $N$  represents the number of teams that got the question right and  $n$  represents the question number (in this regard, expect all questions to be ordered by difficulty). The cumulative score of a submission will be determined by the sum of these values. With this scoring system, ties will be very unlikely. Note that the scoring system is subject to change, so if there is any type of edits we want to make we will do so before the start of the contest.

## 3 Invitational Contest

Approximately the top 10% teams from the Open Contest will be invited to compete in the Invitational Exam (in all honesty, this value depends. We may simply choose to select the top 50 teams). The Invitational Competition will be a three day Olympiad style physics competition. Invitees will be required to write their solutions either handwritten or on a LaTeX compiler (we prefer the latter because many times handwritten solutions are hard to read). For information on an online LaTeX compiler, please visit <http://www.overleaf.com>.

### 3.1 Submission of Test Papers

If a team qualifies for the Open Contest, we will e-mail the Invitational Contest to them from [opho@physoly.tech](mailto:opho@physoly.tech). Once a team is finished with write-up of their solutions, they will be asked to submit them to a survey, which will be provided to them via e-mail.

### 3.2 Scoring

Scoring for the invitational competition will be done by the OPhO Lead Organizers. We will each grade a submission's solution out of the points value of the individual problem and then sum all of our scores together. The cumulative sum of our scores over the entire exam will be the submission's final score which will be used to determine prizes.

## 4 FAQs

- **Q:** Do you get anything if you win?
- **Yes!** Thanks to our sponsors, we will be giving out over \$5000 dollars in prizes! These will include a one year subscription to Wolfram|One, medals, and other prizes to the top teams in the invitational round for the top teams in the open round.
- **Q:** Does your Open Contest exam score contribute to your final standing?
- If you did not qualify for the Invitational Exam, then yes, it does contribute to your final standing. But, if you did qualify for the invitational competition, then *ONLY* your invitational exam score will count towards your final ranking. The Open Contest score **does not** contribute to prizes. It solely determines the qualifiers for the Invitational Exam.
- **Q:** Can we use online resources?
- No, doing so is against the competition guidelines. However, you are allowed to use Wikipedia in the Open round to read up on the background information if it is needed. No resources are permitted in the invitational round.
- **Q:** Can we communicate with my teammates online?
- Yes, the only communication allowed is between teammates. You may not contact friends not on your team, mentors, or coaches during the period of the competition.
- **Q:** What happens if we request a clarification during the contest?
- A form will be made available where participants can ask for clarification. A list of clarifications will be made publicly available to all participants and updated throughout the contest if it is necessary.
- **Q:** Will we know of our ranking during the open competition?
- There will be a live leaderboard of every team and the problems that they have solved. However to maintain suspense, the adjusted scores based off of speed and difficulty will not be known until after the contest has concluded.
- **Q:** My team is registered, but we want to add/remove a team member. How do we do this?

- Simply have your team leader go back to the registration form. There, you can make all the edits that you need. If a problem comes up, please email us and we'll get it sorted.
- **Q:** How will ties be broken?
- We will not be breaking ties for the open competition, though we do not suspect there will be many ties. In the invitational competition, ties will be broken based on how elegant and well written your solutions are.
- **Q:** Can we code solutions?
- No you may not code solutions. Everything can be solved without computer assistance.
- **Q:** Is there access to past papers?
- No, this is the first year OPhO is running! We will be following the syllabus of the International Physics Olympiad (IPhO), so you can look at your country's physics olympiads for practice as it will most likely be similar in content.
- **Q:** I don't remember all my constants. What do I do?
- Don't worry, we will provide you with all the constants needed to successfully complete the exam!
- **Q:** What if I have any other questions that have not been answered in this FAQ?
- Feel free to reach out to us at [opho@physoly.tech](mailto:opho@physoly.tech)!

Enjoy the contest!