AAPT PHYSICS EDUCATION American Association of Physics Teachers

March 2024

Dear Colleague:

Congratulations! Your student is one of the students who are being invited to take the 2024 USAPhO exam.

The morning of Tuesday, April 2nd, you will receive access to the password protected PDF of the USAPhO exam. The password to open it will be sent by email at 12 pm EDT. Download the exam and print one copy for each of your students who qualified for the exam. Please keep all copies (as well as the PDF) secure.

The USAPhO exam may cover all topics in introductory physics: Mechanics, Electricity & Magnetism, Thermodynamics & Fluids, Relativity, Nuclear & Atomic Physics, and Waves & Optics. The exam will consist of two parts, Part A and Part B. Both last for 90 minutes, and have 3 problems drawn from any of the above topics. Students should not assume that every topic will be covered, and it is possible that some topics will appear more than once.

Primarily on the basis of the USAPhO exam, 20 students will be selected to form the 2024 U.S. Physics Team. The team will be announced in early May.

On the following pages are some more detailed instructions about the USAPhO exam. **Please read them carefully.**

Also in this email are the answer sheets that students should use to write their solutions, and a form to list the students that you proctored for this exam.

<u>As soon as possible:</u>

- If you have not already done so, please immediately arrange with your semifinalists and with school administration for a 3.5-hour block of time for your students to take the USAPhO exam, on **Tuesday April 2nd between the hours of 1pm and 6pm EDT**. The exam must be taken in a single sitting: 90 minutes for part A, a 5-10 minute break, and 90 minutes for part B.

- If you have more than one semifinalist at your school, all semifinalists should take the exam at the same time, please stress the importance of not discussing the exam prior to April 3, 2024.

- The answer sheets should be scanned as soon as the students have completed the exam, and **should be emailed to AAPT by 7pm EDT**. If you have difficulty meeting this deadline, please email usapho@aapt.org immediately to discuss your situation.

On the day of the exam, before the students arrive:

- When you receive the PDF of the exam, check that you can open and print the exam; the password for the exam will arrive in a separate email.

- For each student, print one full copy of the exam, and one full copy of the official answer sheets. Also bring plenty of plain white paper for scratch work. Students are not permitted to bring in their own paper.

- Separate and read the first page of the exam PDF. This contains instructions for administering the exam. Separate the rest of the exam into 3 sections: the student instructions, Part A, and Part B.

- You might want to prepare spare calculators and rulers. Students cannot share calculators, and they may not use smartphones or tablets as calculators.

When the students arrive, but before the exam starts:

- **Students should hand in their smartphones, computers, tablets, smartwatches, and anything else that they may be able to access the internet with. You may want to tell them ahead of time to not even bring these things with them.**

- Remind the student that all work is to be done on the answer sheets provided. They can use as many additional plain and/or graph sheets as they need for each problem. Nothing outside these answer sheets will be graded.

- Encourage your student to write clearly. Partial credit will be awarded. Please emphasize that a student's score will be based on the quality of their solutions. Therefore, it is important that your student's work should be organized and easy to follow. Although students need not show every step in their algebra, they should not combine basic equations without first writing down each equation they are using separately, and clearly show how they are applying each equation to the problem.

- The USAPhO will likely be the most difficult physics test your students have ever encountered. Emphasize that very few students will be able to solve all six of the problems. Even solving one or two problems is an extraordinary achievement.

During the exam:

They should proceed as described in the instructions on the first page of the exam PDF.

1. **There is a Pre-contest honor code that the student needs to sign.**
2. Give each student the student instructions and a full set of answer sheets. Give them a few minutes to read the instructions and fill out their information on the answer sheets.
3. Give the students Part A. After 90 minutes, collect Part A and its answer sheets.

4. Give the students a 5 to 10 minute break.
5. Give the students Part B. After 90 minutes, collect everything.
6. **There is a Post-contest honor code that the student and proctor need to sign.**

After the exam:

- Before students leave, make sure that students have turned in all sheets with exam questions, solutions, and scratch work. **Please make sure that every answer sheet has all the required information filled out at the top** (if they have forgotten to do this, they may fill it out after time has expired.) Have the students arrange their answer sheets in order: **first the Pre-contest honor code, then pages 1 to 13** (including blank answer sheets) followed by all additional answer sheets. For example, if a student used additional answer sheets for problem A1, then these additional pages should be placed after page 13. **Then the Post-contest honor code**.

- Please make a PDF scan of each student's solutions, with the pages in this order. Each student should have a single PDF file for all six problems. Name that pdf file in the form **888888-7777.pdf** where "888888" is the **Proctor ID** and "7777" is the **Student ID.**

- **Before sending the scans, please check the quality of the image files. A clear image will facilitate the grading process.**

- **Until April 19th, hold on to all of the answer sheets in the event that your scans are lost or illegible.** Also, please keep the exam questions secure, and do not discuss anything about the questions or their solutions with your students or online. You may discuss the questions after April 3rd, and return everything to the students after April 19th.

- **Please email the scanned solutions as pdf attachments to usapho@aapt.org**. Also email the scanned list of students who sat the exam that you proctored. On this list, note the start and stop times of the students, as well as commenting on any irregularities that occurred during the exam administration.

- Do NOT return anything to AAPT via snail mail.

Once again, congratulations, and thank you for all of your help; the selection and success of the U.S. Team would not be possible without the strong physics preparation and guidance that you have already provided to your students.

Sincerely,



Tengiz Bibilashvili
Academic Director
U.S. Physics Team