

## 22nd Bay Area Mathematical Olympiad

Exam date: Wednesday, February 26, 2020

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### Proctoring Instructions - *Please Read Carefully!*

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#### Overview

The proctor is responsible for

- Providing the contestants a quiet place to work.
- Ensuring that students choose the correct exam
- Assigning identification numbers to the contestants, and if possible entering student data into a online spreadsheet (you will need internet).
- Explaining to the contestants how to label their answer papers.
- Making sure that students don't cheat!
- Collating student answer papers. PLEASE SORT PAPERS BY PROBLEM! EACH PROBLEM IS GRADED SEPARATELY, AND SOME PROBLEMS MAY EVEN BE MAILED TO SEPARATE LOCATIONS.
- **Mailing student answer papers back to the grading center as soon as possible! We MUST receive them by Wednesday, March 4!**

IMPORTANT: WE ARE USING TWO GRADING SITES THIS YEAR, ONE IN CALIFORNIA AND ONE IN REDMOND, WA. The Redmond site will grade ONLY problem B from BAMO-8. So if you are proctoring BAMO-8 students, you MUST separate out problem B and make sure that problem B papers get sent to Redmond, with the rest of the papers going to our California site.

- Gathering demographic data about students (optional, but requested).
- Giving students information about the **awards ceremony** on Mar. 14.
- Informing your school administrator if you need to ask for an **excused absence** for any students.

See below for more details.

## About the exam; eligibility

We offer two exams: BAMO-8, open to students in grade 8 and below **who have not won a first, second, or third prize in BAMO-8 in past years**, and BAMO-12, open to all. Collectively, BAMO contains 7 questions, in roughly increasing order of difficulty. BAMO-8 has five questions, labeled A through E, while BAMO-12 has five questions, labeled #1–5. The two exams share three questions.

*Students who have won first, second, or third prizes or who are now in 9th grade or higher may not take BAMO-8.* Other students may choose BAMO-8 or BAMO-12. BAMO-8 is designed to be easier and is explicitly aimed at younger students. We expect that if an 8th grader is very experienced at contests, he or she might find BAMO-12 more challenging.

Both exams have four-hour time limits. However, some students may want to leave earlier, which is fine.

## What to do before the exam

The exam takes place on **Wednesday, February 26** during a four-hour time block between 12 noon and 9 PM. For example, 1–5 PM, 12–4 PM, 3–7 PM, etc. Before you administer the exam, you will need to:

- Download the exam and make as many photocopies as you need. You should have received both exams in PDF format by email. Each exam is two pages long but can be printed out on a single sheet of paper if your machine allows double-sided printing. The exam PDFs are password-protected. The passwords will be emailed to you on **Sunday, February 23**.
- Download and print out the online student registration form. You should have received a link to this form, which is a google doc, by email. Make sure that you have enough ID numbers to accommodate all the students who will take the test at your site. Each student gets a unique ID number, and an easy way to assign them is by passing out the registration form, having students write their name next to an ID number, and writing down this ID number on a piece of scratch paper. You can fill in more information later, during the exam (see item #2 in “During the Exam”).
- Print out the **invitation** to the awards ceremony and make as many copies as you’d like to give out to students.
- Arrange to have a quiet room for the students to work in, with enough room for them to spread out papers. If you are proctoring students from more than one school, please make arrangements with these students.
- Ideally, use a room with internet available, so that you can enter student information into the online registration form.
- Make sure that you have enough blank, unlined paper for the students, at least a dozen pages per student, possibly much more.
- You will need a stapler, for collating student papers after the exam. If you have several staplers, it will make things easier, because students can do some of the collating during the exam.
- Get ready to return the papers to the grading centers. **THE PAPERS MUST ARRIVE BY Wednesday, March 4 AT THE LATEST!** If you are proctoring BAMO-8 students, problem B papers will be sent to Redmond, WA. All other papers will go to San Francisco, CA. We apologize for this complexity, but we are experimenting with dispersing our grading teams as we increase participation along the west coast. (See item #4 of “After the Exam” below for more details.)
- Let the students know that they may not use calculators or computers. The only items that are allowed are pencils, pens, rulers, compasses, blank paper, and graph paper. In addition, *you are responsible for supplying an adequate supply of blank paper.*

## During the exam

Please follow this procedure.

1. Get the students seated in the exam room, with plenty of space between students, if possible. Make sure that students have only pens, pencils, rulers, compass, and plenty of blank, unlined paper and/or graph paper—no other items are allowed. The only exception to this rule is food and drink—the exam is long and students may need nourishment. Likewise, bathroom breaks are permitted (one at a time, of course)!
2. Using the student registration form that you have printed out, make sure that each student gets a unique ID number. **Enter the other information requested into the online registration form.** Either pass the form to the students and let them fill in their names (writing legibly), and then transcribe this into the online form later, or else type the information directly into the online form. Make sure that the school attended by the student (not necessarily the school where they are taking the exam) and grade level (4–12) is included, and fill in the “BAMO-8 or BAMO-12?” column with the **number** 8 or 12, depending on which exam the student is taking. Email addresses are optional, but help us get in touch with students who win prizes. You should have more than enough ID numbers to accommodate all of your students.
3. If at all possible, write the same information on the printed-out registration form. We know that it is annoying to do things twice, but having online information saves us precious time, and having the redundancy of a paper form reduces errors. *If an ID number is incorrectly written by a student and we cannot figure out who wrote the paper,* it may not be possible to grade his or her paper.
4. Explain to the students that they must *not* write their names on any paper that they hand in. Instead, they should write their identification number on the **upper-right corner** of every page that they turn in for grading. The upper-left corner should be used for the problem number, and a page number, if needed. For example, the top of student #3141’s solution to problem 2 might read:

Prob. 2, p. 1 of 3

#3141

5. Please read the following statement to the students:

The Bay Area Mathematical Olympiad has five questions. You will have 4 hours to work. Your solutions should be clearly written careful arguments. Merely stating an answer without any justification will receive little credit. On the other hand, a good argument that has a few minor errors may receive substantial credit.

Please label all pages that you submit for grading with your identification number in the upper right hand corner, and the problem number in the upper-left hand corner. Write neatly. If your paper cannot be read, it cannot be graded! Please write only on one side of each sheet of paper. If your solution to a problem is more than one page long, please staple the pages together. Even if your solution is less than one page long, please begin each problem on a new sheet of paper.

The problems are arranged in roughly increasing order of difficulty. Few, if any, students will solve all the problems; indeed, solving one problem completely is a fine achievement. We hope that you enjoy the experience of thinking deeply about mathematics for a few hours, that you find the exam problems interesting, and that you continue to think about them after the exam is over. Good luck!

6. You may not answer **ANY** math questions during the exam. Well-meaning “clarification” is also prohibited. If there is an emergency (for example, you think the problem statement is wrong)

contact Daniel O'Connor at bamo@msri.org or (310) 909-4073. But a good rule of thumb is that if there are two interpretations to a problem, and one leads to a trivial solution or a false statement, then the other interpretation is the correct one. Also assume that we have spent quite a bit of time editing the problems for clarity and correctness.

7. It may be helpful to have your stapler available to the students while they work, so that they can staple together solutions that are more than one page long. Also, you may want to fill out the demographic survey [form](#).
8. Announce when there are 5 minutes left. Remind students that all sheets of paper that are to be graded must have the identification number and problem number on them. They do not need to include their scratch work; they only need to include what they want the graders to see.

### After the exam

1. Collect the papers, making sure that all pages are labeled and all multi-page solutions are stapled. The students are welcome to keep the questions.
2. **Please make sure that different solutions are not stapled together.** The exams will be graded by problem, not by student (we will have a team that only grades problem #1, etc.) Consequently, if you have time, **please sort the papers by problem (not by student)** before you mail them. If you have even more time, sort by identification number as well—the hardworking graders will thank you!
3. Hand out the [invitation](#) and schedule to the awards ceremony (if you printed it out), or at least inform the students about the awards ceremony, which will take place at the Mathematical Sciences Research Institute on **Saturday, March 14**, from **2–4PM**. The speaker will be **Alon Amit**.
4. Send all student papers (**except for problem B of BAMO-8**), along with the registration form (*make sure that you sign and date it somewhere on the form*) by Express Mail or FedEx to

<p><b>Shan Wang</b> <b>1 Saint Francis Pl, Apt 5507</b> <b>San Francisco, CA 94107</b></p>
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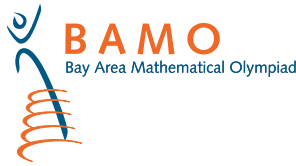
If you have any BAMO-8 problem B papers, please send them (and only them) to

<p><b>Alexander Vaschillo</b> <b>10724 183 Ave NE</b> <b>Redmond, WA 98052</b></p>
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For BAMO-8 problem B only, you have the option of sending scanned copies of the solutions in PDF format to Alexander Vaschillo at the email address alexva@microsoft.com. However, you must mail the remaining solutions (written on paper) to Shan Wang at the address above.

**THE PAPERS MUST ARRIVE BY Wednesday, March 4 AT THE LATEST!** *If using US Express Mail, packages bearing stamps and weighing over 13 ounces must be taken by hand to a US Post office! If you put it in a mailbox, it will get returned to you.* **Please note that these are new addresses! Don't use last year's addresses. And please do NOT ask for signature, since it is possible that no one will be home when your package arrives.**

5. You're done, thanks! See you at the awards ceremony!



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### BAMO 2020 Awards Ceremony

You are cordially invited to attend the BAMO 2020 Awards Ceremony.

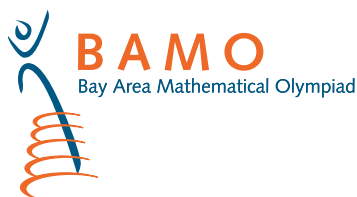
- Where: Mathematical Sciences Research Institute, Berkeley  
When: Saturday, March 14, 2020, 2–4PM  
2:00 PM Welcome and Introduction  
2:10 AM Mathematical talk, *Title TBA*  
Alon Amit  
3:00 PM Presentation of Awards  
3:45 PM Refreshments  
Parking: Parking is available a short distance below the building.  
(See directions and map below.)

#### Driving Directions

- **From South, North, West (San Francisco):** Get to I-80 (East or West), exit on University Avenue and drive away from the Bay. Follow University Avenue to its end. Turn left onto Oxford street, then right onto Hearst Avenue. At the second light, turn right onto Gayley Road (on the UCB campus). Take the first left onto Rimway Road, and the first left onto Centennial Drive (which goes away from the Memorial stadium). Signs now indicate the direction of MSRI. Centennial Drive goes up up up, past the UC Botanical Garden, Lawrence Berkeley National Labs, and the Lawrence Hall of Science. Past the Lawrence Hall of Science the road curves right and up. MSRI's parking spaces are in the uppermost 2 rows of the parking lots after this curve. If these are filled up, the parking area immediately below will also be available. Please park there and walk the 94 steps up to the MSRI building.

For handicapped parking, stay on Centennial Drive until after the parking lots. Turn right onto the access road to MSRI/Space Sciences Lab (Gauss Way - but the sign is easy to miss since its on the opposite side of the road as the turnoff). Drive between the two buildings and down to MSRI at the end of the road (about 250 yards/meters).

- **From the East:** Take 24 West and exit at Fish Ranch Road. At the end of the ramp, turn right (so as not to be redirected back onto 24 East). Follow Fish Ranch up the hill to the stop sign at Grizzly Peak. Turn right. At the next stop sign (after 3 miles), turn left onto Centennial Drive. Drive down until you see the parking lots on your left about 200 yards/meters. MSRI's parking lot is the uppermost 2 rows. Please park there and walk the 94 steps up to the MSRI building.



## 22nd Bay Area Mathematical Olympiad

February 26, 2020

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### Dear Teacher or School Administrator:

One or more students from your school will be participating the Bay Area Mathematical Olympiad (BAMO) on February 26, 2020.

The Bay Area Mathematical Olympiad (BAMO) is an annual competition, consisting of four or five proof-type math problems to be solved in four hours. One version of the exam is for students in 8<sup>th</sup> grade and under and another version is for students in 12<sup>th</sup> grade and under. The program was founded in 1998 and is currently in its 22nd year.

Over 600 students from dozens of different schools participate in BAMO each year. The contest is proctored at numerous middle schools, high schools, and universities around the Bay Area, including some schools on other locations on the west coast. Many students have to travel to another school to take the exam.

**Please excuse your students who will be taking BAMO from classes on Wednesday afternoon, Feb. 26, 2020.** The contest will take place during a four-hour time period between 12 noon and 9 pm, and students may need additional time to travel to the site where they are taking contest.

All participating students, along with their families, teachers, and school administrators, are cordially invited to attend the awards ceremony which will be held on Saturday, March 14 from 2–4PM at the Mathematical Sciences Research Institute in Berkeley. The awards ceremony will include a mathematical talk by Alon Amit, followed by the presentation of awards and refreshments.

Thank you for your cooperation to make this wonderful and unique educational opportunity for our Bay Area students possible.

Sincerely,

A handwritten signature in black ink that reads 'Paul Zeitz'.

Paul Zeitz  
Professor, Department of Mathematics and Statistics  
University of San Francisco  
BAMO Organizing Committee  
bamo@msri.org