

16th HMMT November
Mathematics Tournament
at **Harvard College**

HMMT

HMMT November Tournament
Saturday, November 11, 2023

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Hello HMMT November 2023 Contestants!

THE HMMT organizing team is delighted to have you join us here in Cambridge! We have all been committed to building this November's competition into an experience that we hope you will recall fondly for many years to come. From crafting the most intriguing of problems to setting up the spaces for optimal test taking, our team of over 100 MIT and Harvard students presents to you the 27th season of HMMT.

These couple of days every year are truly special for us, and we hope that you all will find the same statement holds for you. We are honored by how eager many in the high school math community are to take part in HMMT. As we celebrate this wonderful discipline, never forget that even more importantly, we gather here to showcase and laud the achievements of all you fantastic mathletes.

Those of you who are seasoned veterans of HMMT may recall that, for years, our tournament directors have equated the importance of the human element of HMMT to that of math. This year, we take this statement further; the human element of HMMT is crucial to our competition. For all its purity and intrinsic beauty awaiting discovery by bright minds such as your own, math cannot hold the sole, dominant place in our minds and being. Take the time to speak to the other incredibly bright students around you, but more importantly, listen. We hope that you will find unparalleled appreciation and wonder by familiarizing yourself with your exceptional peers.

To the coaches, parents, and chaperones: we have seen how much you care about granting your students opportunities to pursue their interests in math, and we cannot express enough how appreciative we are for your support of the next generation of mathletes. Through the toils of registration, the anxiety of the lottery, and the logistical taxes of organizing the trip here, your commitment shines. While today is primarily about the students, we hope that you will enjoy our talk by Po-Shen Loh and cheer on your students during the guts round.

As you navigate Harvard's campus, we hope you will find the maps in this brochure helpful. Please check your team's room assignments carefully and notify any HMMT member (clad in red volunteer shirts or black officer jackets) if you require any assistance. We understand that the campus can be hard to navigate at first, and we're here to help!

Once again, we are excited to have you join us for today's tournament, and we wish you all the best in the competition!

Regards,

Claire Chen
William Hu
TOURNAMENT DIRECTORS

William Qian
CHIEF ADVISOR
Richard Allen
HISTORIAN

Vidur Jasuja
Isabella Quan
Neil Shah
NOVEMBER PROBLEM CZARS

Student Schedule

Friday, November 10, 2023 (MIT)

6:00PM — 7:00PM	Early Registration	Building 10 Lobby
6:00PM — 6:45PM	Pizza and Ice Cream	Building 13 Lobby
6:45PM — 7:00PM	Mini-Events Preview	Room 10-250
7:00PM — 9:00PM	Mini-Events	Assigned Locations

Saturday, November 11, 2023 (Harvard)

7:45AM — 8:30AM	Registration	Science Center Hall B
7:45AM — 8:45AM	Breakfast	Science Center Arcades
8:30AM — 8:55AM	Individual Competitor Meeting	Science Center 109
9:00AM — 10:15AM	General Round	Assigned Locations
10:30AM — 11:45AM	Theme Round	Assigned Locations
12:15PM — 1:30PM	Team Round	Assigned Locations
1:30PM — 2:45PM	Lunch	Science Center Arcades, Clover, Ticknor Lounge
2:50PM — 4:35PM	Guts Round	Assigned Locations
4:45PM — 5:30PM	Integration Bee Finals	Science Center Hall B
5:40PM — 6:00PM	A capella Performance	Science Center Hall B
6:00PM — 6:55PM	Awards Ceremony	Assigned Locations

Sunday, November 12, 2023 (Harvard)

8:00AM — 8:50AM	Breakfast	Ticknor Lounge
9:00AM — 9:50AM	Education Classes: Block 1	Assigned Locations
10:00AM — 11:00AM	Education Event: Play	Emerson 210
11:05AM — 11:45PM	Lunch	Ticknor Lounge
11:50AM — 12:40PM	Education Classes Block 2	Assigned Locations
12:50PM — 1:40PM	Education Event: Workshop	Emerson 210

Coach, Proctor, and Parent Schedule

Friday, November 10, 2023 (MIT)

6:00PM — 7:00PM	Early Registration	Building 10 Lobby
6:00PM — 6:45PM	Pizza and Ice Cream	Building 13 Lobby
6:45PM — 7:00PM	Mini-Events Preview	Room 10-250
7:00PM — 9:00PM	Mini-Events	Assigned Locations

Saturday, November 11, 2023 (Harvard)

7:45AM — 8:30AM	Registration	SC (Hall B, Hall C)
7:45AM — 8:45AM	Breakfast	SC Arcades (4 Distribution Centers)
9:30AM — 11:00AM	Talk by Po-Shen Loh	Geological Lecture Hall (100)
11:10AM — 11:50PM	Proctor Meeting	Geological Lecture Hall (100)
12:15AM — 1:30PM	Team Round	Varies
1:30PM — 2:45PM	Lunch	SC Arcades (4 Distribution Centers), Clover, Ticknor Lounge
2:50PM — 4:35PM	Guts Round Viewing	Geological Lecture Hall (100)
4:45PM — 5:30PM	Integration Bee Finals	SC (Hall B)
5:40PM — 6:00PM	A capella Performance	SC (Hall C)
6:00PM — 6:55PM	Awards Ceremony	SC (Hall B, Hall C)

Sunday, November 12, 2023 (Harvard)

8:00AM — 8:50AM	Breakfast	Ticknor Lounge
9:00AM — 9:50AM	Education Classes: Block 1	Assigned Locations
10:00AM — 11:00AM	Education Event: Play	Emerson 210
11:05AM — 11:45PM	Lunch	Ticknor Lounge
11:50AM — 12:40PM	Education Classes Block 2	Assigned Locations
12:50PM — 1:40PM	Education Event: Workshop	Emerson 210

A help center is located in Science Center 111.

Test Information

Rules

You may not use books, notes, calculators, pocket organizers, slide-rules, abaci, or any other computational aids. Similarly, you may not use graph paper, rulers, protractors, compasses, architectural tools, or any other drawing aids. Translators are also prohibited.

Guidelines for Acceptable Answers

- Answers must be simplified and exact unless otherwise specified.
- Rational numbers should be given in lowest terms.
- An n^{th} root should be simplified so that the radicand contains no fractions and is not divisible by the n^{th} power of any prime.
- Denominators do not need to be rationalized.
- Correct mathematical notation must be used.
- No partial credit will be given unless otherwise specified.
- Any illegible or ambiguously written answers will be deemed incorrect.

Protests

If a student believes that an answer given on the answer key is incorrect, they must submit an appeal via a Google Form. The deadline to do so will be announced on the day of the contest.

Decisions of the November HMMT coordinators are final.

Rules of Conduct and Expectations for HMMT Attendees

HMMT is organized by undergraduate students at Harvard and MIT under the eponymous student organization at MIT and Gender Inclusivity in Mathematics (CiiM). While we receive support from both universities, HMMT is a distinct entity. When you attend our competition, you are a HMMT-sponsored visitor to the campuses of Harvard and MIT. As such, we mandate that HMMT attendees abide by the following rules of conduct. We strongly urge the coach of each organization to carefully read this document and ensure that students are also familiar with it.

Conduct

While you are an attendee of HMMT, you must abide by these rules:

- Be respectful of people. Rude behavior, inappropriate language, and threats against another person of any nature, whether verbal or physical, executed or suggested, will not be tolerated.
- Dishonesty accompanied by ill intent (including, but not limited to, lying, cheating, doping, and scamming) is forbidden.
- Be respectful of the spaces. While attending the events of HMMT, you are a visitor to the private property of Harvard or MIT. Do not deface the rooms.
- Do NOT eat or drink in classrooms unless designated for eating. Do not dispose of food scraps in classroom waste containers. You will be issued wristbands based on your food service location. If your team has ordered food, it will be delivered to your location by HMMT staff.
- Do not transfer furniture between rooms. If you require more furniture, alert a HMMT officer, and arrangements will be made for you.
- Do not linger around doors and stairs or obstruct hallways; please wait in open locations or your assigned rooms.
- Be responsible for your organization's members. Penalties may be leveraged against an entire organization based on a single person's actions.

Consequences

The HMMT Tournament Directors reserve the right to disqualify any team at any time for any reason. In severe situations of misconduct, you may be escorted off the premises. Your test results will be nullified, and you will be disqualified. Permanent bans will be imposed upon organizations that severely infringe upon the code of conduct.

Local Information

Food

- **Clover** (\$\$)
Vegetarian sandwiches and plates. 1326 Massachusetts Ave
Cambridge, MA 02138
- **Felipe's** (\$)
Made-to-order fresh Mexican food with authentic recipes. 21 Brattle St
Cambridge, MA 02138
- **Shake Shack** (\$)
American fast casual food, famous burgers and shakes. 92 Winthrop St
Cambridge, MA 02138
- **El Jefe's Taqueria** (\$)
Assembled-to-order Mexican eats with lots of toppings and sauces. 14 Brattle St.
Cambridge, MA 02138
- **sweetgreen** (\$\$)
Build-your-own salads with many healthy options. 39 John F. Kennedy St
Cambridge, MA 02138
- **Pokeworks** (\$\$)
Composed & customizable Hawaiian raw fish served in a fast, casual setting. 1440 Massachusetts Ave
Cambridge, MA 02138

Emergency

In the event of fire or life-threatening emergency, call (617) 495-1212, not 911. This number will reach the Harvard University Police Department; they will respond faster than 911.

Harassment Policy

HMMT strictly does not tolerate harassment or violence of any form to our competitors and staff, regardless of the identity of the offender. If you believe that you or your competitors have been harassed, please immediately call the Harvard University Police Department at (617) 495-1212. If you do not feel comfortable contacting police yourself, please visit the help center in Science Center 111 and request help with your incident, and we will make every effort to help you decide on an appropriate response and recourse.

Sponsors

Thank you to our sponsors for making HMMT possible! Through their generous support, we are able to make this year's tournament even better and more accessible with free lunch and t-shirts for all competitors, as well as financial aid to support teams' stays in Cambridge.



HMMT Officers and Staff

Officer Team

Tournament Directors

- Claire Chen
- William Hu

Chief Advisor

- William Qian

Community Coordinators

- Noah Chung
- Arushi Mantri

Education Directors

- Hari Iyer
- Ilaria Seidel

Finance Directors

- Justin Li
- Vivian Tan

Friday Night Events Chairs

- Julia Liu
- Alicia Zhang

Historian

- Richard Allen

Inventory Czar

- Derek Chen

Outreach Directors

- Drake Du
- Jennifer Zhang

Problem Czars

- Rishabh Das
- Vidur Jasuja
- Jerry Liang
- Isabella Quan
- Mark Saengrungkongka
- Neil Shah

Registration Directors

- Grace Liu
- Sophie Wu

Schedules Coordinators

- Orion Foo
- Autumn Shin

Software Directors

- Brian Shi
- Paul Yang

Tournament Directors Emeritus

- Philena Liu
- Nathan Sun

Staff Members

Chief Proctors

- Amy Chang
- Mason Fang
- Christine Huang
- Alan Lee
- Eli Park
- Arvind Seshan
- Lucy Vuong
- Claire Xu
- Andy Zheng
- Grace Zhou

Community Associates

- Minnie Liang
- Joshua Qin
- Alina Yang

Education Assistants

- Jack Austen
- Cheuk Hei Chu
- Amy He
- Mohit Hulse
- Eunsu Hur
- Nicole Shen

Finance Associates

- Renee Hong
- Miranda Zhao

Friday Night Events Assistants

- Lucia Wang
- Jerry Zhang

Outreach Associates

- Sharvaa Selvan
- Yina Wang
- Heidi Zhang

Inventory Staff

- Emma Zheng

Photographers

- Jue Gong
- Moeka Koyama

Problem Staff

- Serena An
- Nithid Anchaleenukoon
- Andria Bao
- Ankit Bisain
- Reagan Choi
- Nickolas Ellison
- Evan Erickson
- David Ettl
- Amy Feng
- Arnav Goel
- Andrew Gu
- Aaron Guo
- Paul Gutkovich
- Daniel Hong
- Tristan Kay
- Arul Kolla
- Julia Kozak
- Michelle Le

Problems Staff (continued)

- Daeho Lee
- Maxim Li
- Jinyang Li
- Ethan Liu
- Derek Liu
- Brandon Lou
- Joel Manu
- Nilay Mishra
- Holden Mui
- Joseph Othman
- Jacob Paltrowitz
- Eric Shen
- Benjamin Shimabukuro
- Karthik Vedula
- Albert Wang
- Andrew Wen
- Cedric Xiao
- Edward Yu
- Claire Zhang
- Kevin Zhao
- Ethan Zhou
- Katelyn Zhou
- Peter Zhou
- Isaac Zhu
- Isabella Zhu

Registration Associates

- Margulan Ismoldayev
- Akshay Kumar
- Diya Rana
- Kimberly Wang
- Sarah Xuan
- Zara Yu

Software Team Staff

- Katherine Li
- Ryan Yang



Map also at <http://map.harvard.edu>

HMMT Season 27
November **2023**