MATHEMATICS
COLORADO STATE UNIVERSITY

November 5, 2026

MATH DAY

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MAIN EVENTS

7:45 am - 8:45 am
Check-in
Mathematics Table
Lobby outside the Grand Ballroom
Lory Student Center, 3rd-floor

9:00 am - 10:30 am
Opening Session and Instructions
Guest Lecture by Trevor Hyde, Vassar College
"Down the Rabbit Hole: An Introduction to P-adic Numbers"
Grand Ballroom A & B

10:30 am - 10:45 am
Sponsors Meet with their Students
Team Competition Room Assignments posted:
Monitors Outside the Grand Ballroom

11:00 am - 2:50 pm
Team Competitions
Large School - Start at 11:00 am
Small School - Start at 11:20 am
Room Assignments on Monitors

12:30 pm
Poster Judging Finalized
Grand Ballroom C & D
Pick up Posters & Prizes: 12:30 - 2:00 pm
Mathematics Table

2:50 pm - 3:50 pm
Final Competition Begins
Awards & Closing
Grand Ballroom A & B

ELECTIVE EVENTS

7:45 am - 2:00 pm (drop-in hours)
Math Fair: Games, Activities, Student Projects
Grand Ballroom C & D

12:15 pm - 1:00 pm
Campus Tour
Meet at: Mathematics Table
Lobby outside the Grand Ballroom

1:00 pm - 1:40 pm Breakout Sessions:

Ask a Math Student Panel
CSU Undergrad & Graduate Students
Classroom: 386

Workshop for Educators: Obvious to Whom? The Strange Life of Side-Angle-Side, from Euclid to the Sphere
Jess Hagman, Associate Professor, CSU Math Education
Classroom: 390

1:50 pm - 2:30 pm Breakout Sessions:

Hidden fractals in Pascal's triangle
Mark Shoemaker, Associate Professor, CSU Pure Math
Classroom: 386

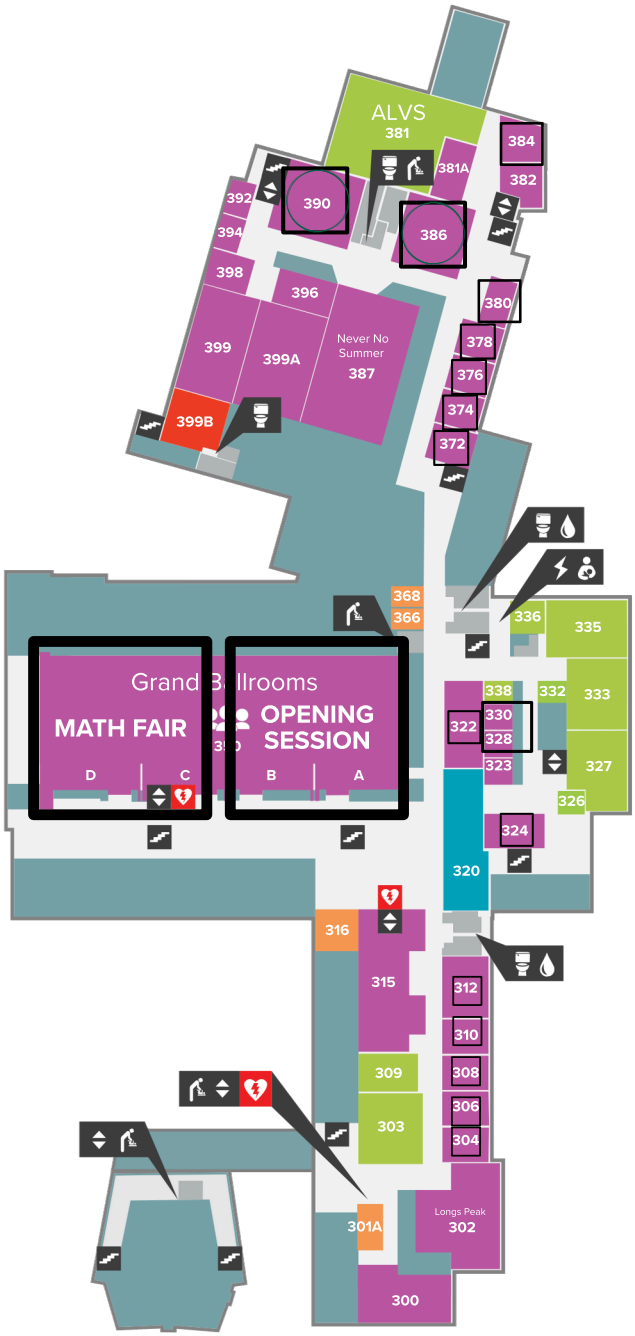
Getting Stuck In Space: An Exploration of Gimbal Lock and Singularities
Jacob Cleveland, PhD Grad Student, CSU Applied Math
Classroom: 390

Math Day Map & Quiz Tournament Bracket on the back >>>

Math Day Map:

Lory Student Center

Third Floor



Large Bracket

Quiz Bowl Tournament:

These brackets will be live starting 10:30 am

Small Bracket

MATH DAY CHECK-IN

7:45 am - 8:45 am Thursday, November 5th, Mathematics Table: Outside Grand Ballroom, Third floor of Lory Student Center, Colorado State University

All sponsors and students must check in as a school on the day of Math Day in addition to online registration. Check-in ends promptly at 9 am for the opening session.

Students can enjoy the Math Fair activities in Grand Ballroom C & D after completing check-in.

Check-in Process:

- Check-in your school
- Distribute name tags to students*
- Pay registration balance
- Finalize team roster/s and number of teams for the Quiz Bowl Competition
- Students set up projects/posters in the Math Fair room

*Name tags must be worn at all times. These identify students on the roster for the Quiz Bowl Tournament, as well as help our photographer know which students can be photographed.

PARKING DETAILS

Location: Colorado State University, Lory Student Center, 1101 Center Ave Mall, Fort Collins, CO 80521

Student Drop-Off/Pick-Up: All buses should drop off and pick up their students on Meridian Ave (Lime Green section on the map below).

Buses: Buses are encouraged to arrange off-campus parking, as space on campus is very limited. Buses that park on campus will need to purchase an Event Parking Pass and park in designated Lot 195 (by Moby Arena), on the west side.

Driver's Note: When picking up, please ensure bus drivers are parked far enough north of the bus stop on the corner of University and Meridian to prevent interruption to TransFort service coming through the area.

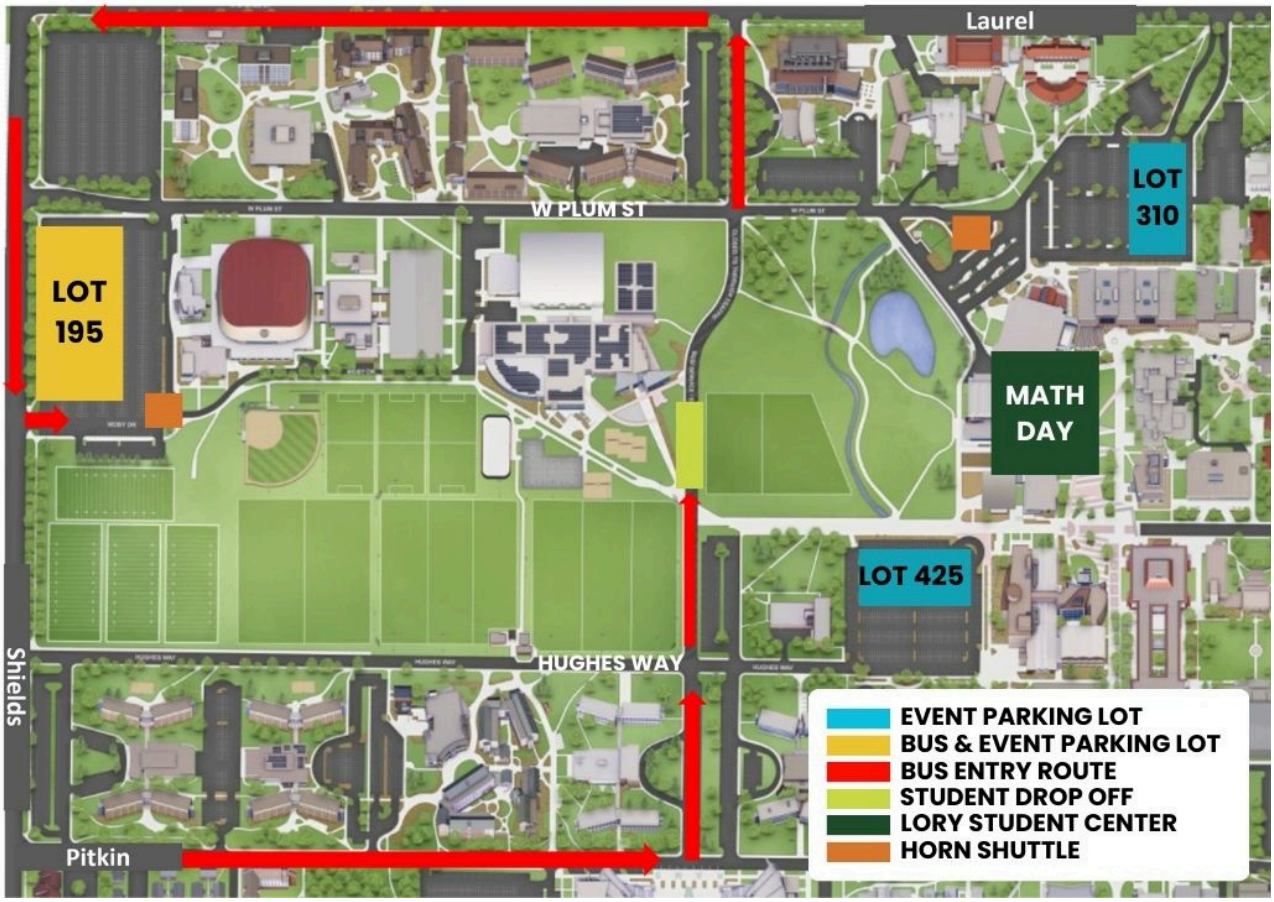
Vehicles: Option to purchase an Event Parking Pass, park in any pay-to-park space, and make hourly payment at designated paystations or on the ParkMobile app, including the Lake Street Parking Garage.

Event Pass:
Purchase a ParkMobile Event Parking Pass: Event Parking Pass: https://col.st/xnq9f

Note: This special access parking pass is not compatible with the ParkMobile App or its designated pay-per-hour lots

Around the Horn Shuttle: This free campus shuttle connects Parking Lot 195/Moby Arena (Stop: 1532) to the Lory Student Center/CSU Transit Center (Stop: 466) with southbound and northbound schedules. Look for a sign with our Ram logo and the corresponding bus stop number. Around the Horn runs every 10 minutes starting at 6:44 am.

PARKING MAP



LUNCH OPTIONS

Lunch arrangements are to be made individually by each school and within your schedule. For students participating in the Quiz Bowl Team Competition, we recommend lunch during one of the 20-minute off-periods during the early rounds of competition, as there are no off-periods for winners in the rounds after 1:00 pm.

Lory Student Center offers a number of dining choices on the second floor, as well as dining tables if students would like to bring in sack lunches. Please be aware that some of these restaurants don't accept cash, just credit/debit card and Apple Pay.

MATH DAY ACTIVITIES

The focus of Math Day is to broaden students' exploration of Mathematics through these main components:

1. **MATH FAIR: MATH-THEMED ACTIVITIES & GAMES** **7:45 AM- 2:00 PM**
2. **STUDENT PROJECT GALLERY & COMPETITION** **9 AM - 12:30 PM**
3. **MATH DAY GUEST LECTURE** **9 AM - 10:30 AM**
4. **QUIZ BOWL TEAM COMPETITION** **11 AM - 3:50 PM**
5. **ELECTIVE BREAKOUT SESSIONS** **1 PM - 2:30 PM**

MATH FAIR: MATH-THEMED ACTIVITIES & GAMES

7:45 am - 2:00 pm, Grand Ballroom C & D, Third Floor, Lory Student Center

The Mathematics Fair is an open house filled with math-themed activities, games and crafts and staffed with graduate students and faculty. This is one of our favorite parts of Math Day! We love to see students engage with mathematics in new and creative ways.

Here are some of the activities that will be at the Math Fair this year:

- Western Chess, Shogi (Japanese chess), Xiangqi (Chinese chess)
- Flexagons
- Origami
- Galton board
- Euler's Characteristic: build platonic solids with paper cutouts
- Pick's Theorem: pegboards with rubber bands to make polygons in the plane
- Sudoku puzzles
- Challenge problems
- Topology
- Mathler
- Coloring Geometry

STUDENT PROJECT GALLERY & COMPETITION

9 am - 12:30 pm, Grand Ballroom C & D, Third Floor, Lory Student Center

Students will set up and display their projects in the Math Fair gallery after check-in between 7:45 am - 8:45 am.

See specific criteria for student projects are found under Educator Resources on our website.

Student projects will be awarded first, second and third place in these five categories:

- Expository: History, Biography & Theory of Mathematics
- Artistic and Recreational Mathematics
- Data Visualization or Mathematics
- Original Mathematical Research
- Mathematics in Education/Teaching

Award ribbons will be placed on the posters in the Math Fair at 12:30 PM. If your student won an award, they will also need to pick up their cash prize at the Mathematics table (Check-in table) between 12:30 pm - 2:30 pm. Poster winners can leave with their posters and do not need to stay until the closing session.

Posters can be picked up from the Math Fair (Ballroom C & D) anytime after 12:30.

MATH DAY OPENING SESSION AND GUEST LECTURE

9:00 am - 10:30 AM, Grand Ballroom A & B, Third Floor, Lory Student Center

WELCOME & TEAM COMPETITION QUIZ RULES

9:00 AM - 9:30 AM

Welcome by Rachel Pries, Mathematics Undergraduate Program Co-chair
Quiz Bowl Rules Directed by Steve Benoint, Mathematics Undergraduate Program Co-chair

GUEST LECTURE

9:30 AM -10:30 AM

Trevor Hyde, Assistant Professor of Mathematics at Vassar College

Bio: Trevor Hyde grew up in rural Southeast Iowa before attending Amherst College where he got his bachelor's degree in mathematics. After college he earned his PhD in mathematics at the University of Michigan and was an L. E. Dickson Instructor at the University of Chicago before arriving at Vassar. He lives in Poughkeepsie, NY with his wife.

Title: Down the Rabbit Hole: an Introduction to p-adic Numbers

Abstract: It's a curious fact that 1 = 0.999... where the 9s repeat forever to the right. An even curiouser fact is that -1 = ...999 where the 9s repeat forever to the left. Now that may seem crazy, but in this talk I will explain the twisted logic behind it which leads us down a rabbit hole to the strange world of p-adic numbers.

CREATING TEAMS: QUIZ BOWL TEAM COMPETITION

11 am - 2:50 pm Team Competitions, Room assignments on monitors outside Grand Ballroom (starting at 10:30). Brackets will update in real time here throughout the tournament.

2:50 pm - 4 pm Final Competition, Grand Prize Drawing, Closing

CREATING A TEAM ROSTER:

The Team Roster is finalized at Check-in (7:45 am - 8:45 am) day of Math Day. Every school is allotted at least one team for the Quiz Bowl Team Competition. Teams don't have a limit on the number of students on one, but only 3 students can participate in each round.

We make every effort to allow additional teams for schools that request them, but we may have to limit the teams, especially requests over 2-3 teams, so we can have representation from every school and build a bracket of 32 teams in each division.

When naming multiple teams from one school, we use the following nomenclature for the team names: *High School Name A, High School Name B, High School Name C*
Each team has a separate roster.

Students can only be listed on one roster card. If a team is eliminated from the competition, all members on that team (those listed on the roster card) are out and cannot move to a different team.

The roster card must accompany the team to all competitions to be verified with the moderators. Students can switch out team members that are listed on the roster before competition rounds begin, but after they are in play, substitutions among the team are not allowed.

Official rules for the Quiz Bowl and Sample Questions are found under Math Day Details on our website under Educator Resources,

COURTESIES FOR TEAM COMPETITIONS:

Students have worked really hard to prepare for team competitions and sound can be very disruptive. We ask that you ensure your students are quiet in the halls while waiting outside competition rooms. Students not waiting for competition rounds can gather in the Math Fair (Grand Ballroom C&D), the lobby outside the Grand Ballroom and the food court on the second floor below to talk. Students will be asked to leave if they are talking or making any gestures to competitors during competition rounds. Please no video or audio recording of competition rounds. Photos are allowed as long as there is no flash or sound.

We ask that you sit with students watching the final rounds of the competition.

ELECTIVE SESSIONS (RUN FROM 12-2:30)

12:15 pm - 1:00 pm Campus Tour
Meet: Mathematics Check-in Table,
Lobby outside the Grand Ballroom, Lory Student Center Third Floor

1 PM - 1:40 PM ELECTIVE WORKSHOP OPTIONS:

1:00 PM - 1:40 PM **High School Student Session:** Ask a Student Panel
Room: 386
Hosted By: Daniel Tedeschi, Mathematics PhD Grad Student, CSU

A panel of undergraduate students in Mathematics will answer High School students' questions about a higher education in Mathematics

1:00 PM - 1:40 PM **Math Educator Session:** Moving to Assess Students' Mathematical Reasoning
Room: 390
Hosted By: Jess Hagman, Associate Professor, Math Education, CSU

Abstract: Every geometry student learns that two triangles with two matching sides and the included angle are congruent. But why is SAS true? In this talk we follow one familiar theorem across 2,300 years.

Euclid (~300 BCE) "proved" SAS by picking up one triangle and laying it on top of the other, a move later mathematicians found troubling. Felix Klein (1872) gave us a more mathematical understanding of motions and asked what stays the same when we move things. David Hilbert (1899) stopped trying to prove SAS at all and made it an axiom. Then we step onto the sphere, where SAS can fail outright, and where triangles with matching angles must be congruent, so there are no similar triangles of different sizes.

Along the way we'll ask bigger questions. How do mathematicians decide what counts as a proof, and why do those standards change? How can seeing a different geometry make the assumptions in our own suddenly visible? And now that AI systems and computer proof checkers are writing and verifying mathematics, what should "obvious" mean, and what does that suggest for how we teach students to justify their reasoning?

Expect history, some hands-on geometry, and ideas you can bring back to your classroom.

1:50 PM - 2:30 PM ELECTIVE WORKSHOP OPTIONS:

1:50 PM - 2:30 PM Pure Math: Hidden fractals in Pascal's triangle

Room: 386

Hosted By: Mark Shoemaker, Associate Professor, CSU

Abstract: Pascal's triangle is a triangle of numbers built from a very simple procedure: each number in a given row is the sum of the two numbers above it. It turns out that the numbers generated this way count quantities related to combinations. For instance, the 5th entry of row 26 give the number of ways one can choose 5 distinct letters of the alphabet. We will discover how, hidden within Pascal's triangle, are an infinite number of fractals related to the Serpinski triangle.

1:50 PM - 2:30 PM Applied Math: Getting Stuck In Space: An Exploration of Gimbal Lock and Singularities

Room: 390

Hosted By: Jacob Cleveland, Mathematics PhD Grad Student, CSU

Abstract: How do you hold a camera still while moving? How can an airplane know which way is up? The answer is to use gimbals, which are nested rings that can freely rotate. However, when two rings line up, the system no longer behaves properly, losing a degree of freedom. This configuration is known as 'gimbal lock', which famously threatened the Apollo 11 Moon mission. In this workshop, we'll discover how gimbal lock arises in various physical systems and how this can be visualized mathematically as a singularity.

SMALL & LARGE SCHOOL FINAL QUIZ BOWL COMPETITION ROUNDS

2:50 PM - 3:50 PM, Grand Ballroom A & B, Third Floor, Lory Student Center

All schools are welcome to watch the competition round for the final two small and large school competitors of the quiz bowl tournament. We do ask that educators stay with students to ensure they aren't disruptive to competitors in any way. Students will be asked to leave if they are talking or making any gestures to competitors during competition rounds. Please no video or audio recording of competition rounds. Photos are allowed as long as there is no flash or sound.

Prizes: Small and large school winners will go home with a trophy for their school.
All students competing in the final quizzing rounds will have their names drawn to pick from a table of donated prizes from HP, the CSU Department of Mathematics and faculty and grad students.

Poster winners do not need to stay until the final quiz round. See pages 5 & 6.