Math in the Mountains

Teacher immersion program

June 30–July 5, 2024 | Jackson Hole, Wyoming

Math in the Mountains (MitM) is a week-long math program for math teachers at all levels. This will be our second year for the program.[1] Elementary, Middle and high school teachers will participate in an intensive residential math circle "immersion program," learning many non-standard topics that will stretch their problem-solving abilities.

What is a teacher immersion program? Math circles for kids came to the US in the mid-1990s. They are learning communities that teach math through escape-the-textbook problem solving, often facilitated by professional mathematicians. Math circles for teachers developed about ten years later, when a middle school teacher in Cupertino, CA watched a circle for kids and asked, "Why can't we teachers do this, too?"

Teachers are very busy and very hard-working, and also used to leading students. It's not easy reversing roles and encountering math problems that you cannot solve! So, many math teacher circles start out with an immersion program: a residential camp where the teachers are away from the pressures of home, and have the freedom to spend several days in a **beautiful location** where they can focus completely on doing mathematics. It's sort of a cross between a wellness spa and boot camp, but with math problems instead of massages and drills. *At the end of the immersion program, teachers feel rejuvenated, with fresh ideas to try out in the classroom, an expanded network of like-minded colleagues, and a renewed sense of professional purpose.*

Dozens of math teacher circles have formed all over the country, and have been proven to help improve learning and morale. However, the pandemic shut down many programs, and we are now in the process of rebuilding. Teton Science Schools (TSS) in Jackson, WY joined forces with a team of math educators to start this new immersion program in one of the most spectacular places in North America.

For more information, please contact Paul Zeitz. To begin the registration process, please fill out this form.

[1]Last year we co-existed with a camp for gifted kids and their parents, but this year, the kids camp takes place during the previous week. This allows us to admit more teachers to the program and to focus more fully on them.

Where is the program located? The program is done in collaboration with the Teton Science Schools (TSS), one of the top educational institutions in the world focused on conservation that touches 30,000 students each year in field education, classroom education, and educator development programs. We will be based at the Jackson, WY, campus of TSS, which is located about a dozen miles from the Jackson Hole airport, about three miles from downtown Jackson. Grand Teton National Park is less than 30 minutes away; Yellowstone National Park is just an hour further.

Who should attend? Math in the Mountains is for any elementary-, middle- or high-school math teacher that wants to challenge themselves with open-ended problems and mind-stretching, "I forgot that math was this beautiful!" topics.

What topics will be covered? How will the classes be conducted? First of all, there won't be "classes." A typical session may involve just one or two initial questions that lead to deep group discussions. "Time to think" is valued and encouraged. The sessions promote problem solving and collaborative thinking.

You didn't answer the question. What will we *learn*? You will learn what is really meant by problem solving. A problem, in contrast to an exercise, is a mathematical question that you do not (yet) know how to solve. You first need to learn techniques of investigation. And you will learn a lot about this during the immersion program. You will also learn cool not-in-the-textbook mathematical topics such as:

- Magic tricks that require no skills besides simple arithmetic
- Combinatorial games that are easy to play but with deep strategies
- Geometric dissections that will revitalize your love of construction paper
- Topology and number theory: advanced undergraduate ideas that can be mastered and deployed in middle-school or even elementary-school classrooms

Much of the material connects seemingly disparate branches of mathematics. For example, an innocent "mind reading" magic trick is powered by insights about divisibility. The strategies underlying a complicated game turn out to involve symmetry and number-base representations.

But this doesn't really convey what you will learn, because in the end it is about people. You will learn from your fellow participants, but also under the guidance of a stellar team of educators who have great experience in communicating mathematics at all levels.

Who will lead the program? The instructors are mathematicians with years of experience in mathematical research, camps, circles, schools, and competitions. One reason that we are excited about Math in the Mountains is because we have attracted amazing people to an amazing location!

- **Paul Zeitz** has devoted his career to mathematical outreach at all levels, from coaching the USA team for the International Math Olympiad to teaching undergraduates at the University of San Francisco to working at math camps and math circles all over the country. He has produced dozens of lectures for the National Museum of Mathematics, wrote *The Art and Craft of Problem Solving* (1999), produced a 12-hour video course for The Great Courses with the same title, and is a founder and board chairman of San Francisco's Proof School, the only secondary school in the country that is devoted to the education of "math kids." Paul has visited and helped to start dozens of math teacher circles all over the country, and is a veteran of many immersion programs, including one that took place at TSS over a decade ago, and he helped to start last year's program with Beth Malmskog..

- **Beth Malmskog** is an associate professor of mathematics at Colorado College. Her research is in computational number theory, algebraic geometry, and applied discrete mathematics, including mathematical approaches to understanding fairness and social choice. Beth is an award-winning writer, had a math puzzle radio show, and has started math circles in prisons! Born and raised in Wyoming, she was the chief instructor last year and is excited to return to Jackson this summer.

- **TBA** We are still in the process of selecting instructors. Stay tuned!

Paul

Beth

FAQs

- *What is the schedule?* Participants should arrive on Sunday 6/30, with the formal program starting on Monday and ending after lunch on Friday 7/5. A typical daily schedule may look like this. The afternoon sessions are designed to be very hands-on (for example, building polyhedra out of balloons, learning how to tie heptagonal knots with ribbons). The breaks are deliberately long, to foster contemplation and community, and enjoyment of the outdoors.
    - 7:30-8:30 breakfast
    - 9:00-10:30 session A
    - 11:00-12:30 session B
    - 12:30-2:30 long lunch break
    - 2:30-4:00 session C
    - 4:00-6:00 another long break
    - 6:00-7:30 dinner
    - 7:30-?? evening activities (games, socializing, etc.)

- *Where will we stay and eat?* The Jackson campus of TSS has two lodging buildings, and teachers will stay in rooms with one other person in rooms that can hold 6. Excellent food is provided in the campus dining area. Of course there's a great variety of restaurants in town.
- *What will it cost?* The program cost will be approximately $750 per teacher, not including travel. Last year, funding was available for a limited number of teachers from Wyoming, Montana, and California, and we expect similar support. But if possible, we hope that participants can get funding from their school districts or other sources.
- *Is there PD credit?* This depends on your particular school district, but the program will comprise 21 hours of intensive instruction, not including homework.
- *I'm a 3rd grade teacher and am intimidated by high school math teachers who have studied advanced calculus. Will I be overwhelmed?* Not at all: the math that we will explore has very little to do with formal, textbook math. Certainly it will help to know algebra and geometry, but it is more important to love math and to want to learn more, and to want to have time to think and explore new things. Openness to new ideas is much more important than advanced education.
- *I attended the Math in the Mountains program last year. Can I apply for this year?* Of course! We hope to increase our numbers by 50%, and if we have returnees, we will hold some parallel sessions for them so that they won't get bored.

For more information, please contact Paul Zeitz. To begin the registration process (including returnees), please fill out this form.