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## Math Circles and the Mathematical Research Community: Gaps and Bridges

**Zvezdelina Stankova**
**Mills College**
Sunday, March 14, 2010; 8:30—9:15, PSF 166

Are you, as a mathematician, brave, skillful and confident to turn an advanced, even research, topic into a math circle session and deliver it with success? Are such "miracles" possible on a weekly basis? Does this have anything to do with your career as a research mathematician or as a math educator? In this talk, we shall discuss the gaps and bridges between math circles and the research and educational mathematical communities.

## Exploding Dots: A Point of Intersection Between the K-12 Curriculum and Math Circle Thinking

**James Tanton**
**St. Mark's School**
Sunday, March 14, 2010; 1:00—1:45, PSF 166

It seems rare to find a topic that offers educators the ease and the comfort to introduce Math Circle thinking directly into the classroom experience, especially at the high-school level. We offer here a topic that has proved successful as a math circle experience in its own right, and has delighted middle-school and high-school teachers both professionally and personally. The play of "exploding dots" also connects to open research problems. It's just a winner!

## Discussion of the Festival & Sample Sessions

Sunday, March 14, 2010; 1:55—2:55, PSF 166

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## Math Teachers' Circles: Grid Luck

**Tatiana Shubin**
**San Jose State University**
**Sunday, March 14, 2010; 3:15—4:00, PSF 166**

MTCs serve various purposes: to provide a social setting for professional interaction between teachers and mathematicians, to enhance teachers' mathematical knowledge and their confidence, to create space where a teacher's 'math mind' can wander and play, and above all, to foster a culture of problem solving.  In this talk we'll reenact a typical MTC session, where teachers not only solve problems but also invent them by "thinking deeply about simple things," and where material suitable for a middle school classroom can lead to unsolved mathematical problems.

## A Year of School Math Circle: What to Teach and How to Teach; What Works and What Does Not

**Anna Burago**
**Northwest Academy of Sciences**
**Sunday, March 14, 2010; 4:05—4:50, PSF 166**

In this presentation, I plan to give an overview of one year of a middle school  (5-7th grade) math circle.  In this presentation, I am going to review: specifics of running a math circle for middle school students; the successful and unsuccessful teaching techniques and ideas; the structure and organization of our sessions; overview of our curriculum with session problems, math contests and favorite ways to present materials.

## Application of Mechanics to Geometry

**Mirroslav Yotov**
**Florida International University**
**Monday, March 15, 2010; 8:30—9:15, PSF 166**

What I want to do is to start off with the method of Archimedes to proving that the medians of a triangle intersect in one point, and then give other applications of the same circle of ideas to other problems involving segments passing through one point. For Middle School, the arguments may be based mostly on Mechanical considerations and Physics intuition.

# Math Circles as a Problem Solving Playground

Julia Brodsky
Art of Inquiry
Monday, March 15, 2010; 9:20—10:05, PSF 166

Math circle can serve many goals – such as teaching students to appreciate the beauty of math, to collaborate and exchange ideas, to solve non-standard problems. In this presentation I would like to focus on teaching the problem solving skills for young students. Instead of feeding facts, even the most interesting facts, to the students, we try to help the children to learn about themselves, about their strengths and weaknesses in their problem solving approaches, about potential traps created both by our nature and our education. The presentation will address various problem solving approaches along with examples of the problems for each approach.

# A Live Math Circle: In Front of and Behind the Scenes

Robert and Ellen Kaplan
The Math Circle
Monday, March 15, 2010; 10:20—11:05, PSF 166

The session we propose with the people at the workshop would be on the actual running of a Math Circle class. It would take the form of a class with them as the students. Our topic will be one that some but hardly all are likely to be familiar with – those who know the story we'll ask to keep it to themselves, and observe how others deal with it. But surely anyone who is a mathematician, and who also wants to hold Math Circles, will have the imagination to feign not knowing: if you can't put yourself in your student's position, forget it. The conversation will move between work on the problem and stepping back from the work to look at its dynamics: what is an apt question to ask here; what do you do when inquiry has dried up; when one person is dominating; and so on.

# The Geometry of Math Circles

Olga Radko
University of California, Los Angeles
Monday, March 25, 2010; 12:05—12:50, PSF 166

Math Circles without Math? Well, no--by definition. But one way to think about math circles is as filling in the 'holes' in mathematics curriculum: using informal situations to introduce mathematical activities and concepts which are not easily accessed in more formal situations. Sometimes these activities lead back to formal mathematics related to curriculum. Sometimes they lead to mathematics, but not the sort that is studied in school. And sometimes, they simply help build the cognitive structures that are necessary for learning of mathematics, structures that are sometimes easily built with content that is not formal mathematics. The point of the workshop is to explore ways to access a more general perspective on mathematics than is usually obtained through curriculum.  3

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## Re-thinking the Math in Math Circles

**Mark Saul**
**Monday, March 15, 2010; 2:35—3:20, PSF 166**

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## Exploring Kleinian Groups: An Activity for Students

**David Wright**
**Oklahoma State University**
**Monday, March 15, 2010; 4:00—4:45, PSF 166**
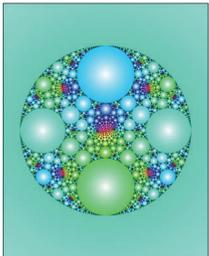
Since ancient times, people have been fascinated with visual symmetry, and that has often provided a gateway to mathematics. In modern times, Mandelbrot's incisive observations on the fractal structure of both physical and mathematical phenomena (including Kleinian groups) has led to a vast renewed public interest in mathematics. The symmetry groups named after the great German mathematician Felix Klein are connected to many advanced mathematical fields and yet they can be explored in a significant way with only a knowledge of circles, elementary algebra and complex numbers. We will show some of the incredible images and patterns that come out of this subject and discuss how to engage in your own investigations of this fascinating subject. Some of these ideas are found in the book Indra's Pearls by Mumford, Series, and the speaker, but we will also discuss the ideas of several people, both amateur and professional, on investigating these symmetry groups.

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# panel discussions

## Sunday, March 14, 2010

9:20—10:05   **Managing Professional Duties and a Math Circle**
Panel: Zvezdelina Stankova, Peter Trapa, Harold Reiter, Virginia Bohme

10:20—11:05  **Organizing and Running Math Circles in a Small City**
Panel: Prokhorov, Natalya Prokhorova, Elgin Johnston, Ratuli Mukerjee, Max Warshauer, Nate Carlson

## Monday, March 15, 2010

11:10—12:00  **Elementary School Math Circles**
Panel: Julia Brodsky, Olga Radko,Ratuli Mukerjee

1:45—2:30    **Connecting with Local Schools and Including Students from Diverse Backgrounds**
Panel: Amanda Serenevy, Mirroslav Yotov, Brandy Wiegers, Nate Carlson, David Scott