

Teacher's Circle

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Math Circles is a program with a long tradition going back to the Eötvös Competitions in Hungary in the nineteenth century. The Circles program spread to the Soviet Union¹ and eventually, about ten years ago, to the United States (in Cambridge, Massachusetts, where Math Circles reaches down even to age four!). Today there are about a dozen independent Math Circles programs in the United States.

Just what is Math Circles? In its current embodiment, it is a mathematics enrichment program for middle school and high school students that puts them in contact with university and professional-level mathematicians on a regular basis. It provides a special, nurturing context in which gifted mathematics students can begin to develop their talents. It tends to concentrate on problem-solving skills, which is something to which the public school system often gives short shrift.

The San Francisco Bay Area is particularly rich with Math Circles, as there are Circles groups in San Francisco, Berkeley, Stanford, and San Jose. The Mathematical Sciences Research Institute (MSRI) in Berkeley has spurred an initiative to create some cohesion among the Math Circles groups around the country. To start, MSRI has created a Web page offering resources to Math Circles groups. This includes lists of problems and activities for Math Circles gatherings.² An organizational meeting was held at MSRI in 1999, and the American Institute of Mathematics (AIM) was one of the key participants.³ One upshot of that meeting was that AIM helped to found the San Jose Math Circles. The Bay Area Math Olympiad group (BAMO) also grew out of these discussions. AIM founded a branch of MathCounts in Morgan Hill, which is a variant of the Math Circles concept.

One interesting upshot of the Math Circles activities in the Bay Area is an idea of Mary Fay-Zenk: why not have a Circles activity for teachers? One of the reasons that the public schools do not teach problem solving skills (which are a decisive part of critical thinking skills) is that teachers are not always proficient with those skills. Paul Zeitz has been running an active Teachers Circle group in San Francisco for one of year. The present workshop, co-sponsored by MSRI, is an outgrowth of these developments. This AIM workshop is the first gathering of this kind.

The hope is that we can magnify the effect of teaching problem-solving skills by teaching the teachers. Obviously if we can inculcate one teacher with the value of problem-solving,

¹See the book *Mathematical Circles (Russian Experience)* by Fomin, Genkin, and Itenberg.

²Today the Berkeley, Stanford, and San Jose Math Circles Web sites have similar resources.

³A followup meeting was held at MSRI in 2005.

then that teacher can in turn influence dozens of students.

The AIM workshop has half a dozen “coaches” and about twenty-five middle school teachers. Each half-day session is run by a different coach, and emphasizes different themes. The activities are hands-on, and up close and personal. The coach poses a challenging problem, at the appropriate level, and the participants work in small groups of two or three to endeavor to crack the puzzle. The point is to teach the teachers basic problem-solving skills:

1. Don't hesitate; jump in and try something.
2. Try a special case.
3. Make a reduction.
4. Relate the problem to something that you already know.
5. Reformulate the problem.
6. Generate an example.
7. Talk about the problem.
8. Exchange ideas.

The middle school teachers in the workshop are enthusiastic and anxious to learn. They are of course pleased to receive advanced teacher certification credits for their work here. They seem to be eager to absorb these skills and to be able to take them back to their classrooms. It is hoped that they will discuss the ideas with their fellow teachers and spread the word.

The present AIM workshop is peopled primarily by local teachers. There are observers from Charlotte, St. Louis, and Chicago. It is hoped that this AIM workshop will create the beginnings of a national network for Teacher's Circles. There will be an application for a second workshop next summer, bringing together participants from across the country, to develop the ideas further. The organizers of the present workshop are developing a Web site, to be based at AIM, that will be the nexus of the Teacher's Circles movement.