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# FOCUS

THE NEWSLETTER OF THE MATHEMATICAL ASSOCIATION OF AMERICA

## Reality Check: At Baltimore Standards Forum, All Quiet Along "Math Wars" Front

by Ken Ross

The problem that no one cares what is going on in mathematics education is gone! Major newspapers from New York to California have published columns about the problems in school mathematics, and the California "math wars" have been a national concern. As usual, the newsworthy stories report on the extreme positions taken. Frequently the culprit is identified as the NCTM Standards. Meanwhile, the invisible majority of concerned mathematicians is not heard from.

At the Baltimore meeting, it was heartening to see the invisible majority

speaking up. The tone was set by the excellent keynote address given by Education Secretary Riley. In reference to the so-called "math wars" in California and elsewhere, he said, "Let me say right now that this is a very disturbing trend, and it is very wrong for anyone addressing education to be attacking another in ways that are neither constructive nor productive. It is perfectly appropriate to disagree on teaching methodologies and curriculum content. But what we need is a civil and constructive discourse."

Though there were still some heated discussions at the meeting, in general

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### Appreciation

## A Mentor, a Teacher, a Mathematician

James R. C. Leitzel, who died of cancer on February 25 at the age of 61, was a multitalented mathematics professor at the University of New Hampshire and an MAA governor-at-large who had earned a national reputation for his research and expertise in mathematics education. Leitzel was a member of the MAA for nearly 40 years and was perhaps best known for his work as codirector of the MAA's national Project NExT (New Experiences in Teaching).



*James R.C. Leitzel*

Organized in 1993, Project NExT is a professional development program for new and recent Ph.D.s in the mathematical sciences that tackles issues in the teaching and learning of undergraduate mathematics. Project NExT Fellows often spoke of Leitzel's "compassion for young mathematicians and their efforts to become the best teachers they could be." Fellow Lynne Baur

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## U.S. Showing in Twelfth-Grade International Math Study Called Unacceptable

*Professional Math Organizations Unite to Make Mathematics Education Top Priority*

U.S. 12th graders scored worse in math than their counterparts in 20 other countries, according to the Third International Mathematics and Science Study (TIMSS) released in late February. Participating countries were Australia, Austria, Canada, Cyprus, Czech Republic, Denmark, France, Germany, Hungary, Iceland, Italy, Lithuania, Netherlands, New Zealand, Norway, Russia, Slovenia, South Africa, Sweden, Switzerland, and the United States.

The U.S. 12th graders' performance has caused widespread concern and prompted calls from mathematics organizations and the U.S. Dept of Education for greater emphasis on math education. "Clearly, other countries focus on algebra and geometry earlier in the curriculum, engage students in more substantive problem solving activities, and require all students to study more complex mathematics throughout their high school years," said NCTM President Gail F. Burrill.

Of three grades tested, U.S. 12th graders fared most poorly, fourth graders scored slightly above the international average, and U.S. eighth graders scored below the international average.

Some dissenters, however, challenged the findings as overly pessimistic, suggesting the study did not take into consideration differences in student ages, attainment levels in calculus, or other factors. The critics pointed out that some of the students from other countries were four years older than their U.S. counterparts; that U.S. students were given a test that assumed a knowledge of calculus; that ten of the nations that took part in the test have a strict national curriculum; and that the study was not truly international because students from Asian nations did not participate.

"The fourth grade TIMSS results show us that the problem is not arithmetic. As students move through middle school and into high school, student achievement and the mathematics curriculum fall short," said Burrill.

The tests were given to the fourth, eighth, and 12th graders in spring, 1995, and the results were released piecemeal. The results for the fourth graders were released last June, and showed American students to be above the international average. The results for U.S. eighth graders, which had been released earlier, showed below average scores. The 12th graders continued the downward trend, ranking near the bottom.

"As we digest the findings from TIMSS, we need to reconsider what is taught and how it is taught," Burrill noted. At the same time, Burrill added a note of caution. "We must define our own curriculum for our own country and not simply replicate what seems to work in other countries."

The NCTM was joined by leaders of the Mathematical Association of America, the American Mathematical Society, and the American Mathematical Association of Two-Year Colleges in advocating a solid mathematics education for every American child. The organizations are committed to supporting teachers through high-quality teacher preparation, opportunities for professional development, and dialogue between K-12 teachers, teacher educators, mathematicians, and administrators.

According to NCTM President-elect Glenda Lappan, it is important to note that over the past decade the performance of American students has improved. Findings from the federally mandated 1996 National Assessment of Educational Progress (NAEP) test showed that achievement scores have risen since 1990 for grades four, eight, and 12. "But the world is not standing still" said Lappan. "We need to offer all students a challenging curriculum focused on thinking and reasoning mathematically."

Such a comprehensive, high-quality mathematics education for every student in the country is called for in NCTM's Standards.

See *TIMSS* on page 5

## Master Cryptanalyst Abraham Sinkov Dies at 90

Abraham Sinkov, who was one of the nation's longtime master code-breakers, died last January of a heart ailment and Parkinson's disease in Mesa, Arizona.

Born in Philadelphia in 1907, Sinkov graduated from CCNY, and then received a master's degree in mathematics from Columbia and a doctorate in mathematics from George Washington University. His life's work began in the early 1930s, when he was one of three people hired by the legendary code-breaker William Friedman to work in the Army's Signal Intelligence Service.

During the Second World War, Sinkov headed the Communications Intelligence Organization, whose job it was to intercept and decode Japanese messages in the Southwest Pacific theater, at the Australian headquarters of General MacArthur. "Sinkov worked wonders," wrote David Kahn in *The Codebreakers*. During the war, Sinkov rose to the rank of colonel. This "sweet and unmilitary" man was unable to return a salute without saying "good morning."

Sinkov called himself "a mathematician." He joined the MAA in 1929, and remained an active member until 1993. Much of his cryptanalysis involved complex mathematics, and he became one of the leading mathematicians in the growing

cryptologic community of the post-war years. He was a top official at the National Security Agency, retiring in 1963. For his services, he received the Order of the British Empire, the Legion of Merit with Oak Leaf Cluster, and was one of the first inductees into the Army Intelligence Hall of Fame.



Abraham Sinkov

Sinkov taught computer programming at the University of Maryland and, after retiring from government work, became a professor of mathematics at Arizona State University. In 1966, Sinkov wrote *Elementary Cryptanalysis: A Mathematical Approach*. It covers the fundamental mathematics that is at the heart of sophisticated cryptanalytic techniques since the advent of the computer.

His book has been reprinted five times in the New Mathematical Library series of the MAA.

On Sinkov's 90th birthday, President Clinton thanked him for his "outstanding contribution to the nation's security." Sinkov is survived by his son, Michael. ■

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## Tensor Foundation Awards 15 Grants

Fifteen high school, college, and university faculty members received matching grants of up to \$5,000 to carry out programs for women and girls on their campuses during 1998 and 1999. Through this program the Tensor Foundation is helping to increase the participation of women in mathematics and science.

The 1998 winners are: Dr. Pushpa Agashe and Dr. Barbara Hatfield, University of Rio Grande/Rio Grande Community College; Dr. Kathy M. Cousins-Cooper, North Carolina A&T State University; Dr. Robert Dworkoski, Viewpoint School; Dr. Nadina M. Duran, Texas A&M University, Corpus Christi; Dr. Kirsten Fleming, Central Michigan University; Dr. Tracy Goodson-Espy, University of North Alabama; Dr. Yvonne Greenleaf and Dr. A. Darien Lauten, Rivier College; Dr. Edna Holbrook, Jackson State University; Dr. Sunil Karnawat, Turtle Mountain Community College; Dr. Harvey Keynes, University of Minnesota; Dr. Kara L. Nance, University of Alaska Fairbanks; Dr. Judith Palagallo, The University of Akron; Dr. Alice Pierce, DeKalb College; Dr. Laura B. Smith, North Carolina Central University; Dr. Patricia R. Wilkinson and Dr. Lawrence Sher, Borough of Manhattan Community College.

Various types of institutions are represented among this fourth round of winners: six state universities; two historically Black universities; one private university; one Hispanic-serving Institution; one small college; three two-year colleges including a tribal college; and one high school.

The projects chosen for the awards concentrate primarily on precollege students. Examples include a four-day computer camp with follow-up at annual Sonia Kovalevsky Days; a program on five Saturdays where students are immersed in situations for analysis using mathematics and science; a 12-day summer program with four follow-up days concentrating on the use of graphing calculators; a Middle School Mathematics Day for 200 girls both in the fall and spring, which will become a feeder for the annual Sonia Kovalevsky Days; creation of a website with information pertinent to assist girls in going into SEM careers to accompany a two-week summer workshop; a yearlong mentoring program for tenth-grade girls to include their mathematics teachers, parents, and professional women mentors; and a multifaceted peer and professional mentoring program for middle school girls.

Projects at the collegiate level include a "Mathematics Afternoon for Women," which will be a monthly program for women mathematicians outside academics to talk about their career paths to both faculty and students; developing a "Women and Mathematics" course to include the history of women in mathematics, both ancient and contemporary; and a one-month mentored research fellowship for 10 women.

The grants program is administered by the MAA on behalf of the Foundation. The Foundation will make funds available to the MAA annually through the year 2000. The request for proposals to be granted in 1999 will be published later this year in FOCUS. ■

*Standards from page 1*

the cease-fire held. In particular, there was a very constructive and well-attended panel discussion on the NCTM Standards. This was co-sponsored by the AMS Committee on Education and the MAA President's Task Force on the NCTM Standards, which are chaired by Roger Howe of Yale University and me. In the fall of 1996, several mathematics organizations were asked by NCTM to have a group assist with the revision process of the NCTM Standards. The assisting groups have come to be known as ARGs, which stands for Association Review Groups. The panelists represented six of the ARGs. They were Roger Howe and me, Terry Herdman from the Society for Industrial and Applied Mathematics, Deborah Hughes-Hallett from the Association for Women in Mathematics, Jean Larson from the Association for Symbolic Logic, and Tom Moore from the American Statistical Association.

Roger Howe gave an overview of some of the issues involved in mathematics education reform. He observed that one of the driving forces has been the international comparisons, in which the U.S. has consistently done poorly. He mentioned some of the key issues such as equity and the increasing need for mathematically talented people. New technology and the changing needs of users of mathematics make curriculum development more difficult than ever. More topics need to be added, but people are reluctant to let go of items now in the curriculum. Roger also discussed the issues of teacher preparation and certification and the issue of assessment.

I began my remarks by giving credit to the NCTM for having the courage to get out there and tackle these issues and for addressing the needs of all students. I also credited NCTM with getting people inside and outside of mathematics interested in these issues. I mentioned our concerns that the NCTM Standards need to be less vague and much less subject to misinterpretation, since a huge variety of things have been done in the name of the Standards. There also has to be recognition that mathematics is not always fun, that it's not always easy, and that it's a myth that only some people can do mathematics. We dealt with the questions from NCTM with an emphasis on a balanced approach.

The other panelists built on the remarks made by Roger Howe and me. Terry Herdman stressed that most students do not see the beauty of mathematics, so that we must respond to the reasonable question, "What's it good for?" The SIAM people talked a lot about estimation and approximation, the ability to realize when answers are reasonable, and about modeling. They felt that modeling should be taught at an early age. Deborah Hughes-Hallett emphasized that the Standards need to be shorter, crisper, and more specific. She amplified my comment about balance and added that balance means that none of us is going to get exactly our vision of the Standards. She mentioned that many of the ARGs would like to see greater attention devoted to logic and reasoning in mathematics. We need to recognize that many of the key words, like "proof" and "verification," have different meanings to different communities. Deborah also warned us that, as difficult as writing and rewriting the Standards has been, implementation will be a greater challenge.

Jean Larson pointed out that the term "algorithms" also has different meanings to different communities. She focused

on the creation and use of algorithms by elementary students and gave some interesting specific examples involving areas of simple geometric figures. Tom Moore began by pointing out that statisticians are a little like doctors and car mechanics; they live on the problems of other people. He stressed that his ARG is very pro-Standards and especially applauded their over-arching theme of problem solving. The approaches to learning encouraged by the Standards are just right for learning statistics and data analysis at an early age. Moreover, the Standards consistently emphasize the statistical paradigm of collecting, analyzing and interpreting data, which is at the heart of all good statistical data analysis. Tom encouraged the use of technology when appropriate, but cautioned against introducing it too early.

The remainder of the session was devoted to questions and comments from the audience. There were many hard-hitting remarks, but most were in the spirit of cooperation, and the atmosphere was amiable. Manuel Berriozabal explained that when he first read the Standards he thought our students would be world class if the kids learned mathematics the way Standards wanted it taught. He has since been dismayed at how the Standards have been interpreted, especially with the deemphasis on proofs.

William McCallum, following up on Terry Herdman's comment that his ARG agreed on the need for basics, said that "basics" is another word that means different things to different people. He's concerned that he has many students with algebraic skills who have no graphing skills. Kenneth Millett cautioned that it is very difficult to identify mathematically talented students early on, and that the attempt to do so often results in identification that has a strong correlation with family income or status rather than the ability and capacity of the students.

Malcolm Sherman was critical of the idea that statistics and data analysis should be done at the elementary level. Regression, for example, should not be introduced before students have done analytic geometry. Dan Fendel strongly disagreed and pointed out that students can get a feel for these concepts at an early age. Then later they'll have the intuition and experience in order to be able to appreciate the mathematical rigor. Tom Moore agreed.

Ed Dubinsky raised the issue that college students aren't learning the mathematics required by the Standards, and that this is our responsibility. He, Ed Barbeau and Marjorie Enneking pointed out that math majors who do well in standard mathematics courses often flounder in courses designed for pre-college teachers. I indicated that these issues will be addressed by the CBMS Partnership in Education.

Jean Larson stated that we need to go out and observe teachers in the K-12 setting and see the kinds of problems they are facing. Nancy Dennin introduced herself as a high school teacher and received a big round of applause. She agreed that we need to see for ourselves, and she pointed out that: "Nothing you can do will prepare a person for teaching in the classroom. We have wonderful children, but it is a different world down in the public schools, and I welcome you to join our world anytime." ■

**Leitzel from page 1**

said, "If there were such a thing as a tornado spreading enthusiasm, encouragement, and smiles, that would be a good metaphor for my memories of Jim. I want to think he has not spun himself away, but rather out into the rest of us," where the "warmth and confidence gained from our contact with him stir us into motion along the paths that mattered to him, and to us."

Mary Lynn Reed, another Project NExT Fellow, was impressed with "just how devoted Jim was to all young mathematicians." He was "an outstanding mentor to me as a new faculty member."

Leitzel earned a Bachelor's and Master's in mathematics from Penn State in 1958 and 1960, and a Doctorate in mathematics from Indiana University in 1965. He taught at Ohio State University from 1965–1992 and at the University of Nebraska-Lincoln from 1993–96.

His service on MAA committees spanned the length and breadth of the Association, beginning with his work on the Committee on the Exchange of Information in Mathematics (1977–82). There followed assignments on the Editorial Advisory Committee, FOCUS (1982–90); Public Information Panel (1984–90); COMET (1988–91); CUPM Subcommittee on Undergraduate Major Programs (1988–91); MAA 75<sup>th</sup> Anniversary Meetings Committee (1988–90); ad hoc Committee on Guidelines (1990–94); CTUM (1991–95); CUPM (1991–94); and the Coordinating Council on Education (1991–95). He was Codirector of Project NExT (1993–98); MAA Representative to the National Council of Supervisors of Mathematics (1994); Visiting Mathematician, MAA (1990–92); and MAA governor-at-large (1997–98); He was chair of the Ohio Section (1984–85); a panelist or speaker at joint national meetings since 1977, and an invited speaker at many Sections.

Ken Ross recalled Leitzel's value to the MAA. "Jim was one of the most unselfish people I've known in the math world. While I was MAA president...many times I would need to know some facts or need some wisdom and advice, and I invariably started by asking Jim because I knew he would give me reliable and sensible information. My responses were frequently based on Jim's input. Jim knew this and characteristically didn't complain that he didn't get 'credit' for my words of wisdom."

**TIMSS from page 2**

"What is important is that we are working together toward a common goal of excellence in mathematics," Burrill said. "The recent math wars have done nothing to improve mathematics education. Our teachers have been caught in the crossfire and our children will be the casualties."

The major mathematics organizations support U.S. Secretary of Education Richard Riley's request for a "cease fire" in the growing math debate about whether adding and subtracting should be emphasized over solving more complex problems. "The answer is both," he said, "but there must be balance and there must be results." ■

Marilyn Mays, past president of AMATYC, said that Leitzel provided invaluable assistance to AMATYC in many ways but particularly in 1993 in the development of *Crossroads in Mathematics: Standards for Introductory College Mathematics Before Calculus*. "We were truly honored when Jim agreed to be part of the effort. He rolled up his sleeves and worked with us."

Leitzel's other professional activities, in addition to his teaching duties, included membership in the MSEB, work with the NCTM, speaker at the ICME Congresses in Berkeley (1980); Budapest (1988); and Quebec (1992); and authorship of a score of articles and papers. "The community will miss him deeply," said Professor Alan Schoenfeld. "He was a wonderful colleague and collaborator: committed, incisive and productive, improving every project with which he was affiliated."

In 1995, Leitzel asked that the MAA expand its efforts in the arena closest to his heart: "To support faculty as they address ways to enhance student learning...address critical transitions in students' mathematical education and...encourage mathematical science departments to take more seriously the challenges and obligations of preparing future teachers of mathematics."

His funeral, held on Saturday, February 28, was attended by MAA Executive Director Marcia Sward on behalf of the Board of Governors and the MAA staff. Other MAA colleagues in attendance included his Project NExT collaborator Chris Stevens, incoming MAA president Tom Banchoff, Donovan Van Osdol, Jim Tattersall, Lida Barrett, Alan Tucker, and Lee Zia.

The funeral service was held at Phillips Church on the grounds of Phillips Exeter Academy, Exeter, NH. The choir from the Leitzel's church sang, as did the minister of the Phillip's Church. Marcia Sward presented "A Remembrance," and spoke about Jim's living legacies, particularly in teacher education and through Project NExT. Chris Stevens read numerous moving tributes about Jim from Project NExT participants and Jim Lewis spoke about the Leitzel's days at the University of Nebraska, from 1993–1996, and about Jim as a teacher. Flowers were sent from the Board of Governors to the church, and from the MAA staff to the Leitzel's home.

He is survived by his wife Joan, his sons James and John, and a granddaughter, Hannah. ■

## Manuscripts Sought on Teaching of the Gifted and Talented

The School Science and Mathematics Association (SSMA) is seeking manuscripts devoted to issues relating to the teaching of gifted, talented, and promising students in mathematics and/or science. Selected papers will appear in the October 1999 issue of the organization's journal, *School Science and Mathematics*. Manuscripts are due October 1, 1998 and should be submitted to Robert W. Prielipp, Mathematics Department, University of Wisconsin-Oshkosh, Oshkosh, WI 54901-8631. For more information, contact Prielipp at (920)424-1057; e-mail: [prielipp@uwosh.edu](mailto:prielipp@uwosh.edu); SSMA web site: <http://hubble.bloomu.edu/~ssma>. ■

# Enlisting Two-Year Colleges in Educating Mathematics Teachers

by Lynn Arthur Steen

In the wake of the abysmal performance by twelfth grade U.S. students on the Third International Mathematics and Science Study (TIMSS), many political leaders and policy experts have aimed their spotlights on a significant and correctable deficiency: the large number of mathematics teachers who have very poor preparation in mathematics. Thus in the space of little more than a year, the challenge enunciated in MAA's 1991 report *A Call for Change* has become a very visible national goal, attracting the attention not only of U.S. Education Secretary William Riley, but also of President Clinton.

Most MAA members are well aware of the responsibility of four-year colleges to provide appropriate courses and programs of study for prospective school teachers. Few realize, however, that two out of every five prospective teachers—and well over half of Hispanic and African-American teacher-candidates—study mathematics first at a two-year college. Indeed, two-year colleges enroll 46% of all undergraduate mathematics students.

Recognizing the emerging but unheralded importance of two-year colleges in the pipeline of teacher preparation, the National Science Foundation (NSF) and the American Mathematical Association of Two-Year Colleges (AMATYC) convened a conference last March to begin a process of strengthening such

programs in the nation's 1,200 two-year institutions.

At this conference, eleven innovative two-year college teacher-preparation programs received awards in a ceremony at the National Academy of Sciences. In congratulating the award winners, Academy President Bruce Alberts observed that one reason science advances more readily than education is that science continually learns from successes and failures whereas education most often invents everything anew. These eleven programs, Alberts observed, provide a foundation on which others should build.

Out-going NSF director (and now Presidential Science Advisor) Neal Lane lauded two-year colleges for providing "the best of all possible educational objectives": preparation for today's technological workforce and habits of mind well-suited to teaching or other careers. He noted that NSF investment in two-year college programs has climbed in just five years from virtually nothing to well over \$50 million annually.

Nonetheless, most teacher-preparation programs at four-year institutions operate without any explicit coordination with their neighboring two-year institutions. Many future teachers take their only introductory mathematics and science courses at a two-year college, sometimes even before they have se-

lected teaching as a career. At the March conference, representatives from both the Department of Education and the National Science Foundation identified as an urgent national need increased collaboration on issues involving teacher preparation between faculty at two-year and four-year institutions (in mathematics, science, and education programs).

Community colleges are a prime recruiting ground for prospective teachers. Many are located in rural communities or in inner cities, directly serving the needs of these communities. There is enormous potential to interest students from these communities in the teaching of mathematics and science with the goal of returning teachers to these same communities.

Partnerships and alliances between two- and four-year institutions for this purpose would go a long way to strengthen the mathematical preparation of children, especially in communities not now benefiting from mathematically well-prepared teachers.

While separate programs do some good, they fall far short of fulfilling their potential or meeting the nation's needs. What conference participants called for are well-planned partnerships among two- and four-year colleges to create attractive, cohesive, high-quality programs. ■

## SUMMA: Year Eight

The Strengthening Underrepresented Minority Mathematics Achievement (SUMMA) Program was established at the MAA headquarters in August 1990. Seven projects were designed to address recommendations identified by a Task Force over the previous two years. Under the oversight of the Committee on Minority Participation (CMP), the staff of the new Office of Minority Participation (OMP) began the work of SUMMA. Armed with the support of the Board of Governors who resolved to use the human and financial resources of the MAA to assist in changing the attitudes and practices of the

mathematics community toward minorities at all levels, the CMP determined the tasks of highest priority. Over the seven and one-half years of the existence of OMP, the programs spoken of collectively under SUMMA have informed the community and assisted individuals and organizations to recognize needs more clearly and recommend paths for action. The Board of Governors policy statement recognized that this program would "require a substantial long term effort."

Technical assistance has been given by the SUMMA staff to more than 200 mathematicians to encourage them to

initiate programs on their campuses for minority precollege students.

Each year more than 40,000 students participate in these programs under the guidance of more than 750 collegiate faculty. The success of the students in these programs and the increased enrollment of minority students as mathematics majors was part of the background for the policy statement passed by the Board of Governors in August 1997, that all mathematics departments should conduct programs for precollege students and encourage and support the faculty for their involve-

See *SUMMA* on page 10



## JPBM Task Force on the Educational Activities of Faculty Needs Your Help

The Joint Policy Board for Mathematics has created a Task Force whose mission is to provide the post-secondary mathematical community with resources for enhancing the educational activities of faculty. Its goal is to help institutions and departments reflect on their educational missions, determine the range of educational activities that should "count" in the promotion and tenure process given their missions, and document educational activities in reliable and meaningful ways.

In sum, it wants to help faculty do the job well and be rewarded for their efforts. To do this, the Task Force is looking for information and ideas, including:

- What issues should it address? Are there things you want to know about or that you think the field should know about?
- What resources, ideas, or programs should be included?
- What departments are good candidates for site visits?

The task force's aim is to produce two books. One will describe the state of the art, providing a statistical survey of cur-

rent practices at different kinds of institutions. It will discuss reliable methods for enhancing, documenting, and rewarding faculty's educational contributions (e.g., through student evaluations, peer review, and documentation of instructional efforts via course and teaching portfolios).

The second book will provide descriptions of models that work. It will offer case studies of how institutions as different as community colleges, small colleges, and public and private universities help faculty, graduate students, and administrators develop institutional cultures and procedures that enhance and reward educational efforts.

There will be no prescriptions, only rich examples to learn from.

Contact the Task Force chair with information and suggestions:

Alan H. Schoenfeld  
Chair, JPBM Task Force on Educational Activities  
School of Education, EMST  
University of California, Berkeley  
Berkeley, CA 94720-1670

email: [alans@socrates.berkeley.edu](mailto:alans@socrates.berkeley.edu). ■

## The MAA's New Section Governors Begin Terms in July

Beginning July 1, the following people become members of the MAA's Board of Governors:

- David R. Hill: Eastern Pennsylvania and Delaware
- Frederic J. Zerla: Florida
- Larry J. Morley: Illinois
- James W. Cannon: Intermountain
- Elgin H. Johnston: Iowa
- Jon W. Scott: Maryland-DC-Virginia
- John O. Kiltinen: Michigan
- Gail S. Nelson: North Central
- Barbara J. Beechler: Southern CA
- Montie G. Monzingo: Texas

Many thanks to the current Governors of these Sections and all those members who were willing to stand for election.

## 1998 Morgan Prize Nominees Sought

The Frank and Brennie Morgan Prize in mathematics is given each year in recognition of outstanding research by an undergraduate student. The application deadline this year is June 30.

Students who were undergraduates in December 1997 are eligible for the prize. One award is given each year, although the committee may also award one or more honorable mentions. The amount of the top award is \$1,000.

A nomination for the award should include at least one research paper and at least one letter of recommendation. The research paper that is submitted need not be a published paper. ■

Applications should be sent to:

Morgan Prize Committee  
c/o Robert M. Fossum, Secretary  
American Mathematical Society  
Department of Mathematics  
University of Illinois  
1409 West Green Street  
Urbana, IL 61801-2975

## Math Student Wins Top Prize in 1998 Westinghouse Science Talent Search

Seventeen-year-old Christopher Colin Mihelich, a junior at Park Tudor School, Indianapolis, was awarded the first-place prize, a \$40,000 scholarship, for his project that studied properties of polynomials having applications to geometry and combinatorics. He developed a family of operations that examine the structural peculiarities created when assuming that a certain class of expressions, called quotient rings, is equivalent to zero.

Two other students placed among the top ten for mathematics projects.

Travis Schedler, 17, from the Illinois Mathematics and Science Academy, in

Aurora, took the fifth-place prize, a \$15,000 scholarship. His project was in set-theoretical solutions of the Quantum Yang-Baxter Equation, which was originally posed in 1992. He summarized results of a computer search for the smallest solutions for  $|X| \leq 6$ .

Finally, Jonathan Kelner, a 17-year old from the Wheatley School, Old Westbury, NY, took 8th place and a \$10,000 scholarship for his math project involving the Dirac operator, a complex operator used to better understand quarks. ■

# Letters to the Editor

To the Editor:

We are grateful to Saunders MacLane (FOCUS, February 1998, p. 6) for his opening a reasoned discussion of issues related to research in mathematics education. The timing could not be better. At the Baltimore meetings there was unprecedented interest in, and thoughtful discussion of, both basic and applied issues in mathematics education research. We agree with the urging of Brown and DeVries (FOCUS, October 1997, p. 19) that mathematicians should look to the science of mathematics education.

Established mathematicians will recall earlier periods when, each in their turn, applied mathematics, statistics, and computer science were nurtured within the field of mathematics until they developed to the point of independence. Here we offer some thoughts, grounded in our experience, about what happens when we try to educate ourselves about theory and research in an area that is new to us. Interestingly, many of the issues raised today about mathematics education are highly reminiscent of comments made then about those fields.

It is clear that the traditions, vocabulary, standards of evidence, modes of critique, and nature of research differ by area within the mathematical sciences. Judgments about the quality of the work in a new area, or interpretations of complex theories in an unfamiliar domain, are difficult to make. They often lead to discussions like the current one, in which practitioners of a relatively new field (like us) respond to concerns of highly respected individuals in more established fields (like MacLane) with explanations, interpretations, and yes, even corrections.

To characterize constructivism, which is a theory of knowledge, as a philosophy that urges students to construct their own mathematics is a serious misinterpretation. As with most theoretical perspectives, various interpretations exist; treatments range from the strictly philosophical (see, for example, Von Glasersfeld, "Learning as a Constructive Activity," in C. Janvier (ed.), *Problems of*

*Representation in the Teaching and Learning of Mathematics*, Hillsdale, NJ: Erlbaum, 1985, pp. 3–17) to those grounded in cognitive psychology (see, for example, pp. 20–27 of Schoenfeld, A. H. (ed.) 1987, *Cognitive Science and Mathematics Education*, Hillsdale, NJ: Erlbaum).

Despite the differences, one generally accepted tenet of the constructivism is that humans do not perceive reality directly, but that we "interpret" our experiences and behave consistently on the basis of those interpretations (take any optical illusion, or any student's misconception, such as the belief that  $(a+b)^2 = a^2 + b^2$ , as examples of this phenomenon).

Another point on which there is considerable agreement is that students construct their own *understandings* of mathematics—not their own mathematics. The central theoretical/empirical issue, then, is how we make sense of the phenomena we experience, including those in mathematics. The central pedagogical issue, in the words of von Glasersfeld, is how teachers work to develop a "fit" between students' developing understandings and the understandings established in the field of mathematics. Many constructivists feel that one can never know precisely what another person thinks or understands, but we can (and constructivists do) maintain that whatever this understanding may be, it must be consistent with the mathematical phenomena that everyone encounters.

MacLane offered "reviews" of three mathematics education articles. It would be one thing to try to read and perhaps devise personal abstracts or reviews of articles in a field that is not our own, but to write caricature reviews doesn't seem to be a productive venture. Nonetheless, it is indeed tempting to imagine what a tongue-in-cheek review of a major research paper about, say, computer science, written by a person who thinks mainly about algebraic topology, might look like. We defer from actually undertaking the exercise. In general, any random selection of

articles in a field is unlikely to yield a sense of its breadth, richness, depth, or quality.

As mathematics educators who teach and have taught mathematics at all levels, we wish to make several points. Theory and research from mathematics education have had numerous positive influences on our teaching. Mathematics education research can be useful to mathematicians. Just as one cannot learn mathematics by deciding to read some random assortment of papers, it is unlikely that people who do not have formal preparation in the field of mathematics education would find it fruitful to read only a few papers. In fact, one argument for providing reviews of mathematics education papers is to allow the mathematics community to see a range of type, quality, and focus of mathematics education papers, as a screening process for actually reading the papers. Reviews can help orient people to the field, and publishing well considered critical reviews of published papers is one way to improve the quality of research.

Research and theoretical presentations in mathematics education range in depth and quality—as do papers in all fields of mathematics. At its best, research in mathematics education offers better, deeper and increasingly more useful explanations of teaching and learning, and the contexts in which they happen. We each find the intellectual stimulation, as well as the benefit to our teaching, of the evolving and growing field of mathematics education to be enormously important. We hope that discussions such as this will lead to more examples in our field of research at its best, and we welcome MacLane's help in this quest.

Polarization in the discourse between mathematicians and mathematics educators is neither productive nor practical. It takes energy away from the important business to which we all are committed, that of improving mathematics teaching and learning at all levels. Secretary Riley, in his remarks during the Baltimore meetings, encour-



aged the mathematical sciences community to work together toward such improvement. We feel that the various mathematics education programs at the Winter Meetings in Baltimore, with their tones of sharing information, considering a variety of ideas, and showing mutual respect for those with whom there was the strongest disagreement were a huge step in the direction of improving the learning and teaching of mathematics. We urge our colleagues to stay focused on that end, to continue and expand the sorts of discussions and collaborations that mathematicians are engaged in as evidenced in Baltimore, and to structure the discussion, collaborations, and cross-disciplinary interactions likely to further continued improvement.

Ed Dubinsky,  
Georgia State University  
Alan H. Schoenfeld,  
University of California, Berkeley

To the Editor:

There are two aspects to education: The learning of facts, theories, and methods to use related to fields of knowledge; and the ability and habit of using them creatively and usefully.

The first without the second is characteristic of the idiot savants we often meet, and are not what we wish to produce from our educational system. Almost everyone wants to measure the amount of education we produce in the individual without ever asking if it is at all possible, and what would be the results if we try. The difficulty is that *you get what you measure*. A standard example is that measuring the success of a business every quarter by the bottom line produces short-term optimization. In education, the first part is easy to set up exams for, the second is not. We simply cannot do it at all well. As a result we will get concentration on the first part—and still more idiot savants.

We already have a flourishing business of teaching students, usually for money, how to pass such standardized exams as the SAT. Coaches claim to be able to raise scores by more than 100 points, and there is ample evidence that they do—and the more you pay, the more you can raise your scores. Thus widespread testing by standardized exams

will favor the rich over the poor, hardly what we want to do!

There is ample evidence of this evil in the past. At Cambridge, in England, they long had the Tripos exams to measure mathematical ability, and if you wanted to be at the top of the list then you went to a special coach and trained for a year or two. G. H. Hardy, the great mathematician, protested and got them abolished. I saw a similar effort in 1942 when Brown University held a training course for mathematicians. It soon became obvious to me that those students from the New York area, where standard tests were widely used, were much better than those from the Midwest at solving particular problems, but were much worse at general theory.

Everyone knows in their hearts that that is exactly what national exams in education will produce: the ability to pass exams, along with a thriving business for coaches. There is no way to stop it, since no one can long produce questions that relate strongly to the second aspect of education, which coaches cannot master and cannot teach. Thus, before we plunge into what we want, but cannot have, let us stop and think of the consequences first. Measurements at lower levels of education, where it is mainly learning, are good and useful, but at higher levels they are bound to be evil.

R. W. Hamming  
Naval Postgraduate School  
Monterey, CA 93943

## Call for Manuscripts for the February 2000 Issue of *Teaching Children Mathematics*

The February 2000 issue of *Teaching Children Mathematics*, which is a journal of the National Council of Teachers of Mathematics, will concentrate on children as mathematicians. It aims to highlight the engagement of children as discoverers and inventors, as well as users, of mathematics to understand the world. The editorial panel wishes to highlight pre-K-6 examples of young mathematicians at work, classrooms that exhibit a community of inquiry, tasks that require powerful thinkers, and methods to assess children's thinking. Teachers and mathematicians are encouraged to collaborate and coau-

## International Gathering of Mathematicians to Discuss Use of Computer Algebra in Teaching

The 3rd International Derive/TI-92 Conference is dedicated to the tradition of master instructors of mathematics sharing their insights on the use of computer algebra in teaching at all levels from middle school (12-14 year olds) through college level. One of the main features of this conference is that it includes teachers from around the world.

Presentations are scheduled by teachers in Australia, Austria, Belgium, Canada, England, Germany, Israel, the Netherlands, Russia, Slovenia, Spain, the United Arab Emirates, the Ukraine, as well as the United States.

Please consider attending this marvelous conference in historical Gettysburg, Pennsylvania July 14-17, 1998. Let your colleagues know about this opportunity! The tentative program is listed at <<http://www.math.ohio-state.edu/~waitsb/DRV98/conf.html>> ■

thor manuscripts. Topics of particular interest include:

Engaging All Children as Mathematicians Learning Environments for Mathematical Work

Children's Mathematical Discoveries

Assessing the Thinking and Dispositions of Young Mathematicians

The complete call for manuscripts and guidelines for submitting manuscripts appeared in the April 1998 issue of *Teaching Children*. For more information, contact Daniel Breidenbach (703) 620-9840; e-mail: [dbreidenbach@nctm.org](mailto:dbreidenbach@nctm.org). ■

**SUMMA from page 6**

ment in this work. Current and former project directors are willing and able to assist those of you who are ready to start projects passing on the skills they acquired in project management and fund raising. Generous support from the Carnegie Corporation of New York from 1990 through 1997 paid the SUMMA staff and provided \$250,000 in small grants to 62 mathematicians to plan projects resulting in 54 on-going summer programs.

For five years, with funding from NSF, SUMMA held annual meetings of the directors of the precollege projects in which the members of this consortium could share their experiences and learn from agencies and experts about what are the best procedures to follow. These inspiring meetings culminated in 1997 when 150 college and precollege SUMMA students came from all over the country to the Joint Mathematics meetings in San Diego to take part in a carefully orchestrated mathematics problem solving day.

The opinion of many was that it was the greatest event of their lives. And so it was for the faculty and SUMMA staff as well. A full evaluation of the five years of these activities has been completed by Dr. Susan Gross and is available to those who are interested in documenting the success and significance of this work which was directed by Dr. Florence Fasanelli, Director of SUMMA Intervention Programs.

An Archival Record of members of minority groups who have received PhDs in mathematics or mathematics education as American citizens is available on the MAA web page. A graduate student completed this project, which was made possible with a grant from the Alfred P. Sloan Foundation. Each week new names are added to the material available. The OMP has much more data available which is not posted including the names of the (approximately) 375 individuals with minority degrees; data on the schools and colleges and years of degrees; photographs; and other biographical material. The OMP often receives requests from students writing papers. The staff assists in having the student make direct contact with the mathematician for an interview.

To understand more fully the reasons why few minority Ph.Ds have been granted since the first in 1925, also with funding from Sloan, OMP conducted a survey, also funded by Sloan, of graduate students in colleges and universities in 1996. This survey makes it clear that much work needs to be done to encourage minority students to major in mathematics and to persist in graduate school. In the past three years few minority students have completed doctoral studies. In about five years this number might increase to 20 each year. This survey is available in the OMP.

Since 1990 the MAA membership has elected its first two minority Vice-Presidents, James Donaldson, and then Wade Ellis, as well as the first minority

elected by a section, Tino Mendez. The SUMMA staff have had the resources to recommend names of individuals to be speakers, serve on committees, and be nominated for prizes. This need was made clear when the numbers of minority speakers at the Joint Mathematics Meetings grew from 12 in 1990 to 55 in 1996 and 1997. Members of minority groups now serve on 34 of the 134 MAA Committees. The MAA nominated two of the members of CMP which oversees SUMMA for Presidential Awards in Mentoring. Both received these prestigious \$10,000 awards of the 20 given to date: Joaquin Bustoz in 1996 and Robert Megginson in 1997.

William Hawkins, Associate Professor of Mathematics at the University of the District of Columbia, and the Director of OMP since its inception, has assisted two projects that directly address the need to assure that faculty at MSIs are involved in mathematics reform.

Since 1996 Hawkins has assisted projects that taught more than 100 faculty the use of handheld calculators in mathematics and science teacher preparation classes. SUMMA initiated a project of a similar nature which will reach all Tribal Colleges. Robert Megginson is director of this SUMMA project, funded by NSF, which will also include teaching modern pedagogical techniques in mathematics and improve teacher preparation, particularly for American Indian teacher aides. ■

## Single-Sex Education Doesn't Serve Students Better, Says New Report

A new report by the American Association of University Women Education Foundation, released in mid-March, concludes that single-sex classes and schools don't necessarily offer students a better education than coed ones. The report drew particular attention to the mathematics and science community, because much of the nationwide experimentation with single-sex groupings over the past few years has taken place in math and science classes.

*Separated By Sex: A Critical Look at Single-Sex Education for Girls* notes that girls, in particular, often seem to prefer such classes, crediting them with a more supportive atmosphere. This preference,

however, does not produce a corresponding rise in achievement.

The 100-page inquiry into the complex educational issues raised by all-girls and all-boys classes and schools also found:

—Where single-sex programs are successful, success may stem more from such factors as small class size and more personal attention to students than from the class's composition.

—Many of the conditions linked to high student achievement can be implemented in coed classrooms.

—Single-sex classes are disruptive to the coed school environment because they

“siphon off students” from coed classes and “skew the sex ratio” in classes left behind.

The report, which consists of four research papers and a literature review, has stirred controversy because a 1992 report from the same organization was the impetus for many of the current experiments with single-sex education. The earlier report, however, stopped short of endorsing this approach.

The researchers were Patricia B. Campbell, Valerie E. Lee, Pamela Haag, Diane S. Pollard, Cornelius Riordan, and Ellen Wahl. ■

## The MAA's Liaisons Program: An Update

Let's say an exciting opportunity exists for undergraduate mathematics teachers to participate in a summer institute in Park City. The details are conveyed to the MAA headquarters office in Washington, and a day later, faculty in 1500 post secondary mathematics departments across the country find out about the program in an email message from a colleague.

At the MAA's web site, a new page provides a calendar of workshops, minicourses, and short courses for college mathematics faculty. The calendar lists dates, location, title, contact information and a short description of each workshop with links to more details. Within two days, the availability and location of this information source is brought to the attention of thousands of mathematics faculty nationwide.

Thanks to generous grants from the Exxon Education Foundation and the Tensor Foundation, the MAA is able to support regional and campus programs run by mathematics faculty for students at a variety of levels.

Guidelines for obtaining this support are formulated by MAA staff members, and within hours are put into the hands of interested teachers in virtually every region and city of the country.

These are examples of the MAA/De-

partmental Liaisons Program in action. There are around 1500 participating college and university mathematics departments in the US and Canada. In each one, a faculty member has agreed to serve as a liaison between the MAA and the department. These liaisons participate in a national electronic network, disseminating information of professional interest to mathematics teachers and students, and helping the MAA to be more responsive to the needs and interests of its members and the profession.

The Liaisons Program is only in its third year of operation, but it has already been recognized as an important resource for the MAA and the mathematicians and educators that the MAA serves. The examples above illustrate the ability of the program to distribute information nationally. This capability can play a vital role within the full range of electronic services offered by the MAA.

MAA Online makes available an ever-increasing volume of information for mathematics enthusiasts of all descriptions. In fact, there is so much information available that it is hardly feasible to keep up with it all, or to survey it on a regular basis. The Liaisons network makes this sea of information more navigable, providing timely beacons

that highlight specific resources and announcements. Local review and judgement are provided on an individual basis in each participating department. The Liaisons Network and MAA Online give MAA members unprecedented access to information that enriches and expands their professional lives.

The Liaisons Program is still developing. Future plans include greater involvement with MAA Sections, and a web site dedicated to information for and about Liaisons. Last January saw the first gathering of Liaisons at a national meeting, an event that was so successful that it is sure to become an annual affair. And gatherings of Liaisons at Section meetings are becoming common.

Do you know who the Liaison is in your department? He or she can be a valuable source of information for you and your students. And if your department has been missing out on the benefits of participation, it is not too late to join in!

Discuss the program with your colleagues and chair, and choose someone to serve as Liaison for your department. You can email Jane Heckler (jheckler@maa.org) at MAA headquarters for information on how to get started. ■

## MATHFEST GOES INTERNATIONAL!

New for 1998

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Dormitory Housing Reservations .	June 1
Delta Chelsea Inn Reservations ...	June 11
Regular Registration .....	June 29
Short Course Registration .....	June 29
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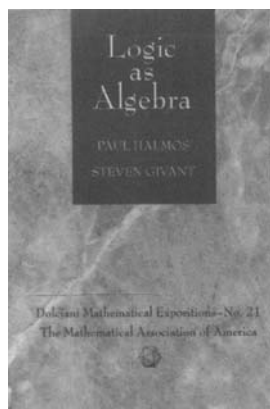
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# NEW FROM THE MATHEMATICAL ASSOCIATION OF AMERICA



## Logic as Algebra

PAUL HALMOS AND STEVE GIVANT

This book is based on the notes of a course in logic given by Paul Halmos. This book retains the spirit and purpose of those notes, which was to show that logic can (and perhaps should) be viewed from an algebraic perspective. When so viewed,

many of its principal notions are seen to be old friends, familiar algebraic notions that were “disguised” in logical clothing. Moreover, the connection between the principal theorems of the subject and well-known theorems in algebra becomes clearer. Even the proofs often gain in simplicity.

Propositional logic and monadic predicate calculus—predicate logic with a single quantifier—are the principal topics treated. The connections between logic and algebra are carefully explained. The key notions and the fundamental theorems are elucidated from both a logical and algebraic perspective. The final section gives a unique and illuminating algebraic treatment of the theory of syllogisms—perhaps the oldest branch of logic, and a subject that is neglected in most modern logic texts.

The presentation is aimed at a broad audience—mathematics amateurs, students, teachers, philosophers, linguists,

computer scientists, engineers, and professional mathematicians. Whether the reader’s goal is a quick glimpse of modern logic or a more serious study of the subject, the book’s fresh approach will bring novel and illuminating insights to beginners and professionals alike. All that is required of the reader is an acquaintance with some of the basic notions encountered in a first course in modern algebra. In particular, no prior knowledge of logic is assumed. The book could serve equally well as a fireside companion and as a course text.

**Catalog Code: DOL-21/FOC98**

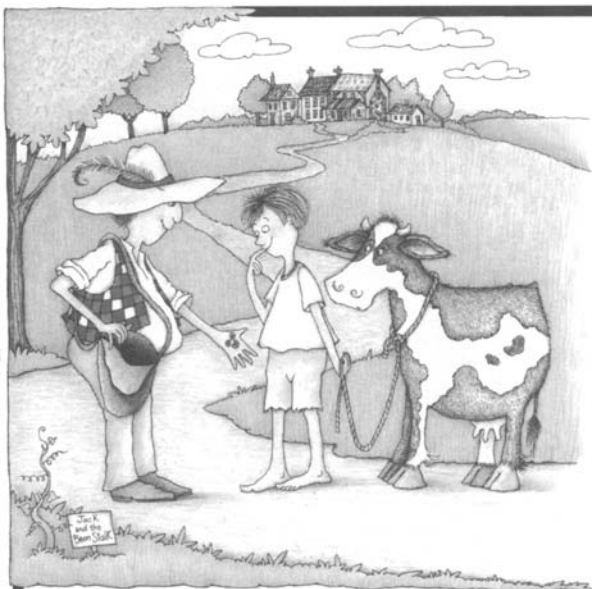
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# Professional Development Calendar

## MAY

May 18–19  
**Reconnecting Two-Year College Faculty to the Mathematical Sciences Enterprise \***

DIMACS, Rutgers University, Piscataway, NJ  
(732) 445-4631;  
epfoley@dimacs.rutgers.edu

May 28–June 2

**Teaching**

**Undergraduate Geometry \***

Cornell University, Ithaca, NY  
(607) 255-3523; dwh@math.cornell.edu

May 26–30

**New Mexico Initiative for Math Reform Workshops\***

Dona Ana Branch Community College, Las Cruces, NM  
maryrobn@unm.edu

## JUNE

June 3–9

**Statistical Thinking with Active Teaching Strategies\*+**

Emory & Henry College, Emory, VA  
(202)-387-5200; jheckler@maa.org

June 8–12

**Mathematical Preparation of Elementary Teachers \***

Sam Houston State University, Huntsville, TX  
(409) 294-1577; mth\_mlk@shsu.edu

June 14–18

**Teaching Dynamical Systems Across the Curriculum+**

Messiah College, Grantham, PA  
(717) 766-7283; jmccaustl@messiah.edu

June 16–20

**Elementary Statistics Laboratory Workshop \***

University of South Carolina, Columbia, SC  
(803) 777-5072; spurrier@stat.sc.edu

June 21–July 3

**Cooperative Learning in Undergraduate Mathematics Education \*+**

Georgia State University, Atlanta, GA  
(404) 651-0658; jgaitner@cs.gsu.edu

June 24–26

**A Mathematical Sampler: 1699-1900+**

Ashland University, Ashland, OH  
(419)-289-5262; tdence@ashland.edu

## JULY

July

**Partnerships: Interdisciplinary Workshops and Materials \*+**

Dartmouth College, Hanover, NH  
(707) 423-6023;  
tstraley@ksu.kennesaw.edu

July 6–17

**Reconnecting Teaching Faculty to the Mathematical Sciences Enterprise \***

DIMACS, Rutgers University, Piscataway, NJ  
(732) 445-4631;  
epfoley@dimacs.rutgers.edu

July 7–11

**Chance Workshop \***

Dartmouth College, Hanover, NH  
(603) 646-3507; jlsnell@dartmouth.edu

July 12–August 1

**Representation Theory of Lie Groups**

(800) 726-4427; pcmi@math.ias.edu

July 15–18

**MAA Minicourses, Mathfest 98**

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Cooperative Learning in Undergraduate Mathematics Education

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July 16-17

**Statistical Thinking with Active Teaching Strategies\***

California Poly, San Luis Obispo, CA  
(202) 387-5200; jheckler@maa.org

July 20–31

**Institute in the History of Mathematics and its Use in Teaching \*+**

Catholic University, Washington, DC  
(202) 387-5200; jheckler@maa.org

July 19–25

**Pre-Stat \***

Appalachian State Univ., Boone, NC  
(704) 262-2362; perryilm@appstate.edu

July 26–August 1

**Pre-Stat \***

Montana State University, Bozeman, MT  
(704) 262-2362; perryilm@appstate.edu

July 27–August 8

**The Art and Science of Model Building \***

University of Montana, Missoula, MT  
(406) 243-5311; karenb@selway.umt.edu

## OCTOBER

October 8–10

**Calculus for the 21st Century \***

Inn at Grand Glaze, Osage Beach, MO  
(660) 543-8792;  
tag8792@cmsu2.cmsu.edu

\* Supported by the National Science Foundation  
+ Sponsored by the MAA or an MAA section

For additional information on these and other professional development activities for mathematics faculty, please visit the Professional Development area of MAA Online at <http://www.maa.org>.

## National Meetings

July 15–18, 1998 Mathfest 98, Toronto, Canada; Board of Governors Meeting July 14, 1998

January 13–16, 1999 82<sup>nd</sup> Annual Meeting, San Antonio, TX; Board of Governors January 12, 1999

January 19–22, 2000 83<sup>rd</sup> Annual Meeting, Washington, DC; Board of Governors January 18, 2000

January 10–13, 2001 84<sup>th</sup> Annual Meeting, New Orleans, LA; Board of Governors January 9, 2001

## Section Meetings

**Indiana** November 7, 1998, St. Mary's College, Notre Dame, IN

**Michigan** May 1–2, 1998, Western Michigan University, Kalamazoo, MI

**Pacific Northwest** June 18–20, 1998, Washington State University, Pullman, WA

**Seaway** November 6–7, 1998, Nazareth College, Rochester, NY

**Southern California** October 17, 1998, Pepperdine University, Malibu, CA



# EMPLOYMENT OPPORTUNITIES

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## DELAWARE

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### UNIVERSITY OF DELAWARE

#### Department of Mathematical Sciences

The Department of Mathematical Sciences at the University of Delaware is recruiting for an individual for a professional position as a Preparatory Math Educator. Candidates must have a Master's degree in mathematics, mathematics education or a related major with at least two years of mathematics teaching experience, preferably at the collegiate level. Knowledge of the integration of new instructional techniques and calculator technology is required.

The appointee will teach and tutor students and participate in curriculum and instructional material development. Courses to be taught include intermediate algebra, trigonometry, basic statistics, pre-calculus and calculus. There will also be some administrative duties.

The position is a full-time, 12-month appointment beginning July 1, 1998 or at an agreed date before September 1, 1998. Contracts are for one year with renewal by mutual agreement. Teaching load is approximately 16 contact hours with 6 office and 3 tutorial/testing hours. Salary is dependent upon previous experience and educational background but normally is in the range of \$31,000—\$38,000.

Please send resume, three letters of reference and transcripts to, PME Search Committee, Department of Mathematical Sciences, University of Delaware, Newark, DE 19716. To be given full consideration applications must be received by May 15, 1998.

The University of Delaware is an equal opportunity employer which encourages applications from qualified minority group members and women.

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## ILLINOIS

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### OAKTON COMMUNITY COLLEGE

#### Faculty Position - Fall 1998

Oakton Community College is seeking faculty members who are committed to the community college philosophy and to teaching and learning for a diverse student population. They should also be knowledgeable in the uses of current technology in their field and should be willing develop new approaches to teaching.

Mathematics: includes one tenure track and two one-year appointments. These faculty members will teach mathematics courses from Developmental Mathematics through Calculus and Differential Equations. Ideally at least one of the faculty members will also be qualified to teach Computer Science classes (e.g. Introductory through Data Structures).

Screening of applicants will continue until the positions are filled. Please visit <http://www.oakton.edu/news/facsrch.html> for a more descriptive listing. To request an application, please contact:

Oakton Community College  
1600 East Golf Road  
Des Plaines, IL 60016-1268  
Attn: Craig Ahmnd, Human Resources  
(847) 635-1676 fax: (847) 635-1764  
e-mail: [facsearch@oakton.edu](mailto:facsearch@oakton.edu)

Oakton Community College encourages applications from candidates with diverse backgrounds and identities. EOE.

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## NEW JERSEY

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### FELICIAN COLLEGE

#### Department of Mathematics and Computer Science

The Department of Mathematics and Computing Science invites applications for a full-time faculty position in Mathematics, starting Fall 1998. The ideal candidate will have a strong commitment to teaching undergraduate mathematics courses for majors and non-majors, to scholarship activities, and curriculum development. Felician College is a private, Catholic liberal arts college serving the educational needs of 1200 students within the greater New York/New Jersey metropolitan area. Ph.D. in Mathematics or related field required and college teaching experience preferred.

Send curriculum vita, cover letter, and names of three references to Dr. Beate A. Schlwek, Vice President and Dean for Academic Affairs, Felician College, 262 S. Main Street, Lodi, NJ 07644.

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## NEW YORK

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### ROCHESTER INSTITUTE OF TECHNOLOGY

Rochester Institute of Technology (RIT) National Technical Institute for the Deaf (NTID) Department of Science and Engineering Support Mathematics Faculty Position Applications are now being accepted for a full-time, 10 month, tenure track faculty position in the Department of Science and Engineering Support at NTID, a College of RIT.

RIT is a privately endowed educational university composed of 7 colleges with over 12,000 full and part-time students. NTID is a federally funded institution created by an Act of Congress in 1966. NTID is the largest post secondary program in the world offering mainstream higher education opportunities to the deaf and hard-of-hearing students and it has more than 1,100 students enrolled in undergraduate and graduate programs.

Nature of Position: Provides support services to deaf students taking mathematics courses in the College of Science (COS). These services include: instruction; tutoring both group and individual; classroom teaching; formal and informal advising; content evaluation of classroom notes and liaison with faculty in the COS math department and other groups.

Required Qualifications: BS in mathematics or its equivalent and MS in mathematics or statistics. Two or more years experience in college teaching or equivalent.

Preferred Qualifications: Doctoral Degree in one of the above fields. Background in theoretical mathematics; teaching experience in mathematics. Sign language skills; experience in providing support services. Ability to contribute in meaningful ways to college's commitment to cultural diversification, pluralism, and individual differences. People who are deaf or hard of hearing, with a disability, and/or members of a minority group are encouraged to apply.

Deadline: May 1, 1998 or until position is filled. Send letter of application and resume to: Dr. Rosemary Saur, Chairperson NTID/RIT Department of Science and Engineering Support 52 Lomb Memorial Drive Rochester, New York 14623-5604.

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## VIRGINIA

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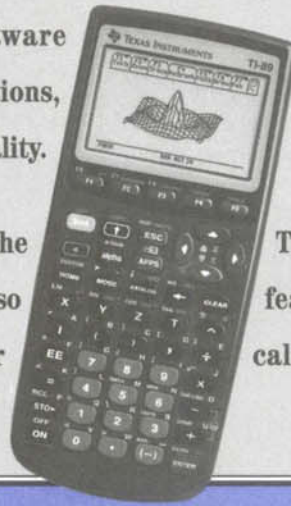
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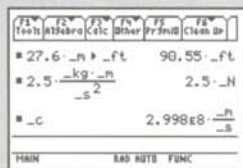


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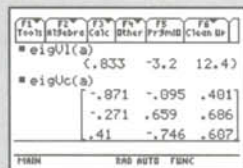
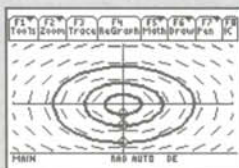
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