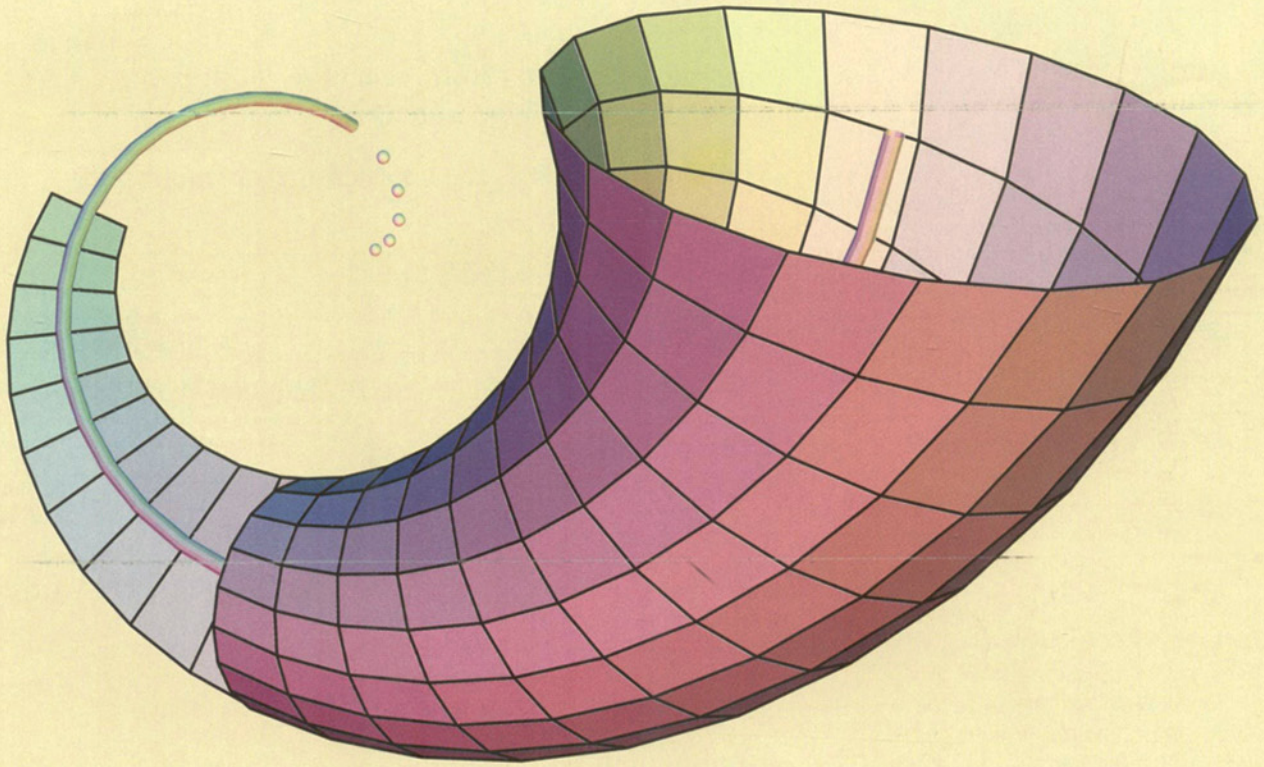
March 2000

FOCUS

THE NEWSLETTER OF THE MATHEMATICAL ASSOCIATION OF AMERICA

Math Spans All Dimensions



April 2000 is Math Awareness Month

Interactive version of the complete poster is available at:
http://mam2000.mathforum.com/

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FOCUS

March 2000

Volume 20, Number 3

In This Issue

About the Cover: This first ever four-color cover of FOCUS depicts a portion of the paper version of the poster for Math Awareness Month, April 2000. To see the "real" interactive electronic version of the poster, go to http://mam2000.mathforum.com. The concept and the design of the poster are due to Tom Banchoff of Brown University and Davide Cervone of Union College, copyright Thomas Banchoff Productions, Inc.

FOCUS Deadlines

	May/June	Aug/Sept	October
Editorial Copy	March 22	July 14	—
Display Ads	April 4	July 28	August 21
Employment Ads	March 30	July 21	August 10

"Math Spans All Dimensions" During April Math Awareness Month

"Math Spans All Dimensions" is the theme for Math Awareness Month 2000, sponsored by the Joint Policy Board for Mathematics, comprised of representatives of the MAA, the AMS, and SIAM. As in recent years, mathematics departments nationwide are being encouraged to organize a wide range of activities to focus attention on mathematics during the month of April. JPBM has been promoting mathematics in this way since 1991, when the first Math Awareness Week had "Mathematics: It's Fundamental" as its theme and highlighted applications in industry, technology, and science. Last year, the week was expanded to a month, and a web site at the Math Forum (http://www.mathforum.com/mam/past.html) provided support for and reports on the many activities organized to bring a greater awareness of the importance of mathematics to teachers and students at all levels and to the general public.

Each year one of the organizations in the JPBM takes the responsibility for the design of the MAM poster, and this year the MAA has that charge. Based on their experience with the experimental MAA electronic journal *Communications in Visual Mathematics*, MAA president Tom Banchoff and his collaborator Davide Cervone of Union College have raised the concept of a poster to a new level.

This year's Math Awareness Month poster exists in two forms. The first is a paper poster which will be distributed to mathematics and mathematical sciences departments in colleges and universities. The second (for some, this is the *real* poster) is an electronic poster that can be accessed on the web at http://www.mam2000.mathforum.com.

The central image of the poster starts as a string of zero-dimensional points, then becomes a 1-dimensional curve, then expands to a two-dimensional strip, which then expands to a 3-dimensional cornucopia. Extensions beyond the third dimension are accessible only by computer. Around the poster are clickable windows, each "inhabited" by a person whose work connects in some way to the theme of dimensionality. The people who have agreed to participate go way beyond the expected mathematicians and physicists to include an author of children's books (Madeleine L'Engle, author of *A Wrinkle in Time*), a choreographer (Julie Strandberg of Brown University), and even a cartoon character (Geri, one of the characters created by Pixar Animation, who appears in *Toy Story II*). As one might expect, Edwin A. Abbott, author of *Flatland*, gets a prominent place also.

Clicking on the images on the poster takes one to pages giving more information on the person pictured and on the mathematics involved, so that the poster itself becomes a useful beginning point for Math Awareness Month activities.

Production and distribution for the Math Awareness Month 2000 poster has received support from Wolfram Research, Inc. ■

Felix Browder Named Recipient of National Medal of Science

By Don Albers

Felix Browder, who is a University Professor at Rutgers University, has been named a recipient of a 1999 National Medal of Science. He was cited for pioneering work in nonlinear functional analysis, opening up new avenues in nonlinear problems, and for being a leader in the scientific community to broaden the range of interactions among disciplines.

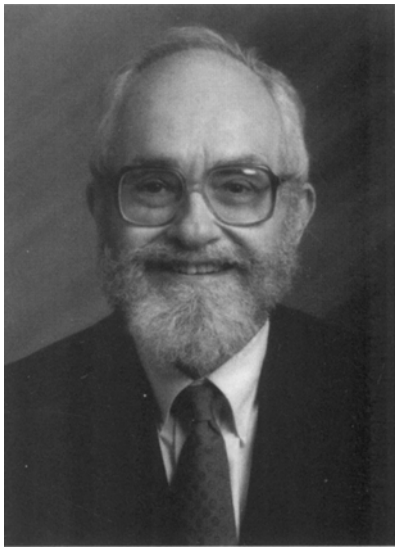
Browder, 72, is one of three brothers, all of whom are mathematicians. His younger brothers, Andrew (Andy) and William (Bill), have spent most of their careers at Brown University and Princeton University, respectively. Both Bill and Felix have served as presidents of the American Mathematical Society.

Browder was born in Moscow and came to the U.S. when he was five years old. He says that he was a bookish child and liked all subjects. He attributes his interest in mathematics to reading E.T. Bell's *Men of Mathematics* when he was in seventh grade. He describes that book as a "marvelous piece of historical fiction."

Browder earned his doctorate at the age of 20 from Princeton in 1948. Before joining Rutgers University, he spent twenty-three years at The University of Chicago, including a twelve-year stint as chair of the department.

In 1999 he became President of the American Mathematical Society. ■

Don Albers is the Associate Executive Director and Director of Publications and Electronic Services for the MAA.



Felix Browder

The Curriculum Revisited: A Proposal

By Sol Garfunkel

In a 1989 study and follow-up analysis of CBMS reports, the late Gail Young and I noted that the number of students taking mathematics courses above the level of calculus in departments of mathematical sciences had been steadily declining. We also demonstrated that a great deal of mathematics instruction at this level is taking place in departments other than mathematics. I am sure that there are many reasons for this trend, over several of which we have no control. However, there is one area in which we have almost complete control, namely the entry-level undergraduate curriculum.

The central importance of mathematics in our increasingly complex and technological world is undeniable, and the possibilities for new applications almost endless. We miss an extraordinary opportunity when we fail to convey this excitement to our students. If we were to ask students at the end of their first year of collegiate mathematics what mathematics is and how is it used, we know what we would hear. We would find out how much calculus (reformed or unreformed) they retained. We know the breadth and richness of our subject; how then do we expect students starting their studies to gain these insights and hopefully continue on in mathematics?

I argue that we need to adopt the model used by the other sciences, namely an introductory course that focuses on developing basic principles and concepts while introducing students to a broad range of subject matter. The intent is clear. For those students who stop taking mathematics after one year, they will have a stronger sense of what mathematics is about. For those who go on, they will have an appreciation for the different branches of mathematics as well as their contemporary applications. In this way, in our first course, we can be statesmen for our subject, showing its breadth, its modernity and its power. ■

Sol Garfunkel is the Executive Director of COMAP, the Consortium for Mathematics and its Applications.

Updating the NCTM Standards

By Kenneth A. Ross

The National Council of Teachers of Mathematics (NCTM) published the *Curriculum and Evaluation Standards* for School Mathematics in 1989, with follow-up documents on standards on teaching (1991) and assessment (1995). After gathering reactions from members and others, the Council made a decision early in 1996 to proceed with updating the *Standards* and targeted the year 2000 for release of the next document.

In shaping the updated document, NCTM sought the views of many different groups, especially the mathematical sciences community. One of the first outreach actions of NCTM was to request that the presidents of the Conference Board of the Mathematical Sciences appoint or designate a committee to serve as an Association Review Group (ARG) to provide input to the process. The MAA was one of the 12 professional mathematics organizations which formed an ARG and gave input throughout the process of updating. The MAA's ARG is the President's Task Force on the NCTM Standards; it has fourteen members and is chaired by Kenneth A. Ross.

Input from the ARGs began before the first word was written. As you can imagine, there were often diverse and even opposing positions. Consider, for example, the following question from the second of four rounds of questions submitted by NCTM: "How should the Standards address mathematical proof? Why?" The range of responses from various ARGs included:

- Some traditional proof-axiom should be replaced with more applied mathematics.
- Rigorous and structured proof need be experienced by only a small percentage of high school students.
- The word "proof" should be used consistently beginning grade 8. They need to see the need for airtight arguments.

Our task force's response to the second round of questions is discussed in an article in the *American Mathematical Monthly* (March 1998, volume 105, pages 252-255).

Responses received from the ARGs in 1997–98 were weighed by the writers as they produced *Principles and Standards for School Mathematics: Discussion Draft*, released in October 1998, at which time the ARGs were asked to review the draft. According to the NCTM, the ARG's reviews were central to the set of reactions NCTM solicited and received from a wide range of audiences. The feedback was synthesized into a set of key issues used both to guide the writers as they revised the document and as the focus of a review sponsored by the National Research Council. The full set of comments was also available to the writers electronically to allow easy access to the feedback on particular topics or sections.

The final *Principles and Standards for School Mathematics* document will be presented at the NCTM Annual Meeting in Chicago on April 12, 2000. According to NCTM, this document has truly been a team effort, drawing on the wisdom of the many people who contributed their input along the way. The MAA task force represented a broad cross-section of informed views within the mathematics community. Some members were highly critical of the 1989 *Standards*, some were very supportive of the 1989 *Standards*, and several were in between. Nevertheless, this group worked harmoniously and, in general, was able to provide consensus recommendations to the NCTM. The time and effort of the members of our task force was invaluable. The reports of the MAA task force can be found on MAA Online at http://www.maa.org/past/maa_nctm.html. For more information on the release of *Principles & Standards* and on how to obtain a copy (which will be free to current members of NCTM), go to http://www.nctm.org/standards2000/.

Kenneth A Ross is Professor of Mathematics at the University of Oregon and a past president of the MAA. He is chair of the MAA Coordinating Council on Meetings, of the Carus Monographs Editorial Board, and of the President's Task Force on the NCTM Standards.

A Different Pencil

Moving Our Focus from Teachers to Students

By Ed Dubinsky

Over the last decade, mathematicians have begun to pay more and more attention to how they teach and how their students do (or do not) come to understand mathematical concepts, develop the ability to make calculations, and become good problem solvers. MAA's Project NExT provides a forum for young mathematicians to ask questions and share ideas about teaching and learning. MAA's Project CLUME runs workshops and minicourses and produces written material all designed to help faculty use cooperative learning as a pedagogical strategy. Activities devoted to mathematics education are now a major part of the annual winter mathematics meetings and the summer Mathfest. Finally, our professional publications are devoting increasing space to articles about teaching and learning.

With all of this progress, I think we are ready to take a further step forward and begin to sharpen our critiques of teaching methodologies so as to move from anecdotal analysis to a more solid foundation. We should also try to refocus our attention from what we as teachers do to outcomes in terms of student learning.

The article, "What is so good about them anyway..." by Nora Franzova, in the *A Different Pencil* department of the January 2000 issue of FOCUS, is a good example that illustrates both our progress in becoming more aware of teaching issues, and some of the steps we still need to take.

We can be very grateful to Franzova for the first six paragraphs of this article. There, she points out that her objections to using technology in her classes were largely based on the unjustified assumption that what worked for her, a future mathematician, was also the right thing for her students, who will largely go in different directions. But then, in the main paragraph describing the effects of her current use of CAS (computer algebra systems), she demonstrates how difficult it is to get away from this largely teacher-centered point of view in making decisions about what to do in the classroom.

In the paragraph in question, there are 7 sentences. The word I (i.e., Franzova) appears 6 times as the subject of a sentence or phrase. We are told that the teacher becomes excited, can show, can work out, can stimulate, and can solve. All we read about the students as active participants is that they "like the idea of seeing the final answer and comparing it to the one in the back of their textbook," which is hardly a notion newly brought out by technology. The remaining three paragraphs do not tell us any more about what the author's students are doing or feeling, or, what is most important of all, learning.

As a proponent of and participant in education reform in general and the use of technology in general, I cannot reiterate often enough what I first said many years ago: in the mathematics classroom, in the last analysis, what the teacher says or does is of little or no importance; what really matters is what goes on with the students. ("A Learning Theory Approach to Calculus," in (Z. Karian, ed.) *Symbolic Computation in Undergraduate Mathematics Education*, MAA Notes, 24, pp. 48-55, 1992.)

Education reform and the use of technology are highly controversial and there is major opposition. Those of us who are convinced of the value of these innovations will not succeed in bringing our colleagues along by pointing out how wonderful we think the new methodologies are. We simply must start biting the bullet and ask the hard questions about what effects these pedagogical approaches have on students' understanding of mathematical concepts and their applications, on students' ability to perform mathematical calculations, on their attitudes towards mathematics and on the role in which mathematics plays in our students' future professional and personal lives.

One way of doing this is for college mathematics faculty in general to refocus our thinking from the teacher to the student. An excellent and highly readable article by Donald L. Finkel and G. Stephen Monk ("Teachers and Learning Groups: Dissolution of the Atlas Complex," in C. Bouton and R.Y. Garth (Eds.), *Learning in Groups*, pp. 83-97, reprinted in MAA Notes 44) makes a strong case for such a transformation and gives some first suggestions on how to carry it out.

Another way of increasing the attention we pay to what is going on with our students has to do with a development in our profession over the past decade that is parallel to the development of our interest in pedagogy. I am referring to the rapid growth of the field of Research in Undergraduate Mathematics Education (RUME). New groups more or less connected with the MAA such as the new special interest group of the MAA (SIGMAA) called the Association for Research in Undergraduate Mathematics Education (ARUME), and a Research in Undergraduate Mathematics Education Community (RUMEC) have come into being; there is a joint AMS/MAA Committee concerned with RUME and which publishes an occasional volume of research papers; reports of research are an integral part of the programs of the annual mathematics meetings; and MAA publications are beginning to include research reports as well as summaries of published research.

So I think that although there is much work to be done and a lot of progress yet to come, we can be optimistic about the future of undergraduate mathematics education. By heightening our awareness of pedagogical issues and incorporating the results of research in our thinking about what might be going on in the minds of our students, we can vastly improve the quality of our teaching. The beneficiaries of this will be our students, who will come to understand more mathematics at higher levels of profundity, and society as a whole, which will benefit from a stronger mathematical research community and a more mathematically literate general population. ■

Ed Dubinsky is Professor of Mathematics at Georgia State University. He was Second Vice-President of the MAA from January 1998 to January 2000.

Mathematics Across the Curriculum at Dartmouth

By Dorothy I. Wallace

At the front of the room the art professor is demonstrating techniques of block printing to a dozen students. On the board is a diagram of a graph of subgroups drawn by the students, indicating which of the seventeen wallpaper groups are contained in each other. The students are getting ready for their fourth assignment: printing a series of three block prints, each of which displays a symmetry group containing that of the previous one. The finished prints will take hours of work, require mathematical precision, and dazzle the eye.

A room of thirty premedical students watches as the professor connects some flexible plastic tubes to an apparatus. This class has been developing a model for changes in blood pressure due to constricting arteries. In addition to actual medical data, they are using this apparatus to test their model. Later, students will say this class "opened their eyes" to the fact that math is "more than just taking a derivative" and has many applications in real life.

Forty first year students are gathered in groups of three or four to work out a problem in vector calculus as both their math professor and their physics professor look on. They know that the physics they learned yesterday ought to inform the problem they are working on right now, and that the math they are studying today is likely to be used in tomorrow's physics class. They help each other master the material they know they will need. More of these students will be inclined to major in engineering by the end of their two quarters of intensive interdisciplinary study than when the class began, making the course a recruiting force for engineering.

A mathematics professor is explaining the basis of relativity theory to a lecture hall of a hundred and sixty liberal arts students, who sit quietly taking notes. The silence is broken by the professor of comparative literature, who demands to know why the students do not question the information they are receiving. "Do you believe him? This would never stand in one of my classes! If I said something incomprehensible, students would be all over me until I explained myself thoroughly. Why do you accept this from a scientist?" Discussion breaks out about the information we take at face value, the authority of the "expert" and the role of critical thinking as it pertains to science and mathematics.

"Pattern, Applications of Calculus in Medicine and Biology," "Integrated Mathematics and Physical Science," and "A Matter of Time" are just a few of the

Dorothy Wallace pictured with Heidi Williams, class of 2003.

26 courses developed or enhanced at Dartmouth College as part of the *Mathematics Across the Curriculum* project funded by the National Science Foundation in 1995. In addition to courses, this project sponsored the development of many materials, including an interdisciplinary text in math and physics, parts of a text on the math and biology of Lake Victoria, (intended to address the diversity of students taking math), several new modules in statistics and data analysis, and a collection of course readers in mathematics and humanities. All of these materials make interdisciplinary teaching of math more accessible to a national audience.

By 1998, the MATC project had benefited over 2,000 students at Dartmouth, directly involved 178 faculty at Dartmouth and collaborating institutions, created 78 modules, books and videos, and sponsored or cosponsored five workshops serving faculty in mathematics, literature, history, philosophy, art, art history, biology, geology, and engineering. Other institutions interested in such interdisciplinary activities might find the course syllabi and materials at (http://www.dartmouth.edu/~matc/) a useful feature.

While the cries for increased numeracy of the undergraduate population have fed the development of mandatory general education courses in "quantitative literacy" throughout the country, Dartmouth has taken a different and more difficult road, with the creation of a broad swath of courses designed to attract rather than conscript students into mathematics. This alternate path stems from a lengthy discussion of the goals of a liberal arts education. One of the best descriptions of these goals is due to Gerald Holton, historian of science, who twenty-five years ago made his case in an essay on the teaching of physics:

"Here I must explain in more detail just why I believe it to be wrong to force a nonscience student to take, as is often done to "fulfill a science requirement," simply the regular introductory specialty course given by a science department. I start from a general belief that the total orienting process of a young student in college, it seems to me, has at least five goals.

"If he or she is to emerge as an educated and sane person from our educational institutions, the student should be well on the road to recognizing which are his own talents, whatever they may be; second, he should know enough about his physical home, this universe, not to feel either overwhelmed by it or a total stranger in it; third, he should know how to be in fruitful relationship with his fellow men; fourth he should know what the past means and what the probable future may be; and fifth, he should know the difference between, and the relative functions of, his mind and his soul." ("Physics and Culture, Criteria for Curriculum Design", *Thematic Origins of Scientific Thought*, Harvard University Press, 1973).

Holton's vision of what an interdisciplinary physics course could be offers a model which Dartmouth independently pursued with respect to mathematics. The process of delineating their goals and designing their courses created consensus and camaraderie among faculty. The courses themselves fostered a new attitude toward mathematics among the students taking them. Clearly a large variety of courses would have different kinds of impact on students, some resulting in

measurable differences in mastery of the mathematics, some improving retention in science majors, some affecting the attitudes of the students toward mathematics. Independent evaluators studied the impact of the Dartmouth courses on students through subject tests, surveys and interviews with individual students. Three results stand out across all the curriculum interventions as potential guideposts to future development in any mathematics curriculum:

Students' interest in mathematics is more important than their perceived math ability in determining whether they study more mathematics. Many students who view themselves as able mathematicians forego college mathematics because they see no career utility or intellectual reward.

Real-life applications make mathematics more approachable and more interesting. Whether students' interests are pre-med, pre-engineering or pre-history, connecting mathematics to their existing interests transforms math from a "cut and dried" requirement to a relevant tool for advancing their learning.

Expanding the range of mathematics topics accessible to average college students increases their interest in mathematics. To most entering college students, calculus is upper level math. As a result, many who do not need calculus in their careers turn away from college math altogether. Students were excited by courses that offered non-calculus topics (combinatorics, number theory, group theory, probability, etc.), revealing unsuspected new worlds of mathematics to discover and enjoy.

For many students, these courses have been a source of great insight into the doing of science and math. As one of the future engineers in the Integrated Mathematics and Physical Science sequence put it: "Math and science are scary and messy and wonderful and exciting. It's no longer about right and wrong answers; there are so many more things to think about. IMPS math and science isn't cameo, homogenized topics; it's the real thing at times—headaches and all." ■

Dorothy I. Wallace is Professor of Mathematics at Dartmouth College and the Principal Investigator for the Mathematics Across the Curriculum *program.*

The National Commission on Mathematics & Science Teaching for the 21st Century Wants Input

The National Commission on Mathematics and Science Teaching for the 21st Century, chaired by former Senator and astronaut John Glenn, wants your input!

The Glenn Commission has created an interactive discussion forum site to gather ideas on ways to ensure high quality teaching in mathematics and science at all grades nationwide. Visitors to the site have the opportunity to watch presentations from Commission meetings and offer comments about what they've heard (or not heard) and what other visitors had to say.

The Commission is preparing a report for Secretary of Education Richard W. Riley in the fall of 2000 that will include a small number of recommendations and corresponding action strategies to help ensure that an adequate supply of highly skilled individuals enter and remain in the math and science teaching profession. The recommendations will also help make certain that throughout the span of a teacher's career, he or she has the opportunity to learn, generate, accumulate, and share knowledge about math and science content and teaching methods. Commission members include business and education leaders; public officials at the Federal, national, state, and local levels; and teachers of mathematics and science.

You can find the discussion forum and background information on the Glenn Commission at http://www.ed.gov/americacounts/glenn. The Commission invites you to return regularly to this site as new material is posted for comment.

ARUME is the First SIGMAA

As reported recently in FOCUS, the MAA has approved the creation of special interest groups (known as SIGMAAs) within the Association. The first such group to be established and approved is ARUME, the Association for Research in Undergraduate Mathematics Education.

At the January Joint Mathematics Meetings, a SIGMAA Reception was held, and ARUME was welcomed as the first SIGMAA by MAA president Tom Banchoff. The ARUME Coordinator for 2000 is Annie Selden, who can be reached by email at aselden@asu.edu. Queries about membership should go to ARUME Secretary/Treasurer David Meel at meel@bgnet.bgsu.edu.

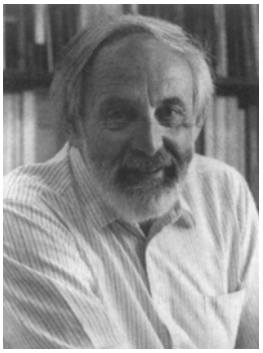
Prior to its business meeting, ARUME sponsored a talk by Hyman Bass and Deborah Ball entitled "Making Believe: The Collective Construction of Public Mathematical Knowledge." It illustrated an interesting parallel between mathematicians discussing a problem on a listserv and coming to resolve different assumptions about it and Deborah Ball's third grade class trying to decide whether zero was an even number and having to deal with two different views (or working definitions) of "even."

ARUME will sponsor the Fifth Annual Conference on Research in Mathematics Education, to be held in Chicago on September 21–24, 2000. Visit the conference web page at http://galois.oxy.edu/mickey/rume2000.html for more information on the conference.

Information on SIGMAAs in general, including the procedures for establishing a SIGMAA and a model charter, is available on MAA Online at http://www.maa.org/features/SIGMAAs/sigmaa.html. ■

Raoul Bott and Jean-Pierre Serre Share the Wolf Prize

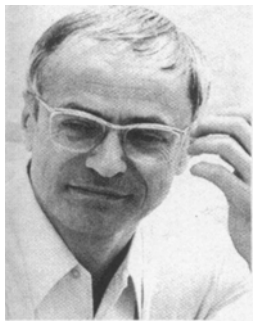
The Wolf Foundation has announced that Raoul Bott of Harvard University and Jean-Pierre Serre of the College de France will share the $100,000 Wolf Prize in Mathematics for 2000. The prize will be awarded next May in Jerusalem.



Raoul Bott

Raoul Bott was recognized for his "deep discoveries in topology and differential geometry and their applications to Lie groups, differential operators, and mathematical physics." Bott holds an Engineering degree from McGill University in Canada and a Ph.D. in Science from the Carnegie Institute of Technology in Pittsburgh. He has been a member of the Harvard Mathematics department since 1959. His more recent work has centered in the connections between differential geometry and theoretical physics which have emerged in recent decades, especially in string theory.

Jean-Pierre Serre was recognized for his "many fundamental contributions to topology, algebraic geometry, algebra and number theory, and for his inspirational lectures and writing." Serre holds degrees from the Ecole Normale Superieure and the Sorbonne. His work runs through a wide range of subjects, including algebraic topology, algebraic geometry, group theory, and number theory. He is known as an inspired and inspiring lecturer, and his books are legendary for their clarity and precision. Through lectures, courses, and books, he has left a significant mark on the mathematics of the second half of the twentieth century.



Jean-Pierre Serre

The list of recent Wolf Prize Laureates in Mathematics includes Robert Langlands, Andrew Wiles, Yakov G. Sinai, Elias M. Stein, Joseph B. Keller, and Laszlo Lovasz. For more on the Wolf Foundation and the Wolf Prize, visit the Foundation web site at http://www.aquanet.co.il/wolf/. ■

Photograph of Raoul Bott courtesy of Jane Reed/Harvard University.

Short Course on Error-Correcting Codes at the Los Angeles Mathfest

Vera Pless of the University of Illinois at Chicago and William C. Huffman of Loyola University of Chicago will offer a short course on Error-Correcting Codes at the Los Angeles Mathfest, to be held on August 3 to 5, 2000. A description of the course is given below. Check the next issue of FOCUS for the full Mathfest program and information on how to sign up.

Error-Correcting Codes
Vera Pless and William C. Huffman

The practical origins of coding are in the reliable transmission of digitally encoded information. This is the motivation for the study of error-correcting codes. Linear codes will be defined and many examples given detailing various encoding and decoding procedures. A very useful theorem on weight distributions will be given. Promising classes of codes, such as cyclic codes and self-dual codes, will be explored, as will famous codes from these classes such as the Golay codes. Well-known algebraic structures give practical information needed to use these codes. Very good codes often "hold" very good combinatorial designs. Relations with combinatorial designs can be used to decode the code. Error-correcting codes provide the high fidelity in compact disc recordings. They are also the means whereby information can be transmitted from outer space to earth. A panel will examine some of these achievements and possible difficulties. ■

Read This!

Recently Reviewed on MAA Online

The MAA Online book review column is still going strong. The latest reviews are featured at the main Read This! page at http://www.maa.org/reviews/reviews.html.

Recently reviewed books include:

Euclid: the Creation of Mathematics, by Benno Artmann

Geometry Civilized: History, Culture, and Technique, by J. L. Heilbron

Surfing Through Hyperspace, by Clifford A. Pickover

The Shaping of Deduction in Greek Mathematics, by Reviel Netz

Mathematical Expeditions, by Reinhard Laubenbacher and David Pengelley

The Nothing That Is, by Robert Kaplan

The Teaching Gap, James W. Stigler and James Hiebert

Assessment Practices in Undergraduate Mathematics, ed. by Bonnie Gold, Sandra Keith, and William Marion

Starting Our Careers, ed. by Curtis D. Bennett and Annalisa Crannell

Cinderella: the Interactive Geometry Software, by Jürgen Richter Gebert and Ulrich H. Kortenkamp

The Magical Maze, by Ian Stewart

Math Trek: Adventures in the MathZone, by Ivars Peterson and Nancy Henderson

Statistics and Society, ed. by Daniel Dorling and Stephen Simpson

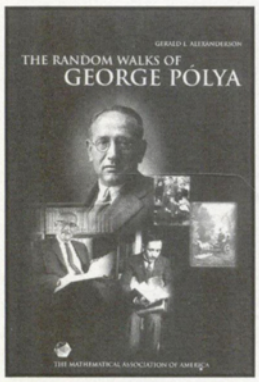
Imaginary Numbers, ed. by William Frucht

Proof, Logic, and Conjecture: the Mathematician's Toolbox, by Robert S. Wolf

Real Analysis: A Historical Approach, by Saul Stahl ■

The Mathematical Association of America

Three of the latest from MAA Publications!



The Random Walks of George Pólya

Gerald L. Alexanderson

George Pólya enjoyed the esteem of the mathematical community not only for his deep and influential contributions in a variety of mathematical fields, but also for his groundbreaking work in the teaching of mathematics. His standing in the latter area could rest solely on his having written one of the most widely read books in mathematics, the still-popular *How to Solve It*. In addition to his championing problem-solving, he contributed to mathematics important results in complex and real analysis, inequalitites, mathematical physics, combinatorics, probability theory, number theory, and geometry. He coined the phrases "random walk" and "central limit theorem" and gave to mathematics the Pólya Enumeration Theorem, along with many other ideas used widely today. The present work describes how such versatility came about and, along the way, tells some enlightening stories about mathematics and mathematicians.

Paperbound Edition:
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Casebound Edition:
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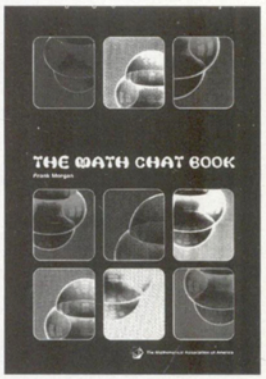
List Price: $41.95 Member Price: $32.95

The Math Chat Book

Frank Morgan



This book shows that mathematics can be fun for everyone. It grew out of Frank Morgan's live, call-in *Math Chat* TV show and biweekly *Math Chat* column in The Christian Science Monitor. The questions, comments, and even the answers come largely from the callers and readers themselves. This book makes no attempt to fit any mold. Although written by a research mathematician, it goes where the callers and readers take it, over a wide range of topics and levels. Almost anyone paging through it will find something of interest. Why does the new year start earlier in Europe? Why is the Fourth of July on a different day of the week each year? How can you be elected President with just 22% of the vote? Can a computer have free will? Didn't some kid find a mistake on the SATs? Do airplanes get lighter as passengers eat lunch?

Catalog Code: MCH
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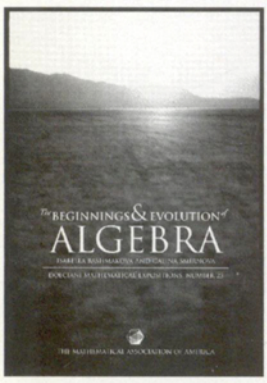

The Beginnings and Evolution of Algebra

Isabella Bashmakova and Galina Smirnova

There is hardly a branch of mathematics whose evolution has undergone as many surprising metamorphoses as has algebra, and these metamorphoses are described by the authors with vividness and clarity. The special merit of the book is that it corrects the widespread view that up to the 1830s the mainspring of the development of algebra was the investigation and solution of determinate algebraic equations, and especially their solution by radicals. The authors show that this viewpoint is one-sided and gives a distorted view of of its evolution. Specifically, they show that the role of indeterminate equations in the evolution of algebra was no less important than that of determinate equations.

Catalog Code: Dol-23
196 pp., Paperbound, 2000
ISBN- 0-88385-329-9
List Price: $24.95 Member Price: $19.95

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Undergraduate Poster Session a Success

A record 65 posters were presented on Friday January 21 at the Undergraduate Student Poster Session sponsored by the MAA CUPM Subcommittee on Undergraduate Research in conjunction with the Joint Mathematics Meetings in Washington, DC. One hundred and sixteen students were there to present their posters, whose content and quality demonstrated that undergraduate research is flourishing.

The evaluation of the posters was handled by 35 judges who worked with dedication for about 2 hours. Each poster was evaluated by three judges and each judge was given no more than six posters. To achieve a more reliable ranking posters were assigned so that the same three judges would not evaluate two or more different posters. Fifteen $100 prizes, offered by the MAA, the American Mathematical Society, the Council on Undergraduate Research, and by an anonymous MAA supporter, were awarded to the best posters. The full list of winners is given below.

The success of the session was beyond everybody's expectations. The organizer, Mario Martelli, received numerous favorable comments on the professionalism, enthusiasm, and knowledge of the presenters. Many judges told Mario that they did not expect to find the posters' content so interesting and challenging. "Students, judges and visitors had a great time," said Mario. "The students presenting were such a bunch of marvelous kids that we can safely say the future of mathematics is in great hands!" ■

Best Undergraduate Research Posters at the January 2000 Joint Mathematics Meetings

Spanning Tree Edge Densities, Michael Ferrara (Stevens Institute of Technology)

Tranversality (sufficient) conditions for bifurcation: a geometric viewpoint, Gary Mikaelian and Susanne Sindi (California State University Fullerton)

On the analytic geometry of the traveling salesman problem, Kathleen Bellino and Rekha Narashiman (James Madison University; Arizona State University)

Triangle Iterations and Algebraic Numbers, Matthew Lepinski, Alexander Diesl, Tegan Cheslack-Postava, and Adam Schyler (Rose-Hulman Institute of Technology; Williams College; Williams College; Williams College)

Dynamics of a ball bouncing on nonlinear curves, Daniel Mathews, Gary Mikaelian and Suzanne Sindi (California State University Fullerton)

Number Theoretic Balls in Boxes, Jayadev Athreya and Lukasz M. Fidkowski (Iowa State University; Harvard University)

Probability of False Prostate Cancer Diagnosis Using a Logistic Function Given Age and f/t PSA Ratio, Aldo Crossa, Brisa N. Sanchez, Johnny Guzman, and Andie Hodge (Wittenberg University; University of Texas, El Paso; California State University, Long Beach; University of the Virgin Islands)

The traveling salesman and a tale of four cities, Melissa Desjarlais (Alma College)

The Trials and Triangulations of a Zero-Divisor Graph, Andrea Frazier (Illinois College)

Reve's puzzle, Danielle Arett (Augsburg College)

Bi-symmetric invariants, Emily Puente, Monica Castro-Simmons, and Thomas Jose Castillo (Wellesley College; University of Puerto Rico-Humacao; Harvard University)

On the Sato-Tate conjecture for genus two curves, Nikolai Roussanov and Carleton Bosley (Harvard University)

Graphs with (Edge) Disjoint Links in Every Spatial Embedding, Katherine Sharrow, Jennifer Hespen, Trent Lalonde, and Nathan Thomas (University of Kentucky, Lexington; SUNY Postdam; Clarkson University; Clarkson University)

Modeling Pollution Dispersion in Large Complex Spaces, Jeffrey Housman (Sonoma State University)

The Growth of Generalized Diagonals in a Polygonal Billiard, Noah Salvaterra and Brian Wickman (Pennsylvania State University) ■

Call For Papers

Thirteenth Annual MAA Undergraduate Student Paper Sessions

Student papers have been a traditional part of the program for the MAA summer meeting, and this year is no exception. The Thirteenth MAA Undergraduate Student Paper Sessions will take place at the MAA Mathfest 2000 in Los Angeles, CA, August 3 to 5, 2000.

Partial support for travel by students presenting papers will be available on a limited basis. Complete details on submission procedures and applications for travel support will be published in the April issue of FOCUS. This information will also be available on the MAA home page at http://www.maa.org/students/students_index.html.

Students are advised to begin making plans now regarding participation. The deadline for student paper submissions is Friday, June 30, 2000.

Please direct all inquiries to Dr. Charles Diminnie via email at charles.diminnie@angelo.edu or by phone at (915) 942-2317 ext 238. ■

The Anneli Lax New Mathematical Library

By Don Albers

Anneli Lax, the young founding editor of the NML.

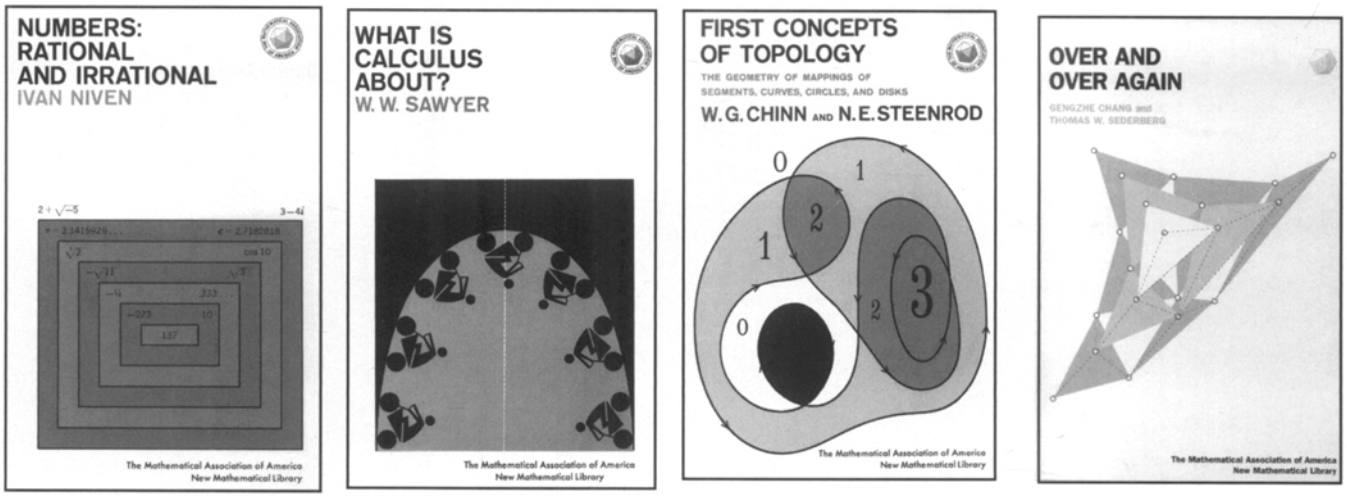
For thirty-eight years, until her death in 1999, Professor Anneli Lax served as Editor of the New Mathematical Library (NML), one of the corner stones of the MAA's publications program. In 1958, Edward G. Begle, head of the School Mathematics Study Group, (SMSG), appointed a special panel of twelve people to produce a series of short expository books for high school students on various topics not usually covered in the high school curriculum. Richard Courant, Lax's dissertation advisor, became aware of her editorial skills while she was working on her doctorate at New York University. She claimed that Courant hired her for editorial tasks because "I seemed more literate than most people. In the fifties, according to Lax, publishers didn't have people who could do mathematical copy editing or anything like that, so I ended up doing everything [editing, copy editing, layout, cover design]! The layout was fun; it was like playing with paper dolls."

Acquisition of good material is vital to the success of any publishing program, and Anneli had something of a Midas touch when it came to attracting mathematics manuscripts. The first of her acquisitions, *Numbers: Rational and Irrational* by Ivan Niven, was published in 1961 and is in its fourteenth printing. Her second, *What is Calculus About* by W.W. Sawyer, also published in 1961, is in its eighteenth printing. Her list of authors was remarkably strong–Beckenbach, Bellman, Chinn, Coxeter, Davis, Greitzer, Klamkin, Niven, Ore, Pólya, Sawyer, Steenrod, and Yaglom to name a few.

When asked about her editorial accomplishments, she modestly responded: "I think it had to do with my being very slow when I read. I don't instantly get the gist of it. I have to understand every darn little step, which slows me down terribly and which is one of the reasons that I never learned very much, but it is good for checking errors and making sure everything is okay."

During her thirty-eight years as Editor of the NML, she brought thirty-nine volumes to publications–a truly remarkable achievement! It is easily argued that the NML is Anneli's series, and it serves as an enduring monument to her contributions to quality mathematics exposition. In recognition of her great work on the NML, in October of 1999 the New Mathematical Library was renamed the Anneli Lax New Mathematical Library. ■

Don Albers is the Associate Executive Director and Director of Publications and Electronic Services for the MAA.



Some of the volumes in The Anneli Lax New Mathematical Library from her first to her last.

Short Takes

Seventh Annual Hudson River Undergraduate Mathematics Conference

The seventh annual Hudson River Undergraduate Mathematics Conference will be held on April 8, 2000, at Vassar College in Poughkeepsie, NY. The conference includes presentations on mathematics by both faculty and students. Conference sessions are designed so that some presentations are accessible to undergraduates in their first years of study, and others are accessible to third or fourth year undergraduate mathematics majors. Additionally, Peter Hilton will give a presentation on some generalizations of the Chinese Remainder Theorem.

You can find out more about HRUMC by visiting the conference web site at http://www.skidmore.edu/academics/mcs/hrumc.htm.

Michigan Section Chooses Top Ten

The Michigan Section of the MAA recently polled its members to determine the top ten mathematical achievements of the twentieth century. About thirty different events, ranging from "Lebesgue's Dissertation" to "Development of Linear Programming", were nominated, and ballots were distributed asking members to rank their top five choices. Here are the Michigan Top Ten:

1. The Development of the Digital Computer
2. Gödel's Incompleteness Proof
3. Einstein's Relativity Theory
4. Proof of Fermat's Last Theorem (Wiles)
5. Hilbert's Talk at the 1900 Congress
6. Classification of Finite Simple Groups
7. Development of Linear Programming (Dantzig)
8. Mathematization of Quantum Mechanics (Von Neumann)
9. The Development of Fractal Geometry (Mandelbrot)
10. Applications of Mathematics to Cryptology.

The results of the Michigan Section's Top Ten vote can also be found online, at http://www.cst.cmich.edu/units/mth/ttm2k/topten.htm. Perhaps other MAA sections will want to produce their own lists!

International Conference on Technology in Education

An International Conference on Technology in Mathematics Education will be held on July 5–7, 2000, at the Lebanese-American University in Beirut, Lebanon. The conference organizers hope that it will provide an opportunity for educators to share thoughts and experiences, and also that it will allow extensive contact between educators from the developed nations and those from developing countries, particularly the Middle East. Invited speakers include Deborah Hughes Hallett from the USA, Celia Hoyles from the UK, Bernard Winkelmann from Germany, and Peter Jones from Australia. Visit the conference web site at http://www.lau.edu.lb/news-events/conferences/ictme/main-index.html for more information.

New Officers of the Association

The year 2000 brings several changes in the leadership of the MAA. Marcia Sward stepped down as Executive Director, the two MAA vice-presidents (Anita Solow and Ed Dubinsky) concluded their terms, and Gerald Alexanderson left the Executive Committee after having been a member (in various capacities) for 17 years. Tina Straley became Executive Director at the beginning of the year. Barbara L. Osofsky, First Vice-President, Frank Morgan, Second Vice-President, and Ann E. Watkins, President-Elect, took office at the end of the Joint Meetings and will now be members of the Executive Commitee.

Who's NExT?

Project NExT, which stands for New Experiences in Teaching, is one of the most successful programs of the MAA. It is a great way for new members of the mathematics profession to explore new ideas in teaching, develop connections with other mathematics professors, learn more about the mathematical community, and generally acquire valuable tools for their professional life. Applications for this year are due on April 14. More information and application materials are available at the Project NExT web site at http://archives.math.utk.edu/projnext/, or contact T. Christine Stevens, Dept. of Mathematics and Mathematical Computer Science, Saint Louis University, 221 North Grand Blvd., St. Louis, MO 63103 [Email: stevensc@slu.edu; Phone: 314-977-2436].

CUPM Curriculum Initiative Gets National Attention

As FOCUS readers know, the MAA's Committee on the Undergraduate Mathematics Program (CUPM) is undertaking an ambitious plan to study the mathematics curriculum and come up with recommendations for what and how we should teach our students. CUPM has been collecting ideas and opinions from a wide range of professors, in and out of mathematics, and their efforts have been highlighted in an article in the *Chronicle of Higher Education* (January 7, 2000, page A14). Describing the curriculum review as "what will likely be the greatest change in mathematics since calculus reform in the early 1990s," the *Chronicle* includes quotes from Tom Berger, chair of CUPM, and cites the United States Military Academy at West Point as one of the leaders in this area. The article notes that the mathematical community is still far from consensus on the curriculum, and CUPM is working on giving everyone a chance to share ideas and comments (for example, see Sol Garfunkel's article in this issue). Send your comments on the mathematics curriculum to CUPM by email at cupm-curric@maa.org.

Bylaws Change

With only one dissenting vote, the bylaws change announced in the December issue of FOCUS and on MAA Online was approved at the Business Meeting of the Association held at the January Joint Meetings. As a result, the MAA no longer has a Finance Committee. Functions formerly performed by the Finance Committee will now be the responsability of the Executive Committee. For the details, check the changes at http://www.maa.org/aboutmaa/bylaws99.html.

Teacher Shortages Cause Concern

Extensive media reports and op-ed pieces have highlighted the current acute shortage of mathematics and science teachers at the high school level. Responses have ranged from emergency measures, such as the granting of extra work visas to allow foreign teachers to come to the United States, to plans for systemic

change. These range from attempts to simplify the certification process to proposals that would offer special rewards to young people going into the teaching profession. Despite the shortage and the occasional bidding wars it has engendered, teacher salaries still lag behind those of people with comparable training in other professions, which may account for part of the problem.

Marcia Sward is Executive Director Emerita

At the Joint Mathematics Meetings in Washington, DC, the MAA Board of Governors named Marcia Sward "Executive Director Emerita." As the Executive Director of the MAA from 1989 to 1999, Sward has played a fundamental role in the life of the Association for many years.

At the Business Meeting, Sward received a Certificate of Appreciation for her great contributions to the MAA. In response, she thanked the Association and said that she had been "blessed with good work to do and good people with whom to do it."

Later that day, the Marcia Sward Lobby at the MAA building was dedicated. Among the renovations for the Sward Lobby was the installation of a tiling designed by Marjorie Rice and Doris Schattschneider (check MAA Online for more information about the tiling). A banquet in Sward's honor was the closing event of the Joint Mathematics Meetings.

Intel and Microsoft To Launch Major Training Program For Teachers

Two giants of American technology, Intel and Microsoft, are funding a three-year "Teach to the Future" program to train 400,000 teachers to use educational technology in the classroom. Intel will spend $100 million and Microsoft will donate 400,000 copies of its Encarta 2000 encyclopedia and Office 2000 Professional software for what is believed to be the largest private effort to spur the use of technology in education.

In the U.S., an estimated 100,000 teachers will be encouraged to participate in the program. "Master teachers" will be chosen for training in each school district. These teachers will then train their colleagues. Each master trainer will receive a laptop computer when they sign up for the 10 four-hour training sessions.

Intel's announcement can be found on the web at http://www.intel.com/pressroom/archive/releases/ed012000.htm. ■

Secretary Riley Responds to Open Letter

Early in January, Secretary of Education Richard Riley responded to the open letter from several mathematicians objecting to the findings of the Expert Panel that chose "exemplary" and "promising" school mathematics programs. Riley expressed appreciation for the interest the signers of the letter showed in mathematics education, and argued that it was important to find areas where all of the participants in the debate were in agreement. For example, he said, all agree that "the very best mathematics programs must include mastery of basic skills and the use of those skills in solving complex problems." Another area of agreement, he argued, is that children must learn both the "traditional basics" and "the basics of a new information age", which include "communicating mathematical ideas, applying mathematics in real-world settings, and problem solving."

Riley then discussed the panel's findings more specifically, acknowledging that this is an area of disagreement, but arguing that the findings should be taken seriously because the panel required programs to demonstrate measurable improvement in students' learning. "Undoubtedly," he went on to say, "there are other materials that can or will demonstrate achievement gains in both basic skills and problem solving. If you or others cosigning the letter have such materials or programs, we welcome their submission in the next round." The panel will review science programs this year, then review mathematics programs again in 2001.

Finally, Riley addressed the issue of the lack of representation of research mathematicians on the panel, conceding that "additional representation of research mathematicians knowledgeable about K-12 mathematics education would strengthen panel deliberations."

The full text of Secretary Riley's letter can be seen at the Department of Education web site, at http://www.ed.gov/News/Letters/000106.html. ■

Employment Opportunities

CALIFORNIA

SAN DIEGO MESA COLLEGE
Assistant Professor, Mathematics

The San Diego Community College District is currently accepting applicationsfor an Assistant Professor, Mathematics position for a full-time assignment beginning Fall, 2000. The Assistant Professor, Mathematics will be expected to teach programming in a higher level language and courses ranging from pre-algebra through linear algebra and differential equations. Also, the applicant must possess the ability to integrate the computer and other technology as teaching and learning aids. Successful candidates must possess a Master's degree in Mathematics or Applied Mathematics; OR, a Bachelor's degree in Mathematics or Applied Mathematics AND a Master's Degree in Statistics, Physics, or Mathematics Education. Salary range for this tenure-track position is $3,428–$5,149 per month and includes an excellent benefits package. To obtain the required District application, please contact the San Diego Community College District, Employment Office, 3375 Camino del Rio South, Room 330, San Diego, CA 92108, (619) 584-6579,1-800-648-4023 (if outside California). Internet Website: http://www.sdccd.cc.ca.us/jobs. Filing Deadline—April 13, 2000. AA/EOE.

Employment continued on page 14.

INDIANA

DEPAUW UNIVERSITY

The Department of Mathematics at DePauw University invites applications for a two-year term appointment starting in the fall of 2000. Duties include teaching three undergraduate courses (twelve contact hours per week) each semester and winter term. Ph.D. preferred, master's required. DePauw is a private liberal arts college with 2200 students located forty-five miles west of Indianapolis.

Applicants should send vita, statement of professional goals and teaching philosophy, and three letters of recommendation to Underwood Dudley, Mathematics Department, DePauw University, Greencastle, IN 46135. E-mail: dudley@depauw.edu; phone: 765-658-4488; fax: 765-658-4732. Review of applications will begin March 15 and continue until the position is filled. More information about DePauw can be found at its website, www.depauw.edu. DePauw University is an equal opportunity, affirmative action employer. Women and minority candidates are encouraged to apply.

KANSAS

TABOR COLLEGE
Mathematical Sciences Department
Hillsboro, KS 67063-1799

Tenure-track faculty position in computer science/mathematics starting fall 2000; prefer Ph.D. in computer science with a strong background in mathematics but will consider Ph.D. in mathematics with a strong background in computer science. Successful candidate must be committed to excellence; will teach (and develop) mathematics and computer science courses, direct undergraduate research, sustain professional growth, and support the mission and goals of a Christian liberal arts college. Further information: www.tabor.edu, or Professor Frank Brenneman at frankb@tabor.edu or 316.947.3121. Tabor is an AA/EOE and welcomes applications from women and minority candidates. All applications: Dr. Lon Fendall, Dean of the Faculty.

MASSACHUSETTS

WILLIAMS COLLEGE
Department of Mathematics
Williamstown, Massachusetts 01267

Anticipated tenure-track position in mathematics, pending administrative approval, beginning fall 2000, probably at the rank of assistant professor. In exceptional cases, however, more advanced appointments may be considered. Excellence in teaching and research and a Ph.D. are required.

Please have a vita and three letters of recommendation on teaching and research sent to the Hiring Committee. Evaluation of applications will begin on or after December 6. As an EEO/AA employer, Williams especially welcomes applications from women and minority candidates.

WILLIAMS COLLEGE
Department of Mathematics
Williamstown, Massachusetts 01267

Tentative full-time visiting position in mathematics for the 2000-2001 year, probably at the rank of assistant professor; in exceptional cases, however, more advanced appointments may be considered. Excellence in teaching and research, and Ph.D. required.

Please have a vita and three letters of recommendation on teaching and research sent to Visitor Hiring Committee. Evaluation of applications will begin on or after January 15 and continue until the position is filled. As an EEO/AA employer, Williams especially welcomes applications from women and minority candidates.

NORTH CAROLINA

METHODIST COLLEGE
Mathematics Instructor

Methodist College, an Equal-Opportunity employer, welcomes applications for a full-time position in Mathematics, starting in August 2000 at the beginning of the 2000-01 academic year. A Masters Degree in Mathematics is required and a Ph.D. in Mathematics is preferred. Teaching responsibilities include introductory mathematics courses with possibility of upper division course in area of specialization. Methodist College, in harmony with its tradition, takes seriously the ethical and moral development of students. Members of populations traditionally underrepresented in higher education are encouraged to apply. Send a letter of application including a statement of professional goals and teaching philosophy, full resume, three letters of reference, and graduate transcripts to : Dr. Shivappa Palled, Head, Department of Mathematics and Computer Science, Methodist College, 5400 Ramsey Street, Fayetteville, NC 28311-1420, (910) 630-7133/7125. Deadline for submissions is March 13, 2000.

WAKE FOREST UNIVERSITY

Applications are invited for two positions in mathematics at the Visiting Assistant Professor level beginning August 2000. A Ph.D. in mathematics or equivalent is required. The sole duty is to teach three sections of mathematics each semester during the nine month academic year. Send letter of application and curriculum vitae to Richard Carmichael, Department of Mathematics and Computer Science, Wake Forest University, Box 7388, Winston-Salem, NC 27109.

OHIO

OBERLIN COLLEGE

Oberlin College has a full-time, continuing position beginning with the academic year 2000-2001. Responsibilities include teaching undergraduate courses in mathematics (5/year), supervising honors students, and sustained scholarly production. A Ph.D. degree (in hand or expected by August 31, 2000) is required. Preference will be given to candidates who are interested in and experienced with applied mathematics (all specialties considered except statistics and operations research). Candidates must demonstrate potential excellence in teaching. Send a letter of application, curriculum vitae, academic transcripts (graduate and undergraduate, unofficial transcript are acceptable initially), and 3 letters of reference to Michael Henle, Department of Mathematics, Oberlin College, Oberlin OH 44074 by February 15, 2000. Oberlin College admitted women since its founding in 1833 and has historically been a leader in the education of African-Americans. AA/EOE.

PENNSYLVANIA

CEDAR CREST COLLEGE
Faculty Position in Mathematics

Applications are invited for a tenure-track position at the Assistant Professor rank commencing no later than August 1, 2000. Cedar Crest is a small, liberal arts college for women located on a beautiful park-like campus in Allentown, Pennsylvania, a medium-sized city within two hours of New York City and Philadelphia. The college offers B.S. and B.A. degrees in mathematics and Pennsylvania teaching certification in secondary mathematics. This faculty member will teach mathematics courses for majors, but will also be expected to teach a broad range of service courses in mathematics for science, humanities and arts students, with a teaching load of 12 credit hours per semester. Minimum qualifications: Ph.D. in mathematics or applied mathematics, promise of excellence in teaching at the undergraduate level, a desire to mentor mathematics and mathematics education students, and a commitment to continued research. The successful candidate must be able to demonstrate not only mathematical expertise but also an ability to communicate mathematics clearly and effectively to undergraduate students. Applicants should send a letter of intent, a curriculum vita and three letters of reference to Marie E. Wilde, Mathematics Search Committee, Cedar Crest College, 100 College Drive, Allentown, PA 18104. Questions should be directed to mewilde @cedarcrest.edu. Applications should be received by April 1, 2000 to receive full consideration.

LA SALLE UNIVERSITY
Philadelphia, Pennsylvania
Department of Mathematics and Computer Science
Tenure-track Mathematics Positions

La Salle University invites applications for a tenure-track Mathematics position effective Fall, 2000. La Salle is a Roman Catholic institution of higher Education in the tradition of the De La Salle Christian Brothers. The university strives to offer, through effective teaching, quality education founded on the idea that intellectual and spiritual development go hand in hand mutually complementing and fulfilling one another. Candidates should hold the Ph.D. in Mathematics or Applied Mathematics. The duties of the positions are those typically associated with a faculty position including teaching twelve hours each semester, undergraduate advising, and committee assignments.

Please submit a curriculum vita and three letters of recommendation (with at least one addressing the applicant's teaching experience) to Linda J. Elliott, Chair, Department of Mathematics and Computer Science, La Salle University, 1900 West Olney Avenue, Box 258, Philadelphia, PA 19141-1199 (elliott@lasalle.edu). Review of applications will begin immediately and continue until the positions are filled.

La Salle University is an Equal Opportunity, Affirmative Action employer.

SECTION MEETINGS

Allegheny Mountain April 7–8, 2000 South Campus, Community College of Allegheny College, Pittsburgh, PA

Eastern PA & Delaware April 8, 2000 Messiah College, Grantham, PA

Florida March 3-4, 2000 University of South Florida, Tampa, FL

Illinois March 30-April 1, 2000 North Central College, Naperville, IL

Indiana Spring 2000 Earlham College, Richmond, IN

Intermountain March 24–25, 2000 Southern Utah University, Cedar City, UT

Iowa April 14-15, 2000 Simpson College, Indianola, IA

Kansas March 31–April 1, 2000 Baker University, Baldwin City, KS

Kentucky March 31 - April 1, 2000 Eastern Kentucky University, Richmond, KY

MD-DC-VA April 28–29, 2000 Bowie State University, Bowie, MD

Metro New York May 7, 2000 Bronx Community College, NY

Michigan May 5-6, 2000 Central Michigan University, Mt. Pleasant, MI

Missouri April 14-15, 2000 Central Missouri State University, Warrensburg, MO

Nebraska-Southeast South Dakota April 28–29, 2000 Nebraska Wesleyan, Lincoln, NE

New Jersey April 8, 2000 Georgian Court College, Lakewood, NJ

North Central March 31–April 1, 2000 Duluth Convention Center, Duluth, MN

Northeastern June 16-17, 2000 St. Paul's School, Concord, NH

Ohio April 7–8, 2000 Marshall University, Huntington, WV

Oklahoma-Arkansas March 31-April 1, 2000 Arkansas Tech University, Russellville, AR

Pacific-Northwest June 15-17, 2000, University of British Columbia, Vancouver, BC, Canada

Rocky Mountain April 7-8, 2000 Colorado State University, Ft. Collins, CO

Seaway April 14–15, 2000 SUNY Oswego, Oswego, NY

Southeastern March 10-11, 2000 UNC-Charlotte, Charlotte, NC

Southern California March 4, 2000 University of California, Los Angeles

Southwestern April 7-8, 2000 Arizona State University, Tempe, AZ

Texas April 6-8, 2000 University of Texas at Austin, Austin, TX

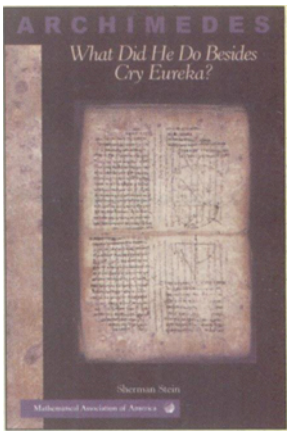
Wisconsin April 14–15, 2000 University of Wisconsin-Superior, Superior, WI

From the MAA... CALL 1-800-331-1622

Archimedes What Did He Do Besides Cry Eureka?

Sherman Stein

Series: Classroom Resource Materials



Using only high school-level mathematics, Stein presents an accessible account of Archimedes' accomplishments. He discusses the life of Archimedes, the discovery of Archimedes' manuscript in 1906, and Archimedes' methods for figuring out the law of the lever, center of gravity, the parabola, floating bodies, the spiral, the sphere, and pi. Helpful information is appended, including a discussion of Archimedes' system of notation.

—Booknews

This book has only one purpose: To make the discoveries of Archimedes easily accessible to a wide audience, from anyone with a background in high school algebra to a busy practicing mathematician.

Many people have heard of two things about Archimedes; He was the greatest mathematician of antiquity and he ran naked from his bath crying: "Eureka, eureka." Few of us, layperson or mathematician are familiar with the accomplishments on which his reputation rests. This book answers the questions by describing in detail his astonishing accomplishments: how he developed the theory of the lever and the center of gravity; how he used the center of gravity to study whether a floating object would tip over; how he summed a geometric series and the squares; and how he found the volume and surface area of a sphere. His ability to do so much with the few tools at his disposal is astonishing. He was like a one-person Institute of Advanced Study, making fundamental discoveries in the fields of geometry, mechanics and hydrostatics.

The exposition is leisurely and supported by some 120 illustrations. Any reader who is aware that the graph of $y = x^2$ is a parabola can follow all the reasoning. Although the book uses only high school mathematics, professional mathematicians will find much here of interest as well.

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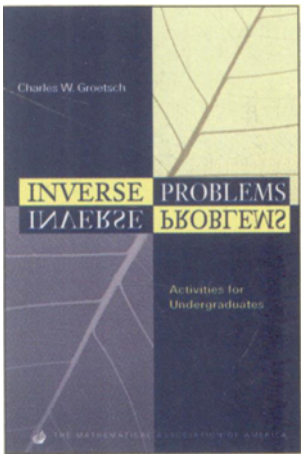

Usually in mathematics you have an equation and you want to find a solution. Here you were given a solution and you had to find the equation. I liked that.

—Julia Robinson

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Scripts in **MATLAB** keyed to Computations in the modules are provided in an appendix (the M-files may be downloaded from author's Webpage). Each module opens with advice on the course level of the module, mathematical and scientific prerequisites, and the type of technology appropriate for the module.

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