so that they could experience the range of options.

Additional resources are provided by direct access to online sources to a variety of options for teachers' and students' use. These options include outlines on selected mathematics courses, lecture notes and assignments, classroom techniques, tests that can be taken and graded online, online sites for mathematics and science, and a selection of comments about the product by students. The usefulness of these options to the instructor depends, of course, on individual need. The usefulness to the student lies in the fact that the resources model the ways in which other students use the software. The options at least illustrate the variety of uses and the scope of the product.

The program is complementary to a broad range of mathematical content, including arithmetic, algebra, calculus, and differential equations, as well as linear algebra. The program supplies a convenient means of graphing, solving, and representing all the symbolism normally required of these topics. Teachers should find the active features through the Maple utility a worthwhile addition to the word-processing feature of the program, even though the word processing is somewhat below standard in flexibility.—*Thomas B. Clark, Trident Technical College, Charleston, SC 29423.*

Publications

Prices on software, books, and materials are subject to change. Consult the suppliers for the current prices. The comments reflect the reviewers' opinions and do not imply endorsement by the National Council of Teachers of Mathematics.

From NCTM

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nctm.org/catalog;

call toll free, (800) 235-7566; or use the NCTM Educational Materials Order Form in this issue.

Implementing Standards-Based Mathematics Instruction, Mary Kay Stein, Margaret Schwan Smith, Marjorie A. Henningsen, and Edward A. Silver, 2000. ix + 146 pp., $21.95 paper. ISBN 0-8077-3907-3. National Council of Teachers of Mathematics, 1906 Association Dr., Reston, VA 20191-9988, (800) 235-7566, nctm.org.

This book is a must for every in-service instructor and supervisor of mathematics. The main emphasis is on teaching mathematics in the middle school, but upper elementary and high school teachers could benefit from in-service training that is based on this book.

The book is divided into two parts. The first part describes the mathematical-tasks framework, which is a way to analyze the mathematical task that students are asked to do during an instructional period. The analysis is performed in relation to the cognitive demands on the student. The authors use the following terms to define these demands: *memorization, procedures without connections, procedures with connections,* and *doing mathematics.*

The first chapter describes a process for determining the cognitive demands of a mathematical task as presented in print materials or teacher-created materials and as the task unfolds during instruction. Chapter 2 describes how well-conceived tasks may become altered during instruction. Chapter 3 describes the rationale for using cases to study mathematics instruction.

Chapter 4 begins part 2. It introduces the cases examined and would be extremely valuable to an in-service leader. At the end of each case, it describes ways to use the material. Chapters 5 through 10 present cases in which the teacher had planned very specific cognitive demands that were altered during instruction for a variety of reasons.

It appears to me that this book would be an excellent place to start for a school that wishes to implement the NCTM's Standards as part of a sound mathematics curriculum.—*L. Lee Osburn, Valrico, FL 33594.*

Teaching and Learning Mathematics in Poor Communities: Report of a Task Force, prepared by Patricia F. Campbell and Edward A. Silver, 2000. 48 pp., $8 paper. National Council of Teachers of Mathematics, 1906 Association Dr., Reston, VA 20191-9988, (800) 235-7566.

This report was the result of a two-day-long working conference that addressed questions about learning and teaching mathematics in poor communities. The task force was charged with identifying the problems that face students and teachers, locating programs that seem to overcome those difficulties, and making recommendations to NCTM for improving mathematics education.

The task force identified many factors that contribute to lower mathematics achievement in poor communities. However, it also found many differences that did not lead to a general solution and notable programs that could not be broadly replicated. The needs of the poor communities were the same as the needs of any community—an organized curriculum, a stable environment, professional development, appropriate instructional materials, and parental involvement. The ability to meet these needs was different, and the cost was expensive.

The task force seems to recommend that NCTM's role is to continue to lobby for funding that can support poor-community schools at a higher level and to furnish leadership as those schools implement changes in the teaching and learning environment. This document contains very little new information. It only validates what teachers and administrators in poorer districts have always known—no easy fix is possible, and any fix requires time and money.—*Judith Stoeri, Linden Community Schools, Linden, MI 48451.*

From other publishers

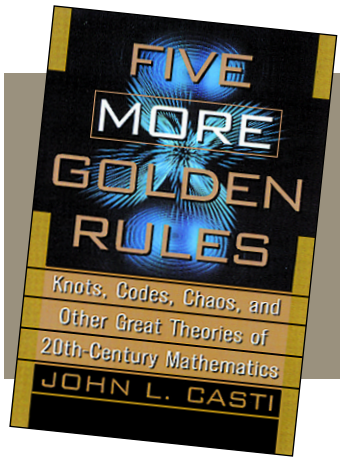
The Beginnings and Evolution of Algebra, Isabella Bashmakova and Galina Smirnova, translated by Abe Shenitzer, 2000. vii + 179 pp., $24.95 paper. ISBN 0-88385-329-9. Mathematical Association of America, P.O. Box 91112, Washington, DC 20090-1112, (800) 331-1622, www.maa.org.

This book follows the development of algebra from the Babylonians through Hamilton's quaternions. The authors are unquestionably experts in the history of algebra. The terminology and proofs throughout the book require a high level of sophistication, at least that of a graduate student, although the initial chapter, which discusses Babylonian numeration and its relationship with algebra, is perhaps readable by high school students.

It is fascinating to read about the historical context of mathematical developments, the tidbits of personal history about mathematicians, the development of algebraic notation, and the mathematical insights that are often overlooked for centuries. The authors investigate the relationship between algebra and geometry throughout history; they give extensive coverage to Diophantus, Gauss, Descartes, Galois, and Euler.

However, the use of historical notation makes many of the proofs and much of the reasoning in the first half of the book difficult to follow. The frequent reference to the sequel—which has no bibliographic reference—for more in-depth coverage of certain concepts and proofs can be distracting, and the absence of a subject index reduces the book's reader-friendliness. This book might be best used as a resource for those who want to learn more about specific mathematicians.—*Jeanne Ramirez Corpus Mather, University of Science and Arts of Oklahoma, Chickasha, OK 73018.* ➔

Five More Golden Rules: Knots, Codes, Chaos, and Other Great Theories of 20th-Century Mathematics, John L. Casti, 2000. iii + 268 pp., $27.95 cloth. ISBN 0471322334. John Wiley & Sons, One Wiley Dr., Somerset, NJ 08875-1272, (800) 225-5945; bookinfo@wiley.com, www.wiley.com.



The subject matter of this book is very attractive—five important theorems of the twentieth century from the fields of knot theory, dynamical systems, control theory, functional analysis, and information theory. These topics are quite deep, and the author approaches them in a fresh way. The level of background required to read this book is quite high, as the book includes such concepts as Taylor series and eigenvalues. The readership is therefore limited.

Unfortunately, this book is disappointing. The author made so many mistakes in areas with which I am familiar that I am unwilling to believe him in areas in which I am less knowledgeable. For example, on page 22, in discussing knot theory, the author confuses equivalent knots and knots that have the same Alexander polynomial. Duality between line and point is a powerful feature of projective geometry that the author attributes to Euclidean geometry, where it is not true (page 180). With so many excellent expositions of modern mathematics available, I suggest leaving this one on the shelf.—*Catherine A. Gorini, Maharishi University of Management, Fairfield, IA 52557.*

Giant Book of Challenging Thinking Puzzles, Michael DiSpenzio, 1999. vi + 256 pp., $14.95 paper. ISBN 0-8069-2087-4. Sterling Publishing Co., 387 Park Ave. S, New York, NY 10016, (800) 542-7567.

The hundreds of mind-stretching problems in this new puzzle anthology range in subject matter from geometry and algebra to logic and probability. Although it is not intended as a mathematics textbook, this book could certainly supplement any of the new, NCTM *Standards*-based curricula. Textbooks often challenge students to create three-by-three magic squares in which each row, column, and diagonal must sum to the same number. But how about placing the numbers from 1 to 9 in the grid to that none of the sums are the same? I read that problem in this book for the first time and found it much harder than I thought.

I should note that many of the book's problems are familiar chestnuts. The quality and range of puzzles represented, however, make the collection worthwhile for even the most well-versed educators and puzzle buffs. Keep a copy next to your textbook.—*Daniel Scher, New York University, New York, NY 10012.*

The Math Chat Book, Frank Morgan, 2000. ix + 113 pp., $19.95 paper. ISBN 0-88385-530-5. Mathematical Association of America, P.O. Box 91112, Washington, DC 20090-1112, (800) 331-1622; www.maa.org.

This small volume contains a varied collection of problems that have come to *Math Chat,* a live call-in TV show that is also available at the Web site of the Mathematical Association of America. Some of the problems are old friends that were fun to revisit; others are new. The first problem, involving time zones in the United States, is especially challenging. A later problem about people crossing a bridge two at a time is a good variation on the standard problem that involves people rowing across a river two at a time.

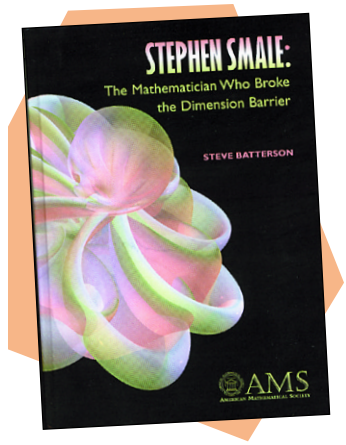
The book is loosely divided into such categories as probability, prime numbers, and geometry. The problems are not categorized by level of difficulty. They range from some that can be solved quickly to those that take time with paper and pencil. This book could serve as a source of puzzle or enrichment problems for students from middle school through college, as well as a source of entertainment for mathematics instructors. Its aim is to show that anyone can have fun with mathematics, and it has accomplished that aim. My one regret is that the book is so short.—*Anne C. Flanigan, Kapi'olani Community College, Honolulu, HI 96816.*

The Random Walks of George Pólya, Gerald L. Alexanderson, 2000. vii + 303 pp., $29.95 paper. ISBN 0-88385-531-3. Mathematical Association of America, P.O. Box 91112, Washington, DC 20090-1112, (800) 331-1622; www.maa.org.

This important work immediately reveals Alexanderson's phenomenal knowledge of mathematical personalities, for it sets George Pólya in the context of the men and women—and the important mathematical ideas—of a long and uniquely productive lifetime. Pólya is perhaps best known to secondary teachers for his classic works on heuristics, the strategies—and joys—of problem solving. His overriding interest in identifying, posing, and solving worthy problems extended to diverse areas: analysis, combinatorics, probability theory, number theory, geometry, and mathematical physics are among these. Hence, the title is apt; indeed, Pólya himself gave us the term *random walk*.

This eminently readable book shares Pólya's diverse interests while offering anecdotes and pictures of Pólya's life and his mathematical companions. Seven people who knew Pólya and his work contributed essays. Pólya is compared to Euler, and the comparison is apt because of Pólya's lifelong productivity, breadth of interest, and fascination with the problem-solving process. An extended Pólya bibliography shows that the master problemist can continue contributing to mathematical growth.—*Harold Don Allen, McGill University, Montreal, PQ H3A 1Y2.*

Stephen Smale: The Mathematician Who Broke the Dimension Barrier, Steve Batterson, 2000. ix + 306 pp., $35 cloth. ISBN 0-8218-2045-1. American Mathematical Society, P.O. Box 6248, Providence, RI 02940-6248, (800) 321-4267; www.ams.org/bookstore.



Stephen Smale—mathematician, political activist, collector of minerals, photographer—has led an extraordinarily exciting and productive life. Steve Batterson—mathematician and biographer—has done extensive research to record the details of Smale's life and his incredible accomplishments. The resulting book acquaints the reader with Smale's mathematical achievements, his wide variety of interests, his worldwide travels, and the personal characteristics that have driven him to an unending string of successes.

Smale's contributions to mathematics are legendary. The 1966 winner of the Fields Medal, the mathematical equivalent of the Nobel Prize, is well known for everting the sphere, creating the "horseshoe" function, and solving the higher-dimensional Poincaré conjecture.

Among Smale's lesser-known activities was his leadership role in opposing the Vietnam War. As a friend of Jerry Rubin, Smale participated in organizing a thirty-hour teach-in at the University of California at Berkeley and creating the Vietnam Day Committee to carry out a series of marches and rallies. In a continuing effort to sustain media attention, Smale held a press conference in Moscow in 1966 at the International Congress of Mathematicians, where he offered harsh criticism of the governments of both the United States and the Soviet Union.

Batterson's book is readable by, and accessible to, high school

(Continued on page 798)

(Continued from page 796)

students. The mathematical explanations are contained in four appendixes. Smale's life is inspiring; Batterson's book is fascinating.—*Maita Levine, University of Cincinnati, Cincinnati, OH 45221-0025.*

Projects

Edited by ***Peggy Kasten,*** *USI_KASTEN@ode.state.oh.us, Ohio Department of Education, Columbus, OH 43215-4183*

Delaware 6–12 Exemplary Mathematics Curriculum Implementation

The Delaware 6–12 Exemplary Mathematics Curriculum Implementation (DEMCI) project seeks to substantially scale up from existing pilot projects to implement research-based, standards-driven mathematics curricula in middle school and high school programs throughout Delaware. This National Science Foundation (NSF)–funded project is a partnership of fourteen Delaware school districts, the University of Delaware, and the Delaware Department of Education. Over the 38-month life of the project, 300 middle school and high school mathematics teachers—nearly two-thirds of all secondary mathematics teachers in Delaware—will engage in a substantial program of professional development that exceeds 150 hours for all teachers and may approach 200 hours for many.

Participating schools and districts have selected or will select instructional materials from among the NSF-supported, comprehensive instructional materials—primarily Mathematics in Context and Connected Mathematics for the middle grades, and Contemporary Mathematics in Context and MATH Connections for the high school grades. Professional development is keyed, but not limited, to the chosen instructional materials. Each teacher participates in three summer institutes: new project teachers participate in an eight-day institute, and veteran teachers participate in four-day institutes. Collaborative work at the school sites adds at least another forty hours of professional development per year. The workshops focus on a content strand that places more emphasis on mathematical content than on pedagogy. To meet the needs of as many teachers as possible, participating teachers can choose among stipends, college credit, or continuing-education units.

Central to the infrastructure of DEMCI are six secondary mathematics specialists, who work as a team to offer instructional support and mentoring to teachers in participating schools. Although the specialists do demonstration teaching, that function is not their primary role. The specialists are attempting to facilitate teacher discussion and collaboration. The goal is to develop "lesson studies" that can enhance the teachers' ability to reflect on their own teaching and hence to improve instruction for their students.

In addition to the required core evaluation, the project's evaluation includes a two-pronged student-outcome component: (*a*) learning gains, as reflected in data from the Delaware Student Testing Program at grades 8 and 10, and (*b*) student attitudes. Furthermore, a project-specific evaluation component monitors gains in teachers' content knowledge. Data have been gathered for the first year; analysis is not yet available. Anecdotal evidence suggests that teachers are enthusiastic about the work.

For further information, please contact Sally Caldwell; scaldwell@state.de.us; Education Associate, Mathematics; Delaware Department of Education; P.O. Box 1402; Dover, DE 19903.—*Sally Caldwell.*