

Women in Science and Engineering (WISE) **The University of Iowa**

A short list of hardcopy materials for use in Math & Science Classrooms available through WISE

Calculus Mysteries and Thrillers R. Grant Woods ISBN: 0-88385-711-1

This book is a collection of a dozen mathematics projects. These are typically novel, interesting and several levels more complex than those usually found in textbooks. The nature of the projects makes them suitable for group working. The problems involve such diverse concepts as Newton's method for approximating roots, inverse trigonometric functions and surface area integrals. Although ideas from economics and physics are used in the problems no prior knowledge of these fields is required.

Environmental Mathematics BA Fusaro and PC Kenschaft ISBN: 0-88385-714-6

Environmental Mathematics in the Classroom seeks to marry the most pressing challenge of our time with the most powerful technology of our time--mathematics. It does so at an elementary level, demonstrating a wide variety of significant environmental applications that can be explored without resorting to the calculus. Several chapters are accessible enough to be a text in a general education course, or to enrich an elementary algebra course. Ground level ozone, pollution and water use, preservation of whales, mathematical economics, the movement of clouds over a mountain range, at least one population model, and a smorgasbord of newspaper mathematics can be studied at this level. and would form a stimulating course. It would prepare future teachers not only to learn basic mathematics, but to understand how they can integrate it into other topics that will intrigue their students.

Other chapters provide sufficient challenge for prospective mathematics majors. Harder population models, the spread of infections, and the survival of buffalo after the nineteenth century slaughter provide substance for such students. Those ready to apply trigonometry to real-world models also could study groundwater dissipation, the cleaning of oil spills, and the filling of oil tanks.

Everything You Need to Know About Math Homework Anne M. Zeman ISBN: 0590493590

This book provides fourth to sixth grade students and their parents with the information they need to complete math assignments. With the help of Dial-A-Teacher, which has operated a telephone helpline since 1979, the authors have compiled this math reference guide with easy-to-understand answers to students' most frequently asked questions.

Everything You Need to Know About Science Homework Kate Kelly ISBN: 0613115198

Need to know the difference between a plant cell and an animal cell? What makes a reptile a reptile? How to label the parts of a flower? What radioactivity is? What causes ocean tides? Whether aluminum is a compound? Which planet takes the longest to circle the sun? What causes smog? Which of Newton's Three Laws of Motion is illustrated by a pitcher throwing a curve ball? Everything You Need to Know About Science Homework provides fourth-to-sixth-grade students and their parents with the information they need to complete science assignments. With the help of Dial-A-Teacher, which has operated a telephone help line since 1979, the authors have compiled this science reference guide with easy-to-understand answers to students' most frequently asked questions. No other source offers such a full range of information directly related to the fourth through sixth grade science curriculum.

Experimenting with Illusion Robert Gardner ISBN: 0531109097

In Experimenting with Illusions, optical illusions are discussed in detail. The diagrams are clear, the writing is well organized and understandable, and the instructions for the activities are easy to follow. The range of the material covered, however, and the difficulty of that material make this book better for older students. In fact, this book gives a more in-depth overview of optical illusions than Beeler and Branley's Experiments in Optical Illusion (Crowell, 1951). Experimenting with Inventions is harder to pin down--little of this book actually deals with experiments. Instead, much of it is a discussion of the creative processes of inventors. Specific examples are given from the lives of inventors, living and dead. A number of activities are suggested, but few of these qualify as experiments. So, while this book is written with Gardner's typical clarity, and the diagrams, the index, and suggestions for further reading are all helpful, this book will have limited usefulness for class assignments and may be best used by budding inventors.

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The University of Iowa
Math Books and Curricula

Geometry from Africa-Mathematical and Educational Explorations Paul Gerdes ISBN: 0-88385-715-4

Selected by Choice Magazine as one of the Outstanding Academic Books of 2000

The peoples of Africa south of the Sahara constitute a vibrant cultural mosaic, extremely rich in its diversity. Among these peoples interest in creating and exploring forms and shapes has blossomed in diverse cultural and social contexts with such an intensity that with reason it may be said that "Africa Geometrizes."

Gerdes presents examples of geometrical ideas in the work of wood and ivory carvers, potters, painters, weavers, and mat and basket makers. He analyzes geometrical ideas inherent in various crafts and explores possibilities for their educational use. Using as examples African ornaments and artifacts, he shows how students may be led to discover the Pythagorean Theorem and to find proofs of it. He also explores connections to Pappus' Theorem, similar right triangles, and Latin and magic squares as well as the geometrical ideas inherent in mat and basket weaving, house building, and wall decoration.

The author presents the geometry of a sand drawing tradition called sona in the Chokwe language (predominantly northeast Angola). The knowledge of sona has been passed from generation to generation via beautiful, often symmetric, designs made in the sand. Gerdes uncovers mathematical ideas in sona and presents examples of how they may be used in teaching mathematics. He underscores the mathematical potential of the sand drawing tradition by developing the geometry of a new type of design pattern, which he calls Lunda-designs.

Great Jobs for Math Majors Stephen Lambert, Ruth Decotis, Julie Ann Degalan ISBN: 0844264229

Answers the question "What can I do with a major in math?"

It isn't always obvious what a math major can offer to the workplace. But it provides you with valuable skills and training that can be applied to a wide range of careers. *Great Jobs for Math Majors* helps you explore these possibilities.

Introduction to 3D Spatial Visualization an Active Approach

Sheryl Sorby, Anne Frances Wysocki, Beverly Baartmans

ISBN: 1-4018-1389-5

Take advantage of the power of technology to develop 3D spatial visualization skills and minimize the learning curve! This revolutionary multimedia CD-ROM and its companion workbook are aimed at helping users develop the skills they need for success in a variety of technical careers, including: engineering, architecture, medicine, computer database operation, chemistry, and more. Nine fun, easy-to-use modules provide first-hand experience in working with isometric drawings, orthographic projections, reflections and symmetry, surfaces and solids of revolution, plus combining solids. Each module consists of a multimedia software component, as well as a workbook component, enabling users to learn by doing. Whether integrated into courses that require extensive 3D spatial visualization, or used as a remediation tool to help students who may be struggling due to poorly developed skills, Introduction to 3D Spatial Visualization will provide every user with a highly interactive and long-lasting learning experience.

Inventive Strategies for Teaching Math James A. Middleton, Polly Goepfert ISBN: 1557983682

Building & choosing curricula/building teaching strategies/ building a balanced assessment strategy/finding resources.

Learning Styles: Implications for Improving Educational Practices

Charles Claxton, Patricia Murrell

ISBN: 091331739X

Reviews four approaches to examining the learning styles of college students: personality, information processing, social interaction, and instructional methods. Includes techniques for applying your knowledge on learning styles.

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Math and Bio 2010

Lynn Arthur Steen (Editor)

ISBN: 088385-818-5

Math & Bio 2010: Linking Undergraduate Disciplines envisages a new educational paradigm in which the disciplines of mathematics and biology, currently quite separate, will be productively linked in the undergraduate science programs of the twenty-first century. As a science, biology depends increasingly on data, algorithms and models; in virtually every respect, it is becoming more quantitative, more computational and more mathematical. While these trends are related, they are not the same; they represent, rather, three different perspectives on what many are calling the "new biology."

All three methods—quantitative, computational, mathematical—are spreading across the entire landscape of biological science, from molecular to cellular, organismic, and ecological. The aim of this volume is to alert members of both communities—biological and mathematical—to the expanding and exciting challenges of interdisciplinary work in these fields.

Math & Bio 2010 grew out of Meeting the Challenges: Education Across the Biological, Mathematical, and Computer Sciences, a joint project of the MAA, the American Association for the Advancement of Science, and the American Society for Microbiology. It was funded by the National Science Foundation Division of Undergraduate Education and the National Institute of General Medical Sciences. Representatives from the biological and mathematical sciences interested in strengthening interdisciplinary efforts in undergraduate education met to discuss opportunities and challenges presented by recent changes in biology. Discussion leaders at the initial project meeting wrote several of the articles in this volume.

Math for Girls and Other Problem Solvers

Diane Downie, et al.

ISBN: 091251101X

Creating a strong foundation in math is a good way for girls to assure future economic independence. Professional and scientific occupations are the only jobs where women's earning begin to approximate men's. For non-college-bound women, math skills can enable them to enter the better-paying trades traditionally dominated by men. With this in mind, the Lawrence Hall of Science developed *Equals* in 1977, a classroom program to promote math education for girls. It supports new ways of thinking about math learning, with an emphasis on the use of manipulatives (blocks, marbles, sticks, etc.), cooperative learning, creative problem-solving, alternative learning assessment and parental involvement.

Math Survival Guide

Jeffrey R. Appling, Jean Richardson

ISBN: 0471270547

Appling 2e is designed as a supplemental text to support freshman science students who need extra help with their math skills. This review and practice guide is written in a clear, accessible manner to help students get up to speed quickly on basic math principles. The text can supplement any prep/intro chem. text (Malone, Hein), allied health chem. text (Hein), or General Chem text (Brady, Olmsted/Williams, Spencer). It also works well for intro level physics and geology courses--any place where student need to muster their math skills.

Mathematical Adventures for Students or Amateurs

David Hayes & Tatiana Shubin

ISBN: 0-88385-548-8

How should you encode a message to an extraterrestrial? What do frogs and powers of 2 have in common? How many faces does the Stella Octangula have? Is a plane figure of constant diameter a circle, and what has this to do with NASA? $210 = 5 \times 6 \times 7 = 14 \times 15$, so just how many numbers can be the product of both two and of three consecutive integers? Is there any such thing as a truly correct map? What patterns are possible in juggling?

Mathematical Modeling in the Environment

Charles R Hadlock

ISBN: 0-88385-709X

Suitable for classroom adoption in an innovative course for:

- * a general education mathematics elective;
- * a mathematics advanced elective for science majors;
- * an interdisciplinary course;
- * a modeling course in a civil/environmental engineering program.

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Math Books and Curricula

Mathematical Modeling in the Environment (continued):

This book has a dual objective: first, to introduce the reader to some of the most important and widespread environmental issues of the day; and second, to illustrate the vital role played by mathematical models in investigating these issues. The environmental issues addressed include: groundwater contamination, air pollution, and hazardous material emergencies.

The first part of the book leads the reader through relatively elementary modeling of these phenomena, including simple algebraic equations for groundwater, slightly more complex algebraic equations (preferably implemented on a spreadsheet or other computerized framework) for air pollution, and a fully computerized modeling package for hazardous materials incident analysis. The interplay between physical intuition and mathematical analysis is emphasized.

For more advanced readers, the second part of the book returns to the same three subjects but with a higher level of mathematical sophistication.

Many important classical mathematical themes are developed through this context, examples coming from single and multivariable calculus, differential equations, numerical analysis, linear algebra, and probability.

Mathematical Modeling in the Environment,-Supplementary Material and Solutions Manual

Charles R Hadlock

ISBN: 0-88385-713-8

What do all of these questions have in common? They, and many others, are answered in this book.

The authors are distinguished mathematicians; some are bright newcomers while others have been well known in mathematical circles for decades.

This is a partial record of the Bay Area Math Adventures (BAMA), a lecture series for high school students (and incidentally their teachers, parents, and other interested adults) hosted by San Jose State and Santa Clara Universities in the San Francisco Bay Area. These lectures are aimed primarily at bright high school students, the emphasis on bright, and as a result, the mathematics in some cases is far from what one would expect to see in talks at this level. There are serious mathematical issues addressed here.

We hope that this book will capture some of the magic of these talks that have filled auditoriums at the host schools almost monthly for several years. Join the students in sharing these mathematical adventures.

Mathematics in Service to the Community Charles R. Hadlock (Editor)

ISBN: 0-88385-176-8

This book looks at the wide variety of ways in which math, statistics, and math education teachers have incorporated service-learning into their courses. These projects are not just stand-alone community service initiatives, but rather they specifically target the improvement of mathematics skills and insights of the college students in the courses with which they are associated. In some cases, the projects are the major focus of the courses. In others, they may range from an essential component to one of several options. The book also speculates about heretofore untapped possibilities for service-learning, even including courses in pure mathematics.

College faculty often may not fully appreciate the wide range of support mechanisms for such ventures even within their own institutions, so the book includes a lengthy chapter on the details of converting a rough idea to a solid action plan, sometimes even picking up financial support and other often unexpected benefits along the way. Creative teachers rarely implement a project in exactly the same way as a colleague might have, so the emphasis here is to display a wide range of successful projects in order to encourage readers to develop some of their own.

Peer Teaching: To Teach is to Learn Twice Neal A. Whitman

ISBN: 0913317489

Describes the practice and benefits of using students as teachers. Explores different types of peer teaching, strategies for academic planning, specific peer groups, evaluation studies, and the psychological merits of peer teaching.

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Math Books and Curricula

Resources for Teaching Elementary School Science

Staff of National Academy Press, National Academy of Sciences Staff

ISBN: 0309052939

What activities might a teacher use to help children explore the life cycle of butterflies? What does a science teacher need to conduct a "leaf safari" for students? Where can children safely enjoy "hands-on" experience with life in an estuary? Educators will find a wealth of information and expert guidance in *Resources for Teaching Elementary School Science*. A completely revised edition of the best-selling resource guide, *Science for Children: Resources for Teachers*, this book is an annotated guide to hands-on, inquiry-centered curriculum materials and sources of help for teaching science from kindergarten through sixth grade. The guide annotates about 350 curriculum packages, describing the activities involved and what students learn. Each annotation also lists recommended grade levels, accompanying materials and kits or suggested equipment, and ordering information. The curriculum materials annotated in the guide were reviewed by both educators and scientists to ensure that they are accurate and current. They are grouped by scientific area - Life Science, Earth Science, Physical Science, and Multidisciplinary and Applied Science - and by type of materials - core, supplementary, and science activity books. Additionally, a section of references provides annotated listings of books about science and teaching, directories and guides to science trade books, and magazines that will help teachers enhance their students' science education. *Resources for Teaching Elementary School Science* also lists by region and state about 600 science centers, museums, and zoos where teachers can take students for interactive science experiences; highlights almost 300 facilities that make significant efforts to help teachers; describes more than 100 organizations from which teachers can obtain other resources and assistance; and provides names and addresses of publishers and suppliers of materials.

Schools for Thought John T. Bruer

ISBN: 0262521962

Schools for Thought provides a straightforward, general introduction to cognitive research and illustrates its importance for educational change. Using classroom examples, John Bruer shows how applying cognitive research can dramatically improve students' transitions from lower-level rote skills to advanced proficiency in reading, writing, mathematics, and science.

She Does Math Marla Parker (Editor), Mathematical Association of America

ISBN: 0883857022

She Does Math! presents the career histories of 38 professional women and math problems related to their work. Each history describes how much math the author took in high school and college; how she chose her field of study; and how she ended up in her current job. Each of the women presents problems that are typical of those she faces in her job. The problems require nothing beyond high school mathematics.

There are many good reasons to buy this book:

- It contains real-life problems. Any student who asks the question, "Why do I have to learn algebra (or trigonometry or geometry)?" will find many answers in its pages. Students will welcome seeing situations from real-world jobs where the math skills they are learning in class are actually used.
- It provides strong female role-models.
- It supplies practical information about the job market. Students learn that they can only compete for these interesting, well-paying jobs by taking mathematics throughout their high school and college years.
- It demonstrates the surprising variety of fields in which mathematics is used.

Buy a copy for your daughter, granddaughter, sister, former math teachers, your students-and young men too. They want to know how the math they study is applied to real-life problems and this book will show them.

Social Choice and the Mathematics of Manipulation

Alan D. Taylor

ISBN: 0-521-00883-2

Honesty in voting, it turns out, is not always the best policy. Indeed, in the early 1970s, Allan Gibbard and Mark Satterthwaite, building on the work of Nobel Laureate Kenneth Arrow, proved that with three or more alternatives there is no reasonable voting system that is non-manipulable; voters will always have an opportunity to benefit by submitting a disingenuous ballot. The ensuing decades produced a number of theorems of striking mathematical naturalness that dealt with the manipulability of voting systems. This book presents many of these results from the last quarter of the twentieth century - especially the contributions of economists and philosophers - from a mathematical point of view, with many new proofs. The presentation is almost completely self-contained and requires no prerequisites except a willingness to follow rigorous mathematical arguments.

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The University of Iowa
Math Books and Curricula

Social Consciousness and Career Awareness: Emerging Link in Higher Education

John S. Swift, Jr., Jonathan D. Fife(Editor)

ISBN: 1878380052

Solve This: Math Activities for Students and Clubs James Tanton

ISBN: 0-88385-717-0

Sophisticated mathematics is accessible to all. This book proves it! This is a collection of intriguing mathematical problems and activities linked by common themes that all involve working with objects from our everyday experience. Learn about the mathematics of a bagel, a checkerboard and a pile of laundry for example. Discover for yourself that wheels need not be round, that braids need not have free ends, that it's always best to turn around twice - and more! Mathematics is all around us, we all do mathematics every day. The activities contained in this book are immediate, catchy and fun, but upon investigation, begin to unfold into surprising layers of depth and new perspectives. The necessary mathematics, in increasing levels of difficulty, is explained fully along the way. Mathematics educators will find this an invaluable resource of fresh and innovative approaches to topics in mathematics.

Teaching About Evolution and the Nature of Science

Staff of National Academy Press, Joyce L. Vedral

ISBN: 0309063647

Teaching About Evolution and the Nature of Science provides a well-structured framework for understanding and teaching evolution. Written for teachers, parents, and community officials as well as for scientists and educators, this book illustrates how evolution explains both the great diversity and the underlying similarity of the earth's organisms; it explores how scientists approach the question of evolution; and it describes the nature of science as a way of knowing about the natural world. In addition, the book provides answers to frequently asked questions to help readers understand many of the issues and misconceptions about evolution.

Thought and Knowledge Diane F Halpern

ISBN: 0-8058-3966-6

When we consider that many of the people alive today will someday be working in jobs that do not yet exist, and that the explosion of information in our world means that today's knowledge will quickly become outdated, two goals for education emerge: learning how to learn and how to think critically about information that changes at a rapid rate. Neither education nor business as usual will provide adequately thoughtful perspectives and creative solutions to the problems society faces today. A genuine commitment to an educated thinking populace will. This book, the fourth edition of Diane Halpern's best-selling text, was written as tangible evidence of that commitment. In it, the author applies the theories and research of cognitive psychology to the development of critical thinking and learning skills. In addition to its rigorous scholarly grounding, the book is distinguished by its clear writing style, humorous tone, and numerous practical examples and anecdotes. The book features new and expanded coverage of topics including: analyzing visual arguments; asking questions as a means of understanding complex information; accessing information in problem solving, decision making, and argument analysis; and thinking critically about controversial research.

Understanding Human Evolution 3rd Edition

Jeffrey Kevin Kevin McKee, Frank E. Poirier, William Scott McGraw

ISBN: 0131113909

This book provides a complete, unbiased, relatively non-technical overview and *state-of-the-art* discussion of the rapidly changing field of paleoanthropology. It features an abundance of illustrations and photographs from the authors' visits to fossil sites, and views skeletal remains in light of what they can reveal about the populations they represent -- not only their anatomy but also their behavior and social organization. Features rather extensive discussions on the use of genetic data -- particularly that of mtDNA.

Covers: Fossils, Fossilization, and Dating Methods; Determining Evolutionary Relationships; Our Place in the Animal Kingdom; Reconstructing Human Behavioral Patterns and Social Organizations: Use of the Comparative Approach; Early Primate Evolution; The Transition to Apes; Trends in Human Evolution; The Earliest Hominids; The Hominid Divergence; *Homo Erectus*; Early *Homo Sapiens*; Neandertals and Their Immediate Predecessors; and The Appearance of *Homo sapiens sapiens*.

For anyone interested in a state-of-the-art discussion of paleoanthropology.

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Math Books and Curricula

Women and Numbers Teri Perl, Annalee Nunan (Illustrator)

ISBN: 093317487X

Presents biographies of women from the nineteenth and twentieth centuries who pursued their interests in mathematics. Each chapter includes different mathematical activities.

Women in Mathematics: Scaling the Heights Deborah Nolan (Editor)

ISBN: 0883851563

This is a rich resource of ideas and examples that should be essential reading to all those involved in developing courses and programs for stimulating students who are considering higher education in the mathematical sciences. Three opening essays take stock of the progress women have made in mathematics in the past twenty years, and are accompanied by quantitative comparisons between male and female students that have striking implications for teachers of mathematics. The heart of the book is a collection of articles about how to teach topics not usually found in the undergraduate curriculum; they provide practical advice about how to help students to achieve their potential. A final part gives detailed information on model teaching programs that can serve as case-studies

Women of Discovery Milbry Polk, Mary Tiegreen

ISBN: 0609604805

Across the centuries and from many lands, women have set forth on journeys of exploration. Visionaries, adventurers, artists, and scientists, these women challenged the limitations, both physical and social, of their times and, in the face of formidable challenges, expanded the world's body of knowledge. Yet despite their extraordinary achievements, they have remained unknown and unsung for too long. No longer. The stories of more than eighty extraordinary explorers and adventurers are vividly recounted and stunningly illustrated in *Women of Discovery*. Many brave women have ventured into extreme environments to bring back knowledge, whether they were aviators like Amelia Earhart, mountaineers like Annie Smith Peck, or Arctic explorers like Irina and Valentina Kuznetsova. And the annals of science would be far poorer without the work of such women as primatologists Jane Goodall and Dian Fossey, ethnobotanist Nicole Maxwell, and ichthyologist Eugenie Clark. This is truly a gathering of heroines, full of tales of courage, talent, intelligence, and sheer determination. With a foreword by renowned journalist Christiane Amanpour, **Women of Discovery** is a remarkable book, an achievement in its own right, and certain to thrill anyone captivated by the world-changing drama of exploration.

Writing Projects for Mathematics Courses: Crushed Clowns, Cars, and Coffee to Go

Annalisa Crannell, Gavin La Rose, Thomas Ratliff, Ellyn Rykken

ISBN: 0-88385-735-9

This volume is a collection of writing projects suitable in a wide range of undergraduate mathematics courses, from a survey of mathematics to differential equations. The projects vary in their level of difficulty and in the mathematics that they require, but are similar in the mode of presentation and use of applications. Students see these problems as real in a way that textbook problems are not, even though many of the characters involved (e.g., dime-store detectives and CEOs) are obviously fictional. These stories are sometimes fanciful and sometimes grounded in standard scientific applications, but the mere existence of the story draws the students in and makes the problem relevant.

Zero – The Biography of a Dangerous Idea Charles Seife

ISBN: 0140296476

A concise and appealing look at the strangest number in the universe and its continuing role as one of the great paradoxes of human thought.

The Babylonians invented it, the Greeks banned it, the Hindus worshiped it, and the Church used it to fend off heretics. Now, as Y2K fever rages, it threatens a technological apocalypse. For centuries the power of zero savored of the demonic; once harnessed, it became the most important tool in mathematics. For zero, infinity's twin, is not like other numbers. It is both nothing and everything. In *Zero*, science journalist Charles Seife follows this innocent-looking number from its birth as an Eastern philosophical concept to its struggle for acceptance in Europe, its rise and transcendence in the West, and its ever-present threat to modern physics. Here are the legendary thinkers--from Pythagoras to Newton to Heisenberg, from the Kabalists to today's astrophysicists--who have tried to understand it and whose clashes shook the foundations of philosophy, science, mathematics, and religion. Zero has pitted East against West and faith against reason, and its intransigence persists in the dark core of a black hole and the brilliant flash of the Big Bang. Today, zero lies at the heart of one of the biggest scientific controversies of all time, the quest for a theory of everything.