Mathematical Resources for Teacher Candidates, Mathematics Teachers and Librarians

mathematics journals and magazines, associations, conferences, educational supplies, posters, software, handhelds, websites, videos, games, books, wordplay, a licence to do math, anamorphic art, origami, magic, places to go to for pi and a coffee

Ron Lancaster
Lecturer in Mathematics Education, OISE/UT
252 Bloor Street West
11th floor, Room 262
Toronto, ON
M5S 1V6

416-923-6641 EXT 2587
rlancaster@oise.utoronto.ca



Cafe π, Montreal

Table of Contents Page

Introduction 3
Journals and magazines for teachers 4
Professional associations for teachers 7
Conferences for teachers 9
Educational supplies and publishers 10
Mathematics posters for your classroom 11
Computer software 12
Handheld technology 16
Graphing calculator books 17
Websites for mathematics teachers 18
Online mathematics columns 21
Videos 22
Games for the classroom 24
Books about games 24
Books with collections of problems and activities 25
Beautiful books about mathematics 26
Books about geometry 29
Mathematics dictionaries and books that contain definitions and origins of words 29
A book about stamps and math 29
Books about women and men who love and use mathematics 30
Books for young children 31
Pop-Up Books 34
Books About the Calendar and Time 34
Alphabet and counting books 35
Books and videos from Marilyn Burns 36
A number of books about numbers 38
Books that involve finding numbers and letters in unintended places 39
Recreational math books 40
Books by Martin Gardner 41
Puzzle books 42
Books about mathematical chess puzzles 43
The Rubiks Cube 44
Books about magic squares 45
Books on wordplay 46
A licence to do math 47
Using personalized licence plates to help students become more CR8IVE 47
Books about anamorphic art 49
Books about origami 50
Magic resources for teachers and students 51
Mathematics competitions for students 53
Mathematics camps for students 53
A restaurant, coffee shop and subway station that math teachers will love 54

Introduction

This document contains a list of the resources that have been important to me as a classroom teacher, an independent mathematics consultant and now as a Lecturer in Mathematics Education at the University of Toronto.

Throughout my career in education I have always had a home office. In my work space I am surrounded by mathematics books, videos, puzzles, games and journals. Having immediate access to this material has made it possible for me to make my classes more interesting without having to reinvent the wheel. Through the use of these resources I have been able to develop interesting projects for my students and engaging questions for tests and examinations. The resources have had a major impact in making math a part of my life.

Ron Lancaster
Lecturer in Mathematics Education, OISE/UT

Two puzzles for you to do at home

In Puzzle 1, all letters represent a digit from 0 to 9. Each letter stands for just one digit (in other words M cannot be say 3 and 9 at the same time) and two different letters cannot stand for the same digit (so A and K can't both be say 7). The first letter of any word cannot be 0. There are 34 solutions to Puzzle 1. Good luck finding them!

Puzzle 2 (designed for teachers with a growing collection of resources) is independent of Puzzle 1. So the value of say A in Puzzle 1 is not necessarily the same as the value of A in Puzzle 2. There are 9 solutions to Puzzle 2.

M	**A**	**K**	**E**
R	**O**	**O**	**M**
	F	**O**	**R**
M	**A**	**T**	**H**
		A	**T**
H	**O**	**M**	**E**

Puzzle 1

M	**A**	**K**	**E**
M	**O**	**R**	**E**
R	**O**	**O**	**M**
	F	**O**	**R**
M	**A**	**T**	**H**
		A	**T**
H	**O**	**M**	**E**

Puzzle 2

Journals and magazines for teachers

Chance

Chance is an outstanding magazine about statistics and its use in society. It is intended for anyone who has an interest in the analysis of data and is published quarterly by the American Statistical Association

Chance Magazine Homepage
http://www.stat.duke.edu/chance/

Information about ordering
https://www.amstat.org/publications/pubs_individual.pdf

Consortium

Each issue of the Consortium is filled with a mix of ready-to-use projects for high school students and wonderful articles that deal with practical applications of mathematics. A subscription to the Consortium includes on-line access to a huge collection of modules and materials.

Consortium for Mathematics and Its Applications
www.comap.com
(781) 862-7878

Crux Mathematicorum and Mathematical Mayhem

This Canadian publication has long enjoyed a reputation for being one of the best problem solving journals in the world for secondary and undergraduate students. Each issue contains dozens of challenging problems with solutions.

Canadian Mathematical Society
subscriptions@cms.math.ca
http://www.journals.cms.math.ca/CRUX/
613-562-5702

Function: A Secondary School Mathematics Journal
Parabola

In the fall of 2004 Function merged with Parabola, a mathematics journal from Australia. I had a subscription to Function for many years and found the articles and challenging problems to be very useful. To obtain back issues of Function (if they are available) contact Barbara Hardie at barbara.hardie@sci.monash.edu.au

Parabola publishes articles and problems on applied mathematics, mathematical modeling, statistics and pure mathematics for teachers and students at the secondary school level.

Parabola
AMT Publishing, Australian Mathematics Trust
University of Canberra ACT 2601, Australia
http://www.maths.unsw.edu.au/highschool/parabola.html

GAMES Magazine

I have had a subscription to GAMES magazine since the first issue was put out in September 1977 and have found it to be a very good source of problems and puzzles for my students and myself. You can buy it at a newsstand but it tends to sell out very quickly. Get a subscription and you will be sure to get every issue. You can also buy back issues of the magazine. I cannot imagine teaching without my collection of GAMES magazines.

GAMES Magazine, Games Publications Inc.
PO Box 2031, Marion, OH, 43305-2031
(800) 425-4600

Journal of Recreational Mathematics (JRM)

When I was an undergraduate at McMaster University, a professor of mine suggested that I read this journal to satisfy my interest in magic squares, puzzles and games. He steered me in the right direction and the JRM has had a profound influence on my teaching. The articles, problems and puzzles are great and any high school mathematics teacher should be able to make use of the content.

Journal of Recreational Mathematics, Baywood Publishing Company
info@baywood.com
631-691-1270

Math Horizons

Math Horizons, published quarterly by the Mathematical Association of America (MAA), is one of my favourite journals. It is intended primarily for undergraduates in mathematics, but I have used many articles and problems with my middle and high school students. Martin Gardner has written columns for Math Horizons and other writers have focused on math in the movies, profiles of contemporary mathematicians and applications of mathematics.

Math Horizons, Mathematical Association of America
http://www.maa.org/mathhorizons/

Mathematical Intelligencer

I look forward to every issue of this great journal. For the most part, the content is advanced, but some of the material can be adapted for students of average ability. I particularly like three regular Departments: Mathematical Entertainments, The Mathematical Tourist and The Stamp Corner.

Springer-Verlag, New York
800-SPRINGER or 212-460-1500
journals@springer-ny.com

Quantum

Quantum was a great journal for secondary mathematics and science teachers. It is no longer published, but it would be worth trying to track down back issues. The first issue was published in January 1990 and publication ended with the July/August 2001 issue. I have every issue of QUANTUM and have used a great deal of the content as the basis for projects, reading assignments and activities. Quantum was published by Springer-Verlag.

Teaching Children Mathematics (TCM) for Pre-K and elementary grades
Mathematics Teaching in the Middle School (MTMS) for middle grades
The Mathematics Teacher (MT) for secondary grades

These three outstanding journals are published by the National Council of Teachers of Mathematics (NCTM). Depending on the grade levels you teach you may want to subscribe to one, two or maybe even all three them. Each journal contains articles about teaching, hands-on, ready-to-use activities and information about new products, initiatives and opportunities.

National Council of Teachers of Mathematics
1906 Association Drive, Reston, VA, 20191-1593
www.nctm.org
703-620-9840

Professional associations for teachers

Association for Women in Mathematics (AWM)

This is an excellent organization for all teachers to join. Members receive the AWM Newsletter six times throughout the year and each issue has a wonderful mix of articles, news items and profiles of women mathematicians. The content is suitable for teachers at all levels and you will find something valuable in every issue of the newsletter. Your membership will also support a number of initiatives conducted by the AWM throughout the year to promote a strong interest in mathematics among young women.

Association for Women in Mathematics
4114 Computer and Space Sciences Building, University of Maryland
College Park, MD, 20742-2461
awm@math.umd.edu
301-405-7892

Consortium for Mathematics and Its Applications (COMAP)

COMAP's core vision is to improve mathematics education for elementary and secondary students. This organization has developed curriculum materials and teacher programs that are multidisciplinary and highly enjoyable to use. I have used a number of modules from COMAP. My students have particularly enjoyed the following ones:

The Design of Honeycombs; The Windchill Index; The Mathematics of Focusing a Camera; The Relationship Between Directional Heading of an Automobile and Steering Deflection; Glottochronology: An Application of calculus to Linguistics; The Statistical Evaluation of Burn Care; The Consumer Price Index: What Does It Mean

Materials are available in print and video formats and are available on-line.

Consortium for Mathematics and Its Applications
www.comap.com
(781) 862-7878

Mathematical Association of America (MAA)

I have benefited a great deal from my membership both as a mathematician and as a mathematics teacher. I receive two bimonthly journals from the MAA, the Mathematics Magazine and the College Mathematics Journal. Even though these journals are at intended for teachers at the College level I have often found the articles to be useful with my senior high school students.

The MAA publishes many books which can be used by high school teachers. One of my favourites is the Hitchhiker's Guide to Calculus (ISBN 0-914098-23-3) by Michael Spivak. It is a short and inexpensive companion to any Calculus course.

Mathematical Association of America (MAA)
1529 Eighteenth Street, NW, Washington, DC, 20036
www.maa.org
800-331-1622

National Council of Teachers of Mathematics (NCTM)

The NCTM publishes three journals for teachers; Teaching Children Mathematics (TCM) for Pre-K and elementary grades, Mathematics Teaching in the Middle School (MTMS) for middle grades and the Mathematics Teacher (MT) for secondary grades. The NCTM organizes regional conferences throughout the year as well as a huge annual conference that typically attracts about 20,000 mathematics teachers from North America and other parts of the world.

National Council of Teachers of Mathematics
1906 Association Drive, Reston, VA, 20191-1593
www.nctm.org
703-620-9840

National Council of Supervisors of Mathematics

You do not need to be a supervisor of mathematics to belong to this organization and they welcome teachers at all grade levels to join. The cost of a one year membership is USD $75 and for this you will receive the NCSM Journal of Mathematics Education Leadership four times a year. The Journal contains a wealth of information related to what is happening in mathematics education across the United States and Canada. You will also receive various resources free of charge from time to time.

National Council of Supervisors of Mathematics
P.O. Box 150368, Lakewood, CO, 80215-0368
www.ncsmonline.org

Ontario Association for Mathematics Education (OAME)

The cost of a one year membership is $40 and includes a subscription to the Ontario Mathematics Gazette. The Gazette is a terrific journal and each issue contains material for elementary and secondary teachers. The OAME runs an annual conference for teachers at all levels as well as numerous local conferences throughout Ontario. They advise the Provincial government on educational issues and work hand-in-hand with the government to develop curriculum. This is an important organization that deserves the support of teachers in Ontario.

Ontario Association for Mathematics Education
David and Sue Hessey, Executive Directors, OAME
70 Chestnut Court, London, ON, N6K 4J5
www.oame.on.ca
Phone / Fax: 519-471-6324

Conferences for teachers

Most of the organizations listed in the section on Professional Associations have annual conferences and information can be obtained directly from them. The Ontario Association for Mathematics Education (OAME) has their annual conference in late April, early May and chapters of the OAME hold fall and spring conferences throughout Ontario. The National Council of Teachers of Mathematics (NCTM) holds its annual conference in April and it has become so large that there are not very many cities large enough to host the conference. The NCTM also organizes numerous regional conferences throughout the year, one of which is always held in Canada.

The Anja S. Greer Conference on Mathematics, Science and Technology
Phillips Exeter Academy, Exeter, New Hampshire

For the past sixteen years I have been fortunate to be a participant and a Leader at the Exeter Conference. The conference is held during the last week in June and it is designed for high school teachers. Participants take two ten-hour courses and when they are not in classes they can attend hour-long sessions, they can work in a software library or they can spend time talking about mathematics with keen teachers. If you can get away, go to the conference because what you will learn and the people you meet will have a profound impact on your teaching career.

http://mathconf.exeter.edu
Tom Seidenberg at tseidenberg@exeter.edu

The Peddie School Annual Mathematics and Technology Conference for Middle School Teachers
The Peddie School, Hightstown, New Jersey

The Peddie Conference is modeled after the Exeter Conference but it is designed for middle school teachers. It is held annually during the first week of August. I have been a Leader at the conferences in 2001, 2002, 2003 and 2004 and am impressed with the entire program. During the day each participant takes three ten-hour courses and at night activities include featured speakers, social time and a special outing to the campus of Princeton for a Math Trail. The Peddie Conference is one of the very best professional development experiences available for middle school teachers.

The conference will not be held in 2005 but will start back up in 2006.

http://www.peddie.org/mathconf/index.html
Dr. Irina Lyublinskaya at ilyublin@peddie.org.

Week-long summer conferences on the use of the Geometer's Sketchpad

Each summer Key Curriculum Press organizes week-long courses on Sketchpad for middle and high school teachers at all levels of expertise, from beginners to experts. A number of courses are offered each year with different themes. The dates for 2005 are July 17–23 and July 24–30. In 2004 I attended the Master Class on Sketchpad and it was an amazing experience.

Organized by Key Curriculum Press
http://www.keypress.com/pdc/institutes/course_schedules.html

Educational supplies and publishers

There are dozens of excellent companies that sell educational supplies and books to teachers. You will get to see the leading companies when you attend conferences organized by the National Council of Teachers of Mathematics or other mathematics associations.

I am very familiar with the following companies through products I have purchased and from the positive comments I hear from many teachers. They are based in Ontario near where I live and they sell products to teachers in North America and countries overseas.

Exclusive Educational Supplies

Exclusive sells hundreds of exciting, high-quality products for elementary teachers of mathematics, science and literacy. For mathematics teachers, the products available for purchase include manipulatives, calculators and a very long list of excellent resource binders. These resource binders have been written by classroom teachers and they contain ready to use activities related to curriculum topics and manipulatives.

243 Saunders Road, Barrie, Ontario, L4N 9A3
www.exclusiveeducational.ca
800-563-1166

Spectrum Educational Supplies

Spectrum Educational Supplies has a huge product line of educational materials and resources for elementary and secondary teachers. From the time the company started in the late 1960s, Spectrum specialized in products for early childhood educators and mathematics teachers in particular. Spectrum has business links to Nasco, a major catalogue distributor in the United States and through this connection they now offer a wide range of products through seven catalogues for teachers of many subject areas.

50 Pony Drive, Newmarket, ON, L3Y 7B6
www.spectrumed.com
800-668-0600

Tree House Press

Trees House Press publishes workbooks, books and teacher guides under the following categories: Assessment And Evaluation; Career Education; Mathematics; Ontario Grade 10 Literacy Testing; Oral And Visual Communication; Reading And Literature; Spelling and Writing.

The mathematics workbooks have been written by Julian D'Angela, George Fawcett and Paul Lessard. Their experience as classroom teachers and consultants has enabled them to create teacher friendly materials that address the needs of the reluctant learner, particularly young boys.

110 Lancing Drive, Unit 2, Hamilton, ON, L8W 3A1
www.treehousepress.com
800-776-8733

Mathematics posters for your classroom

Posters in the London Underground

During World Mathematical Year 2000, a set of posters designed at the Isaac Newton Institute for Mathematical Sciences were displayed month by month in the London Underground. The posters are stunning and they will bring to your students a new and richer appreciation for mathematics.

Isaac Newton Institute for Mathematical Sciences
http://www.newton.cam.ac.uk/wmy2kposters/

Multicultural posters for math classrooms

There are 16 posters in this series that celebrate and showcase the math of China, Japan, the Maya, Africa, the Navajo, Arabia, Europe, India, Russia, Korea, the United States, Egypt, Ireland, the Aztecs, Babylon and the Inca. They also have available posters dealing with quilts and origami.

Key Curriculum Press
http://www.keypress.com/catalog/products/posters/

Illusion and Math posters

The posters available from this company are highly creative. The combination of optical illusions and mathematics will grab the attention of anyone.

Archimedes' Laboratory
http://www.cafepress.com/mariejo2/221806

Can You See the Math? table-top posters

These unique posters have been designed so that pattern blocks and dominoes fit perfectly on them. This design allows elementary students to work directly on them and display solutions to problems from accompanying workbooks. These large posters are very colourful and each one comes with a teacher guide.

Tree House Press
110 Lancing Drive, Unit 2, Hamilton, ON, L8W 3A1
www.treehousepress.com
800-776-8733

Computer software

Cabri Geometry

This dynamic geometry software was developed in France. It is powerful and incredibly easy to use. Cabri can be used to teach many mathematical topics beyond geometry. Visit their website for details about support materials for teachers.

Cabrilog: Innovative Math Tools, France
http://www.cabri.com/web/nsite/html/home.html

Computer Algebra Systems (CAS)
Derive, Maple and Mathematica

These three pieces of software can be used to perform literally every basic algebraic skill taught at the secondary level along with all of the basic skills of the differential and integral Calculus. These days all three are commonly said to make use of a computer algebra system (CAS) to obtain exact algebraic results. Using CAS, it is possible to calculate the exact value of say 1000!, it is possible to expand say $(x + 1)^{100}$ and it is possible to differentiate say $\frac{e^x \sin x}{x^5}$. CAS can also be used to work with matrices and graph functions in two and three dimensions.

Derive 6
Texas Instruments, USA
http://education.ti.com/us/product/software/tii/features/features.html

Maple 9.5
Maplesoft, a division of Waterloo Maple, Canada
http://www.maplesoft.com/

Mathematica 5
Wolfram Research, USA
http://www.wolfram.com/

Fathom

Teachers and students can use Fathom to explore data, plot functions, and create animated simulations. Users can type in their own data, they can also access hundreds of data files that come with Fathom and they can import data from text files or directly from the Internet.

Key Curriculum Press, USA
www.keypress.com/fathom

The Geometer's Sketchpad

When this software first came out it was primarily used for teaching geometry. New features have been added in recent versions and these days the software is being heavily used to teach concepts in algebra and Calculus and even topics from the elementary level such as hundreds charts and much more.

Key Curriculum publishes numerous resource books for teachers and students to support the use of Sketchpad. They also run conferences on the use of Sketchpad in the summer. Visit their website for details.

Key Curriculum Press, USA
www.keypress.com/sketchpad

Halomda Mathematics and Physics Software

Halomda has specialized in software for physics and mathematics teachers. Their software is excellent and very easy to use. It can be used to teach an incredibly wide range of topics, from fractions to Calculus.

Halomda Educational Software, Israel
http://www.halomda.com

Mathematix, Pythagoras, Math Solver and Math Editor

Dalin has created a vast collection of excellent software for all grade levels. The software can be used to teach geometry, algebra, statistics, calculus and more. Dalin is currently offering teachers free and unlimited use of the software for six months.

Dalin Educational Software Publishing, Israel
http://www.mathematix.com

Math Type

Math Type is the most popular software used by math teachers and students to create mathematical expressions. The software is very easy to use and once typed, the mathematical expressions can be pasted into any word processor.

Design Science
http://www.mathtype.com

$$(\sin x)^3 + (\cos x)^3$$

$$= \frac{\sqrt{13}\sin\left(x + \tan^{-1}\left(\frac{2}{3}\right)\right) + \sqrt{2}\cos\left(3x + \frac{\pi}{4}\right) + \cos x}{4}$$

a sample of what can be typed with Math Type

SimCalc software for computers and graphing calculators

SimCalc is a partnership between the University of Massachusetts Dartmouth and the NSF-funded SimCalc Project. Jim Kaput, a professor at U Mass, created the SimCalc Project, initially as a research project that eventually lead to the development of software for computers and graphing calculators. The software is available for Mac and PC users and only for graphing calculators from Texas Instruments.

The mission of SimCalc is to provide students from grade 6 and up with early access to powerful mathematics through the study of change. This is accomplished through activities that involve a number of wonderful animations. Visit their website for details.

SimCalc Technologies http://www.simcalc.com/
SimCalc Project http://www.simcalc.umassd.edu
Jim Kaput, Department of Mathematics, jkaput@UMassD.Edu

TI Connect and TI Connectivity Cable

TI Connect software, available for Mac and PC users, allows teachers and students to transfer files between a graphing calculator and a computer. Users can also obtain screen shots from their graphing calculators and then paste the image into a word processor. In addition to the software which is available for free from the TI website, users will also need a TI Connectivity Cable. In Canada the cable can be purchased form Grand and Toy and Business Depot/Staples. Outside of Canada, consult the TI website for a list of stores where the cable can be bought.

Texas Instruments, USA
http://education.ti.com/us/product/accessory/connectivity/features/features.html

TI InterActive!

TI InterActive! is an all-in-one piece of software that consists of a word processor, a spreadsheet, a graphing utility, an Internet browser, software for typing mathematical expressions and a symbolic manipulator. The software can be used to interface with all of TI's graphing calculators and data collection devices.

Texas Instruments, USA
http://education.ti.com/us/product/software/tii/features/features.html

TI Navigator Classroom Learning System

Navigator is a wireless system that allows teachers to communicate with all of the graphing calculators in their classroom all at the same time or individually. Teachers can send and receive from files using their computer. Multiple choice and free response tests can be created, transferred, retrieved and marked using Navigator. Data files, programs and Apps can also be transferred. Information about how teachers are using Navigator along with resource documents can be found at the TI website.

Texas Instruments, USA
http://education.ti.com/us/product/tech/navigator/features/features.html

Understanding Mathematics

Neufeld has produced superb software for mathematics teachers at the elementary and secondary levels. Their software is engaging, easy to use and very supportive of students as they learn new material. The software can be used to teach topics from algebra, exponents, graphing, measurement and geometry, probability, equations, fractions, integers, percent.

Neufeld Learning Systems, Canada
http://www.neufeldmath.com

Handheld technology

Texas Instruments http://education.ti.com

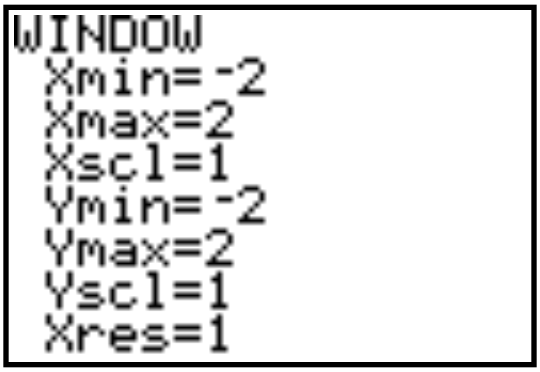
For the past two decades, Texas Instruments has dominated the world-wide market for handheld devices such as basic calculators, graphing calculators with keyboards and data collection devices.

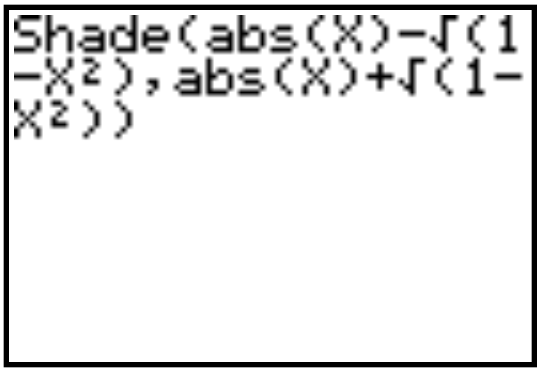
At the elementary level, teachers and their students use the following models: The Math Mate, The Math Explorer, The TI10 and the TI15 Explorer. At the middle school level, the TI73 Plus is fast becoming the calculator of choice.

High school teachers and their students mainly use the TI83 Plus graphing calculator, although growing numbers are using the TI89. Texas Instruments recently introduced the TI84 Plus which will eventually replace the TI83. The TI84 is very similar to the TI83 but there are several major differences including a clock and a USB port. The TI89 has CAS (Computer Algebra System) and it can be used to manipulate algebraic expressions and determine derivatives and integrals.

The TI83, TI73, TI89 and TI84 all have flash memory and their operating systems can be upgraded via the Internet using TI Connect software (for information see the section on software)

Apps (Applications) are also available for these graphing calculators. For a complete listing of available Apps visit the TI website. Data collection devices and scientific probes are also available and this equipment is being used by math and science teachers.







Vernier Software & Technology
http://vernier.com/

Since 1981 Vernier has been a world leader in the development of data collection tools and sensors. In the beginning the use of a computer was an essential component to collecting data. Today all of Vernier's equipment can still be used in conjunction with a computer (Mac or PC) but many teachers are now using a graphing calculator instead of a computer. Vernier and Texas Instruments have developed applications that make it possible for teachers and students to connect their TI83s to a data collection tool which in turn is connected to a sensor. Vernier currently manufacturers over 40 sensors, many of which are very low in cost and can be used by both science and mathematics teachers. Visit the Vernier website for more information.

Graphing calculator books

Brendan Kelly Publishing

Brendan Kelly is the leading publisher of books on graphing calculators (books are available for the TI83 Plus and the TI89). Kelly has also published other books including an outstanding series for middle school teachers that is closely aligned with the NCTM Standards.

Books available from Brendan Kelly include the following:

Functions with the TI-83 Plus & TI-83 Plus 83
Algebra with the TI-83 Plus & TI-83 Plus 83
Statistics with the TI-83 Plus & TI-83 Plus 83
Advanced Algebra with the TI-89
Statistics with the TI-89
Calculus with the TI-89

Authentic Learning Activities in Middle School Mathematics

Book 1	Number and Operation
Book 2	Measurement
Book 3	Patterns, Functions and Algebra
Book 4	Data Analysis, Statistics and Probability
Book 5	Geometry and Spatial Sense

Brendan Kelly Publishing, Burlington, Ontario, Canada
http://www.brendankellypublishing.com
mail@brendankellypublishing.com
905-335-3359

Websites for mathematics teachers

The number of websites for mathematics teachers at any level is approaching infinity. The following list contains a small selection of websites that I have found to be useful. Additional sites can of course be obtained via Google using keywords such as mathematics, projects, activities, puzzles and so on.

Activities from the Shodor Education Foundation
http://www.shodor.org/interactivate/activities/

This website contains a wealth of activities and Java Applets for teaching mathematics at the elementary and secondary levels. The material is organized in these sections: Number and Operation Concepts; Geometry and Measurement Concepts; Function and Algebra Concepts; Probability and Data Analysis Concepts.

Ask Dr. Math
http://mathforum.org/dr.math/

Websites do not get much better than this one. The information posted here is incredibly rich and very helpful to mathematics teachers at all levels. I particularly like the Selected Answers to Common Questions section. The discussions are wonderful and there is something here for every mathematics teacher.

When you visit the Dr. Math website be sure to read about the three wonderful books that have been written by the staff of the Math Forum. These books are particularly useful for new teachers. The names of the three books are Dr. Math Gets You Ready for Algebra; Dr. Math Explains Algebra and Dr. Math Introduces Geometry.

Dr. Math is hosted by the Math Forum and you should make sure that you visit their site located at http://mathforum.org/ Click on the link for Discussions to obtain a rich collection of strategies for and thoughts about teaching various mathematics topics.

Awesome Library - Elementary, Middle and High School Math
http://www.awesomelibrary.org/Classroom/Mathematics/Mathematics.html

This website contains an excellent list of websites for mathematics teachers at all levels.

Classroom Activities for elementary and secondary mathematics using The Geometer's Sketchpad
http://www.keypress.com/sketchpad/general_resources/classroom_activities/index.php

The Geometer's Sketchpad (see the section on software in this document) started off as a great too for teaching geometry at the secondary level. As visitors to this website will quickly see, the software is now being used to teach many other mathematical topics including those at the elementary level. No matter what grade level you teach, be sure to look at the Sketchpad Activities for Young Learners: Grades 3-5. Your students will love working with these files.

Education in Physics and Mathematics: Welcome to Zona Land
http://id.mind.net/~zona/mmts/mmts.html

This website will help your students visualize a wide range of mathematical topics. It will also help students develop a solid background in the words used in mathematics.

Elementary Geometry Mathematics
http://www.bcps.org/offices/lis/curric/elem/elemgeo.html

Mathematical activities for students in grades 1-5 are posted at this website. Be sure to follow the origami links and learn how to make a dollar bill valentine.

Geometry Junkyard by David Eppstein
http://www.ics.uci.edu/~eppstein/junkyard/

David Eppstein has put together a massive collection of highly interesting material related to geometry. The site is a geometrical gold mine not a junkyard.

Hands-on Math: Activities for the Elementary Classroom
http://www.dpgraph.com/janine/mathpage/handson.html

This website contains a collection of excellent lesson plans and activities developed by a teacher. The material involves geometry, number patterns and topology.

High School Mathematics
http://wneo.org/hotlists/highschoolmathematics.htm

The content of this website is organized under the following categories: Basic Skills, General Topics; High School Topics (Algebra, Geometry, Trigonometry, Calculus); History of Mathematics; Hotlists; Measurement; Organizations, Puzzles, Games, and Problems; Spreadsheets; Statistics and Teacher Resources.

isbn.nu search for books
http://www.isbn.nu/sisbn/mathematics%20study%20teaching%20elementary

The isbn.nu website can be used for search for mathematics books at all levels. This is a terrific way of finding the names of books that are not well know.

Jim Loy's Mathematics Page
http://www.jimloy.com/math/math.htm

Jim Loy has created one of the very best websites for teachers. At his site you will find hundreds of links to other websites. These links lead to fascinating material that is not well known. The links are organized under the following categories: Algebra; Geometry; Calculus and Pre-Calculus; Arithmetic, Roman Numerals; Calendars; Number Theory; Fractals & Chaos; Other Topics; Book Reviews; Other Links

Mathematics Archives K-12 Internet Sites
http://archives.math.utk.edu/k12.html

The Internet sites posted at this website are organized by the following categories: Lesson Plans; Software; Topics in Mathematics; Contests and Competitions; Professional Societies and Other

MEGA-Mathematics!
http://www.c3.lanl.gov/mega-math/

Teachers and students at the elementary and secondary level will enjoy the activities posted at this site. Be sure to visit Hotel Infinity!

Middle School and Elementary Mathematics
http://wneo.org/hotlists/msandelemmath.htm

The content of this website is organized under the following categories: Flash Cards, Games, Activities; General Topics; History of Mathematics; Hotlists; Measurement and Geometry; Money; Puzzles and Problems; Spreadsheets and Teacher Resources

Middle School Mathematics Websites
http://www.itrc.ucf.edu/mssites/math.html

This website contains links to a large number of other sites. The links are organized in an easy to use format.

Nick's Mathematical Puzzles
http://www.qbyte.org/puzzles/

This website contains a collection of lovely puzzles, some old, some new and many not well known. The puzzles are related to geometry, probability, number theory, algebra, calculus, trigonometry, and logic. Nick continues to post new puzzles on a regular basis.

Visualization of Elementary Math
http://www2.dsu.nodak.edu/users/edkluk/public_html/ViElMath/ViElMath.html

This website contains easy to use applets created to help students develop a better understanding meanings of elementary math operations.

Online mathematics columns

Mathematics Association of America
http://www.maa.org/

The homepage of the Mathematical Association of America has links that lead to a number of wonderful online mathematics columns (see the list below). The content of these columns covers a wide range of grade levels and all teachers will be able to find something that they can use with their students. Past issues for each column are archived and available for teachers to freely use.

The columns by Ivars Peterson will delight and amaze teachers and students. His writing style is engaging and accessible to the average reader. The Cut the Knot by Alex Bogomolny column will literally take your breath away. Additional material by Bogomolny can be found at http://www.cut-the-knot.org/front.shtml

Ivars Peterson's Math Trek from Science News
Devlin's Angle by Keith Devlin
Cut the Knot by Alex Bogomolny
Math Games by Ed Pegg Jr.
How Euler Did It by Ed Sandifer
Math News from Science News
Ivars Peterson's Math Muse from Science News for Kids

Mathematical Sciences Digital Library
http://www.mathdl.org/jsp/index.jsp

The Mathematical Sciences Digital Library provides online resources for teachers and students. Resources include an online journal about the history of mathematics; Java Applets and tools and learning materials that can be used to teach concepts. This material is available through the following sections.

Convergence
Journal of Online Mathematics and its Applications (JOMA)
Digital Classroom Resources
Osslets

Videos

The Films of Charles and Ray Eames

For many years I have used the film Powers of Ten and the accompanying book when I am teaching exponents. This engaging film was created by Charles and Ray Eames a husband-wife team famous for their highly innovative designs and inventions. In all they created over 75 films some of which involve mathematics. In Volume 2 of this series you will find Powers of Ten and Volume 4 contains a series of short films called the IBM Mathematics Peep Shows.

For more information about this couple I would recommend that you buy the book Eames Design, The Work of the Office of Charles and Ray Eames. I have this book in my Library and I love looking at their creative designs, many of which are related to mathematics. I also have their House of Cards and my students enjoy creating structures from these interlocking cards. I bought this book, the cards and the videos from the San Francisco Museum of Modern Art (www.sfmoma.org). SFMOMA bought the contents of the office used by Charles and Ray Eames after Ray died and from time to time they display items from the collection.

The Boston Museum of Science has a permanent display of the works of Charles and Ray Eames called Mathematica and my favourite part is a train that runs around a Moebius strip.

Information about Charles and Ray Eames be found at www.eamesoffice.com

The Films of Charles and Ray Eames, Volumes 1, 2, 3 and 4, Pyramid Home Video 1-800-421-2304

Powers of Ten, Philip and Phyllis Morrison and the Office of Charles and Ray Eames Scientific American Library, ISBN 0-7167-6003-7

Eames Design, The Work of the Office of Charles and Ray Eames Harry N. Abrams, ISBN 0-8109-0879-4

The Fantastic World of M. C. Escher

Escher is of course very well known for his fantastic works of art and I would imagine that most math teachers are familiar with his unique tesselations. This video will give you and your students some insight into the world of Escher and is quite informative. In addition to this video I highly recommend the book Visions of Symmetry - M. C. Escher.

The Fantastic World of M. C. Escher, Distributed exclusively by Atlas Videos Inc. ISBN 1-56938--051-1

Visions of Symmetry - M. C. Escher, Doris Schattschneider W. H. Freeman, ISBN 0-7167-2126-0

Mathematics videos from the Foundation for Advancements in Science and Education

This organization has produced a number of award-winning videos that can be used with students or for staff development purposes. Support material is available for each video. A partial list of the videos created to date is given below.

The Eddie Files (grades 3-6)
The Kay Toliver Files (grades 3-6)
Futures with Jaime Escalante (grades 9-12)
Interactions: Real Math-Real Careers (grades 6-9)
Teacher Talk
Good Morning Miss Toliver
Math: Who Needs It?!

Foundation for Advancements in Science and Education
4801 Wilshire Boulevard, Suite 215, Los Angeles, CA 90010
http://www.fasenet.org/
323-937-9911

The Proof

This is a wonderful video that tells the fascinating story of how Andrew Wiles developed a proof of Fermat's Last Theorem, a result that has taken over 300 years to resolve. The video captures the highs and lows that Wiles experienced as he developed his proof.

http://shop.wgbh.org/WGBH/
Item WG2414, UPC 783421275737, ISBN 1-578070-72-41
http://www.pbs.org/wgbh/nova/proof/

Project MATHEMATICS!

Project Mathematics! has produced a number of award-winning videos that are well worth owning. A partial list of the videos that have been created is given below. Excellent workbooks are available for each video at a low cost.

The Theorem of Pythagoras
The Story of Pi
Similarity
Polynomials
Sines and Cosines Part 1 (Periodic Functions)
Sines and Cosines Part 2 (Trigonometry)
Sines and Cosines Part 3 (Addition Formulas)
Sines and Cosines Part 4 (Angles and Slope)
The Tunnel of Samos
Teachers Workshop
Project Mathematics! Contest

Project MATHEMATICS!
California Institute of Technology, Pasadena, California
www.projmath.caltech.edu
800-541-2665

Games for the classroom

When my students are ahead of the rest of the class or in need of a break I allow them to play a game or solve some puzzles. I have quite a large collection of games in my room but by far the three most popular ones have been SET, Abalone and Rush Hour: A Traffic Jam Puzzle. These games are outstanding and they can be connected to the curriculum if so desired. I generally have about half a dozen of each on hand at anytime which allows me to have enough games for students who come to my room during lunch time.

SET is a card game that involves finding groups of three cards that satisfy certain criteria. The makers of SET have posted materials for mathematics teachers at their website along with a daily puzzle that can be completed on-line without a set of cards.

Abalone is played on a hexagonal board and the game involves moving balls according to a simple set of rules.

Rush Hour is a wonderful sliding block puzzle with a twist. Instead of numbered tiles, the puzzle comes with short and long cars that need to be moved around in order to free a particular car. The mathematical analysis of sliding block puzzles is very interesting and is a natural topic for any Finite Mathematics course.

SET
www.setgame.com

Abalone
http://users.skynet.be/glu/abalone.htm
http://www.clickhere.nl/abalone/

Rush Hour
www.puzzles.com
http://education.puzzles.com/plans/rushhourguide.pdf

On-line version of Rush Hour (not connected to the makers of Rush Hour)
http://colbycc.edu/www/math/rushhour/title.htm

Books about games

The Mathematics of Games, John Beasley
Oxford University Press, ISBN 0-19-286107-7

Oval Track and other permutation puzzles (software included), John O. Kiltinen
Mathematical Association of America, ISBN 0-88385-725-1
www.maa.org

Play Marbles!, Shar Levine and Vicki Scudamore
Sterling Publishing. ISBN 1-4027-1108-5

Mathematical Solitaires and Games, Edited by Benjamin Schwartz
Baywood Publishing, ISBN 0-89503-017-9

Your Move: Logic, Math and Word Puzzles for Enthusiasts, David L. Silverman
Dover Books, 0-486-26731-8

Books with collections of problems and activities

You will not be disappointed with these books. They are well worth buying and will give you a life long supply of good material.

The Math Kit is an extraordinary collection of pop-ups, interactive mechanics, pullouts and other cool stuff. I often show the Kit to parents and suggest they buy this kit as a gift for their child.

Toys and Tales With Everyday Materials will show you and your students how to make a number of dynamic toys from different parts of India. What a lovely book!

Math and Science Across Cultures, Maurice Bazin, Modesto Tamez and the Exploratorium Teacher Institute
The New Press, ISBN 1-56584-541-2

Mathematical Activities - A Resource Book for Teachers, Brian Bolt
Cambridge University Press, ISBN 0-521-28518-6

Mathematical FunFair, Brian Bolt
Cambridge University Press, ISBN 0-521-37743-9

The Amazing Mathematical Amusement Arcade, Brian Bolt
Cambridge University Press, ISBN 0-521-26980-6

What's Your Game - A Resource Book for Mathematical Activities, Michael Cornelius and Alan Parr
Cambridge University Press, ISBN 0-521-38625-X

Toys and Tales With Everyday Materials, Sudarshan Khanna, Gita Wolf and Anushka Ravishankar
Tara Publishing and the National Institute of Design, ISBN 81-86211-42-X

The Math Explorer: Games and Activities for Middle School Youth Groups, Pat Murphy, Lori Lambertson, Pearl Tessler and the Explorartorium Staff
Key Curriculum Press, ISBN 1-55953-540-7

Triangles: Shapes in Math, Science and Nature, Catherine Sheldrick Ross
Kids Can Press, ISBN 1-55074-194-2

Solve This: Math Activities for Students and Clubs, James Tanton
Mathematical Association of America, ISBN 0-88385-717-0
www.maa.org

The Math Kit: A Three-Dimensional Tour Through Mathematics, Ron van der Meer and Bob Gardner
Charles Scribner's Sons, ISBN 0-02-621535-7

Beautiful books about mathematics

All of these books have been important to me at various times throughout my teaching career. I rank Mathematics: A Human Endeavor right up there with my books by Martin Gardner.

I have found the three books by Eli Maor to be very useful and on several occasions I used his book e The Story of a Number as a textbook for my Calculus course. Maor tends to include historical information in his books and it is a pity that students learn so little about the history of mathematics. His books can help remedy this situation.

Symmetry: A Unifying Concept is a beautiful book and it contains hundreds of photographs of symmetry taken by two photographers in countries throughout the world. The accompanying text material is well written and describes every form of symmetry imaginable.

Mathematics and Optimal Form is a great resource book to have on hand when dealing with optimization problems (max/min problems) and it too is a beautiful book. Speaking of max/min problems, the book When Least is Best is a must-have-book for every high school mathematics teacher.

Taxi Cab Geometry is really cool and it looks at what happens when we measure the distance between two points by making use of the path that a cab would travel to go from one point to the other. Neat!

In Code was written by Sarah Flannery, a young woman from Ireland, who recently become famous for her science fair project on encryption methods and cryptography. Sarah won a number of major prizes at Science Fairs in Europe and the United States. In the book Sarah writes about her project and she gives a very good explanation of the methods used to encrypt data. The best part of the book however is Sarah's discussion of how and why she became interested in mathematics. Sarah tells the story of how from an early age her father, David Flannery, wrote puzzles on a blackboard that was hung on a kitchen wall. Many of these puzzles appear in the book and Sarah has included a good discussion of each puzzle along with solutions written in her own voice.

The Number Devil is a lovely book with great art work. Readers will learn a great deal of mathematics from this enjoyable book. The story line is quite simple, but very engaging and funny. A young boy begins to have regular visits from the Number Devil while he sleeps. The Number Devil teaches him an incredible amount of mathematics at the middle and high school level.

Mathematical People, Profiles and Interviews, Donald J. Albers and G. L. Alexanderson, Editors
Birkhauser Publishing, ISBN 0-8176-3191-7

Mathematical Mysteries - The Beauty and Magic of Numbers, Calvin C. Clawson
Plenum Press, ISBN 0-306-45404-1

Mathematics The Science of Patterns, Keith Devlin
W. H. Freeman and Company, ISBN 0-7167-6022-3

All The Math That's Fit to Print - Articles from the Manchester Guardian, Keith Devlin
Mathematical Association of America, ISBN 0-88385-515-1
www.maa.org

The Number Devil, A Mathematical Adventure, Hans Magnus Enzensberger
Metropolitan Books, ISBN 0-8050-5770-6

In Code, Sarah and David Flannery
Workman Publishing, ISBN 0-7611-2384-9

the 85 ways to tie a tie, Thomas Fink and Yong Mao
Fourth Estate, ISBN 1-84115-568-3

Symmetry: A Unifying Concept, István and Magdolna Hargittai
Shelter Publications, ISBN 0-89815-590-8

Mathematics and Optimal Form, Stefan Hildebrandt and Anthony Tromba
W. H. Freeman and Company, ISBN 0-7167-5009-0

Mathematics: A Human Endeavor, Harold Jacobs
W. H. Freeman and Company, ISBN 0-7167-2426-X

Taxi Cab Geometry, Eugene S. Krause
Dover Publications, ISBN 0-486-25202-7

To Infinity and Beyond - A Cultural History of the Infinite, Eli Maor
Princeton University Press, ISBN 0-691-02511-8

e The Story of a Number, Eli Maor
Princeton University Press, ISBN 0-691-03390-0

Trigonometric Delights, Eli Maor
Princeton University Press, ISBN 0-691-05754-0

Curve Stitching, Jon Millington
Tarquin Publications, ISBN 0-906212-65-0

When Least is Best, Paul J. Nahin
Princeton University Press, ISBN 0-691-07078-4

The Jungles of Randomness: A Mathematical Safari, Ivars Peterson
Wiley, ISBN 0-471-29587-6

Fragments of Infinity: A Kaleidescope of Math and Art, Ivars Peterson
Wiley, ISBN 0-471-16558-1

Innumeracy: Mathematical Illiteracy and its Consequences, John Allen Paulos
Vintage, 0-679-72601-2

A Mathematician Reads the Newspaper, John Allen Paulos
Basic Books, ISBN 0-465-04362-3

The Golden Section and Related Curiosa, Garth E. Runion
Dale Seymour Publications, ISBN 0-8665-1510-0

The Most Beautiful Mathematical Formulas, Lionel Salem, Frédérick Testard and Coralie Salem
John Wiley & Sons, ISBN 0-471-55276-3

The Music of the Primes, Marcus du Sautoy
Harper Collins, ISBN 0-06-621070-4

Strength in Numbers - Discovering the Joy and Power of Mathematics in Everyday Life, Sherman K. Stein
John Wiley and Sons, ISBN 0-471-32974-6

The Penguin Dictionary of Curious and Interesting Mathematics, David Wells
Penguin Books, ISBN 014-02-3603-1

Books about geometry

Any students or teacher wanting to improve their knowledge in geometry would do well to obtain a copy of the book by Weeks and Adkins. Geometry books do not get much better than this. Equally outstanding is the book by Harold Jacobs. The book by Wells is a dictionary of terms from geometry.

A Course in Geometry Plane and Solid, Arthur W. Weeks and Jackson B. Adkins
Bates Pub Company, ISBN 1-8817-6406-0

The Penguin Dictionary of Curious and Interesting Geometry, David Wells
Penguin Books, ISBN 014-01-1813-6

Geometry, Harold R. Jacobs
W. H. Freeman, ISBN 0-7167-0456-0

Mathematics dictionaries, books and websites that contain definitions and origins of words

The following books are outstanding references and they should be in the library of every mathematics teacher.

Mathematics Dictionary, James and James
Van Nostrand Reinhold, ISBN 0-442-24091-0

The Words of Mathematics - An Etymological Dictionary of Mathematical Terms Used in English, Steven Schwartzman
Mathematical Association of America, ISBN 0-88385-511-9
www.maa.org

Mathwords
http://www.mathwords.com

A book about stamps and math

There are many countries around the world where mathematics is so highly valued that it is commonplace to find stamps issued with mathematical themes and references. If you have not started a collection, you might want to begin one that contains stamps of this nature. Or you could have your students seek out these stamps. The book Stamping Through Mathematics contains an amazing collection of math related stamps. The book will give you a lovely way of bringing more aspects of the history of mathematics into your classes.

Stamping Through Mathematics, Robin J. Wilson
Springer-Verlag, ISBN 0-387-98949-8

Books about women and men who love and use mathematics

She Does Math! contains the career histories of 38 professional women and math problems supplied by them. This book should be in the library of every math teacher because it provides strong female role models mixed in with highly engaging real-life problems. The material in this book tends to be at the middle and high school level. The book Women and Numbers also has profiles of women along with plenty of activities for students. It is suitable for students in elementary school.

Mathematical People is one of my favourite books. The book consists of in-depth interviews with living mathematicians. The question and answer format used throughout the book works very well and readers are given a true sense for why some people devote their lives to mathematics. The people interviewed in the book are passionate about mathematics and they have lead lives that will interest you and your students. The list of people interviewed includes John Conway, H. S. M. Coxeter, Persi Diaconis, Paul Erdos, Martin Gardner, Ronald Graham, Paul Halmos and Henry Pollack.

The Man Who Loved Only Numbers and My Brain is Open both tell the life story of Paul Erdos, one of the greatest mathematicians of the last century. Erdos posed and solved thousands of problems in number theory and other areas and founded the field of discrete mathematics. Go to http://www.maa.org/features/erdos.html for information about Erdos.

Mathematical People, Profiles and Interviews, Edited by Donald J. Albers and G. L. Alexanderson
Birkhauser Publishing, ISBN 0-8176-3191-7

The Man Who Loved Only Numbers: The Story of Paul Erdos and the Search for Mathematical Truth, Paul Hoffman
Hyperion, ISBN 0-7868-6362-5

She Does Math!, Marla Parker, Editor
Mathematical Association of America, ISBN 0-88385-702-2
www.maa.org

Women and Numbers, Teri Perl
Wide World Publishing/Tetra, ISBN 0-933174-87-X

My Brain Is Open: The Mathematical Journeys of Paul Erdos, Bruce Schecter
Sagebrush Education Resources, ISBN: 0613263073

Books for young children

I became acquainted with many of the books in this section from three wonderful educators, Carly Zinuik, Diane Devine and Diane Linder Berman. Carly is an outstanding mathematics teacher at the Bishop Strachan School in Toronto and is well known for the innovative ways in which she uses literature, technology and manipulatives with her middle and high school students. Diane Devine teaches elementary mathematics at Beachmount School in Revere, Massachusetts. She is a popular and engaging speaker at national conferences in the United States on a wide range of topics and is highly regarded for her ability to work with teachers. Diane Linder Berman was a creative and passionate mathematics teacher at the Trinity School in Manhattan. She is currently looking after her own children and teaching a course on connecting children's literature with mathematics at Queens College in New York City.

I really like the book G is for Googol. It contains mathematical material for every letter of the alphabet and every grade level. The list of chapters includes F is for Fibonnaci, M is for the Mobius Strip, R is for Rhombicosidodecahedron and W is for "When are we ever gonna use this stuff, anyway?". Making Faces is a perfect book for introducing students young and old to permutations and combinations. The publishers of the book claim that by mixing up the pages it is possible to make more than 65,000 faces. Using some simple counting techniques students can verify if this claim is in fact true and if it is, how long it would take to view every possible face.

One Grain of Rice is a gorgeous book to read to your students while they are learning about exponents and exponential growth. It tells the story of a young girl named Rani who after doing a good deed for the raja is invited to choose her own award. Rani asks for just one grain of rice, doubled every day for 30 days. Through the use of exquisitely detailed art, the author illustrates that Rani eventually ends up with more than a billion grains of rice.

Anno's Mysterious Multiplying Jar, Masaichiro Anno and Mitsumasa Anno
Philomel Books, ISBN 0-3992-0951-4

The Greedy Triangle, Marilyn Burns
Scholastic Press, ISBN 0-590-48991-7

Mrs. McTats and her Houseful of Cats, Alyssa Satin Capucilli
Aladdin Paperbacks, ISBN 0-689-86991-6

One Grain of Rice - A Mathematical Folktale, Demi
Scholastic Press, ISBN 0-590-93998-X

A Second Is a Hiccup, Hazel Hutchins and Kady MacDonald Denton
North Winds Press, ISBN 0-439-97400-3

The Great Divide, Dayle Ann Dodds
Candlewick Press, ISBN 0-7636-0442-9

What's Your Angle, Pythagoras?, Julie Ellis
Charlesbridge, ISBN 1-57091-150-9

The Wing on a Flea: A Book About Shapes, Ed Emberly
Little, Brown & Company, ISBN 0-316-23487-7

Mathematickles, Betsy Franco
Margaret K. McElderry Books, 0-689-84357-7

A Cloak for the Dreamer, Aileen Friedman
Scholastic Press, ISBN 0-590-48987-9

Roman Numerals I to MM, Arthur Geisert
Walter Lorraine Books, ISBN 0-618-15321-7

The Quilting Bee, Gail Gibbons
Harper Collins, ISBN 0-688-16397-1

Shapes, Shapes, Shapes, Tana Hoban
Greenwillow Books, ISBN 0-688-14740-2

So Many Circles, So Many Squares, Tana Hoban
Greenwillow Books, ISBN 0-688-15165-5

Round Buildings, Square Buildings & Buildings That Wiggle Like a Fish, Philip M. Isaacson
Alfred A. Knopf, ISBN 0-394-89382-4

Actual Size, Steve Jenkins
Houghton Mifflin Company, ISBN 0-618-37594-5

Looking Down, Steve Jenkins
Houghton Mifflin Company, ISBN 0-618-31098-3

Arithme-Tickle: An Even Number of Odd Riddle-Rhymes, J. Patrick Lewis
Harcourt, ISBN 0-15-216418-9

Making Faces, Norman Messenger
Dorling Kindersley Publishing, ISBN 1-56458-111-X

I Spy Shapes in Art, Lucy Micklethwait
Collins Picture Books, 0-00-713133-X

The Slant Book, Peter Newell
Tuttle Publishing, ISBN 0-8048-0532-6

Amanda Bean's Dream: A Mathematical Story, Cindy Neuschwander
Scholastic Press, ISBN 0-590-30012-1

Sir Cumference and the Dragon of Pi, Cindy Neuschwander
Charlesbridge, ISBN 1-57091-164-9

Sir Cumference and the Great Knight of Angleland, Cindy Neuschwander
Charlesbridge, ISBN 1-57091-169-X

Gregory and the Magic Line, Dawn Piggot
Dolphin Paperbacks, ISBN 1-84255-278-3

626 by 9, I. Sheldon Posen
Canadian Museum of Civilization, ISBN 0-660-19255-1

square, triangle, round, skinny: 4 little books, Vladimir Radunsky
Candlewick Press, ISBN 0-7636-1532-3

G is for Googol - A Math Alphabet Book, David M. Schwartz
Tricycle Press, Berkeley, California, ISBN 1-883672-58-9

On Beyond a Million: An Amazing Math Journey, David M. Schwartz
Doubleday, ISBN 0-385-32217-8

The Math Curse, Jon Scieszka and Lane Smith
Viking, ISBN 0-670-86194-4

The Art of Shapes, Margaret Steele and Cindy Estes
Los Angeles Museum of Contemporary Art, ISBN 0-914357-50-6

How Big is Big, Stephen Strauss
Key Porter Kids, ISBN 1-55263-017-X

One Monday Morning, Uri Shulevitz
A Sunburst Book, ISBN 0-374-45648-8

The Best of Times: Math Strategies that Multiply, Greg Tang
Scholastic Press, ISBN 0-439-21044-5

Grapes of Math: Mind-Stretching Math Riddles, Greg Tang
Scholastic Press, ISBN 0-439-21040-2

Math Appeal: Mind-Stretching Math Riddles, Greg Tang
Scholastic Press, ISBN 0-439-21046-1

Matherpieces: The Art of Problem-Solving, Greg Tang
Scholastic Press, ISBN 0-439-44388-1

Math Fables: Lessons that Count, Greg Tang
Scholastic Press, ISBN 0-439-45399-2

Math for all Seasons: Mind-Stretching Math Riddles, Greg Tang
Scholastic Press, ISBN 0-439-21042-9

Round is a Mooncake: A Book of Shapes, Roseanne Thong
Chronicle Books, ISBN 0-8118-2676-7

Spotted Yellow Frogs: Fold-Out Fun with Patterns, Colors, 3-D Shapes, Animals, Matthew Van Fleet
Dial Books for Young Readers, ISBN 0-8037-2350-4

Square Triangle Circle, William Wegman
Hyperion Books for Children, ISBN 0-7868-0104-2

Squarehead, Harriet Ziefert
Houghton Mifflin Company, ISBN 0-618-08378-2

Pop-Up and Flap Books

Loose Lace!: A fun tale, plus pop-up shoe and shoelace, Keith Faulkner
Back Pack Books, ISBN 0-7607-1616-1

How To Make Pop-ups, Joan Irvine
Kids can Press, ISBN 0-921103-36-0

Bow Wow: A pop-Up Book of Shapes, Chuck Murphy
Simon & Schuster, ISBN 0-689-82265-0

Slide 'N' Seek, Chuck Murphy
Simon & Schuster, ISBN 0-689-84477-8

One to Ten Pop-Up Surprises, Chuck Murphy
Simon & Schuster, ISBN 0-671-89908-2

Counting: A book with fabulous flaps, Maureen Roffey
Reader's Digest Children's Books, ISBN 0-7944-0405-7

Books about the calendar and time

Calendar Art, Leonard Everett Fisher
Four Winds Press, ISBN 0-02-735350-8

A Mathematical Look at the Calendar, Richard L. Francis
Consortium for Mathematics and Its Applications, ISSN 0889-2652
www.comap.com, (781) 862-7878

Time, Brian Knapp
Grolier Limited, ISBN 0-7172-2875-4

In The Next Three Seconds, Rowland Morgan
Hamlyn Children's Books, ISBN 0-600-58937-4

Alphabet and counting books

There is certainly an endless supply of books that can be used to help students learn the letters of the alphabet and how to count. The following books are particularly engaging.

Anno's Counting Book, Mitsumasa Anno
A Harper Trophy Book, ISBN 0-06-443123-1

los Numeros, Arianna Candell and Francesc Rovira
Barron's, ISBN 0-7641-2996-1

The Turn-Around, Upside-Down Alphabet Book, Lisa Campbell Ernst
Simon & Schuster Books for Young Readers, ISBN 0-689-85685-7

Ten Little Ladybugs, Melanie Gerth
Piggy Toes Press, ISBN 1-58117-091-2

Zoo Flakes ABC, Will C. Howell
Walker, ISBN 0-8027-8827-0

There were ten in the bed, Annie Kubler
Child's Play International Ltd., ISBN 0-85953-897-4

I Spy Two Eyes - Numbers In Art, Lucy Micklethwait
Mulberry Books, 0-68816158-8

Eight Hands Round: A Patchwork Alphabet, Ann Whitford Paul
Harper Collins, ISBN 0-06-443464-8

10, V. Radunsky
Viking, ISBN 0-670-03563-7

One is a Snail, Ten is a Crab, April Pulley Sayre and Jeff Sayre
Candlewick Press, ISBN 0-7636-1406-8

Hanukkah: A Counting Book, in English, Hebrew and Yiddish, Emily Sper
Scholastic, ISBN 0-439-28291-8

Numbers At Play, Charles Sullivan
Rizzoli, New York, ISBN 0-8478-1501-3

1 2 3, William Wegman
Hyperion Books for Children, ISBN 0-7868-0103-0

Can You Count to a Googol?, Robert Wells
Albert Whitman & Company, ISBN 0-8075-1061-0

Teeth, Tails and Tentacles, Christopher Wormell
Running Press Book Publishers, ISBN 0-7642-2100-2

Books and videos from Marilyn Burns

Marilyn Burns is known throughout the world for creating outstanding resources for teaching mathematics at the elementary school level. Information about her books and videos is posted at the site www.mathsolutions.com

The following is an exhaustive list (I was exhausted typing it) of resources currently available. Well, OK, I copied and pasted the list from the website...

About Teaching Mathematics: A K–8 Resource, Second Edition
Amanda Bean's Amazing Dream
The Book of Think
Classroom Discussions: Using Math Talk to Help Students Learn, Grades 1–6
A Cloak for the Dreamer
A Collection of Math Lessons
Complete Lessons for Algebraic Thinking Series, Grades K–8 (set of 3 books)
Complete Math, Literature, and Nonfiction Series NEW
Complete Set of 3 Fraction Books
Complete Set of 3 Month-to-Month Guides
Complete Teaching Arithmetic Series (set of 11 books)
Day-by-Day Math: Activities for Grades 3–6
Developing Number Sense, Grades 3–6
50 Problem-Solving Lessons: The Best from 10 Years of Math Solutions Newsletters
First Grade Math: A Month-to-Month Guide
Getting Your Math Message Out to Parents: A K–6 Resource
Good Questions for Math Teaching: Why Ask Them and What to Ask, K–6
The Greedy Triangle
Growing Mathematical Ideas in Kindergarten
Hello Reader! Math Books (Grades K–3)
The I Hate Mathematics! Book
It All Adds Up! Engaging 8-to-12-Year-Olds in Math Investigations
The King's Commissioners
Leading the Way: Principals and Superintendents Look at Math Instruction
Learning Math with Calculators: Activities for Grades 3–8
Lessons for Algebraic Thinking, Grades K–2
Lessons for Algebraic Thinking, Grades 3–5
Lessons for Algebraic Thinking, Grades 6–8
Marilyn Burns Talks About Math Teaching Today (audiocassettes)
The Marilyn Burns Fraction Kit
Math: Facing an American Phobia
Math and Literature, Grades K–1
Math and Literature, Grades 2–3
Math and Literature, Grades 4–6, Second Edition
Math and Literature, Grades 6–8
Math and Nonfiction, Grades K–2

Math and Nonfiction, Grades 3–5
Math By All Means: Area and Perimeter, Grades 5–6
Math By All Means: Geometry, Grades 1–2
Math By All Means: Geometry, Grades 3–4
Math By All Means: Money, Grades 1–2
Math By All Means: Probability, Grades 1–2
Math By All Means: Probability, Grades 3–4
Math for Smarty Pants
Math Homework That Counts, Grades 4–6
Math Matters: Understanding the Math You Teach, Grades K–6
Mathematics: Assessing Understanding, Grades K–6 (videotape)
Mathematics: For Middle School, Grades 6–8 (videotape)
Mathematics: Teaching for Understanding, Grades K–6 (videotape)
Mathematics: What Are You Teaching My Child? (videotape)
Mathematics: With Manipulatives, Grades K–6 (videotape)
The $1.00 Word Riddle Book
Second-Grade Math: A Month-to-Month Guide
Show and Tell: Representing and Communicating Mathematical Ideas in K–2 Classrooms
So You Have to Teach Math? Sound Advice for K–6 Teachers
Spaghetti and Meatballs for All!
Teaching Arithmetic: Lessons for Addition and Subtraction, Grades 2–3
Teaching Arithmetic: Lessons for Decimals and Percents, Grades 5–6
Teaching Arithmetic: Lessons for Extending Division, Grades 4–5
Teaching Arithmetic: Lessons for Extending Fractions, Grade 5
Teaching Arithmetic: Lessons for Extending Multiplication, Grades 4–5
Teaching Arithmetic: Lessons for First Grade
Teaching Arithmetic: Lessons for Introducing Division, Grades 3–4
Teaching Arithmetic: Lessons for Introducing Fractions, Grades 4–5
Teaching Arithmetic: Lessons for Introducing Multiplication, Grade 3
Teaching Arithmetic: Lessons for Introducing Place Value, Grade 2
Teaching Arithmetic: Lessons for Multiplying and Dividing Fractions, Grades 5–6
Third-Grade Math: A Month-to-Month Guide
Writing in Math Class: A Resource for Grades 2–8

A number of books about numbers

Two of my favourite books about numbers are the Penguin Dictionary of Curious and Interesting Numbers by David Wells and Numbers - facts, figures and fiction by Richard Phillips. Both of these books are filled with interesting properties of numbers that can be used with middle and high school students. For example, on an exponents test I have my students find the value of $1^3 + 5^3 + 3^3$. The answer turns out to be 153 and this result invites students to wonder if this is a coincidence or part of a general rule. If it is a coincidence then students can also look for other similar flukes. The Book of Numbers by William Hartson and The Guinness Book of Numbers are two other very good sources for curious and interesting information about numbers.

The Book of Numbers by John Conway is unbelievably good and it contains a wealth of information about numbers. I also like the book Think of a Number and among the sixteen chapters there is one on Hailstone Numbers and another on Numbers and National Security.

The Joy of π is a tiny book but it contains well over a hundred pages of fascinating information about π.

Joy of Pi, David Blatner
Walker and Company, ISBN 0-8027-1332-7

The Book of Numbers, John Conway and Richard Guy
Springer-Verlag, ISBN 0-387-97993-X

The Book of Numbers, William Hartston
Richard Cohen Books, ISBN 1-86066-112-2

Think of a Number, Malcolm E. Lines
Adam Hilger Publishing, ISBN 0-85274-183-9

A Number For Your Thoughts, Malcolm E. Lines
Adam Hilger Publishing, ISBN 0-85274-495-1

Numbers - facts, figures and fiction, Richard Phillips
Cambridge, ISBN 0-521-46481-1

π: A Biography of the World's Most Mysterious Number, Alfred S. Posamentier and Ingrid Lehman
Promethus Books, ISBN 1-59102-200-2

The Guinness Book of Numbers, Adrian Room
Sterling Publishing Company, ISBN 0-85112-372-4

A Friendly Introduction to Number Theory, Joseph H. Silverman
Pearson Prentice Hall, ISBN 0-13-186137-9

The Penguin Dictionary of Curious and Interesting Numbers, David Wells
Penguin Books, ISBN 0-14-026149-4

Books that involve finding numbers and letters in unintended places

My students have enjoyed searching for numbers formed by chance in architectural designs on my Math Trails. This is a great exercise is being observant and creative. The books listed below will help anyone develop this skill.

Archabet - An Architectural Alphabet is a postcard book filled with black and white photographs of hidden numbers. City by Numbers and the books by Arlene Alda are similar in nature and very good.

Arlene Alda's 1 2 3 What Do *You* See, Arlene Alda
Tricycle Press, ISBN 1-883672-71-6

Arlene Alda's A B C What Do *You* See, Arlene Alda
Tricycle Press, ISBN 1-883672-01-5

City by Numbers, Stephen T. Johnson
Viking, ISBN 0-670-87251-2

Archabet: An Architectural Alphabet, Balthazar Korab
Preservation Press, John Wiley and Sons, ISBN 0-471-14352-9

The City ABC Book, Zoran Milich
Kids Can Press, ISBN 1-55074-942-0



Finding an e with ease in San Francisco

Recreational math books

Mathematical Recreations and Essays, W. W. Rouse Ball
Dover Books, ISBN 0-486-25357-0

Recreations in the Theory of Numbers, Albert H. Beiler
Dover Books, 0-486-21096-0

Ingenuity in Mathematics, Ross Honsberger
Mathematical Association of America (www.maa.org), ISBN 0-88385-623-9

Math Chestnuts from Around the World, Ross Honsberger
Mathematical Association of America (www.maa.org), ISBN 0-88385-330-2

Mathematical Delights, Ross Honsberger
Mathematical Association of America (www.maa.org), ISBN 0-88385-314-0

Mathematical Diamonds, Ross Honsberger
Mathematical Association of America (www.maa.org), ISBN 0-88385-332-9

Mathematical Gems 1, Ross Honsberger
Mathematical Association of America (www.maa.org), ISBN 0-88385-301-9

Mathematical Gems 2, Ross Honsberger
Mathematical Association of America (www.maa.org), ISBN 0-88385-302-7

Mathematical Morsels, Ross Honsberger
Mathematical Association of America (www.maa.org), ISBN 0-88385-303-5

More Mathematical Morsels, Ross Honsberger
Mathematical Association of America (www.maa.org), ISBN 0-88385-334-5

Mathematics on Vacation, Joseph S. Madachy
Scribner, ISBN 0-684-13964-2

Mathematical Diversions, J. A. Hunter and Joseph S. Madachy
Dover Books, 0-486-23110-0

Mathematical Recreations, Maurice Kraitchhik
Dover Books, 0-486-20163-5

The Master Book of Mathematical Recreations, Fred Schuh
Dover Books, 0-486-22134-2

Mathematical Snapshots, Hugo Steinhaus
Dover Books, 0-486-40914-7

Cross out one letter so that the remaining letters (in the same order) spell out a very familiar word.

ORNELEMEATINTIENRG

Books by Martin Gardner

Martin Gardner has been at the centre of the world of recreational mathematics for almost 50 years. His writings have provided me with interesting and engaging material for my students. I don't own every book written by Gardner, but the ones that I do possess have been well used. The puzzle on the previous page is typical of the types of things you will find in his books. His material will surprise, entertain and educate your students.

The Unexpected Hanging and Other Mathematical Diversions, Martin Gardner
University of Chicago Press, ISBN 0226282562

Hexaflexagons and Other Mathematical Diversions : The First Scientific American Book of Puzzles and Games, Martin Gardner
University of Chicago Press, ISBN 0-226-28254-6

Second Scientific American Book of Mathematical Puzzles and Diversions, Martin Gardner
University of Chicago Press, ISBN 0-226-28253-8

Martin Gardner's New Mathematical Diversions from Scientific American, Martin Gardner
University of Chicago Press, ISBN 0-226-28247-3

Mathematical Magic Show, Martin Gardner
Mathematical Association of America, ISBN 0-88385-702-2
www.maa.org

Magic Numbers of Dr Matrix, Martin Gardner
Prometheus Books, ISBN 0-879-75282-3

Aha! Gotcha : Paradoxes to Puzzle and Delight, Martin Gardner
W H Freeman & Co, ISBN 0-716-71361-6

Aha! Insight, Martin Gardner
W H Freeman & Co, ISBN 0-716-71017-X

Wheels, Life, and Other Mathematical Amusements, Martin Gardner
W H Freeman & Co, ISBN 0-716-71589-9

Time Travel and Other Mathematical Bewilderments, Martin Gardner
W H Freeman & Co, ISBN 0-716-71925-8

Fractal Music, Hypercards and More: Mathematical Recreations from Scientific American Magazine, Martin Gardner
W H Freeman & Co, ISBN 0-716-72189-9

The Last Recreations: Hydras, Eggs, and Other Mathematical Mystifications, Martin Gardner
Copernicus Books, ISBN 0-387-94929-1

Puzzle books

Dover Books publishes a large number of books on puzzles and topics from recreational mathematics. Visit the Dover website located at http://store.doverpublications.com and study the books listed in the section called General and Popular Mathematics. You will find plenty of puzzle books as well as books on other interesting topics.

Tricks, Games and Puzzles With Matches, Maxey Brooke
Dover Books, 0-486-20178-3

Coin Games and Puzzles, Maxey Brooke
Dover Books, 0-486-22893-2

Amusements in Mathematics, H. E. Dudeney
Dover Books, 0-486-20473-1

Mathematical Bafflers, Angela Dunn
Dover Books, ISBN 0-486-23961-6

Second Book of Mathematical Bafflers, Angela Dunn
Dover Books, ISBN 0-486-24352-4

The Tokyo Puzzles, Kobon
Frederick Muller, ISBN 0-584-10357-3

Have Some Sums To Solve: The Compleat Alphametics Book, Steven Kahan
Baywood Publishing, 0-89503-007-1

Mathematical Puzzles of Sam Loyd, Edited by Martin Gardner
Dover Books, 0-486-20498-7

More Mathematical Puzzles of Sam Loyd, Edited by Martin Gardner
Dover Books, 0-486-20498-7

The Moscow Puzzles, Boris A. Kordemsky
Dover Books, ISBN 0-486-20709-9

Matchstick Puzzles, Tricks and Games, Gilbert Obermair
Sterling Publishing, ISBN 0-8069-8934-3

Mathematical Quickies, Charles Trigg
Dover Books, ISBN 0-486-24949-2

The Penguin Dictionary of Curious and Interesting Puzzles, David Wells
Penguin Books, ISBN 0-14-014875-2

Speaking of puzzles, here is lovely one for you to play with. To obtain the solution send a stamped self-addressed envelope along with **$7.11** to me and I will reveal the answer.

I recently bought four non-taxable items at a 7-11 store and was surprised that the total cost was $7.11! Later during the day when I got home I was astonished to find that when I multiplied the four prices together I again arrived at an answer of $7.11! What were the prices of these four items?

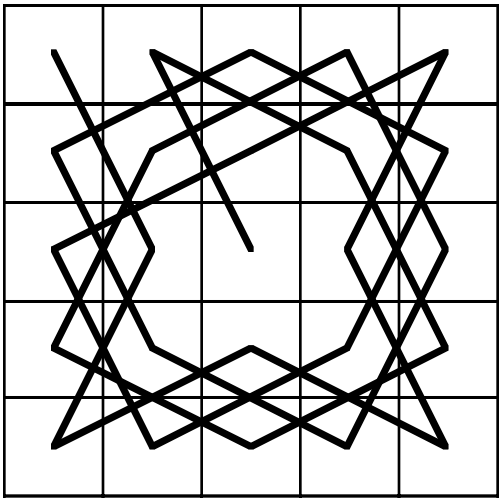
Books about mathematical chess puzzles

There are a number of engaging puzzles and problems related to the chessboard and the pieces in chess that can be used to teach concepts or as a way of providing enrichment for students. The following two books are highly recommended.

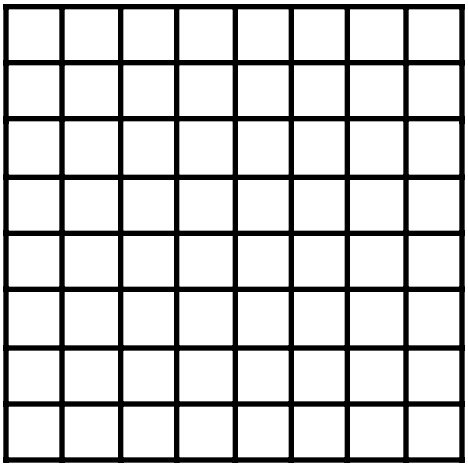
Mathematics and Chess: 110 Entertaining Problems and Solutions, Miodrag Petkovic
Dover Publications, ISBN: 0-486-29432-3

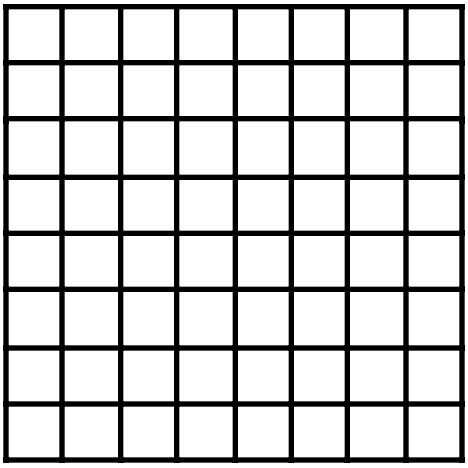
Across The Board, John J. Watkins
Princeton University Press, ISBN 0-691-11503-6

1	24	13	18	7
14	19	8	23	12
9	2	25	6	17
20	15	4	11	22
3	10	21	16	5



This is an example of a Knight's Tour on a 5 x 5 chessboard. Starting from the square in the upper left corner, a path has been laid out in which the knight has visited every square on just one occasion.





Now it is your turn! Can you make a knight's tour on an 8 x 8 chessboard?

The Rubik's Cube

The Rubik's Cube can be used to teach inverse functions and many other mathematical topics. The two books by David Singmaster contain a wealth of information that can be used in any course that involves topics from discrete mathematics.

Many books have been written that contain solutions to the cube, my favourite is the one that was written by Jeffery Varasano who at the time of writing the book was 14 years old. His solution is markedly different in that he gets all the corners in place first.

Books

Handbook of Cubik Math, Alexander H, Frey and David Singmaster
Enslow Publishers, ISBN 0-89490-058-7

Rubik's Cubik Compendium, Edited by David Singmaster
Oxford University Press. ISBN 0-19-853202-4

Jeff Conquers the Cube in 45 Seconds and You Can Too, Jeffery Varasano
Day Books, ISBN 0-8128-7097-2

Articles

Inverse Functions, Rubik's Cube and Algebra, Brian Garman
The Mathematics Teacher, January 1985

Websites

Mark Longridge is well known for his interest and passion for the Rubik's Cube. His website contains a wealth of information as well as links to other sites.

Mark Longridge's Rubik's Cube Site
http://cubeman.org/

$$\frac{3^8 \times 8! \times 2^{12} \times 12!}{12}$$
$$= 43,252,003,274,489,856,000$$

Books about magic squares

During my first year in university I became fascinated with magic squares and I learned a great deal about this topic from the books Magic Squares and Cubes by W. S. Andrews and New Recreations with Magic Squares by William H. Benson and Oswald Jacoby (bridge players will probably recognize these names). If you would like to have your students do some work on magic squares, you should consider getting a copy of the book Wonders of Magic Squares by Jim Moran. It contains a great deal of information along with questions for students and worksheets.

Magic Squares and Cubes, W. S. Andrews
Dover Publications, ISBN 0-486-20658-0

New Recreations with Magic Squares, William H. Benson and Oswald Jacoby
Dover Publications, ISBN 0-486-23236-0

Magic Cubes: New Recreations, William H. Benson and Oswald Jacoby
Dover Publications, ISBN 0-486-24140-8

Magic Squares, John Lee Fults
Open Court Publishing, ISBN 0-87548-197-3

The Wonders of Magic Squares, Jim Moran
Vintage Books, ISBN 0-394-74798-4

The Zen of Magic Squares, Circles and Stars, Clifford Pickover
Princeton University Press, ISBN 0-691-07041-5

1111	8881	8818	1188
8188	1818	1881	8111
1888	8118	8181	1811
8811	1181	1118	8888

A beautiful magic square that remains magic when held upside down or when viewed in a mirror. The magic sum is always 19,998.

Books on wordplay

There are many ways of connecting wordplay with mathematics and these resources have helped me make these connections. The book Making the Alphabet Dance by Ross Eckler is a wonderful source for wordplay along with a great deal of mathematical content that teachers of a Finite course will be able to immediately use with their students. The Anagrams Dictionary by Samuel C. Hunter is amazing and from it I learned that an anagram of my last name Lancaster is Ancestral (very fitting). The Inversions book by Scott Kim is stunning and it contains an incredible collection of unusual ways of displaying words in unconventional forms. I show my students this book when we are studying transformations. Visit the site www.scottkim.com to see samples of Kim's work.

Univers Revolved is a highly creative book that contains hundreds of images of the letters of the alphabet and numbers rotated to form three-dimensional objects. Like Scott Kim's book, this one will leave you speechless.

Eunoia is a highly creative book that can best be described an intellectual achievement of the highest order. The books opens with Chapter A and readers will find that the only vowel used in this chapter is a. Then there is Chapter E, I O, U followed by other material. Eunoia is the shortest English word that contains all five vowels and it means beautiful thinking. This would be a great book to discuss when you are teaching a lesson on say the frequency of the letters of the alphabet.

Eunoia. Christian Bok
Coach House Books, ISBN 1-55245-092-9

Making the Alphabet Dance: Recreational Wordplay, Ross Eckler
St. Martin's Press, ISBN 0-312-14032-0

Wanted Words, Jane Farrow
Stoddart, ISBN 0-7737-6175-6

Anagrams Dictionary, Samuel C. Hunter
Cassell, ISBN 0-304-34258-0

Inversions, Scott Kim
Key Curriculum Press, ISBN 0-7167-2044-2
www.keypress.com
(800) 995-MATH

Univers Revolved: A Three-Dimensional Alphabet, Ji Lee
Harry N. Abrams, ISBN 0-8109-4349-2

Word Winks: Over 300 Visual Verbal Puzzles
Mindware, ISBN 1-892069-75-X

More Word Winks: Over 300 Visual Verbal Puzzles
Mindware, ISBN 1-892069-76-8

Two beautiful anagrams for mathematics teachers

Gosh, see that triangle?	**A decimal point**
It has got three angles.	**I'm a dot in place**

A license to do math

Licence plates can be used to introduce students, even at a young age, to important mathematical concepts from the study of permutations and combinations. For states and provinces that identify their plates with a structure that involves three single digit numbers followed by three letters of the alphabet (see the example given below), a fundamental question that can be asked is how many licence plates can be made. For younger students in particular, the involvement of plates from around the world can be used to integrate geography with mathematics. The following books contain images of licence plates along with historical information about the designs that were used. The Internet can also be used to obtain information of this nature.

License Plates of the United States: A Pictorial History, James K. Fox
Interstate Directory Publishing Company, ISBN 0-9629962-5-4

License Plate Book: Current Plates of the United States and Canada, Thomson C. Murray
Interstate Directory Publishing Company, ISBN 0-9629962-9-7



Question 1

(a) If non-personalized licence plates in Ontario have the type of structure mentioned earlier, how many different plates can be issued?

(b) Find the current population of Ontario and determine if the number of possible plates is enough. If it is not enough, what other structures could be used?

(c) What famous mathematics educator owned this car? He now works for Texas Instruments.



Question 2

(a) If non-personalized licence plates in this country use a structure of a two-digit number followed by a three-digit number followed by a two-digit number, how many different plates can be issued?

(b) In what country would you find this plate?

(d) If this car were involved in an accident, why would every mathematics teacher in the world provide the police with the wrong plate number?

Using personalized licence plates to help students become more CR8IVE

Figuring out the meaning of a personalized (vanity) licence plate is a terrific exercise in creativity. The exercise is like solving a puzzle. With the increasing availability of digital cameras, teachers may want to assign their students a project that involves taking photos of personalized plates and figuring out their meaning.



My licence plate: Does this give me a licence to speed?

Books about anamorphic art

Students spend a great deal of time studying transformations and their effect on regions and curves, yet rarely do they see any dramatic results or surprises. The transformations used to form anamorphic art are wild - line segments turn into arcs of circles, arcs of circles turn into line segments and the regions become unrecognizable unless you know the secret. For many years my students have enjoyed studying this topic through the books listed below and it has given them an opportunity to make connections between art and mathematics. Additional information can be found in the article **The Secret of Anamorphic Art** by Art Johnson and Joan D. Martin in the January 1998 issue of the Mathematics Teacher.

The Magic Mirror An Antique Optical Toy
Dover Books, ISBN 0-486-23847-4

Anno's Magical ABC an anamorphic alphabet, Mitsumasa Anno and Masaichiro Anna
The Bodley Head Ltd., 0-370-30405-5

Anamorphic Art**,** Jurgis Baltrusaitis
Harry N. Abrams Inc., ISBN 0-8109-0662-7

Hidden Pictures, Linda Bolton
Dial Books, 0-8037-1378-9

Time Travels and Other Mathematical Bewilderments (Chapter 8), Martin Gardner
W. H. Freeman and Company, ISBN 0-7167-1925-8

The Magic Cylinder, Ivan Moscovich
Tarquin Publications, ISBN 0-906212-67-7

Arithmetic, Ted Rand
Harcourt Brace Jovanovich, Publishers, ISBN 0-15-203865-5

Books about origami

I really like the art of folding paper and enjoy viewing it from a mathematical perspective. Like many other teachers, I have found that it is possible to teach a great deal of mathematics, especially topics from geometry, through origami.

The books Unit Origami Multidimensional Transformations and Origami Omnibus Paper Folding for Everybody are extraordinary. The directions are for the most part pretty simple, the diagrams and photos add clarity and the final products are beautiful.

I have enjoyed making models from the Buck Book and The Guide to Hawaiian-Style Money Folds. All of the folds are done with paper money and the results are really neat.

I also belong to Origami USA, a club for paper folders. Members receive a newsletter along with an extensive listing of resources for books and origami paper. The organization also runs a conference held in Manhattan in early June.

Origami Books

Paper Capers, Jack Botermans
Henry Holt & Company (An Owl Book), ISBN 0-8050-0139-5

The Guide to Hawaiian-Style Money Folds, Jodi Fukumoto
Island Heritage, ISBN 0-89610-414-1

Origami Boxes, Tomoko Fusè
Japan Publications, ISBN 0-87040-821-6

Unit Origami Multidimensional Transformations, Tomoko Fusè
Japan Publications, ISBN 0-87040-852-6

The Origami Workshop, Gay Merrill Gross
Friedman/Fairfax Publishers, ISBN 1-56799-148-3

The Buck Book, Anne Akers Johnson
Klutz Press, ISBN 1-878257-51-X

Origami Omnibus Paper Folding for Everybody, Kunihiko Kasahara
Japan Publications, ISBN 0-87040-696-5

Amazing Origami, Kunihiko Kasahara
Sterling Publishers, 0-8069-5821-9

Complete Origami, Eric Kenneway
St. Martin's Griffin, ISBN 0-312-00898-8

Origami for Parties, Kazuo Kobayashi
Kodansha International, ISBN 4--7700-1297-7

Origami Organization

Origami USA
www.origami-usa.org

Magic resources for teachers and students

Doug Henning was huge in the 1970s and millions of people throughout the world enjoyed his unique style of magic. Through his many NBC specials and Broadway shows, he created a strong interest in magic. Many people, including myself, took up an interest in magic because of his amazing ability to entertain. For a few years I worked as a professional magician beginning with stage magic and eventually specializing in close-up magic, a form of magic that uses small objects such as cards, coins and sponge balls.

I am currently interested in magic tricks that involve mathematics, a field commonly called mathemagic. I have found these tricks to be very useful in the classroom, either as a way of explaining a concept or as a vehicle for introducing a topic. I have also used a number of magic tricks that make use of store-bought props to make a point in class.

One of the more popular workshops that I conduct is on the topic of shuffling a deck of cards and how mathematics can be used to analyze what happens to the cards as they are mixed up. One of the shuffles I discuss at length is called the Perfect or Faro Shuffle. It takes years to master but it can be used to perform some incredible card tricks. Brent Morris has written a fascinating book about this shuffle. The material is advanced, but it can be used with secondary students who are interested in mathematics or who are in need of some material that will ignite sparks of enthusiasm for mathematics. Morris is the only person in the world with a doctorate in card shuffling.

Magic organizations

International Brotherhood of Magicians
www.magician.org

Society of American Magicians
www.magicsam.com

Magic magazines

Genii Magazine
www.geniimagazine.com

Magic Magazine
www.magicmagazine.com

Magic stores

The Browser's Den of Magic, Toronto
416-783-7022

Morrisey Magic, Toronto
416-782-1393 or 888-202-2122

Louis Tannen Inc,. New York
www.tannenmagic.com

Magic Inc., Chicago
www.magicinc.net

Magic books

Self-Working Number Magic, Karl Fulves
Dover Publications, ISBN 0-486-24391-5

Self-Working Card Tricks, Karl Fulves
Dover Publications, ISBN 0-486-23334-0

More Self-Working Card Tricks, Karl Fulves
Dover Publications, ISBN 0-486-24580-2

New Self-Working Card Tricks, Karl Fulves
Dover Publications, ISBN 0-486-41371-3

Self-Working Paper Magic, Karl Fulves
Dover Publications, ISBN 0-486-24847-X

Self-Working Table Magic, Karl Fulves
Dover Publications, ISBN 0-486-24116-5

Mathematics, Magic and Mystery, Martin Gardner, Dover Publications
ISBN 0-486-20335-2

Magic Tricks, Card Shuffling and Dynamic Computer Memories, S. Brent Morris
Mathematical Association of America, ISBN 0-88385-527-5
www.maa.org

Now you see it, now you don't!, Bill Tarr
Vintage Books, ISBN 0-394-72202-7

Magic article

Ten Amazing Tricks from the Amazing Martin Gardner
Math Horizons, September 1998
Mathematical Association of America
www.maa.org

Mathematics competitions for students

Mathematics contests provide students, particularly those who are mathematically gifted, with an opportunity to improve their problem solving abilities and with exposure to mathematical ideas and content that goes beyond the standard curriculum. The website given below contains links to competitions throughout the world. Many of these competitions allow foreign students to enter and teachers may want to encourage students with an intrinsic interest in mathematics to enter them.

Links to mathematics competitions around the world
http://donut.math.toronto.edu/~naoki/math-comp.htm

Since the 1960s the University of Waterloo's Faculty of Mathematics has been a strong supporter of school mathematics activities, through the creation and organization of mathematics competitions for students in grades 7-12 along with other initiatives including workshops for teachers and students and competitions for computer science students. Students from outside of Canada are permitted and encouraged to enter the University of Waterloo competitions. For more information visit the website given below.

Centre for Education in Mathematics and Computing, Faculty of Mathematics, University of Waterloo.
http://www.cemc.uwaterloo.ca/

Mathematics camps for students

Math Camp USA/Canada

http://mathcamp.org
617-864-8887
camp@mathcamp.org

Math Camp USA/Canada is designed for mathematically talented high school students from around the world. Students with a strong background in mathematics and an intrinsic interest in the subject will thoroughly enjoy this intensive five-week-long summer program.

SummerMath: four-week program for young women

Organized by Char and Jim Morrow
summermath@mtholyoke.edu
http://www.mtholyoke.edu/proj/summermath/

SummerMath is a nationally acclaimed four-week program for young women entering ninth through twelfth grades. I first became familiar with this conference during the 1980s when three of my students from Oakville Trafalgar High School attended SummerMath. They spoke highly of the program and they particularly valued the connections they established with other young woman.

At SummerMath, students take courses on a wide range of topics, including architecture and math, origami, and robotics. Students from outside the United States are permitted and encouraged to apply to be accepted into the program.

A restaurant, coffee shop and subway station that math teachers will love

Montreal is a great city to visit and if you find yourself there while on vacation or to attend a conference, be sure to go to Cafe π. The owner loves math and sells π t-shirts and mugs. People play chess in the restaurant all day long and it is fun to either play or just watch.

When in San Francisco be sure to visit Palindrome Coffee located appropriately enough at 131 Steuart Street. The owner loves palindromes.

In Toronto, be sure to take the subway to the Downsview Station. Go inside and study the thousands of small coloured tiles on the walls throughout the station. The colours of these tiles were selected by using the decimal expansion of π. Arlene Stamp, an artist from Calgary and a former mathematics teacher, created this art work and called it Sliding Pi. This is a perfect place to take students on a field trip, especially on Pi Day (March 14).

Cafe π
4127 Boul. St. Laurent, Montreal, Quebec
514-286-4828

Palindrome: serious coffee on steuart street
131 Steuart Street, San Francisco, California
415-357-0753 (without the area code, a palindrome)

Sliding Pi
Downsview Subway Station, Toronto

