A Trade Book Library for K-12 Mathematics

A Bibliography of Children’s Literature for Teaching and Learning Mathematics in Alberta Elementary and Secondary Schools

Second Edition

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Once Upon a Mathematical Time

Considering mathematics as story

Stories have always existed. In earliest times, these stories were communicated verbally and pictorially. Over time, additional stories were written and the study of human culture became centered on fine arts and literature. A fracture between arts and sciences emerged and mathematics was placed firmly in the latter category.

For much of the 20th century, we settled into a pattern portraying mathematics as tenseless and timeless. We communicated mathematics through graphs, equations, proofs, and algorithms. Our texts of mathematics were the products or artifacts of mathematical thinking. It seemed apparent we had forgotten that mathematical texts throughout history included narrative letters, explanations, poetry, and word problems—the texts of patterned, storied thought.

The separation of mathematics from the humanities is no longer feasible. Returning to and expanding the notion that mathematics is socially constructed and negotiated, mathematics educators and researchers are promoting new curricula that emphasize the mathematical processes of communication and connections. We are beginning to understand that the development of mathematical concepts occurs in a contextual and relational manner and that this context can provide meaning. When mathematics is placed in a social and cultural context, we can think of mathematics as a humanity. Mathematics as story enables us to experience the human dimensions of mathematics.

Our evolving understanding of mathematics is supported by the idea that life is storied and that our experiences are communicated in storied, relational ways. The metaphor, mathematics as story, embodies the characters, settings, plots, and problems of life. Although related to word problems, the intentions of stories are to show our relationship to our world. They are meant to recall our lived lives and to prompt thoughtful consideration; they are not intended to be discarded as exercises. Stories in this narrative sense become dramatizations of mathematics and support rich, emotional, and engaging experiences of mathematics for our students.

Using literature in school mathematics

Considering mathematics as story suggests that using literature in school mathematics humanizes mathematics. By challenging common misconceptions of mathematics as a disconnected set of rules and procedures to be memorized, and of mathematicians as isolated social loners, stories show mathematics as part of human culture. Perhaps this is the most compelling reason for teaching and learning through literature. Pragmatically, using literature integrates learning across curricular areas thus addressing the issue of limited time resources. Students are interested in stories and using literature provides an alternative way for communicating about mathematics.
Some difficulties with using literature in school mathematics include the additive use of literature in the classroom. Frequently the quality of the literature is compromised as mathematics is presented as contrived or tangential to the story. Often the aesthetic experiences of reading the story are not connected to the mathematics. Sometimes the mathematics presented is confusing or incorrect. Occasionally teachers do not understand the mathematics involved and opportunities to explore and extend the mathematics addressed in the story are limited. This document attempts to address these difficulties and explores possible ways, benefits, and challenges of using literary resources in elementary and secondary school mathematics.

Developing the bibliography

Locating the books

In an effort to find books of quality that address the difficulties presented above, many lists were consulted (see Appendix A). Two assumptions were made in the selection of books. First, the book should exemplify good literature. Literary standards include well-developed and creative plots and characterizations written in interesting styles using age-appropriate and correct language. Second, the book must contain explicit or implicit mathematical concepts. Mathematical standards include an appropriate view of mathematics (including interactions by people), correct and accurate mathematics, and a facilitation of the reader’s ability to apply and generalize the mathematics. Cohesiveness between the book’s story and the mathematics was very important in the selection process. Thus, the bibliography includes many historical stories and biographies.

Organizing the bibliography

The bibliography is comprised of picture books, puzzle books, novels, and non-fiction writings organized into five sections: number, patterns and relations, shape and space, statistics and probability, and puzzles and recreational problems. Within each section, entries are grouped into grade-level divisions. Although the Alberta Program of Studies suggests that students should gain an understanding and appreciation for the contributions of mathematics to civilization and to culture, none of the specific objectives address this goal. I believe that it is important for students to encounter people engaged in mathematical inquiry and to understand the impact of their ideas on society. Therefore, a sixth section on history and biographies is included.

The first four sections correspond to the strands identified in the Alberta Program of Studies. This mathematics framework has been designed to reinforce the interrelationship of mathematical concepts and skills across the grades. Because of this structure, books have been grouped into grade-level divisions. It must be emphasized that these grade-level distinctions are permeable. For some strands, few books are listed, reflecting the scarcity of books available in this
area of children’s literature. This is particularly evident in the statistics and probability strand that was added to the curriculum in 1996.

Book reviews are provided for the first five sections. These reviews contain summaries of key story ideas, explicit links to the mathematical concepts, and suggested teaching ideas. The book reviews are part of a collection created during a course on Using Literature in Mathematics taught by Dr. Elaine Simmt in May 2003.

An alphabetical listing with publisher details and the ISBN of all books is included to make ordering easier. The books prefaced by an asterisk are highly recommended.

Analyzing and evaluating books

Each book was read and analyzed on the basis of mathematical and literary standards. Particular elements noted in each entry include mathematical concepts, text features, possible teaching suggestions, and where it might fit in the Program of Studies. A brief description of each of these elements follows.

Mathematical concepts

Mathematical concepts are ideas about the relationships and properties of quantities. These ideas are more than factual information as they emphasize relationships between objects and symbols. Conceptual understanding is influenced by mathematical processes of communication, connections, estimation and mental mathematics, problem solving, reasoning, technology, and visualization. The nature of mathematics includes change, constancy, dimension, number, pattern, quantity, relationships, shape, and uncertainty.

Mathematical concepts may be embedded implicitly or explicitly in the text. Not all texts are conceptually based, and no concepts are listed for such books.

Text features

An underlying assumption in this bibliography is that all books listed present mathematical ideas that support the school program. However, the books have different features in presenting these ideas. Narrative books tell a story and may include picture books and novels. Biographies tell the story of particular mathematicians. Puzzle books present story problems or riddles that rely on logical reasoning. Non-fiction selections may include reference books and books about the development of mathematical ideas.

In addition to different genres, text features include specific elements used by authors to present ideas. Some examples are glossaries, sidebar explanations, indices, tables of contents, charts, tables, graphs, and diagrams. Whenever possible, the noteworthy text features are indicated.

Teaching suggestions

Books can be used for a variety of purposes in the mathematics classroom. They can provide a context that prompts investigative inquiry, stimulates discussion, and encourages enjoyment and interest in mathematics. In
some cases, teaching suggestions are offered that bridge the implicit mathematics in the book with explicit learning outcomes.

*Program of Studies*

All books listed in the first four sections of the bibliography are directly linked to an appropriate strand in the Alberta Program of Studies. Specific Outcomes (SO) are listed by number following the grade. Most books can be applied to many grades and encompass more than one SO. In many cases, the SO provide prompts for teaching suggestions.

When mathematics is presented in a vibrant, creative manner, students can begin to appreciate and understand mathematical concepts. By linking mathematics and literature, the role mathematics plays in our society can be investigated. It is hoped that teachers will explore the potential of these books to occasion mathematical thinking in their classrooms.
Number Strand

Counting Books

 Math Concepts: numbers describe quantities (explicit)
 Text Features: counting book (1-10); beautiful pictures of children engaged in authentic activities
 Teaching Suggestions: students can construct matching sets with manipulatives; students can compare two sets and describe using words such as more, fewer, as many as or the same number; students can count along with the book
 Program of Studies: K – SO#1, 3, 4, 5; Grade 1 – SO#1, 3, 4

 Math Concepts: numbers describe quantities; numbers are represented in multiple ways (explicit)
 Text Features: counting book (1-12); illustrations show events that may have led people to start counting with numbers
 Teaching Suggestions: students can write stories about the pictures; students can construct a set of objects corresponding to a given numeral; students can count on from one page to the next; students can match the numerals with their given pictorial representations
 Program of Studies: K – SO#1, 3, 5; Grade 1 – SO#1, 3, 4,

 Math Concepts: whole numbers can be recognized in familiar settings (explicit)
 Text Features: counting book (1-10); photographs of numerals
 Teaching Suggestions: students can hunt for representations of numbers in the world; initiate discussion about symmetrical numerals; students can trace the numbers with their fingers; students can look for number representations in their own environment; students can construct a set of objects corresponding to the given numerals
 Program of Studies: K – SO#1, 3; Grade 1 – SO#1, 4

 Math Concepts: place value
 Text Features: narrative; American statistics
 Teaching Suggestions: research Canadian statistics; students can group base ten blocks along with the story; students can collect and group juice boxes for recycling
 Program of Studies: Grade 2 – SO#7; Grade 3 – SO#5

**Math Concepts:** numbers describe quantities; numbers can be added (explicit)
**Text Features:** counting book (1-10); cut-outs for eyes make counting easier; rhyming text; plus one addition on each page; Parents’ choice honors
**Teaching Suggestions:** students can write numbers sentences for each page; students can use the text as a skipping song; students can create their own fish and tell their own numbers stories
**Program of Studies:** K – SO#1, 3, 4, 5; Grade 1 – SO#1, 3, 4, 5, 8, 9


**Math Concepts:** numbers describe quantities; numbers can be subtracted (explicit) or added
**Text Features:** narrative counting book (1-14), patterned text, interesting added dimension of another family and constantly changing numbers
**Teaching Suggestions:** students can write subtraction sentences for each page, class can be divided into groups to act out the story
**Program of Studies:** K – SO#1, 3; Grade 1 – SO#1, 3, 4, 5, 9; Grade 2 - SO#9


**Math Concepts:** numbers describe quantities; numbers can be subtracted (explicit)
**Text Features:** narrative counting book (1-5); patterned text
**Teaching Suggestions:** students can write subtraction sentences for each page; students can write their own subtraction story
**Program of Studies:** K – SO#1, 3, 5; Grade 1 – SO #1, 3, 4, 8, 9


**Math Concepts:** numbers can be used as a measure of time
**Text Features:** narrative counting book (1-14); patterned text
**Teaching Suggestions:** students can count along with the babysitter; students can find and count the monkeys
**Program of Studies:** Grade 1 – SO#1


**Math Concepts:** numbers describe quantities; numbers can be subtracted (explicit)
**Text Features:** narrative counting book (1-5); patterned text
**Teaching Suggestions:** students can write subtraction sentences for each page; students can write their own subtraction story
**Program of Studies:** K – SO#1, 3, 5; Grade 1 – SO#1, 3, 4, 8, 9
Math Concepts: numbers describe quantities (explicit)
Text Features: counting book (1-12); watercolour paintings; creative ending
Teaching Suggestions: students can count the sets of animals; students can compare he sets of animals and describe the sets using words such as more or fewer
Program of Studies: K – SO#1, 3, 4, 5; Grade 1 – SO#3

Math Concepts: numbers describe quantities (explicit)
Text Features: narrative counting book on ordinal numbers (1-10)
Teaching Suggestions: students can indicate a position of a specific object in a sequence by using ordinal numbers up to tenth
Program of Studies: Grade 2 – SO#3

Math Concept: numbers describe quantities
Text Features: beautiful cut-out artwork; narrative counting book (1-10)
Teaching Suggestions: students can identify the numbers within each animal; students can create pictures with numbers incorporated
Program of Studies: K – SO#1; Grade 1 – SO#1

Math Concepts: numbers describe quantities (explicit)
Text Features: counting book (1-1 000 000); author’s introduction; narrative about the arctic world provided at the end of the book; glossary
Teaching Suggestions: Students can name the number for a given set of objects; students can use the pictures to show a given number as two parts and name the number of objects in each part; students can answer the question “how many are in each set?”
Program of Studies: K – SO#1, 3, 4; Grade 1 – SO#1, 3, 4

Math Concepts: numbers describe quantities (explicit)
Text Features: counting book (1-10); illustrations of camouflaged animals
Teaching Suggestions: students can find and count animals; students can predict next encounter from partial drawings in text
Program of Studies: K – SO#1, 3, 4, 5; Grade 1 – SO#1, 3, 4
Math Concepts: numbers describe quantities (explicit)
Text Features: counting book (1-10); rhythmic description of Canada’s land and resources; beautiful illustrations; informative notes
Teaching Suggestions: students can describe aspects of Canada for each number (examples of the given numbers in the environment); students can research characteristics of Canada referred to in the book (excellent Social Studies curricular connection)
Program of Studies: K – SO#1; Grade 1 – SO#1, 3, 4; Grade 2 – SO#4

Math Concepts: numbers describe quantities; numbers can be added (explicit)
Text Features: counting book (1-7); rhyming text; detailed illustrations
Teaching Suggestions: students can name the number that comes after a given number in the story; students can find, count and write the numeral that corresponds to the number of monkeys on each page; students can write addition sentences for each page
Program of Studies: K – SO#1, 3, 4, 5; Grade 1 – SO#1, 3, 4, 8, 9

Math Concepts: numbers describe quantities (explicit)
Text Features: narrative counting book (1-100)
Teaching Suggestions: students can estimate the number of popcorn kernels on one cob; students can describe the story using ordinal numbers; students can write their own number story
Program of Studies: K – SO#1, 3, 5; Grade 1 – SO#1, 3, 4, 5, 6; Grade 2 – SO#1, 2, 4, 5, 6; Grade 3 – SO#1, 2, 4

Math Concepts: numbers describe quantities; numbers are represented in multiple ways
Text Features: counting book (1-14); rhyming text, Australian animals
Teaching Suggestions: students can write own entries using Canadian animals
Program of Studies: K – SO#1, 3; Grade 1 – SO#1, 3, 8
Math Concepts: numbers describe quantities; numbers are represented in multiple ways; single things can be put together to make a different whole; numbers have many relationships (explicit)
Text Features: narrative counting book (large numbers); patterned text; set at a county fair
Teaching Suggestions: students can match numerals with their given pictorial representations; students can write their own verses by recognizing parts and wholes; students can build their own sets using manipulatives
Program of Studies: Kindergarten – SO# 3, 5 Grade 1 – SO# 3, 5, 7

Math Concepts: numbers describe quantities; whole numbers can be recognized in familiar settings (explicit)
Text Features: counting book (1-10, 10-1); rhyming text; watercolour paintings; set in Vancouver
Teaching Suggestions:
Program of Studies: K – SO# 1, 3, 5; Grade 1– SO #1, 3, 4, 5, 8

Math Concepts: numbers describe quantities; numbers can be subtracted (explicit)
Text Features: narrative counting book (1-10); fold out pages reveal story plot; alliteration and rhyming text
Teaching Suggestions: students can write subtraction sentences for each page; students can write their own subtraction story; students can hold up the corresponding number of fingers to each numeral, students can match given number sentences to the appropriate page
Program of Studies: K – SO#1, 3; Grade 1 – SO#1, 3, 4, 8, 9; Grade 2 – SO#9

Math Concepts: numbers describe quantities (explicit)
Text Features: counting book (1-10); poetic language; challenging vocabulary; rich paintings
Teaching Suggestions: students can write the numeral for each page on a personal whiteboard; encourage students to identify spot patterns found in nature
Program of Studies: K – SO#1, 3; Grade 1 – SO#1, 3, 4

Math Concepts: numbers describe quantities; numbers can be subtracted (explicit)
Text Features: narrative counting book (1-10); patterned rhyming text
Teaching Suggestions: Students can name the number that will come next in the story (one less); students can write subtraction sentences for each page; students can count the monkeys and relate the numbers to numerals
Program of Studies: K – SO#1, 3; Grade 1 – SO#1, 4, 9 Grade 2 – SO#9


Math Concepts: numbers describe quantities; numbers can be subtracted (explicit)
Text Features: counting book (1-10); rhyming text; Caldecott honor book
Teaching Suggestions: students can write subtraction sentences for each page; students can write their own subtraction story; students can extend the activity by starting at 20
Program of Studies: K – SO#1, 2, 3, 4, 5; Grade 1 – SO#2, 3, 4, 5, 8


Math Concepts: numbers describe quantities; numbers can be subtracted (explicit)
Text Features: narrative counting book (1-10); recursive ending
Teaching Suggestions: students can write subtraction sentences for each page; students can write their own subtraction story
Program of Studies: K – SO#1, 3, 5; Grade 1 – SO#1, 3, 4, 8, 9

Grades K to 3


Math Concepts: place value; additive effects of zero; multiplicative effects of zero
Text Features: narrative; set in the land of Digitaria
Teaching Suggestions: students can play the game “addemup” as presented in the book
Program of Studies: Grade 2 – SO#7, 8; Grade 4 - SO#4


Math Concepts: whole numbers can be represented in multiple ways (explicit)
Text Features: picture book; de-stigmatizes finger-counting
Teaching Suggestions: students can role play making purchases using various African finger signs; discuss the role of mathematics in other cultures
Program of Studies: K – SO#3; Grade 1 – SO#4; Grade 2 – SO#4
  Math Concepts: numbers can be represented in multiple ways; numbers can be divided (implicit)
  Text Features: narrative; detailed, colourful illustrations
  Teaching Suggestions: students can figure out the total number of cookies; students can write number sentences representing the number of cookies shared; students can divide a batch of cookies equally among themselves
  Program of Studies: Grade 2 – SO#9; Grade 3 – SO#9, 12

  Math Concepts: numbers describe quantities; numbers can be added and multiplied (explicit)
  Text Features: counting book (large numbers); questions for students are posed in the text
  Program of Studies: Grade 1 – SO#9, 10; Grade 2 – SO#9, 10; Grade 3 – SO#9, 10, 11

  Math Concepts: fractions can be used to represent quantities; fractions can be recognized in familiar settings (explicit)
  Text Features: picture book; photographs of foods cut into various fractions; recipes and author’s notes included
  Teaching Suggestions: students can create an electronic scrapbook of fractional representations (e.g. PowerPoint); students can prepare the food using the recipes in the book
  Program of Studies: Grade 3 – SO#13

  Math Concepts: fractions, decimals, and percents can be used to represent quantities; mathematic operations can be performed with fractions, decimals and percents
  Text Features: stories based on familiar fairy tales have creative, math-related twists; each story (there are 25) includes word problems to reinforce key skills
  Teaching Suggestions: activities provided can be used to support the teaching of these skills
  Program of Studies: Grade 4 – SO#8, 9, 10, 11; Grade 5 – SO#7, 8, 9, 10; Grade 6 – SO#4, 5, 6, 8
**Full House: An invitation to fractions.** Dodds, D. (2007).  
**Math Concepts:** fractions represent a part of a whole  
**Text Features:** narrative; bright watercolour paintings; information box on every other page showing the fraction equivalent for the number being represented  
**Teaching Suggestions:** students can colour in a whole (divided into six parts) as they listen to the story; students can write number sentences for each page  
**Program of Studies:** Grade 3 – SO#13

**Math Concepts:** estimating is helpful in learning to work with large numbers; estimating can help to recognize numbers in the environment  
**Text Features:** colourful photographs; “Hint” section for each page; broken into strategies: eye training, clump counting, box and count, and greater estimations  
**Teaching Suggestions:** students can follow the activities in the book; students can enter their estimations for a class contest (jar of popcorn kernels etc.) and describe their strategies  
**Program of Studies:** Grade 1 – SO# 6; Grade 2 – SO#6; Grade 3 – SO#4

**Math Concepts:** fractions can be used to represent quantities (explicit)  
**Text Features:** narrative; presents an older brother’s love for his younger sister; creative ending  
**Teaching Suggestions:** students can engage in calendar activities finding their half birthdays; students can brainstorm half presents; students can write their own examples of one-third and quarter birthday presents  
**Program of Studies:** Grade 3 – SO#13

**Math Concepts:** arithmetic operations can be used to solve problems; numbers can be added in a variety of ways (explicit)  
**Text Features:** includes author's note, solutions, and art notes; famous painting are used to add graphical interest; rhyming text; sidebar notes identify each master piece  
**Teaching Suggestions:** problems presented in the text  
**Program of Studies:** Kindergarten – SO#2, 4 Grade 1 – SO#2, 3, 5, 7, 9; Grade 2 – SO#9

Math Concepts: numbers can be thought of in more creative ways; numbers describe quantities; numbers can be represented in multiple ways

Text Features: rhyming patterned text; includes author’s note; includes solutions; very colourful illustrations

Teaching Suggestions: excellent resource for modeling mental mathematics strategies; problems presented in text

Program of Studies: Grade 1 – SO#10; Grade 2 – SO#10; Grade 3 – SO#10; Grade 4 – SO#5; Grade 5 – SO#3


Math Concepts: numbers describe quantities; numbers can be represented in multiple ways

Text Features: includes author’s note; rhyming text; colourful, interesting illustrations

Teaching Suggestions: students can match the numerals with their given pictorial representations; using manipulatives, students can create the sets of objects to correspond with the numbers in the fables; students can answer the question: “How many are in the set?” using the last number counted in the sets given; students can break the sets into two parts and name the number of objects in each part

Program of Studies: Kindergarten – SO#3, 4; Grade 1 – SO#3


Math Concepts: numbers describe quantities; numbers can be represented in multiple ways

Text Features: includes author’s note; rhyming text; colourful and interesting illustrations; follows the same format as Math fables: Lessons that count

Teaching Suggestions: students can match the numerals with their given pictorial representations; using manipulatives, students can create the sets of objects to correspond with the numbers in the fables; students can answer the question: “How many are in the set?” using the last number counted in the sets given

Program of Studies: Kindergarten – SO#3, 4; Grade 1- SO#3, 4


Math Concepts: addition can be used to solve problems

Text Features: rhyming text; whimsical illustrations

Teaching Suggestions: students can act out the problems in the text using manipulatives; students can write addition sentences for each page

Program of Studies: Grade 1 – SO#9; Grade 2 – SO#9
Math Concepts: numbers describe quantities; numbers can be added (implicit)
Text Features: narrative alphabet book; marvelous detailed drawings; Caldecott honor book
Teaching Suggestions: students can estimate and count the number of items in each picture; students can predict whether the number of items will be even or odd
Program of Studies: Grade 1 – SO#1, 3, 6; Grade 2 – SO#1, 2, 6; Grade 3 – SO#1, 2

One is a snail ten is a crab. Sayre, A & Sayre, J. (2003).
Math Concepts: numbers can be grouped in various ways
Text Features: narrative counting book
Teaching Suggestions: students can count the number of feet; students can write additions sentences for each page; students can create different animal combinations for the same number of feet
Program of Studies: K – SO#1; Grade 1 – SO#7

One...two...three...sassafras! Murphy, S. (2002).
Math Concepts: number order
Text Features: narrative
Teaching Suggestions: students can line up according to number attributes (cards handed out, age, height...); students can draw their own families and cut and paste them in order from youngest to oldest
Program of Studies: K – SO#1; Grade 2 – SO#5

100 days of cool. Murphy, S. (2004).
Math Concepts: numbers describe quantities
Text Features: narrative; number line throughout
Teaching Suggestions: students can order a set of numbers using a number line; book can be an introduction to the hundredth day of school and to classroom activities to mark it
Program of Studies: Grade 2 – SO#5

Math Concepts: numbers describe quantities (explicit)
Text Features: narrative; rhyming text; board game is included on inside cover; detailed and interesting illustrations; silhouettes of animals grouped in different ways
Teaching Suggestions: students can find and count the animals; using the silhouettes provided, students can compare sets; students can play the board game inside the cover
Program of Studies: K – SO#1, 3 Grade 1 – SO#1, 4, 5, 7; Grade 2 – SO#1, 4
Math Concepts: place value; subtraction can be used to solve problems
Text Features: non-fiction, informative story tracking the growth of a panda in a zoo; problems, strategies and solutions presented; colourful photographs
Teaching Suggestions: Students can find a real life problem to solve in their environment; students can use manipulatives to solve the presented problems along with the book
Program of Studies: Grade 2 – SO#7, 9, 10; Grade 3 – SO#5, 7, 9

Math Concepts: problems can be solved with division; multiplication and division are inverse operations (explicit)
Text Features: narrative; rhyming text
Teaching Suggestions: students can represent the problem in the story using manipulatives or diagrams and record the problem in a number sentence; identify events from experience that can be described as equal sharing and relate to the story; present the problem prior to reading the story and have students work in groups to solve
Program of Studies: Grade 3 – SO#12, Grade 4 – SO#6, 7

Math Concepts: numbers can be added together in multiple ways; numbers can be added and subtracted to solve problems; addition and subtraction are inverse operations (explicit)
Text Features: narrative; weak plot
Teaching Suggestions: students can use manipulatives to demonstrate the number sentences given in the text; students can invent their own park ride; students can think of different ways to use their tickets based on the number of tickets required for each ride.
Program of Studies: Grade 2 – SO#1, 4, 9, 10; Grade 3 – SO#10

Math Concepts: numbers describe quantities (implicit)
Text Features: narrative tongue twister; rhyming text; beautiful batik artwork
Teaching Suggestions: students can count the other animals encountered by the travelers; students can tap the rhythm of the verses and identify a pattern
Program of Studies: Grade 1 – SO#1, 3, 4, 5
Math Concepts: numbers can be represented in multiple ways (implicit)
Text Features: narrative
Teaching Suggestions: students can solve the problem: “How many dinners did Sid eat in one week on Aristotle Street?” using and explaining their own strategies; discuss the significance of street names: Aristotle, Pythagoras
Program of Studies: K – SO#1; Grade 2 – SO#9; Grade 3 – SO#11

Math Concepts: numbers can be added; numbers can be represented in multiple ways (explicit)
Text Features: narrative
Teaching Suggestions: students can write addition sentences for each page; students can write their own story; students can make sets using manipulatives to correspond to the numbers in the book
Program of Studies: K – SO#1, 3; Grade 1 – SO#1, 3, 4, 5

Math Concepts: numbers can tell you about order
Text Features: narrative picture book
Teaching Suggestions: students can draw a diagram to show Harley’s whereabouts; students can order objects in the classroom; activities provided
Program of Studies: Grade 2 – SO#3

Grades 4 – 6

Alexander, who used to be rich last sunday. Viorst, J. (1987).
Math Concepts: money is used as a measurement of value; money is used for consumer transactions (explicit)
Text Features: narrative; black and white line drawings
Teaching Suggestions: students can write number sentences describing the amount Alexander has left after each transaction
Program of Studies: Grade 4 – SO#9

Math Concepts: money is used as a measurement of value; money is used for consumer transactions (explicit)
Text Features: narrative; an “I can read” book
Teaching Suggestions: students can keep a running total of Arthur’s balance
Program of Studies: Grade 4 – SO#9
Math Concepts: money is used as a measurement of value; money is used for consumer transactions (explicit)
Text Features: narrative; part of the Arthur Adventure series
Teaching Suggestions: students can assign amounts charged by Arthur for each of the pet-sitting jobs and can calculate the total amount of income; students can identify the value of bills to $10
Program of Studies: Grade 4 – SO#9

Math Concepts: patterns can be used to develop understanding and proficiency with multiplying numbers (explicit)
Text Features: rhyming text; colourful illustrations; practice tables are provided
Teaching Suggestions: students can practice techniques presented in problem-solving contexts such as: doubling, halving, using repeated doubling and the properties of 0 and 1; emphasizes the importance of mental mathematics strategies
Program of Studies: Grade 4 – SO#4, 5; Grade 5 – SO#3, 4

Math Concepts: arithmetic operations can be used to solve problems (explicit)
Text Features: games and activities book; includes contents and index
Teaching Suggestions: presented in the text
Program of Studies: Grade 4 – SO#5, 7; Grade 5 – SO#3, 6

Math Concepts: numbers can be represented as decimals (explicit)
Text Features: games and activities book; line drawings; includes table of contents and index; contains games and activities addressed to the student
Teaching Suggestions: presented in the text
Program of Studies: Grade 4 – SO#9, 10, 11; Grade 5 – SO#8, 9, 10, 11; Grade 6 – SO#6, 8; Grade 7 – SO#2, 3

Math Concepts: numbers were invented; numbers can be represented in many ways; the development of number systems coincided with societal and cultural developments (explicit)
Text Features: historical non-fiction; contains a glossary and index; colourful pictures
Teaching Suggestions: students can use various number systems to perform arithmetic operations and can compare method for calculations
Program of Studies: Grade 4 – SO#3, 4, 6, 7, 12; Grade 5 – SO#1, 2, 3, 13; Grade 6 – SO#1, 12, 14
Math Concepts: large numbers can be represented in multiple ways (explicit)
Text Features: includes calculation notes from the author, however most of these use imperial measurements; presents million, billion, and trillion
Teaching Suggestions: students can create their own comparisons
Program of Studies: Grade 5 – SO#1; Grade 6 – SO #1

Math Concepts: numbers can describe quantities (implicit)
Text Features: narrative; chapter book; lesson of compassion and understanding
Teaching Suggestions: students can debate if 100 pictures of dresses counts as 100 dresses; discuss the value of representation in mathematics
Program of Studies: Grade 4 – SO#1

If dogs were dinosaurs. Schwartz, D.M. (2005).
Math Concepts: ratio and proportion can be used to compare quantities (explicit)
Text Features: patterned text; beautiful illustrations; quantities used in the ratios are provided at the back of the book but most of these involve imperial measurements and would have to be converted to metric equivalents
Teaching Suggestions: students can create their own comparisons on posters; students can incorporate the use of technology and estimation to make comparisons.
Program of Studies: Grade 6 – SO#5

Math Concepts: ratio and proportion can be used to compare quantities (explicit)
Text Features: patterned text; beautiful illustrations; quantities used in the ratios are provided at the back of the book but most of these involve imperial measurements and would have to be converted to metric equivalents
Teaching Suggestions: students can create their own comparisons on posters; incorporate the use of technology and estimation to make comparisons
Program of Studies: Grade 4 – SO#1, 2; Grade 5 – SO#2; Grade 6 – SO#5
Math Concepts: patterns can be used to help solve problems
Text Features: rhyming creative riddles; each riddle poses a problem and offers a helpful hint; colourful illustrations
Teaching Suggestions: problems presented can be used in conjunction with lessons regarding mental mathematics strategies and number properties
Program of Studies: Grade 3 – SO#10; Grade 4 – SO#5, 6; Grade 5 – SO#2, 3, 4

Math Concepts: numbers describe quantities; numbers can be represented in multiple ways (explicit)
Text Features: historical narrative; contains a question box at the end of each chapter, a note to teachers, and mathematical explanations of the puzzles presented; colourful lithographs precede each chapter
Teaching Suggestions: problems are presented in the text
Program of Studies: Grade 4 – SO#1, 2, 6, 7, 8, 9; Grade 5 – SO#1, 2, 5, 6, 11; Grade 6 – SO#1, 2, 3, 8

Math Concepts: problems can be solved with division; multiplication and division are inverse operations (explicit)
Text Features: narrative; rhyming text
Program of Studies: Grade 4 – SO#6, 7

Math Concepts: numbers can be represented in multiple ways (explicit), place value
Text Features: information text
Teaching Suggestions: students can investigate mathematical operations using the various number systems presented in the text; students can explain order by making reference to place value
Program of Studies: Grade 4 – SO#1, 2; Grade 5 – SO#1; Grade 6 – SO#1

Math Concepts: arithmetic operations can be used to solve problems
Text Features: narrative; colourful illustrations; main character uses multiplication to un-do harmful multiplication that has occurred
Teaching Suggestions: students can express the decimal equivalent for the given fractions orally and in written form; students can write number sentences for the problems presented; students can write their own multiplication stories
Program of Studies: Grade 4 – SO#9, 10; Grade 5 – SO#8, 9

**Math Concepts:** fractions, decimals, and percents are all related; parts of a whole can be represented in different ways

**Text Features:** simple photographs; little narrative

**Teaching Suggestions:** students can express the solutions orally; students can create their own examples of pieces, parts and portions; students can figure out the decimal or the percentage based on the fraction without seeing the solutions

**Program of Studies:** Grade 4 – SO#8, 9, 10; Grade 6 – SO#6

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**Grades 7 – 9**

**Erin McEwan, your days are numbered.** Ritchie, A. (1990).

**Math Concepts:** numbers can be used to solve problems (explicit)

**Text Features:** novel; imperial measurements used

**Teaching Suggestions:** students can construct mathematics questions that arise from situations involving consumer sales; students can use metric measurements to convert decimals into fractions

**Program of Studies:** Grade 7 – SO#2, 3, 4, 5, 7; Grade 8 – SO#3, 4, 6; Grade 9 – SO #3

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**Math Concepts:** algorithms can be used to demonstrate a proficiency with calculations; understanding numerical patterns can encourage the development of a number sense for decimals (explicit)

**Text Features:** information text; includes table of contents; cartoon drawings

**Teaching Suggestions:** chapters can be read and discussed throughout the teaching unit

**Program of Studies:** Grade 7 – SO#2, 4, 5, 7; Grade 8 – SO#6; Grade 9 – SO#3

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**Math Concepts:** numbers can be represented as fractions; problems can be solved using arithmetic operations with fractions (explicit)

**Text Features:** games and activities book; includes contents and index

**Teaching Suggestions:** problems presented in the text

**Program of Studies:** Grade 7 – SO#5, 7; Grade 8 – SO#6; Grade 9 – SO#3

**Math Concepts:** number operations can be used to express relationships (explicit)

**Text Features:** poetry; language and number operations are combined into playful equations; colourful illustrations (picture book)

**Teaching Suggestions:** students can write their own mathematical poetry (e.g. crisp air + shadows tall + cat’s thick coat = signs of fall)

**Program of Studies:** Grades 7-9 – General Outcomes: develop number sense

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**Math Concepts:** ratios can be used to solve problems (implicit)

**Text Features:** narrative picture book

**Teaching Suggestions:** students can calculate the height of the person throughout the book using ratios to compare the sizes of body parts

**Program of Studies:** Grade 8 – SO#4, 5

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**Math Concepts:** numbers can be represented in multiple ways; numbers can be used to solve problems (explicit)

**Text Features:** novel; colourful artwork; humourous

**Teaching Suggestions:** students can generate and extend the number patterns presented in the text

**Program of Studies:** Grade 7 – SO#1, 2, 3, 5, 6, 7; Grade 8 – SO #3, 4, 5, 6, 7; Grade 9 – SO #3

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**Math Concepts:** numbers can be expressed as powers with exponents and bases (explicit)

**Text Features:** picture book; cartoon drawings; sidebars provide additional information

**Teaching Suggestions:** students can express large numbers in scientific form

**Program of Studies:** Grade 9 – SO#1
Grades 10 – 12


**Math Concepts:** narrative and mathematics are strongly connected; problems can be solved using numbers (explicit)

**Text Features:** anthology of narratives with mathematical themes; includes a table of contents and preface

**Teaching Suggestions:** students can identify and discuss the mathematics inherent in the stories

**Program of Studies:** Applied Math 10 – SO#2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7; Pure Math 10 – SO#1.1, 1.2, 1.5, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6


**Math Concepts:** problems can be solved using numbers (explicit)

**Text Features:** puzzle book; includes table of contents, further reading and exploring, and an index; contains charts, diagrams, and pictures

**Teaching Suggestions:** students can extend the problems presented in the section on further exploring

**Program of Studies:** Applied Math 10 – SO#2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7; Pure Math 10 – SO#1.1, 1.2, 1.5, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6


**Math Concepts:** zero is linked to infinity; philosophical controversies erupted over the acceptance of zero as a number; numerical data can be analyzed for trends, patterns, and interrelationships; arithmetic operations can be applied to solve problems (explicit)

**Text Features:** information text; historical ideas and biographies are presented; includes recent developments of quantum zero, black holes, and string theory; contains a table of contents and index; includes diagrams, drawings, and photographs

**Teaching Suggestions:** students can present the issues of each chapter; students can engage in the philosophical debates highlighted in the text

**Program of Studies:** Applied Math 10 – SO#2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7; Pure Math 10 – S #1.1, 1.2, 1.5, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6
A REMAINDER OF ONE

Complete Reference
ISBN 0618250778

Mathematical Content
Division with remainders, Factoring

Grade Level
Grades 3–8. Could be used with younger children to introduce remainders and to introduce factors in the higher grades.

Prose
This book is very readable for anyone past early elementary. The story has a theme of persistence, though Joe’s answer seems to be reached with more time and luck than mathematical skill. The mathematics is important to the story but could be more explicit in the writing.

Story
Joe the bug wants to march in the parade. There are 25 bugs that form two lines, leaving poor Joe left over. Each day he gets the bugs to march with one more line, hoping that he won’t be left over.

Mathematics
By having the bugs march in a different number of lines, there is an implicit reference to division taking place, leaving Joe as the remainder. Trying whole number division until there is no remainder is also a good introduction to factoring.

Illustrations
The illustrations are colourful and cartoonish. They fit very well for a story of marching bugs. The illustrations of the bugs marching are wonderful and lend to the feel of a bug parade. The artwork complements the story by showing the bugs marching in lines of two, three, four, and finally five.

Potential to Prompt Mathematical Activity
The book is a satisfactory prompt for mathematical activity. However, the mathematics is not featured prominently enough and is not challenging enough for the average student to want to do anything more than read the story.
Teaching Ideas

The book could be read aloud to students.

For lower grade students: Before each march, ask the students to figure out how many bugs will be left over and see if Joe will be left out again. Go over the divisions on the board with the students and continue the story.

For middle level students: Read through the entire story and ask the students what other number of lines could the bugs march in for there to be no remainders. This will lead into factors and factoring. You could then move onto more challenging numbers, such as giving the students a prime number to factor.

Additional Comments

The book is definitely focused towards younger students. Middle school students may feel the story is too childish. The book is also not very large so the illustrations will not be visible to students seated far from the book. The book is available at a reasonable price.

Book Reviewed by

Ryan Langner
NUMBER STORIES OF LONG AGO

Complete Reference
ISBN not available

Mathematical Content
Number systems, Number operations, Fractions, Algebra, Logic, Problem solving

Grade Level
Grades 4 – 9

Prose
This book is unique because it is addressed directly to the reader, as exemplified in the title of the first preface: "Just between us and worth reading" (p. iii). The stories are told by a Story-Teller to the Crowd of children that includes the Tease. The dialogue of the characters in the stories serves to engage the reader. Historical stories told within the context of another story add interest. Each of the ten chapters includes a question box. Materials intended for the teacher are included at the end of the book and contain pronunciations for terms in the stories, a note about historical accuracy, and solutions to the puzzles.

Story
Originally written in 1919 as a supplementary resource for elementary mathematics classes, this author shares stories about the evolution of various number systems. Beginning with Ching who lived in China, An-am who lived in Mesopotamia, and Menes who lived in Egypt, counting systems are described. The development of numerals is told in stories about Ahmes, Lugal, and Chang. More characters are added to the story as number systems in various parts of the world evolve. Algorithms for multiplication and division are offered. Classic number puzzles and logic problems are presented.

Mathematics
Smith believes the history of mathematics is intertwined with the history of civilization. Therefore, he chooses to describe human activities of counting, experimenting with numbers, and solving problems. Many of the classic number and logic problems that have been grappled with throughout history are presented. For example, Smith includes puzzles about magic squares, divisibility rules, and Zeno’s paradox. The author presents mathematics as a human endeavor and as another story of civilization.

Illustrations
Eight colourful paintings of the characters in the stories are reproduced to lend an old-world charm to the book. These are interspersed between the chapters. In addition, black and white diagrams support the mathematics presented.
Potential to Prompt Mathematical Activity
The mathematics in this story is explicit. Problems involving numbers and logic provide effective prompts for mathematical activity. The characters in the stories are children and this is also an effective method for generating interest and motivation for mathematical activity as students relate to like-minded characters.

Teaching Ideas
Students could complete the questions in the question box at the end of each chapter. Since many of these questions involve lower-level cognitive skills (recalling story details, comprehension), the teacher may want to select the more appropriate questions for the students to explore. Some of these questions involve further research into the history of mathematics and students could write their own stories from their research. Students could use ancient algorithms to complete computations and could compare these to present-day algorithms. Problems presented in chapters nine and ten could be solved by the students. Since these chapters are not intended to be read aloud and answers are not provided, this provides a good opportunity for students to interact with the text. The author poses questions directly to the reader and often leaves puzzles for the reader to think about.

Additional Comments
The author has made a successful attempt of merging the history of mathematics with narrative. The characters' desire for problems to be told as bedtime stories fosters a positive attitude towards mathematics.

Book Reviewed by
Gladys Sterenberg
THE NUMBER DEVIL

Complete Reference
ISBN 0805062998

Mathematical Content
Infinity, Zero, Limits, Roman Numerals, Exponents, Place Value, Primes, Fractions, Irrationals, Perfect Squares, Triangle Numbers, Fibonacci Sequence, Pascal’s Triangle, Permutations, Combinations, Factorials, Graph Theory, Solids, The Golden Ratio, Proofs, Goldbach’s Conjecture

Grade Level
Grades 5-12

Prose
This book is written for children ages eight and up so it is very readable for any student in middle school. It speaks to those students who dislike mathematics but given the right setting find that mathematics can be interesting. The plot is pure mathematics lectures with a little twist that most readers will enjoy. The author uses what he calls “dream words”, that is, he has taken the original mathematical terms and changed them to something new that speaks to the younger readers. For example, taking the square root of a number has changed to taking the “rutabaga” of a number. This may help the younger reader who has no idea of the proper terminology but it can be potentially harmful to those students just learning the proper mathematical vocabulary. The mathematics in each dream is based on the mathematics from the dream before so each dream does not necessarily stand on its own.

Story
Meet Robert, a young man with a distaste for mathematics possibly caused by his pretzel-obsessed mathematics teacher, Mr. Bockel. One night Robert falls asleep and instead of the usual nightmares that plague him, Robert finds himself face to face with the Number Devil. In twelve dreams Robert and the Number Devil explore the wonderful world of mathematics.

Mathematics
The story is a series of mathematical “lectures” so the mathematics is very prevalent. The mathematical concepts are well laid out and easy to follow. The author has chosen a varied yet related selection of mathematics. Almost all of it is at the introductory level for each topic but each new dream relies on facts learned the night before. The author also poses questions to the reader to solve on their own using the mathematics from that particular dream.
Illustrations
The illustrations are colourful and imaginative, lending a very dreamlike feel to the story. Many of the illustrations help show the mathematical concepts in a visual form with colourful tables and graphs. These great illustrations may have to be enlarged and placed on overheads so that all students in the class can see them.

Potential to Prompt Mathematical Activity
This adventure is a highly effective prompt for mathematical activity. The topics and lessons are interesting and leave much more of the topic to be explored. The sections involving Pascal's triangle are so interesting that students could spend several lessons just looking for patterns.

Teaching Ideas
The idea of the Number Devil could be introduced early in the year as a recurring character in the lesson plans. *The number devil* has many concepts used to generate patterns. These patterns reappear in Pascal's Triangle. The teacher could discuss several patterns then give the students copies of Pascal's Triangle and ask them to find as many patterns as possible. When prime numbers are introduced, students could be given the chapter with Eratosthenes’ sieve and a number chart and asked to follow the Number Devil's algorithm for finding the prime numbers on the chart. Students are always asking and looking for short cuts. When dealing with combinations students are expected to work with the formula: $C(n,k) = \frac{n!}{k!(n-k)!}$! The teacher could show them how Pascal's triangle could be used to find combinations quickly and without computation. The method is clearly explained in the novel.

Additional Comments
While this is a great story with wonderful mathematics, the author has taken it upon himself to change accepted mathematical vocabulary as well as respected mathematicians’ names, replacing them with farcical and childish terms. I think this takes away from the story and that there really was not any benefit to changing these terms and names.

Book Reviewed by
Ryan Langner
Patterns and Relations

Grades K to 3

Math Concepts: patterns can be used to describe the world and to solve problems (implicit)
Text Features: alphabet picture book
Teaching Suggestions: students can play the game listed in the author’s note at the end of the book, where students create a repeating pattern using actions (repeat previous students’ actions/words and add a new one- extend)
Program of Studies: K – SO#1; Grade 1 – SO#1; Grade 2 – SO#2; Grade 3 – SO#1

Math Concepts: patterns can be described using numbers (explicit)
Text Features: narrative fable; a note from the author is included
Teaching Suggestions: students can diagram the growth and use patterns to predict next year’s growth; students can create a table or chart from the problem presented in the story
Program of Studies: Grade 2 – SO#2; Grade 3 – SO#1; Grade 4 – SO#2; Grade 5 – SO#1

Math Concepts: patterns can be used to describe the world and to solve problems (implicit)
Text Features: narrative
Teaching Suggestions: students can diagram the sequence of events; students can extend the pattern by inserting additional events; students can describe the relationship by matching causes to events
Program of Studies: Grade 2 – SO#2 Grade 3 – SO#1

Beep beep, vroom vroom! Murphy, S. (2000).
Math Concepts: patterns can be used to describe the world and to solve problems
Text Features: narrative picture book; includes write-up with extension ideas by the author
Teaching Suggestions: students can identify the patterns in which cars are placed on the shelf; students can create, extend, or reproduce the patterns using manipulatives; students can identify the patterned text
Program of Studies: K – SO#1, 2; Grade 1 – SO#1, 2, 3; Grade 2 – SO#1, 2, 3
Math Concepts: numerical patterns can be identified, created, and compared (explicit)
Text Features: counting book; rhyming text
Teaching Suggestions: can be integrated into a unit on multiplication; students can identify patterns of square numbers
Program of Studies: K – SO#2; Grade 1 – SO#1, 2, 3; Grade 2 – SO#2, 3; Grade 3 – SO#1, 3

Math Concepts: patterns can be used to sort objects (explicit)
Text Features: narrative; historical note provided
Teaching Suggestions: students can sort their own collections
Program of Studies: K – SO#2; Grade 1 – SO#3; Grade 2 – SO#3; Grade 3 – SO#3

Math Concepts: patterns can be used to describe the world and to solve problems (implicit)
Text Features: narrative
Teaching Suggestions: students can draw the sequence of events for one of their field trips; students can describe relationships by matching causes to events; while reading, skip a page and have students determine/create missing elements
Program of Studies: Grade 2 – SO#2; Grade 3 – SO#1

Math Concepts: algebraic expressions can be represented in multiple ways
Text Features: narrative picture book; includes teaching suggestions and extensions
Teaching Suggestions: students can set up a trading “store” in the classroom and determine if two given sets are equal or unequal and explain the process used; students can act out the trading of the cards using manipulatives (cut out coloured paper to act as cards)
Program of Studies: Grade 1 – SO#4, 5; Grade 2 – SO#4, 5

Math Concepts: patterns can be used to sort objects (explicit)
Text Features: narrative; black and white line drawings; Newbery Medal honor book
Teaching Suggestions: students can sort favorite animals according to one or two attributes; integrate with numbers unit
Program of Studies: K – SO#2; Grade 1 – SO#3; Grade 2 – SO#3; Grade 3 – SO#3

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Math Concepts: patterns can describe the world and solve problems
Text Features: photographs, no words
Teaching Suggestions: students can determine the difference between sets of objects or within sets of objects and record their sorting rules; can be used in number strand for K – SO#5 and Grade 1 – SO#5
Program of Studies: K – SO#2; Grade 1 – SO#3; Grade 2 – SO#3; Grade 3 – SO#3


Math Concepts: patterns arising from daily experiences can be identified, created, and compared (implicit)
Text Features: narrative
Teaching Suggestions: students can diagram the pattern of Mrs. Fitz’s purchases; students can calculate how many weeks it took Mrs. Fitz to make her purchases; students can identify and describe the pattern; integrate with measurement unit
Program of Studies: Grade 2 – SO#2; Grade 3 – SO#1


Math Concepts: patterns arising from daily experiences can be identified, created, and compared (explicit)
Text Features: narrative; rhyming and patterned text
Teaching Suggestions: students can calculate the number of items eaten by the little sister; students can identify and extend the increasing pattern; students can write and describe their own story following a similar pattern
Program of Studies: Grade 2 – SO#2; Grade 3 – SO#1


Math Concepts: patterns arising from daily experiences can be identified, created, and compared (explicit)
Text Features: narrative; patterned text
Teaching Suggestions: students can identify the pattern and predict the next step; students can identify the pattern according to one attribute (e.g. size: largest to smallest); students can extend the pattern by adding their own ideas
Program of Studies: Grade 1 – SO#2, 3, 4, 5; Grade 2 – SO#3, 4, 5


Math Concepts: patterns can be used to describe the world (explicit)
Text Features: narrative; rhyming text; Caldecott honor book
Teaching Suggestions: students can group objects found in the classroom according to sets (e.g. pairs, groups of 3, dozen)
Program of Studies: K – SO#2; Grade 1 – SO#3; Grade 2 – SO#3
Math Concepts: patterns can be used to describe the world (explicit)
Text Features: counting song (1-10); rhyming text; lyrics and music provided on the last page of the book; Caldecott honor book
Teaching Suggestions: students can sing the words; students can identify musical patterns; students can write number sentences describing each page; students can write their own number story using the text pattern
Program of Studies: K – SO#1; Grade 1 – SO#1; Grade 2 – SO#1; Grade 3 – SO#2

Math Concepts: non-numerical and numerical patterns arise from daily experiences (explicit)
Text Features: narrative
Teaching Suggestions: students can re-draw the contents of the basket as the numbers change; students can predict what might happen to the pattern before each page; students can make up their own story and draw the corresponding representations
Program of Studies: K – SO#1; Grade 1 – SO#1, 2; Grade 2 – SO#1; Grade 3 – SO#2

Math Concepts: patterns can be used to describe the world and to solve problems; patterns arising from daily experiences can be identified, created, and compared (implicit)
Text Features: narrative; patterned text
Teaching Suggestions: students can build and classify objects for a teeny tiny neighbourhood; students can write their own story with repeated patterned text describing a different attribute; students can translate the pattern using different words in place of “teeny tiny”
Program of Studies: K – SO#1, 2; Grade 1 – SO#1, 2, 3; Grade 2 – SO#1, 3

Math Concepts: patterns arising from daily experiences can be identified, created, and compared (explicit)
Text Features: counting book (1-10); rhyming text
Teaching Suggestions: students can identify, count, and sort round objects found in the classroom; distribute papers with random dots (use bingo dodder or round stickers); students can create a picture incorporating the dots, when complete, a class book can be assembled showing the increasing pattern; students can describe their picture and write the number of dots on their page; can also be used in number strand for teaching subitization (K-SO#2, Grade 1 – SO#2)
Program of Studies: K – SO#2; Grade 1 – SO#2, 3; Grade 2 – SO# 2, 3

Math Concepts: patterns can be used to describe the world and to solve problems; patterns arising from daily experiences can be identified, created, and compared (implicit)

Text Features: narrative; Chinese folktale

Teaching Suggestions: students can estimate, predict, and calculate the number of objects that result when the pot is emptied; students can write number sentences to represent changes; students can employ a classroom doubling pot (students put numbers in/rotating students double the amount on the sheets and return them to the pot)

Program of Studies: Grade 1 – SO#1, 2, 3; Grade 2 – SO#2, 3; Grade 3 – SO#1, 3


Math Concepts: numerical patterns can be identified, created, described, and translated (explicit)

Text Features: narrative; rhyming text; colourful pastel illustrations

Teaching Suggestions: students can write number sentences describing the pattern for each page; discuss the homonyms ‘two’ and ‘too’

Program of Studies: K – SO#1; Grade 1 – SO#1


Math Concepts: algebraic expressions can be represented in multiple ways

Text Features: narrative picture book; includes author’s note and recipe for sancocho

Teaching Suggestions: students can identify equivalent ingredients and make substitutions; students can prepare sancocho; students can write equations for the ingredients in the story pictorially or using words (e.g. 3 ears of corn = 8 carrots)

Program of Studies: Grade 2 – SO #4, 5


Math Concepts: objects can be organized by attributes

Text Features: colourful photographs prompt sorting by size

Teaching Suggestions: students can sort various sets of objects by size

Program of Studies: K – SO#2; Grade 1 – SO#3

**Math Concepts**: patterns and relations; objects can be organized by attributes

**Text Features**: colourful photographs prompt sorting based on different single attributes

**Teaching Suggestions**: students can sort objects in the classroom based on a common attribute or attributes and explain the sorting rule

**Program of Studies**: K – SO#2; Grade 1 – SO#3; Grade 2 – SO#3; Grade 3 – SO#3

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Grades 4 to 6


**Math Concepts**: patterns can be used to describe the world and solve problems

**Text Features**: novel

**Teaching Suggestions**: students can identify and describe the pattern of the tortoises to solve how many there were in total; students can translate the information into a chart; students can extend the pattern

**Program of Studies**: Grade 4 – SO#2, 3, 4

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**Math Concepts**: patterns can be used to describe the world and solve problems (implicit)

**Text Features**: narrative

**Teaching Suggestions**: students can estimate and calculate the number of paying customers in a year; students can create a table or chart from the representation of the pattern; students can write their own patterned story

**Program of Studies**: Grade 4 – SO#1, 2, 3; Grade 5 – SO#1; Grade 6 – SO#1

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**Math Concepts**: objects can be sorted according to attributes; non-numerical and numerical patterns can be investigated, established, and communicated (implicit)

**Text Features**: narrative; watercolours reproduced in brown and white

**Teaching Suggestions**: students can share their collections and memories; objects can be counted, categorized, and represented in a table or a chart

**Program of Studies**: Grade 4 – SO#1, 2, 3; Grade 5 – SO#1; Grade 6 – SO#1, 2

Math Concepts: patterns can be used to describe the world and to solve problems (implicit)
Text Features: novel; black and white line drawings; the second book of a series
Teaching Suggestions: students can recognize number patterns in the story and express these using symbols; students can write a story about a character “Sam Three-three”
Program of Studies: Grade 4 – SO#1, 2; Grade 5 – SO #1; Grade 6 – SO #1


Math Concepts: patterns can be constructed, extended, and summarized using rules and charts (explicit)
Text Features: narrative picture book; watercolour artwork
Teaching Suggestions: students can work together to solve the problem: “How many grains of rice would the wise man have received?”; students can identify the pattern and apply it to their own stories; students can translate the pattern to a table of values; students can play out the story using a chessboard and grains of rice~ how many days can they make it?
Program of Studies: Grade 4 – SO#1, 3, 5, 6; Grade 5 – SO#1, 2, 3; Grade 6 – SO#1, 2, 3, 4


Math Concepts: patterns can be constructed, extended, and summarized using rules and charts (explicit)
Text Features: narrative folktale; detailed Indian-inspired art; strong female character; fold-out page reveals growth pattern; chart of numbers of grains of rice is included
Teaching Suggestions: students can solve the question: “How many grains of rice by day ____ ?”; students can translate the pattern to a table of values (table included at the end of the story); students can write number sentences for each day
Program of Studies: Grade 4 – SO#1, 3, 5, 6; Grade 5 – SO#1, 2, 3; Grade 6 – SO#1, 2, 3, 4


Math Concepts: patterns can be used to describe the world
Text Features: beautifully illustrated narrative; includes table and explicit description of the Fibonacci sequence
Teaching Suggestions: students can solve the Fibonacci sequence ahead of the explanation; students can extend the pattern; students can create a table or a chart from the representation of the pattern
Program of Studies: Grade 4 – SO#1, 2, 3, 4; Grade 5 – SO#1

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**Math Concepts:** relationships can be used to summarize, generalize, and extend patterns found in language (implicit)

**Text Features:** picture book; legend; haiku stanzas

**Teaching Suggestions:** students can identify the poetic pattern of five, seven, and five syllables; students can write haiku stories

**Program of Studies:** Grade 4 – SO#2; Grade 5 – SO#1


**Math Concepts:** patterns can be used to describe the world and to solve problems; relationships can be used to summarize, generalize, and extend patterns (explicit)

**Text Features:** narrative; weak plot; includes a note for adults and kids that explains the mathematical concept of combinations

**Teaching Suggestions:** students can invent their own way of representing the pattern of choices; students could have a sundae party and chart possible combinations of ingredients

**Program of Studies:** Grade 4 – SO#1, 2, 3, 4; Grade 6 – SO#1, 2


**Math Concepts:** patterns can be constructed, extended, and summarized using rules and charts (explicit)

**Text Features:** narrative picture book; vivid illustrations; includes historical note

**Program of Studies:** Grade 4 – SO#1, 2; Grade 5 – SO#1, 2, 4, 5; Grade 6 – SO#1, 2, 3; Grade 7 – SO#1, 4


**Text Features:** beautifully illustrated narrative picture book; creative nonsensical language; reader searches illustrations for the objects discussed in the text; each page has a legend of objects in the story, which also lays out the patterns; section at the back explains the different patterns used in the story

**Teaching Suggestions:** students can write number sentences for each page; students can identify and extend the pattern; students can create their own story; students can translate the pattern to a table or chart

**Program of Studies:** Grade 4 – SO#2, 3; Grade 5 – SO#1; Grade 6 – SO#1
Grades 7 to 9

Math Concepts: patterns can be expressed in terms of variables; variables and equations can be used to express and summarize relationships (explicit)
Text Features: picture book; includes afterword; recursive ending
Teaching Suggestions: as the book is read, students can develop their own system of notation; introduce students to factorial notation
Program of Studies: Grade 7 – SO #1; Grade 9 – SO#1

The countingbury tales. de Guzmán. (2000).
Math Concepts: games and beauty often compel mathematicians to develop concepts (explicit)
Text Features: information book; includes table of contents and bibliography; historical; each chapter differs in degree of difficulty
Teaching Suggestions: activities are presented in the text
Program of Studies: Grade 7 – SO #1, 5; Grade 9 – SO #1

Math Concepts: patterns can be used to describe the world and to solve problems (explicit)
Text Features: information book; includes diagrams, a few proofs, and historical notes
Teaching Suggestions: students can express patterns using variables
Program of Studies: Grade 7 – SO#1, 2, 3, 4, 5, 6; Grade 8 – SO#2; Grade 9 – SO#1

Math Concepts: patterns can be expressed using variables (explicit)
Text Features: novel; includes table of contents, a map of mathematics, and a list of characters
Teaching Suggestions: integrate with science unit on the periodic table; can be used to teach order of operations (Strand: Number; Grade 9 – SO#1, 4)
Program of Studies: Grade 7 – SO#3, 4, 5, 6; Grade 8 – SO#2; Grade 9 – SO#3, 4

**Math Concepts:** patterns can be used to describe the world and to solve problems

**Text Features:** narrative, rhyming text; picture book; includes a forward with history of Fibonacci and “Ways to have fun with Fibonacci”

**Teaching Suggestions:** students can describe, orally or in writing, a given pattern using mathematical language; students can translate the pattern to a table of values; students can formulate a linear relation to represent the relationship in a given oral or written pattern

**Program of Studies:** Grade 5 – SO#1; Grade 6 – SO#1; Grade 7 – SO#1

Grades 10 to 12


**Math Concepts:** mathematics has developed over time; mathematics is a cultural activity; patterns and algebraic expressions can be used to solve problems (explicit)

**Text Features:** non-fiction; includes a preface, suggested uses for the book, an appendix, selected answers, and an index; each vignette is followed by a list of activities and related readings

**Teaching Suggestions:** activities are presented in the text

**Program of Studies:** Pure Math 10 – SO#1.1, 1.2, 1.7, 1.8, 1.9, 4.8; Applied Math 20 – SO#2.1; Pure Math 20 – SO#1.2, 3.1, 3.3, 3.6, 4.3, 4.5; Pure Math 30 – SO#2.1, 2.2


**Math Concepts:** patterns can be used to describe the world and to solve problems; algebraic and graphical models can be used to generalize patterns, make predictions, and solve problems (explicit)

**Text Features:** non-fiction novel; includes a preface and an index; contains historical explanations and references

**Teaching Suggestions:** sections at the beginning of the book can be read to the students as an introduction to a geometry unit

**Program of Studies:** Pure Math 10 – SO#1.1, 1.2, 1.7, 1.8, 1.9, 4.8; Applied Math 20 – SO#2.1; Pure Math 20 – SO#1.2, 3.1, 3.3, 3.6, 4.3, 4.5; Pure Math 30 – SO#2.1, 2.2


**Math Concepts:** numerical values can change over time; number patterns can be generated and analyzed (explicit)

**Text Features:** information book; includes table of contents, preface, afterword, and more information on pi

**Teaching Suggestions:** students can document the various interpretations of the value of pi

**Program of Studies:** Pure Math 10 – SO#1.1, 1.2, 1.7, 1.8, 1.9, 4.8; Pure Math 20 – SO#4.3, 4.5; Pure Math 30 – SO#2.1, 2.2

Math Concepts: principles of mathematical reasoning can be applied to solve problems and justify solutions (explicit)

Text Features: mystery puzzle book; narrative; includes table of contents with the level of difficulty indicated for each puzzle, preface, and solutions

Teaching Suggestions: problems presented in the text

Program of Studies: Pure Math 20 – SO#4.1, 4.2, 4.3, 4.4, 4.5


Math Concepts: principles of mathematical reasoning can be applied to solve problems and justify solutions (explicit)

Text Features: puzzle book; solutions included for each chapter; contains a preface and epilogue

Teaching Suggestions: problems are presented in the text

Program of Studies: Pure Math 20 – SO#4.1, 4.2, 4.3, 4.4, 4.5

Patterns and Relations 35
THE TOKEN GIFT

Complete Reference
ISBN 1550374982

Mathematical Content
Exponential Growth, Exponents, Logarithms, Doubling

Grade Level
4 – 12. Can also be used with younger children and for family mathematics projects.

Story
This story tells the legend of how the game of chess came into being. In the story the king learns that it is one of his subjects that has created the game and summons the creator to his palace in order to reward the creator. When asked to name a reward the creator asks for nothing but rice. A single grain to be placed on the first square of a chess board, double that on the second square, and double that for the next square, repeating this process until all 64 squares of the chess board have been covered. The king hastily grants the wish only to find out it may not be possible.

Prose
It is very readable for the secondary school student and can likely be read by students in upper elementary school. The story speaks to the theme of cleverness and humility. It has an interesting plot that captivates the reader. Not only does mathematics figure prominently in the plot but it is the mathematics that offers the opportunity for surprise and delight.

Illustrations
The illustrations are beautiful and exotic. The full-page illustrations take us back to ancient India with pictures of people playing their games in the sand and the king, with all his advisors, in the royal court. The artwork, consisting of landscapes and portraits appear to have been done in pastels; this has resulted in a very deep and rich look to the illustrations. The writer has used the artwork very effectively. It serves to add to the depth of the story.

Mathematics
The mathematics of exponential growth, units and transformation units is wonderfully handled in this book. In the story the king calls for the royal mathematician to address his problem of finding out how much rice would be needed to cover all the squares of the chessboard. The royal mathematician creates a table to illustrate the amount of rice needed for each square. But
because the numbers grow so large the mathematician does a transformation of unit each time the number grows to 32 768.

**Potential to Prompt Mathematical Activity**
This book is a very effective prompt for mathematical activity: in particular around doubling, exponential growth and the transformation of quantity. Indeed, in the story there is a very natural place to break from the reading to consider mathematics. Only once the students have considered the problem for their selves should they be allowed to read on. After they have read the authors solution to the mathematics problem there is a wonderful opportunity to discuss how number can be transformed to keep large numbers within the grasp of humans.

**Teaching Ideas**
Read the book out loud to the students. Before you begin ask students if they have ever played the game of chess or if they know people who play chess. While reading the story pause and ask students about using dice in a game like chess and leaving some of the game up to chance or whether chess without dice is better because it takes skill and careful strategizing. Pause when the story comes to the point where the game creator was to name his reward. Ask students what kind of reward would they ask for. Stop reading at the point when we learn that the king has made a great mistake. Ask what that mistake might be. Then have the students consider an 8x8 grid (chessboard). Ask the students to try to figure out how much rice would be needed to cover the chessboard. As students are working on the problem they can be prompted to consider: how big the number is: how many digits it has; what number it ends with; what number it begins with; how can that number be represented; is it possible to figure out the number with out figuring out all the numbers that come before it?

**Additional Comments**
This book is very suitable for oral reading. However, it is not a particularly large book hence students far away from the teacher may find it difficult to see the illustrations. Further, many students may want to re-read the story for themselves after they work through the mathematics; hence a classroom teacher may want to have multiple copies of the book available. The book is currently available in paperback at a very reasonable cost.

**Book Reviewed by**
Elaine Simmt
ANNO’S MYSTERIOUS MULTIPLYING JAR

**Complete Reference**
ISBN 0698117530

**Mathematical Content**
Factorials, Combinations and Permutations, Probability, Sequences, Infinity, Recursive Number Patterns

**Grade Level**
Grades 7 – 12. The first section of the book can also be used with younger children to explore multiplication patterns.

**Prose**
The first section of the story is written as a traditional picture book with a minimal amount of words. The reading level is quite low and students above grade 3 should have no difficulty with the vocabulary used. The story is predictable with a weak plot but this is consistent with the authors’ emphasis on patterns and the demonstration of large numbers generated by factorials.

**Story**
The opening sentence describes this story: “This story is about one jar and what was inside it.” After a creative beginning of imagining that the jar contains a sea with one island, the story continues by describing this island. The island contains two countries, each having three mountains, each having four walled kingdoms. The story continues until there are nine boxes, each containing ten jars. Mathematical descriptions, visual demonstrations of notation, and explanations follow as the story is repeated.

**Mathematics**
Many students struggle with the visualization of a factorial. Through the vivid description of an island, the authors show the reader a special pattern of how numbers can increase. In the second section of the book, the authors establish a purpose for factorial notation by demonstrating the magnitude of factorial numbers through the use of dots and equations. Thus, the reader is introduced to mathematicians’ method of inventing and establishing conventions. The notion of infinity and recursive patterning is implicit as the story concludes with the beginning sentence. This encourages the reader to consider each of the 10! jars as containing a sea with an island.

**Illustrations**
The appealing illustrations are detailed and colourful. The drawings provide visual interest as the reader encounters many opportunities to explore patterns. Rather than drawing identical objects, the artist has provided unique perspectives
of a variety of items. The illustrations are aimed at a more mature audience and
do not include childish caricatures. The simplicity of the language in the book is
balanced by the sophistication of these drawings.

Potential to Prompt Mathematical Activity
The mathematics in this story is explicit, therefore, the book is a very effective
prompt for mathematical activity. At the end of the first section, the authors
present the notion that 10! means 10 factorial or 3,628,800. They ask the reader
how there came to be so many jars. At this point, students should formulate an
explanation as they begin to visualize 10! As the second section of the story is
read, students should be given the opportunity to connect equations and the dot
arrays with the story text and their own explanations.

Teaching Ideas
Before referring to the book, have the students solve the following riddle in the
poem, "How many were going to St. Ives?" by Mother Goose: "As I was going to
St. Ives,/I met a man with 7 wives./Every wife had 7 sacks./Every sack had 7
cats./Every cat had 7 kittens./Kittens, cats, sacks, and wives./How many were
going to St. Ives?" Discuss the multiplication patterns (if students reply everyone
was leaving St. Ives except one, change the question to include those leaving).
Have students represent this poem in pictures. Read the story aloud. Pause at
the end of the first section and have students work in groups to answer the
question, "How did there come to be so many jars?" Discuss the need for a
system of notation. Continue reading the second section of the story. Perhaps it
would be useful to write the equations on the board. Have students brainstorm
other situations where factorials could be used. Ask students to solve the
following problems using factorials (from the Afterword of the book): How many
different ways can a row of four desks be arranged? What is the likelihood of
being seated directly behind your best friend?

The use of tree diagrams could be incorporated into the lesson to show the
pattern of multiplying. Counting books could be used to introduce younger
children to the notion of increasing magnitude through multiplication (e.g. Giganti,
Greenwillow Books). Students could generate their own story using factorials.

Additional Comments
The impact of the illustrations is lost when using one book with an entire class.
Since the purpose of the book is to demonstrate large numbers and the pattern
of factorials, multiple copies should be used with small groups of students. The
authors are internationally renowned for their integration of mathematics and
children's literature.

Book Reviewed by
Gladys Sterenberg
Shape and Space

Grades 1 to 3

Math Concepts: periods of time can be measured; some things do not change over time (implicit)
Text Features: narrative; watercolour artwork
Teaching Suggestions: students can describe activities they look forward to in summer; students can sequence the activities the children do when they arrive at the summer house
Program of Studies: Grade 2 – SO#1; Grade 3 – SO#1, 2; Grade 4 – SO#2

Math Concepts: value measurements may be different than money measurements (implicit)
Text Features: narrative; set at the fair
Teaching Suggestions: students can create a story of their best buy using a dollar; students can draw timelines of the story; students can say repeated text in unison along with reader; students can extend story by thinking of other uses for the hat
Program of Studies: K – SO#1; Grade 1 – SO#1; Grade 2 – SO#1

Math Concepts: 3-D objects are related to 2-D shapes (explicit)
Text Features: picture book (no words)
Teaching Suggestions: students can identify and count shapes in the pictures; students can use 3-D blocks to construct the objects in the pictures
Program of Studies: Grade 1 – SO#2, 4; Grade 2 – SO#6, 7, 9

Math Concepts: periods of time can be measured in standard units (explicit)
Text Features: narrative
Teaching Suggestions: students can read the clocks in the story; students can explain why Mr. Higgins’ clocks all seem to be different
Program of Studies: Grade 3 – SO#1, 2; Grade 4 – SO#1
Math Concepts: the mass of objects can be measured with nonstandard and standard units (explicit)
Text Features: narrative; sidebars include cooking tips and instructions; contains the recipe for strawberry shortcake
Teaching Suggestions: imperial measurements may need to be converted but the use of fractions with imperial measurements meets many of the number outcomes
Program of Studies: Grade 1 – SO#5; Grade 2 – SO#6; Grade 3 – SO#7, 8; Grade 4 – SO#9; Grade 6 – SO#8

Math Concepts: 3-D objects can be classified according to their properties; 3-D objects can be identified in everyday settings (explicit)
Text Features: picture book; photographs of objects
Teaching Suggestions: students can identify the objects in the photographs; students can create a collage using magazine photos of 3-D objects; students can identify the 2-D faces of the given 3-D objects
Program of Studies: Grade 1 – SO#4; Grade 2 – SO#7, 9

Math Concepts: shapes can be explored and classified according to their properties (implicit)
Text Features: narrative; painted collages
Teaching Suggestions: students can identify 2-D shapes used in the illustrations; students can create pictures from shapes
Program of Studies: Grade 1 – SO#2, 3, 4; Grade 2 – SO#8; Grade 3 – SO#7

Math Concepts: quantities can be estimated, measured, and compared using standard and nonstandard units (implicit)
Text Features: narrative; rhyming text
Teaching Suggestions: students can brainstorm ways to measure the various ingredients and objects; students can build models of the various scenes
Program of Studies: K – SO#1; Grade 1 – SO#1; Grade 2 – SO#2; Grade 3 – SO#3, 4
- **Math Concepts**: 2-D shapes can be classified according to their properties (explicit)
- **Text Features**: narrative; includes author’s notes for parents, teachers, and other adults
- **Teaching Suggestions**: students can create a story highlighting one shape’s attributes
- **Program of Studies**: Grade 1 – SO#2, 3; Grade 2 – SO#6, 8; Grade 3 – SO#7

- **Math Concepts**: periods of time can be measured in standard units (explicit)
- **Text Features**: narrative; analog clock diagrams are given in the top corners of each page; may be too primary for Grade 3 students
- **Teaching Suggestions**: students can make a timeline of events; students can calculate the time between events
- **Program of Studies**: Grade 3 – SO#1, 2

- **Math Concepts**: everyday phenomena can be measured using nonstandard and standard units of length (explicit)
- **Text Features**: narrative of historical fiction; line drawings
- **Teaching Suggestions**: students can write their own stories involving miscommunication with nonstandard units of measurement
- **Program of Studies**: K – SO#1; Grade 1 – SO#1; Grade 2 – SO#2, 4; Grade 3 – SO#3

- **Math Concepts**: everyday phenomena can be described and compared using measurement; nonstandard and standard units are used for measuring objects (explicit)
- **Text Features**: students are addressed directly by the text and encouraged to engage in mathematical tasks; metric and imperial/standard systems are presented
- **Teaching Suggestions**: students will need to be aware that the imperial system of measurement is called customary or inch-pound in this book
- **Program of Studies**: K – SO#1; Grade 1 – SO#1; Grade 2 – SO#2, 3, 4; Grade 3 – SO#3
**Math Concepts:** organisms have a variety of lifespans; periods of time can be measured in standard units (explicit)
**Text Features:** footnotes include suggestions for activities; includes a foreword; Learning Magazine teachers' choice award
**Teaching Suggestions:** activities are presented in the text
**Program of Studies:** Grade 2 – SO#1; Grade 3 – SO#1, 2

**Math Concepts:** everyday phenomena can be described and compared using measurement; nonstandard and standard units are used for measuring objects (explicit)
**Text Features:** contains an index; metric and imperial/standard systems are presented; American examples are used
**Teaching Suggestions:** students will need to be aware that the imperial system of measurement is called the English system in this book
**Program of Studies:** Grade 2 – SO#2, 3, 4; Grade 3 – SO#3

**Math Concepts:** everyday phenomena can be described and compared using measurement; nonstandard and standard units are used for measuring objects (explicit)
**Text Features:** narrative; imperial measurements are used in most places; includes examples of nonstandard measurements
**Teaching Suggestions:** prior to reading the story, students can complete the homework assignment given to the character
**Program of Studies:** K – SO#1; Grade 1 – SO#1; Grade 2 – SO#2, 3, 4; Grade 3 – SO#3, 4

**Math Concepts:** volume can be measured in nonstandard units (implicit)
**Text Features:** narrative
**Teaching Suggestions:** students can experiment with measurements of capacity and volume using different objects and containers; can be integrated with science
**Program of Studies:** K – SO#1; Grade 1 – SO#1; Grade 5 – SO#4
Math Concepts: growth can be measured (implicit)
Text Features: narrative legend; detailed colourful illustrations; set in the United States
Teaching Suggestions: students can measure and compare their heights and masses; students can predict events if they were twice as big, three times as big; students can identify and solve problems as a result of being bigger
Program of Studies: K – SO#1; Grade 1 – SO#1; Grade 2 – SO#2, 3, 4; Grade 3 – SO#3, 4

Math Concepts: mathematical shapes can represent objects in our environment (explicit)
Text Features: picture book; includes sea facts about the organisms
Teaching Suggestions: students can identify 2-D shapes in 3-D objects in the classroom; students can reproduce the shapes
Program of Studies: K – SO#2; Grade 1 – SO#3, 4; Grade 2 – SO#6, 8, 9; Grade 3 – SO#6

Math Concepts: 2-D shapes can be identified in everyday settings (explicit)
Text Features: shapes are introduced; search and find scenario for specific shapes; answers, glossary and index included; basic introductory level
Teaching Suggestions: students can identify 2-D shapes in their environment; students can reproduce the given 2-D shapes
Program of Studies: Grade 1 – SO#3; Grade 2 – SO#8

Math Concepts: 2-D shapes can be classified according to their properties; 2-D shapes can be identified in everyday settings (explicit)
Text Features: rhyming text; patterned verses
Teaching Suggestions: students can find congruent shapes in the environment; students can create a scene using 2-D shapes
Program of Studies: Grade 1 – SO#2, 3, 4; Grade 2 – SO#8; Grade 3 – SO#7

Math Concepts: 3-D objects can be classified according to their properties; 3-D objects can be identified in everyday settings (explicit)
Text Features: picture book; photographs of objects
Teaching Suggestions: students can identify the objects in the photographs; students can identify circles and squares in their environment
Program of Studies: Grade 1 – SO#2; Grade 2 – SO#6, 8


Math Concepts: periods of time can be measured in standard units (implicit)
Text Features: narrative written in first person; maps of the canoe trip are included; recipes are given for food eaten along the way
Teaching Suggestions: students can record the events in the story according to timelines; students can create a timeline of their own vacations
Program of Studies: Grade 2 – SO#1; Grade 3 – SO#1; Grade 4 – SO#2


Math Concepts: 2-D shapes can be identified according to their characteristics; relationships between 2-D shapes exist (explicit)
Text Features: tangram cutouts are included, mathematics activities are listed
Program of Studies: Grade 1 – SO#19, 20; Grade 2 – SO#21, 22


Math Concepts: 2-D shapes can be classified according to their properties; 2-D shapes can be identified in familiar and new settings (explicit)
Text Features: narrative; photographs; contains separate explanations of the African items
Teaching Suggestions: encourage multicultural discussions; students can identify shapes in the foods they eat; students can identify favorite shapes and can justify their choices
Program of Studies: Grade 1 – SO#2, 3, 4; Grade 2 – SO#8; Grade 3 – SO#7


Math Concepts: periods of time can be measured in standard and nonstandard units (explicit)
Text Features: picture book; Caldecott medal winner
Teaching Suggestions: students can draw the next frames using time references to continue the story
Program of Studies: Grade 2 – SO#1; Grade 3 – SO#1; Grade 4 – SO#2

Shape and Space 45

Math Concepts: 2-D shapes are comprised of line segments; 2-D shapes can be classified according to their properties; 2-D shapes can be identified in everyday settings (explicit)

Text Features: rhyming text; colourful illustrations

Teaching Suggestions: the definition of a line is mathematically incomplete and includes concepts of curved and bent lines; the idea of line segments should be reinforced; students can find congruent shapes in the environment; students can create a scene using 2-D shapes

Program of Studies: Grade 1 – SO#4; Grade 2 – SO#8, 9

Grades 4 to 6


Math Concepts: motions can be described as transformations; tessellating shapes can be used in designs (explicit)

Text Features: narrative; beautiful watercolours; includes author’s notes for parents, teachers, and other adults

Teaching Suggestions: students can create their own cloak design; activities are presented on the last page

Program of Studies: Grade 5 – SO#8, 9; Grade 6 – SO#6, 7; Grade 7 – SO#4, 5


Math Concepts: periods of time can be measured using standard units such as the 24-hour clock and time zones (explicit)

Text Features: includes a few words to the readers, a note to parents and other older readers; the subtext reveals the commonality of humankind and promotes world peace

Program of Studies: Grade 3 – SO#1, 2; Grade 4 – SO#1, 2


Math Concepts: periods of time can be measured (explicit)

Text Features: novel; includes full-page coloured illustrations

Teaching Suggestions: students can construct a timeline of the journey

Program of Studies: Grade 4 – SO#1, 2

**Math Concepts:** volume can be measured using standard and nonstandard units (explicit)

**Text Features:** narrative; includes activities listed at the back of the book; imperial measurements are used in a few places but metric conversions are provided at the back of the book

**Teaching Suggestions:** activities are presented in the text; students can measure volume using the displacement of water; students can measure the volume of a container using nonstandard units

**Program of Studies:** Grade 5 – SO#4

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**Math Concepts:** visualization of 2-D shapes can be used to solve problems related to spatial relations (explicit)

**Text Features:** narrative; watercolour illustrations; tangram shapes of characters are given in text; activities for students and author’s notes to parents and teachers are included

**Teaching Suggestions:** activities are presented on the inside of the back cover

**Program of Studies:** Grade 4 – SO#5; Grade 5 – SO#9

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**Math Concepts:** direct and indirect measurement can be used to solve problems; the characteristics of 3-D objects and 2-D shapes can be described and the relationships among them can be analyzed

**Text Features:** games and activities; “Tips and Tricks”, extensions, and index included

**Teaching Suggestions:** activities are provided

**Program of Studies:** Grade 3 – SO#4, 5, 6, 7; Grade 4 – SO#3, 4; Grade 5 – SO#1, 4, 6, 7; Grade 6 – SO#1, 2, 3, 4, 5; Grade 7 – SO#1, 2

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**Math Concepts:** periods of time can be measured in standard units (explicit)

**Text Features:** information book; includes contents, a bibliography, and an index; line drawings

**Teaching Suggestions:** students can construct sundials and other kinds of timekeepers using the instructions in the text

**Program of Studies:** Grade 3 – SO#1, 2; Grade 4 – SO#1, 2

**Math Concepts:** shapes can be used to solve problems related to spatial relations (implicit)

**Text Features:** picture book; includes author's information about the history of kite flying; Chinese meaning of the shapes of kites is included

**Teaching Suggestions:** students can build and fly kites

**Program of Studies:** Grade 5 – SO#6, 7

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**Math Concepts:** mathematics is a cultural activity (implicit)

**Text Features:** information book; includes contents, a glossary, and an index; part of a series on ancient civilizations

**Teaching Suggestions:** students can read the section on science and mathematics and make posters showing the origin of geometric concepts; using the section on famous buildings, students can explore the golden ratio

**Program of Studies:** Grade 3 – SO#7; Grade 4 – SO#4; Grade 5 – SO#6, 7; Grade 6 – SO#4, 5

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**Math Concepts:** everyday phenomena can be described and compared using measurements (explicit)

**Text Features:** nonstandard measurement systems are described from a historical background; imperial and metric system are presented; detailed illustrations; a center foldout section shows metric measurements; author's notes on the metric system are included

**Program of Studies:** Grade 3 – SO#3, 4; Grade 5 – SO#3, 4, 5

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**Math Concepts:** the volume of everyday objects can be measured and compared (implicit)

**Text Features:** narrative; set in the Canadian mountains and prairies; black, white, and orange line drawings

**Teaching Suggestions:** students can calculate the volume of the cheese when it is as big as a house

**Program of Studies:** Grade 5 – SO#4

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**Math Concepts:** everyday phenomena can be described and compared using shapes (implicit)

**Text Features:** novel; the interplay between language and mathematics is explored

**Teaching Suggestions:** students can construct 3-D objects as characters in the story (e.g. the dodecahedron) for a book report display

**Program of Studies:** Grade 5 – SO#8

**Math Concepts:** the volume of everyday objects can be measured; volume measurements of cubic centimeters are related to milliliters (implicit)

**Text Features:** narrative; Caldecott honor book

**Teaching Suggestions:** students can estimate and measure the volume of different rooms

**Program of Studies:** Grade 5 – SO#4


**Math Concepts:** everyday phenomena can be described and compared using measurements of perimeter and circumference (explicit)

**Text Features:** narrative; imperial measurements are used

**Teaching Suggestions:** students can investigate and build models of tables having the same areas but different perimeters

**Program of Studies:** Grade 4 – SO#3; Grade 5 – SO#1, 2; Grade 6 – SO#1, 2, 3


**Math Concepts:** everyday phenomena can be described and compared using angle measurements (explicit)

**Text Features:** narrative; a protractor is included

**Teaching Suggestions:** students can plan a treasure hunt using angle measurements

**Program of Studies:** Grade 4 – SO#3; Grade 5 – SO#1, 2; Grade 6 – SO#1, 2, 3


**Math Concepts:**

**Text Features:** narrative adventure; the play on words for characters’ names reinforces vocabulary

**Teaching Suggestions:** imperial measurements are used and can be discussed

**Program of Studies:** Grade 3 – SO#5; Grade 5 – SO#2; Grade 6 – SO#3; Grade 7 – SO#1

*Spaghetti and meatballs for all!* Burns, M. (1997).

**Math Concepts:** space can be measured using perimeter and area; shapes with the same area can have different perimeters (explicit)

**Text Features:** narrative; includes the author’s notes for parents, teachers, and other adults

**Teaching Suggestions:** activities are presented in the text

**Program of Studies:** Grade 4 – SO#3; Grade 5 – SO#2; Grade 6 – SO#3

Shape and Space

Math Concepts: everyday phenomena can be described and compared using squares (explicit)
Text Features: includes historical notes; contains contents, answers, a glossary, and an index; metric measurements are given
Teaching Suggestions: activities and games are presented in the text
Program of Studies: Grade 5 – SO#8, 9; Grade 6 – SO#6, 7


Math Concepts: visualization of 2-D shapes can be used to solve problems related to spatial relations (implicit)
Text Features: narrative; detailed illustrations; different quilt patterns form the border on each page
Teaching Suggestions: students can classify 2-D shapes according to angles and sides; students can design a quilt
Program of Studies: Grade 5 – SO#6, 7; Grade 6 – SO#4, 5


Math Concepts: 3-D objects can be classified and constructed (implicit)
Text Features: narrative; beautiful artwork; an African story
Teaching Suggestions: students can build villages of round, square, and triangular houses
Program of Studies: Grade 2 – SO#8, 9; Grade 3 – SO#6; Grade 4 – SO#4; Grade 5 – SO#6


Math Concepts: problems can be solved using direct and indirect measurements
Text Features: narrative picture book; watercolour paintings; instructions for projects included; imperial measurements used
Teaching Suggestions: students can bring in something to measure; students can make a Moebius strip; students can make an expanding frame; students can light and measure a big area with a small beam of light
Program of Studies: Grade 4 – SO#3; Grade 5 – SO#3; Grade 6 – SO#3
Grades 7 to 9

  Math Concepts: everyday phenomena can be described and compared using circles (explicit)
  Text Features: includes historical notes; contains contents, circle formulas, answers, a glossary, and an index; metric measurements are given
  Teaching Suggestions: Pi is presented incorrectly as 3.14; activities and games are presented in the text
  Program of Studies: Grade 7 – SO#1, 2

  Math Concepts: everyday phenomena can be described and compared using measurement; the effects of dimension changes in 3-D objects can be described using volume measurements (implicit)
  Text Features: novel; National book award winner
  Teaching Suggestions: students can calculate the volume of the dirt removed from the holes and the surface area needed for the resulting conical piles
  Program of Studies: Grade 8 – SO#3, 4

  Math Concepts: similar triangles may be used to solve problems; angle measurements are linked to the properties of parallel lines (explicit)
  Text Features: biography of Eratosthenes; picture book; includes the author’s note, an afterword, and a bibliography
  Teaching Suggestions: students can replicate Eratosthenes’ system of measurement using e-mail partners from another city
  Program of Studies: Grade 7 – SO#1, 2; Grade 8 – SO#1; Grade 9 – SO#1

  Math Concepts: mathematics develops within a cultural context (implicit)
  Text Features: information book; includes a table of contents, maps, family trees, names and terms, a bibliography, suggested reading lists, and an index; full-page colourful and detailed illustrations; includes short biographical notes on Euclid and Archimedes
  Teaching Suggestions: students can determine the volume of a sphere that fits exactly into a cylinder
  Program of Studies: Grade 8 – SO#4, 7

**Math Concepts:** 3-D objects can be described and analyzed according to their characteristics and their relationship to 2-D shapes (explicit)

**Text Features:** activity book; contains brightly-coloured photographs and diagrams; includes step-by-step instructions

**Teaching Suggestions:** students can construct, identify, and classify polyhedrons

**Program of Studies:** Grade 8 – SO#2, 3


**Math Concepts:** properties of circles can be used to solve problems; everyday phenomena can be described and compared using measurement (explicit)

**Text Features:** narrative adventure; the play on words for characters’ names reinforces vocabulary

**Teaching Suggestions:** imperial measurements are used; the mathematically incorrect use of three and one-seventh to describe Pi is corrected on the last page of the book

**Program of Studies:** Grade 7 – SO#1, 2; Grade 9 – SO#1

**Grades 10 to 12**


**Math Concepts:** characteristics of 3-D objects and 2-D shapes can be described and analyzed; mathematics can be a recreational activity (explicit)

**Text Features:** collection of puzzles and problems; includes a preface and a postscript

**Teaching Suggestions:** students can investigate the geometric patterns referred to in the text

**Program of Studies:** Applied Math 10 – SO#1.5, 1.6, 6.1, 6.2, 6.3; Pure Math 10 – SO#6.1, 6.2, 6.3; Applied Math 20 – SO#5.1, 5.2, 6.1; Pure Math 20 – SO#5.1, 5.2, 5.3; Applied Math 30 – SO#5.4, 6.1, 6.2, 6.4; Pure Math 30 – SO#4.1, 4.2

**Math Concepts**: a tension exists between metamathematics (theories replaced by formal systems) and the contextual logic of mathematical problem solving; everyday phenomena can be described and compared; characteristics of 3-D objects and 2-D shapes can be described and analyzed (explicit)

**Text Features**: is a discussion between the teacher and students in the form of a play

**Teaching Suggestions**: students can role-play the discussion; students can explore ideas using readers’ theatre as they debate a mathematical conjecture; students can debate the logic of $V - E + F = 2$

**Program of Studies**: Applied Math 10 – SO#1.5, 1.6, 6.1, 6.2, 6.3; Pure Math 10 – SO#6.1, 6.2, 6.3; Applied Math 20 – SO#5.1, 5.2, 6.1; Pure Math 20 – SO#5.1, 5.2, 5.3; Applied Math 30 – SO#5.4, 6.1, 6.2, 6.4


**Math Concepts**: geometry underlies much of the mathematics developed to date (explicit)

**Text Features**: biographies; includes an introduction, an epilogue, and an index

**Teaching Suggestions**: students can investigate the geometric contributions of Euclid, Descartes, Gauss, Einstein, and Witten

**Program of Studies**: Applied Math 10 – SO#1.5, 1.6, 4.1, 4.2, 4.3, 4.4, 6.1, 6.2, 6.3; Pure Math 10 – SO#6.1, 6.2, 6.3; Applied Math 20 – SO#5.1, 5.2, 6.1; Pure Math 20 – SO#5.1, 5.2, 5.3, 5.4, 5.5; Applied Math 30 – SO#5.4, 6.1, 6.2, 6.4
SPAGHETTI AND MEATBALLS FOR ALL!

Complete Reference
ISBN 0590944592

Mathematical Content
Area, Perimeter, Graphing, Division

Grade Level
Grades 4 – 8

Prose
This book is well written with an easy-to-read conversational style of prose. The reader is drawn into the story by the believable event of a family reunion party. The interruption of speech lends well to the activities. This story is written so that one can actually hear the commotion as things are constantly being rearranged.

Story
Mr. and Mrs. Comfort decide to have a family reunion and invite all their family and their neighbors who are “almost like” family. Once they invite and count all the guests, they begin preparing for the event. They organize everything precisely to fit a party of 32 people. The tables and chairs are set and ready for everyone’s arrival, however, things get a little chaotic when the guests start arriving and shuffling things around. Mrs. Comfort tries to explain how things need to be according to her plans, but no one is listening. Everyone is too busy visiting. Eventually everything gets put back as it was originally only after much commotion and, by the looks of the illustrations, much mess.

Mathematics
The most obvious mathematics is the organization of the tables and the relation of perimeter to the seating of the guests. This information can also be used to compare area and perimeter.

Illustrations
The illustrations are realistic, depicting the commotion, noise, and disarray of a large party. The reader is invited into the story by the believable happenings surrounding the large family gathering or party. The illustrations depict the mess and noise so well that between the words and the illustrations we can almost hear everything that is going on. Certainly anyone who has experienced a large party of any type will be able to relate to all the activity.

Potential to Prompt Mathematical Activity
The story is a good introduction or a review of perimeter and area as we can look at the different arrangements of the tables. Throughout the story there are a number of natural places to stop and discuss the table arrangements by having

Shape and Space

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the students speculate about various solutions. The amounts of food and the different categories of the guests (i.e. daughter, son, children and neighbors) can be represented in a bar graph. Also, the amount of food can be used as a division activity.

**Teaching Ideas**

Before beginning to read, ask the students if they have ever been to a reunion, wedding, or large party of some sort. Discuss the things that they noticed at these events and possibly list them. While the story is being read, pause and discuss the amount of food and the seating arrangement that Mrs. Comfort begins with to see if the students can predict what may happen. As things are moved around, point out the problem that Mrs. Comfort is having because no one is listening. Discuss her feelings and similar feelings that they may have experienced. After reading the story, go back and look at the different table arrangements, possibly drawing them on the board and discussing why they won't work. Give the students graph paper and have them draw as many different arrangements that they can find to accommodate 32 people. Was Mrs. Comfort's arrangement the best? Why or why not? What is the least amount of tables that can be used? After this activity is done, we can use the information to discuss perimeter and compare area and perimeter in each of the seating arrangements by using each side as one unit. This story can also be used to discuss the idea of division by looking at the amount of food and comparing it to the portion size each adult or child should get. Is everyone going to have the exact amount of meatballs, garlic bread, etc.? Once we have divided up the portions and calculated our results we could further divide the guests into categories and represent our findings on a bar graph.

**Additional Comments**

For an extended activity the students could organize a classroom party and look at amounts and types of food, discuss the possible seating arrangements and the different placement of tables and chairs as well as the best and most efficient arrangements. While the students are making the preparations, have the students discuss the perimeter and areas of all their arrangements. Once it has been arranged and the party is over, have the students make a list of things that have to be done in order for the party to be enjoyable for everyone. Maybe have them prioritize activities. This book has a fun story line and you may need to have multiple copies of the book in order for students to look through and re-read it if they so desire.

**Book Reviewed by**

Marlene A. Sharpe
A CLOAK FOR THE DREAMER

Complete Reference

Mathematical Content
Geometric shapes, Angles

Grade Level
Grades 4 - 7

Prose
This would be appropriate for upper elementary students to read on their own. Younger children would need to have this story read to them. The story allows the reader to appreciate that all people and children are unique. It suggests that we are not all meant to "fit the pattern" symbolized by the circles which do not fit together. We are drawn into the loving family life of the three children and their father where kindness, understanding, and love are the underlying values.

Story
The story appears to be set in Russia in the 1800's. This picture book tells the story of a father and his three sons. The three sons help their father with his tailoring business. The father has been asked to sew three cloaks for the Archduke. He employs his sons to help him meet the deadline and the boys set out to work on the cloaks. Each child chooses a different geometric pattern for the cloak they are designing. Two of the boys use squares, rectangles, and triangles. The third son, Alex, chooses to use circles and finds that the cloak is useless because of the spaces left between the circles. The father realizes that his son is not meant to be a tailor and decides that his son should follow his dreams and set off to see the world. Being a loving father, he enlists the two other sons to help him make Alex a cloak that he can wear on his journey. They work all night long, creating hexagons from the circles in Alex's old cloak. Alex leaves home the very next day wearing a beautiful cloak made from hexagons.

Mathematics
The basic concepts surrounding patterns, geometric shapes, angles, and how they fit together is gently woven into this loving story about family, tradition, and how each of us will find our own individual destiny. We are confronted with a problem when the circles do not fit together. The mathematics is implicit in the story and you can delve as deeply into the concepts as your students require.

Illustrations
The corner-to-corner, full-page watercolor paintings are all consuming and fabulous. The images depict village and family life with a great deal of detail. A pattern with rectangles, circles, or squares appears on every page. The patterns
and geometric shapes appear in windows, doors, dresses, walls, maps, wheelbarrows, and carpets.

**Potential to Prompt Mathematical Activity**
This book would be effective in prompting activities exploring geometric shapes and finding the sum of interior angles. If you were, for instance, creating a large patchwork with certain shapes in the class, it could be stretched to lead into measurement and division. For example, how many 5 cm triangles can fit across the 8 m wall when creating a geometric pattern on the wall? If you were to use this story as a prompt for exploring angles and how they fit together, it would be excellent.

**Teaching Ideas**
Read the story aloud to students. Pause at the page where Ivan makes a quilt with rectangles (there are no page numbers). Have a student come up and demonstrate what types of patterns you could make with rectangles. Use some large pre-cut rectangles and sticky tack at the board. Talk about how the angles fit together. Stop at the page where Alex makes the quilt with triangles. Demonstrate what happens when you snip a square in half, diagonally, by cutting some squares in half and allowing another student to come up and show how to design a pattern using these triangles (use pre-cut squares and sticky tack). Stop at the page where the father comes in to get his two sons and make the cloak while Alex sleeps. Have some circles prepared. Have the class help solve the problem. How can we make them fit together? What can we do? What do the other patchworks have in common? Lead them through questioning to see if they can solve the problem with a geometric shape other than a square or triangle. Finish reading the story. Use this story as a springboard into a lesson on the sum of the interior angles of a quadrilateral and how angles fit together. Have the class design some huge wall patchwork quilts using geometric shapes. You can fill your hallways with them.

**Additional Comments**
The large, detailed illustrations make this book very suitable for reading aloud. If I were reading this orally I would go slowly and draw attention to some of the details brought out by the illustrations. I would want students to see the patterns, geometry, and angles that exist in the world surrounding us. I believe the historical perspective adds a great deal to the depth of the story, for example, women with head scarves, mean with twirled moustaches, children working in a trade with their father, and horses used for transportation. This book would also be very appropriate for grades 1 and 2 mathematics students because of the abundance of patterns and life’s virtues build into the story.

**Book Reviewed by**
Beth Stewart
THE LIBRARIAN WHO MEASURED THE EARTH

Complete Reference
ISBN 0316515264

Mathematical Content
Circumference, Measurement, Degrees, Angles, Ratio, Trigonometry

Grade Level
Grades 7 – 12

Prose
The author writes as a storyteller and includes vivid descriptions of the settings. Eratosthenes' character is developed throughout the book as he responds emotionally and cognitively to various situations. Pronunciations for places and people are provided within the text. The book includes an author’s note, an afterword, and a bibliography. The reading level is appropriate for middle school students.

Story
This historical story is about Eratosthenes, who was born in the Greek city of Cyrene more than 2000 years ago. As a boy, he was sent to Athens to study mathematics, philosophy, and science. When he was 30 years old, he moved to Alexandria to become a tutor for the king’s son. Soon he was appointed head librarian of Alexandria. His reputation as an all-rounder, a person who was good at many things, was becoming established. Eratosthenes loved geography. He decided to write a geography book but wanted to include the circumference of the earth. His solution for calculating the circumference of the earth is presented in great detail. Emphasized in the story is Eratosthenes' curiosity and questioning nature. This interesting story indicates that early Greeks understood the earth was round two thousand years before Columbus.

Mathematics
By measuring the inside angle of the section of the earth's surface between Alexandria and Syene, and measuring the distance between the two cities, Eratosthenes was able to calculate the earth's circumference. Shadows were used to measure the sides of a triangle and ratios were used to determine the interior angle of the earth. His measurement is within 200 km of our present-day calculation of the earth's circumference. Eratosthenes is portrayed as a remarkable man. The importance of curiosity in mathematics is explicitly presented.
Illustrations
Wonderful illustrations support the actions and discoveries of Eratosthenes. Full page, colourful pictures are artistically appealing.

Potential to Prompt Mathematical Activity
The mathematics in this story is explicit as Eratosthenes' method for calculating the circumference of the earth is presented. Although formulas for this calculation existed at the time, Eratosthenes created his own method for solving his problem.

Teaching Ideas
In groups, have students brainstorm methods of calculating the circumference of the earth. Read the story. On a sunny day, students could recreate Eratosthenes' solution and compare this to their own. Students could use trigonometry to calculate the circumference of the earth. Students could research other methods (e.g. formula). Students could discuss the significance of June 21 for the measurement. Students could write and act out the Eratosthenes' conversation with the king as he requests the services of the bematists.

Eratosthenes is also well known for his method of sorting prime numbers called the Sieve of Eratosthenes. Students could follow his procedure to produce a table of all prime numbers to 100.

Additional Comments
Some background knowledge of how to measure the angle of the sun by the shadow it casts is necessary. Also, the author does not explain why the angle of the sun in Alexandria at noon on June 21 would be the same as the inside angle.

Book Reviewed by
Gladys Sterenberg
Statistics and Probability

Grades 2 to 3

- **Math Concepts**: concepts of chance and chance events can be described using ordinary language; experimental probability can be used to represent problems involving uncertainty (explicit)
- **Text Features**: narrative fairy tale; detailed illustrations
- **Teaching Suggestions**: students can record the number of each colour of balloon using tally marks; students can create a bar graph to represent the data
- **Program of Studies**: Grade 2 – SO#1, 2; Grade 3 – SO#1, 2

- **Math Concepts**: concepts of chance can be described using ordinary vocabulary (implicit)
- **Text Features**: whimsical narrative
- **Teaching Suggestions**: using vocabulary from text, students can tell or write their own descriptions of the weather; students can collect weather data over a period of time and organize it
- **Program of Studies**: Grade 2 – SO#2; Grade 3 – SO#1, 2

- **Math Concepts**: data can be collected, displayed, and analyzed; predictions from data can be made (implicit)
- **Text Features**: narrative
- **Teaching Suggestions**: students can estimate, count, record, and graph the number of letters in the first names of classmates
- **Program of Studies**: Grade 2 – SO#1, 2; Grade 3 – SO#1, 2

- **Math Concepts**: numbers describe quantities; predictions about a population can be made by analyzing data (implicit)
- **Text Features**: narrative; cartoon-like drawings; repeated word pattern
- **Teaching Suggestions**: students can estimate, count, record, and graph the number of students in each grade at their school; students can calculate the cost of the birthday party; students can figure out the likelihood that two of the students in the class have the same birthday
- **Program of Studies**: Grade 2 – SO#1, 2; Grade 3 – SO#1, 2
Math Concepts: data can be collected, displayed, and analyzed
Text Features: narrative
Teaching Suggestions: students can add up the tallies; students can record the tallies as they listen to the story; students can play a classroom tally game;
Program of Studies: Grade 3 – SO#1

Math Concepts: data can be collected, displayed, and analyzed; predictions from data can be made (implicit)
Text Features: narrative
Teaching Suggestions: students can predict the likelihood of a classmate wearing a hat in winter or in summer; students can gather data on classmates’ collections; by recording the data, students can solve the problem: “How many days could RR Pottle wear his favourite three hats if he put them on in a different order each day?”
Program of Studies: Grade 3 – SO#1,

Grades 4 to 6

Math Concepts: probability can be used to represent and solve problems involving uncertainty (implicit)
Text Features: novel
Teaching Suggestions: students can determine the theoretical probability of receiving one of the five golden tickets; students can compare the odds of winning lotteries to the events in the book; students can conduct experiments on drawing a winning ticket
Program of Studies: Grade 5 – SO#3, 4; Grade 6 – SO#4

In the year of the boar and Jackie Robinson. Lord, B. B. (2003).
Math Concepts: data can be collected, displayed, and analyzed to make predictions (implicit)
Text Features: novel; set in the United States
Teaching Suggestions: students can analyze baseball statistics and make predictions
Program of Studies: Grade 5 – SO#3; Grade 6 – SO#4

Math Concepts: experimental or theoretical probabilities can be used to represent and solve problems involving uncertainty
Text Features: narrative picture book; key vocabulary is bolded
Teaching Suggestions: students can do the assignment presented in the book
Program of Studies: Grade 5 – SO#3, 4; Grade 6 – SO#4
Grades 7 to 9


**Math Concepts:** everyday phenomena can be described using probability (explicit)

**Text Features:** information book; includes a table of contents, a foreword, an introduction, references, and an index; contains dense text

**Teaching Suggestions:** students can investigate the questions posed in each chapter

**Program of Studies:** Grade 7 – SO#4, 5, 6; Grade 8 – SO#2; Grade 9 – SO#4

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Grades 10 to 12


**Math Concepts:** problems involving uncertainty can be solved using theoretical probability (explicit)

**Text Features:** narrative picture book; contains a variety of different types of diagrams for combinations and permutations; includes author’s notes about the mathematics

**Teaching Suggestions:** students can visually represent combinations and permutations for other problems

**Program of Studies:** Applied Math 30 – SO#1.1, 1.2, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7; Pure Math 30 – SO#5.1, 5.2, 5.3, 5.4, 5.5, 5.7, 6.2
SOCRATES AND THE THREE LITTLE PIGS

Complete Reference
ISBN 0370308980

Mathematical Content
Probability, Combinations, Permutations

Grade Level
Grades 7 – 12

Prose
This is an exceptional piece of literature. The author approaches a classic story from a mathematical perspective and does a wonderful job. There are full colour illustrations that will appeal to all grade levels. The mathematics is such that junior high students will be able to follow along with what is being done but only the higher grade levels will be able to take the concepts from the story and work with them independently.

Story
The story is about a wolf named Socrates and his quest to capture a pig for his wife Xanthippe so she can have dinner. With the help of his friend Pythagoras, Socrates goes through all of the permutations and combinations that the three pigs might be in their five houses so that he can see what the probability of finding one all alone is. After countless hours of determining the chances of finding a pig alone, Socrates decides it is better to become the pigs’ friend and not to eat them at all.

Mathematics
The story deals with permutations and combinations. It shows that when looking to find a solo pig in a house, which pig is in the house doesn't matter. The wolf solves the problem using both permutations and combinations and finds that when the events are independent, there are a lot fewer scenarios.

Illustrations
The illustrations in this book are amazing. Each page is a full color illustration. The illustrations help further the story line and are very colorful. The most impressive thing about the illustrations is that each time Socrates comes up with a new set of combinations or permutations, each one is drawn on the page. There are tree diagrams that help show the numerous possibilities as well. All of the illustrations are clear and easy to follow.
Potential to Prompt Mathematical Activity
This is a very good resource to prompt mathematical activity. The students will be pulled into the story and will begin to wonder just how many different arrangements there are for three pigs and five houses.

Teaching Ideas
I would read through the book pausing each time a question arose. I would have the students work on the same problem as Socrates is. They could work in groups or individually to determine both the number of combinations and permutations. After doing all of the picture drawings and tree diagrams, you could work along with the students to develop general formulas for solving such equations.

Additional Comments
This is a great book that will appeal to a wide range of age groups.

Book Reviewed by
Tyler Sorochan
Puzzles and Problems

Grades 1 to 3


**Math Concepts**: develop number sense; concepts include counting, shapes, patterns and measuring.

**Text Features**: narrative; problems presented and extensions suggested

**Teaching Suggestions**: problems presented

**Program of Studies**: each strand addressed; best suited to a younger audience


**Math Concepts**: patterns and relations can be described mathematically; everyday phenomena can be described and compared using measurement (explicit)

**Text Features**: includes an afterword that explains each section

**Teaching Suggestions**: problems are presented in the text


**Math Concepts**: numbers can be used to solve problems (explicit)

**Text Features**: riddles; includes answers; black and white illustrations

**Teaching Suggestions**: students can answer the riddles presented in the text; students can write their own riddles

**Program of Studies**: use with number strand, grade 3


**Math Concepts**: numbers can be used to solve problems (explicit)

**Text Features**: narrative; weak plot; includes answers; colourful graphics

**Teaching Suggestions**: students can answer the questions posed in the text


**Math Concepts**: patterns can be used to solve problems (explicit)

**Text Features**: puzzle book; rhyming text; includes answers that visually explain the mathematics concepts; computer-created artwork

**Teaching Suggestions**: students can apply the addition patterns to objects found in their environment; students can create puzzles using the addition patterns; students can write number sentences showing the patterns

**Program of Studies**: Excellent resource for modeling mental mathematics strategies and for understanding and identifying patterns

Math Concepts: everyday phenomena can be described and compared using mathematics (explicit)
Text Features: includes the author’s note to parents and teachers and a list of activities
Teaching Suggestions: students can respond to the text questions and activities

Grades 4 to 6


Math Concepts: number and shape patterns can be used to solve problems (explicit)
Text Features: includes an introduction, a list of materials, suggestions on performing, and an index; the idea of mathematics as tricky must be mediated; some tricks do not involve mathematical concepts
Teaching Suggestions: emphasize the mathematics rather than the “trick”; students can prepare and perform patterns (tricks)


Math Concepts: shapes can be identified by similarities and differences; numbers can be arranged in order; grids can be used to locate objects; objects can be compared and described using measurement (explicit)
Text Features: includes a few notes for parents, teachers, and other older readers
Teaching Suggestions: the beginning sections are quite simplistic and may be omitted


Math Concepts: changing shapes can be described mathematically; triangles can be classified and compared; patterns can be determined from topographical paths; positional relationships can be described mathematically (explicit)
Text Features: includes an afterword that explains each section
Teaching Suggestions: activities are presented in the text

Arithmetickle: An even number of odd riddle-rhymes. Lewis, J. (2002).

Math Concepts: numbers can be used to solve problems
Text Features: 18 riddles; answers provided in mirror image at the bottom of each page
Teaching Suggestions: excellent tasks for early finishers; students can share their strategies for solving the riddles
Program of Studies: encourages the development of personal strategies in a problem solving context

**Math Concepts:** numbers can be used to solve problems (explicit)

**Text Features:** includes a table of contents, a word from the author, hints, answers, and an index; line drawings; imperial measurements are used; problems are set in Pymm, a land of kings, knights, dragons, wizards, and common people

**Program of Studies:** puzzles cover all strands

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**Math Concepts:** mathematical ideas emerge from human imagination (explicit)

**Text Features:** historical accounts are included; contains a table of contents, solutions, answers, and explanations

**Teaching Suggestions:** activities are presented in the text

**Program of Studies:** concepts cover three strands: number, shape and space, and patterns and relations

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**Math Concepts:** numbers can be used to solve problems; mathematical ideas are human inventions (explicit)

**Text Features:** alphabet book; includes contents and a glossary; sidebar information contains examples, additional descriptions, and diagrams

**Teaching Suggestions:** students can explore one letter per day; students can answer the questions posed in the text

**Program of Studies:** concepts cover all strands

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**Math Concepts:** women can enjoy mathematical activities; patterns can be used to solve problems (explicit)

**Text Features:** includes contents, a note to parents, teachers, and group leaders, a glossary, answers, suggestions to help with calculations, and an index; information on real-life mathematics is included in boxes within the text; 15 women who use mathematics in their careers are showcased

**Teaching Suggestions:** activities are presented in the text

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**Math Concepts:** mathematics is all around us (explicit)

**Text Features:** narrative; colourful text and graphics; humourous; American money used as an example

**Teaching Suggestions:** activities and questions are presented in the text

**Program of Studies:** concepts of all four strands are addressed
   Math Concepts: patterns can be used to solve problems
   Text Features: bright illustrations; riddles
   Teaching Suggestions: problems presented in text; can be used to
   model mental mathematics strategies
   Program of Studies: can be used to support patterns strand and
   numbers strand K – Grade 6

   Math Concepts: numbers are only one dimension of mathematics; there
   are many ways to be smart in mathematics (explicit)
   Text Features: line drawings
   Teaching Suggestions: activities are presented in the text
   Program of Studies: concepts of all four strands are addressed; includes
   a section on logical problem solving

Math-a-magic: Number tricks for magicians. White, L. B., Jr., & Broekel, R.
   (1994).
   Math Concepts: number patterns can be used to solve problems (explicit)
   Text Features: includes authors’ note for getting started; each “trick”
   explains the mathematical concept explicitly
   Teaching Suggestions: perform several “tricks” and have students
   determine the mathematical patterns

   Math Concepts: numbers can be used to solve problems (explicit)
   Text Features: includes contents, hints, and answers; weak narrative
   connection to characters in a previous book of the series
   Teaching Suggestions: activities are presented in the text
   Program of Studies: focuses on number concepts and includes logical
   problem solving

   Math Concepts: numbers can be used to solve problems (explicit)
   Text Features: problem is based on a children’s rhyme
   Teaching Suggestions: stop reading at various parts of the book and
   students can solve the next stage of the problem; accept a variety of
   responses and then present the author’s idea as one kind of solution
   Program of Studies: focuses on number strand and includes using the
   arithmetic operations of addition and subtraction

**Math Concepts**: arithmetic operations can be used to solve problems; numbers can be represented in many ways

**Text Features**: each skill is introduced in a one page action-packed comic set in the city of Mathropolis and is followed by a sheet of problems that can be solved using the comic for guidance

**Teaching Suggestions**: presented in the text. The comics serve as an excellent introduction to several skills. Students are sure to be enticed by fun titles such as Factor Fiction, Greatest Common Hacker, Lights! Camera! Fraction!, and Polly Gonn- Framed!

**Program of Studies**: Specific objectives from each strand are met with this book

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Grades 7 to 9


**Math Concepts**: logic, symmetry, and numbers can be used to solve problems (explicit)

**Text Features**: collection of puzzles from the International Championship of Mathematics and Logic; includes a preface, a table of contents, and solutions

**Teaching Suggestions**: puzzles are presented in the text

**Program of Studies**: focuses on number and shape and space strands

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**Math Concepts**: everyday phenomena can be described using mathematics (explicit)

**Text Features**: activity and information book; historical notes are included; colourful pictures and diagrams; includes a table of contents, a glossary, answers to puzzles, and an index

**Teaching Suggestions**: activities are presented in the text

**Program of Studies**: all four strands are addressed

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**Math Concepts**: throughout history, people have engaged in solving mathematical problems; there are connections between philosophy, religion, and mathematics (explicit)

**Text Features**: narrative; set in the 13th century on the road to Baghdad; answers are provided within the text; historical references to traditional and classic problems are made

**Teaching Suggestions**: students can investigate the problems as they are introduced and prior to reading the answer

**Program of Studies**: focuses on the number strand
**Math Concepts:** mathematics develops in a social context and is a dynamic cultural activity (explicit)  
**Text Features:** biographies; a collection of 16 historical stories; includes a table of contents, an introduction, and an index; brief summaries, terms to know, and follow-on questions and activities are included for each story  
**Teaching Suggestions:** activities presented in the text tend not to support constructivist approaches and need to be adapted  
**Program of Studies:** all four strands are addressed

**Math Concepts:** numbers, arithmetic, geometry, and algebra can be used to solve problems and investigate patterns (explicit)  
**Text Features:** narrative; weak plot; includes a preface, answers, a glossary, further readings, and an index; contains photographs, diagrams, drawings, and tables  
**Teaching Suggestions:** problems are presented in the text  
**Program of Studies:** focuses on number, shapes and space, and patterns and relations strands

**Math Concepts:** women are actively engaged in creating new mathematics; numbers can be used to solve problems (explicit)  
**Text Features:** biographies; includes a table of contents, timelines, and solutions to activities; the historical backgrounds of conceptual developments are provided  
**Teaching Suggestions:** activities are presented in the text  
**Program of Studies:** all four strands are addressed

**Grades 10 to 12**

**Math Concepts:** mathematics can be enjoyable; problems can be solved using mathematics (explicit)  
**Text Features:** includes a preface; diagrams, tables, and charts are used extensively  
**Teaching Suggestions:** students can investigate the problems posed in the text and play the games presented  
**Program of Studies:** all four strands are addressed
Math Concepts: mathematical problems are connected to art, nature, music, architecture, and everyday things (explicit)
Text Features: information text; includes a table of contents, solutions, a bibliography, and an index
Teaching Suggestions: students can investigate some of the problems and relationships described in the text
Program of Studies: focuses on number, shapes and space, and patterns and relations strands

Math Concepts: problems can be solved using mathematics (explicit)
Text Features: includes a table of contents and solutions; problem variations and topics for investigation are presented
Teaching Suggestions: problems are presented in the text
Program of Studies: focuses on geometry, algebra, combinatorics, and number theory
FRACTALS, GOOGLES AND OTHER MATHEMATICAL TALES

Complete Reference
ISBN 0933174896

Mathematical Content
Decimals, Place Value, Dimensions, Topology, Networks, Mobius Strip, Magic squares, Base 12 and Base 10 Number Systems, Fibonacci Sequence, Logic Problems, Mazes, \( \pi \), Zero’s evolution, the Abacus, Fractals, Tangrams

Grade Level
Grades 4 – 12. Some concepts may be used in lower grades.

Prose
Written with light-hearted humor, this book is likely to be enjoyed by all grade levels. The animate objects and concepts acquire the breath of life and add to the light humor to enhance everyone’s interest.

Story
This book is comprised of 22 short stories about the above concepts. For example, in “The Story of \( \pi \), a huge party is thrown for the numbers of that time. It starts out like a fairy tale. When \( \pi \) shows up everyone is aghast because no one invited him because he doesn’t know his position on the number line. \( \pi \) has to prove he knows his exact location in order to be allowed to stay.

Mathematics
The mathematics is explicit and describes \( \pi \)’s evolution and importance, decimal place, volume, area, circumference, diameter, circles, cylinders, cones, spheres, and probability.

Illustrations
This book contains simple cartoon sketches that are all colored as the prose, in different shades of purple.

Potential to Prompt Mathematical Activity
This book is a very good prompt for a number of mathematical concepts. By giving the concepts human- or creature-like characteristics and placing them in difficult situations, the students can begin to understand, use, and manipulate these concepts. At the end of each short story is a historical information section highlighted in purple. There are not activity suggestions or questions in any of the sections.
Teaching Ideas
Before reading the story, discuss the symbol that represents "pi" (\( \pi \)). Perhaps discuss parties and the criteria for how people get invited. Have students listen for similarities to their parties. After reading the book, have students discuss the social implications of the story and the stereotypes described. Have students construct different shapes (dependent upon age level as to types) that would have circles contained within them, for example, cups or lights. Then calculate area and volume for each.

Additional Comments
I like this book as it uses humor and also includes factual information. I feel, however, that only a couple of concepts should be chosen to be used throughout the year so the students do not get bored with this approach. Other concepts could be used with another class. I have strong feelings regarding this type of an activity being misused and photocopied and then handed out for students to read on their own. I feel that this type of treatment would not only ruin a perfect opportunity to have fun while we learn but add negativity to already pessimistic views of mathematics.

Book Reviewed by
Marlene A. Sharpe
Complete Reference
ISBN 1883672589

Mathematical Content
Place Values, Binary Numbers, Measurement, Exponents, Geometry, Fibonacci Sequences, Googol, Googolplex, Base 10 Number Systems, Comparisons, Network Theory, Standard Units, Topography, Probability, Euler's Formula, Symmetry, Tessellation, Venn Diagrams, Graphing, Spatial reasoning, Ratios

Grade Level
Grades 4 –12 including Math 30 applied and Math 31. This will need to be done as a guided reading lesson for younger grades.

Prose
The information presented in this book is done in an enjoyable and humorous way. The author combines historical information and facts with nonsense, whimsy, and insight. All of the concepts are presented in such a way that a reader of any age will have no problems with the language, although without guidance younger readers will find some of the information above their level of mathematical knowledge.

Story
There is no real story line to the overall book, however each segment either has a story or presents its information in a light and entertaining manner. The author provides many good hints or suggestions that lead the reader to a better understanding of the concepts that he is discussing. These hints or tidbits of information truly enhance the reading for the mathematical novice and remove any apprehension that they may have in trying new mathematical concepts. For someone with even a moderate mathematical background many of these excerpts will enhance their current knowledge. The way that the author presents the information is also unique, as he tends to use a non-traditional approach. This approach is non-threatening, informative, and humorous. The author anticipates the type of questions his readers might be pondering as they look at the diagrams as well as formulates questions that would be useful in promoting classroom discussions.

Mathematics
The author does not leave out many mathematical applications. Where he does not use them to describe the letter he will supply them in what is almost a footnoted list of other terms and/or concepts that start with the letter being discussed. With this format he allows readers to embark on their own investigation of the additional terms and concepts.
Illustrations
The illustrations throughout this book are informative, fun, and supportive of the information that has been presented. Directions, suggestions, or silly comments that add to the humour of the book accompany the majority of the illustrations. The reader continues to receive information in these illustrations and is encouraged to think further about what has been presented and to make connections to this information in other areas or aspects of daily life.

Potential to Prompt Mathematical Activity
This piece of literature will be a motivating prompt for mathematical activity. The reader is tempted and encouraged by the author many times throughout this book to stop reading and engage in some of the activities that are being discussed. This book also encourages you to look at mathmatics and the world differently. Because the author makes so many direct comparisons to everyday things, it is hard for an individual to look at these items in the same neutral way again.

Teaching Ideas
The majority of the sections in this book can be used as introductory lessons for individual units. For example, designing an introductory lesson using “C is for Cubit” would be a wonderfully innovative way to start a grade 5/6 unit on cubic measurement. The class can relive some of the problems that the ancients encountered when using the cubit by doing their own cubit measurements and comparing them to their classmates. The teacher could supply the royal cubit and the class might then compare this royal cubit from the classroom down the hall. Another way that this book may be used is to develop the class’s own mathematical alphabet book. By using this book as the rubric students can research and create their own mathematical alphabet from the terms that have been provided, but left undescribed, by the author. While looking at the section entitled “O is for Obtuse”, students can explore where they might find other obtuse, right, or acute angles in nature and in the buildings around them, or even out of their own arms and legs. Once this discussion is opened, one might even want to add in the category of where else these angles might be used. The section on probability opens itself to many different types of discussions as well. For example, how does Murphy’s Law fit into the notion of probability? This section also suggests some of its own activities that would be interesting for the students to engage in.

Additional Comments
While not all of the sections deal directly with mathematical concepts, they all promote mathematical thinking. The author offers many activities that may be done in a classroom setting with materials that are readily available. He also generates a plethora of ideas that can be used in group or individual settings.

Book Reviewed by
Heather Bishop
THE MAN WHO COUNTED:
A COLLECTION OF MATHEMATICAL ADVENTURES

Complete Reference
ISBN 0393309347

Mathematical Content
Number theory, Ratio and Proportion, Algebra, Logic, Problem solving

Grade Level
Grades 5 – 12

Prose
This engaging book is artfully crafted in a poetic style. The language is rich and descriptive, keeping the reader spellbound. Beautiful and eloquent phrases enhance this literary text. Concise summaries of the plot appear at the beginning of each chapter. Although this is a mathematics story, included in the text are references to the Bible, the Koran, and other religious poetry and prayers. Legends are explained and ancient stories are told. Predominant themes include cultural tolerance, differences between knowledge and wisdom, and the connections between philosophy, mathematics, and religion. Problems of life and love are explored.

Story
This story takes place in the thirteenth century and is about the adventures of Beremiz Samir, The Man Who Counted. The story is narrated by Hanak Tade Maia who meets The Man Who Counted along the road as he is returning to Baghdad. Each chapter tells of an account of how The Man Who Counted solves problems as he demonstrates his unusual talent for counting large numbers of objects at a glance. While Hanak is fending off dangerous enemies, Beremiz’s intelligence is constantly being tested. By solving legendary and traditional problems, Beremiz wins riches and rewards and earns the respect of the international people he encounters. The story concludes when Beremiz successfully answers problems posed by the seven wisest sages of Islam. The king offers an award but Beremiz requests to marry the daughter of Sheik Iezid Abul Hamid instead. He is required to answer one more problem before permission is granted. His humble, gracious, and spiritual character provides a model for the reader.

Mathematics
Many of the classic number and logic problems are presented. For example, algebra is used to divide an inheritance between three brothers, magic squares are presented, and the doubling reward requested by the inventor of chess is explored. Further number patterns considered are hypermagical squares known
as diabolicals, perfect numbers, friendship numbers, the sacred number of 7, and the divine number of 3. The stories of famous mathematicians are presented as historical concepts are described and explained. While the solutions are provided within the text, the reader is motivated to understand the logical reasoning before reading further. What makes this book unique is the role of eastern cultures in the development of mathematics. Western attributions of concepts to Greek mathematicians are confronted by descriptions of ancient stories set in eastern countries.

**Illustrations**

Each of the 34 chapters begins with an illustration of the story. The artist uses black and white line drawings, possibly done in ink, to show an important part of the plot. These illustrations include stylized representations of the characters and setting and are appropriate for a mature reader. Several diagrams are included to support the mathematical concepts being presented. These are interspersed throughout the text.

**Potential to Prompt Mathematical Activity**

As the title suggests, the mathematics in this story is explicit. Problems involving numbers and logic provide effective prompts for mathematical activity. In many cases, several solutions are offered and the reader must consider the validity of the answers.

**Teaching Ideas**

Since the mathematics is presented in the form of a story, it makes sense to present the chapters in the order they appear. Each chapter could be read to the students at the beginning of the class and students could work on the problem presented in the chapter. Beremiz's solution could be shared at the end of class by reading the conclusion of the chapter. One possible way to integrate this book into the mathematics classroom would be as a problem of the week. Students could participate in class discussions about the value of mathematics, the differences between mathematical knowledge and wisdom, the importance of mental calculations, the place of women in mathematics, and the role of religion in mathematical development. Perhaps the idea of approaching peace through mathematics could be explored.

**Additional Comments**

Solutions are included within the text and this provides support to the teacher who may not understand the number concepts at first glance. Malba Tahan (the pen name of Júlio Cesar de Mello and Souza) championed the focus on problem solving rather than mechanics and pioneered the didactic use of the history of mathematics. I highly recommend this book because of its sound mathematical content and creative pedagogical approach.

**Book Reviewed by**

Gladys Sterenberg
MARVELS OF MATH:
FASCINATING READS AND AWESOME ACTIVITIES

Complete Reference

Mathematical Content
Number Systems, Geometry, Mathematical Concepts and Applications, Calculation Devices

Grade Level
Grade 5 - 12. The mathematics seems to be aimed at the grades 7 - 12, with a few exceptions, but the stories may be enjoyed by students in grades 5 - 12.

Prose
These stories are written to engage the reader in thinking about the human drama, historical setting, and unique circumstances surrounding the discovery of each of the new mathematics concepts. The stories focus on the character and time period of each mathematician, while cleverly introducing the mathematical concepts - sometimes explicitly, sometimes not. The plot of each story is creative and holds a reader's interest until the end. We are offered a great variety of stories that transcend different time periods in history and mathematics, and include both genders and many different cultures. The individual stories are definitely the strength in this book. I would dub them the "human interest stories" attached to the very human history of math. Even the definitions given before each story are excellent. They are clear and contain very good examples.

Story
The author has divided his stories into four main groups: the development of our number system, the development of our geometry, the development of mathematical concepts and applications, and the development of devices to aid in mathematical computations. Each of the 16 stories is focused on the character of the particular mathematician and his/her invention. All of them follow interesting plot structures. Each story is introduced with a section called "At a Glance" which explains the relevant mathematical and cultural history required to understand the story and introduces the inventor. Following this is a set of definitions under the heading "Terms to Know" which defines terms that will help the reader appreciate the story. Then a short story, usually around 1600 words, is presented. Two to three suggested activities follow each story.

Mathematics
The following inventions are explored: irrational numbers, zero, imaginary numbers, surreal numbers, Euclidean geometry, Cartesian coordinates, projective geometry, specific gravity and buoyancy, probability theory, calculus, topology, theory of elasticity, group theory, theory of sequences and improved
algebraic solutions, logarithms and the slide rule, and computer languages. The specific mathematics underlying these inventions is sometimes referred to explicitly. The stories feature the characters not the concepts.

Illustrations
There are three basic, yet clear mathematical diagrams used to describe the following: Desargues' perspective drawings, estimating area with inscribed and circumscribed shapes, estimating area by creating smaller and smaller segments, and using Napier's Bones to multiply.

Potential to Prompt Mathematical Activity
Each story is followed by suggested activities. These 2 - 3 activities usually suggest discussion questions and an activity or experiment. Although they are relevant, they are much too complex for the suggested age group of grades 3 - 9. I would not solely depend upon the activities suggested. In fact, this book's strength is not the activities provided. The stories, however, have great potential to prompt mathematical activities.

Teaching Ideas
I would read the story "Flying" High aloud and then give each student a piece of graph paper. I would introduce the coordinate system and then give them a specific set of coordinates to plot. I would have already pre-selected these coordinates so that they would eventually create a picture of a fly once you connect the "dots". They could also design their own coordinate planes using chalk outside on the playground. You could stretch this into ratio, proportion and scales, using an overhead projector to reproduce the picture on the wall. After reading the story The Odds are... aloud, I would let the students toss coins, recording heads and tails on paper as H or T. Students could start with 1 coin, and then have it more complicated by tossing 2 coins. They could determine the possibility of outcomes and see what happens when 1 or 2 coins are tossed 50 times. The Elementary Elements is a story about teaching and organizing information in a useful manner. I could choose a mathematics concept and have them write a short textbook, with chapters describing the steps. You could do this as a class on a flip chart or overhead, in groups or individually. This would integrate writing, as well as reading, into their mathematics activities. They could be very creative with their book.

Additional Comments
If I were working with younger grades I would try to find maps and pictures which would help illustrate the culture, time in history, and country in question. If I were working with older grades I may send them to the library to find other books related to this period in time or mathematical invention for further research. The "Introduction" section of the book provides valuable insight into this book.

Book Reviewed by
Beth Stewart
History and Biographies

Math Concepts: mathematics has developed over time; mathematics is a cultural activity; patterns and algebraic expressions can be used to solve problems (explicit)
Text Features: non-fiction; includes a preface, suggested uses for the book, an appendix, selected answers, and an index; each vignette is followed by a list of activities and related readings
Teaching Suggestions: activities are presented in the text
Program of Studies: Pure Math 10 – SO#1.1, 1.2, 1.7, 1.8, 1.9, 4.8; Applied Math 20 – SO#2.1; Pure Math 20 – SO#1.2, 3.1, 3.3, 3.6, 4.3, 4.5; Pure Math 30 – SO#2.1, 2.2

Math Concepts: mathematics is a cultural activity; mathematics has developed over time; algebraic expressions can be used to solve problems
Text Features: reference book; includes timeline, glossary, for more information, for further reading, bibliography and index
Teaching Suggestions: excellent resource for the history of algebra
Program of Studies: Grades 7-12

Math Concepts: mathematics is an ancient process; mathematics has developed over time; Pi; Equilibrium; Archimedes' Principle
Text Features: non-fiction; historical resource; activities, chronology, chapter notes, glossary further reading and Internet addresses, and index included
Teaching Suggestions: activities presented in text; students can present a report
Program of Studies: Grades 7-9

Math Concepts: many women have been actively engaged in creating new mathematics (explicit)
Text Features: biographies; includes a table of contents and a preface; ink illustrations
Teaching Suggestions: students can do biographical research and make presentations on famous mathematicians
Program of Studies: Grades 7-9
The countingbure tales. de Guzmán. (2000).

Math Concepts: games and beauty often compel mathematicians to develop concepts (explicit)
Text Features: information book; includes a table of contents and a bibliography; a historical perspective is given; each chapter differs in degree of difficulty
Teaching Suggestions: activities are presented in the text
Program of Studies (Patterns and Relations): Grade 7 – SO#1, 2; Grade 9 – SO#1


Math Concepts: geometry underlies much of the mathematics developed to date (explicit)
Text Features: biographies; includes an introduction, an epilogue, and an index
Teaching Suggestions: students can investigate the geometric contributions of Euclid, Descartes, Gauss, Einstein, and Witten
Program of Studies: Applied Math 10 – SO#1.5, 1.6, 4.1, 4.2, 4.3, 4.4, 6.1, 6.2, 6.3; Pure Math 10 – SO#6.1, 6.2, 6.3; Applied Math 20 – SO#5.1, 5.2, 6.1; Pure Math 20 – SO#5.1, 5.2, 5.3, 5.4, 5.5; Applied Math 30 – SO#5.4, 6.1, 6.2, 6.4


Math Concepts: patterns can be used to describe the world and to solve problems (explicit)
Text Features: information book; includes diagrams, a few proofs, and historical notes
Teaching Suggestions: students can express patterns using variables
Program of Studies (Patterns and Relations): Grade 7 – SO#1, 2, 3, 5, 6; Grade 8 – SO#1; Grade 9 – SO#1, 2


Math Concepts: patterns can be used to describe the world and to solve problems; algebraic and graphical models can be used to generalize patterns, make predictions, and solve problems (explicit)
Text Features: non-fiction novel; includes a preface and an index; includes historical explanations and references
Teaching Suggestions: sections at the beginning of the book can be read to the students as an introduction to a geometry unit
Program of Studies: Pure Math 10 – SO#1.1, 1.2, 1.7, 1.8, 1.9, 4.8; Applied Math 20 – SO#2.1; Pure Math 20 – SO#1.2, 3.1, 3.3, 3.6, 4.3, 4.5; Pure Math 30 – SO#2.1, 2.2

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Math Concepts: design problems can be explored using properties of networks (explicit)

Text Features: historical non-fiction; includes a table of contents, a preface, notes and references, a chronology of events, a glossary, and an index; contains photographs and diagrams; dense text and high reading level

Teaching Suggestions: students can investigate the four-colour problem and other problems using various maps and diagrams presented in the text

Program of Studies (Shape and Space): Grades 9-10 enrichment


Math Concepts: mathematical ideas emerge from human imagination (explicit)

Text Features: historical accounts included; contains a table of contents, solutions, answers, and explanations

Teaching Suggestions: activities are presented in the text

Program of Studies: concepts include the three strands of number, shape and space, and patterns and relations; Grades 4-6

From five fingers to infinity. Swetz, F. J. (1994).

Math Concepts: the history of mathematics is part of the history of humankind (explicit)

Text Features: non-fiction; includes a table of contents, note to the reader, a preface, a bibliography, and an index; is a comprehensive volume

Teaching Suggestions: students can create timelines of the development of mathematical concepts using the table of contents

Program of Studies: concepts include all four strands; Grades 10-12


Math Concepts: numbers were invented; numbers can be represented in many ways; the development of number systems coincided with societal and cultural developments (explicit)

Text Features: historical non-fiction; contains a glossary and an index; colourful pictures

Teaching Suggestions: students can use various number systems to perform arithmetic operations and can compare their methods for performing calculations

Program of Studies (Number): Grade 4 – SO#1, 2, 3, 6; Grade 5 – SO#1, 2, 5; Grade 6 – SO#1

Math Concepts: everyday phenomena can be described using mathematics (explicit)
Text Features: activity and information book; historical notes are included; colourful pictures and diagrams; includes a table of contents, a glossary, answers to puzzles, and an index
Teaching Suggestions: activities are presented in the text
Program of Studies: all four strands are addressed; Grades 7-9


Math Concepts: everyday phenomena can be described using mathematics (explicit)
Text Features: information book; includes historical notes and descriptions of the concept and the mathematician; includes a table of contents, solutions, bibliography, and an index
Teaching Suggestions: students can investigate some of the problems and relationships described in the text
Program of Studies: focuses on number, shapes and space, and patterns and relations strands; Grades 10-12


Math Concepts: everyday phenomena can be described using mathematics (explicit)
Text Features: information book; includes historical notes and descriptions of the concept and the mathematician; includes a table of contents, solutions, a bibliography, and a cross index with the previous volume
Teaching Suggestions: students can investigate some of the problems and relationships described in the text
Program of Studies: focuses on number, shapes and space, and patterns and relations strands; Grades 10-12


Math Concepts: mathematics is a cultural activity (implicit)
Text Features: information book; includes contents, a glossary, and an index; is part of a series on ancient civilizations
Teaching Suggestions: students can read the section on science and mathematics and make posters showing the origin of geometric concepts; using the section on famous buildings, students can explore the golden ratio
Program of Studies (Shape and Space): Grade 3 – SO#7; Grade 4 – SO#4; Grade 5 – SO#6, 7; Grade 6 – SO#4, 5
Math Concepts: similar triangles may be used to solve problems; angle measurements are linked to the properties of parallel lines (explicit)
Text Features: biography of Eratosthenes; picture book; includes the author's note, an afterword, and a bibliography
Teaching Suggestions: students can replicate Eratosthenes' system of measurement using e-mail partners from another city
Program of Studies (Shape and Space): Grade 7 – SO#1, 2; Grade 8 – SO#1; Grade 9 – SO#1

Math Concepts: mathematics develops within a cultural context (implicit)
Text Features: information book; includes a table of contents, maps, family trees, names and terms, a bibliography, suggested reading lists, and an index; full-page colourful and detailed illustrations; includes short biographical notes on Euclid and Archimedes
Teaching Suggestions: students can determine the volume of a sphere that fits exactly into a cylinder
Program of Studies (Shape and Space): Grade 8 – SO#4, 7

Math Concepts: throughout history, people have engaged in solving mathematical problems; there are connections between philosophy, religion, and mathematics (explicit)
Text Features: narrative; set in the 13th century on the road to Baghdad; answers are provided within the text; historical references to traditional and classic problems are given
Teaching Suggestions: students can investigate the problems as they are introduced and prior to reading the answer
Program of Studies: focuses on the number strand; Grades 7-9

Math Concepts: mathematics develops in a social context and is a dynamic cultural activity (explicit)
Text Features: biographies; collection of 16 historical stories; includes a table of contents, an introduction, and an index; included for each story are brief summaries, terms to know, follow-on questions, and activities
Teaching Suggestions: activities presented in the text tend not to support constructivist approaches and need to be adapted
Program of Studies: all four strands are addressed; Grades 7-9
Math Concepts: mathematics is a human creation (explicit)
Text Features: biographies; includes an introduction for teachers, an introduction for students, a resource list, and a glossary; black and white full-page illustrations
Teaching Suggestions: activities are given in the introduction for teachers
Program of Studies: all four strands are identified and addressed; Grades 7-9

Math Concepts: mathematics is developed and shaped by humans (explicit)
Text Features: biographies; includes an introduction for teachers, an introduction for students, a resource list, and a glossary; black and white full-page illustrations
Teaching Suggestions: activities are given in the introduction for teachers
Program of Studies: all four strands are identified and addressed; Grades 7-9

Math Concepts: everyday phenomena can be described and compared using measurements (explicit)
Text Features: nonstandard measurement systems described from a historical background; imperial and metric system are presented; detailed illustrations; the center foldout section shows metric measurements; includes the author's notes on the metric system
Program of Studies (Shape and Space): Grade 3 – SO#3, 4; Grade 5 – SO#3, 4, 5

Math Concepts: numbers describe quantities; numbers can be represented in multiple ways (explicit)
Text Features: historical narrative; contains a question box at the end of each chapter, a note to teachers, and mathematical explanations of the puzzles presented; colourful lithographs precede each chapter
Teaching Suggestions: problems are presented in the text
Program of Studies (Number): Grade 4 – SO#1, 2, 6, 7, 8, 9; Grade 5 – SO#1, 2, 5, 6, 11; Grade 6 – SO#1, 2, 3, 8

**Math Concepts:** the history of mathematics contains adventures and controversy (explicit)

**Text Features:** mystery novel; diagrams are included; mathematical developments at various levels of difficulty are presented

**Teaching Suggestions:** students can skim the mathematical parts that are too difficult in order to grasp the essence of the story; students can construct a mathematical timeline

**Program of Studies:** all four strands are addressed; Grades 10-12


**Math Concepts:** numbers can be represented in multiple ways (explicit)

**Text Features:** information text

**Teaching Suggestions:** students can investigate mathematical operations using the various number systems presented in the text

**Program of Studies (Number):** Grade 4 – SO#1, 2; Grade 5 – SO#1;
Grade 6 – SO#1


**Math Concepts:** human development is connected to the development of mathematical concepts and ideas (explicit)

**Text Features:** information and biographical text; text is dense and small making it less readable than other texts; includes a foreword, a preface, and an index; includes a high number of illustrations, photographs, reproductions of artifacts and art, and computer-generated images

**Teaching Suggestions:** students can investigate mathematics as a visual science; students can create a mural of the development of mathematical ideas

**Program of Studies:** all four strands are addressed; Grades 10-12


**Math Concepts:** women are actively engaged in creating new mathematics; numbers can be used to solve problems (explicit)

**Text Features:** biographies; includes a table of contents, timelines, and solutions to activities; the historical backgrounds of conceptual developments are provided

**Teaching Suggestions:** activities are presented in the text

**Program of Studies:** all four strands are addressed; Grades 7-9

Math Concepts: zero is linked to infinity; philosophical controversies erupted over the acceptance of zero as a number; numerical data can be analyzed for trends, patterns, and interrelationships; arithmetic operations can be applied to solve problems (explicit)

Text Features: information text; historical ideas and biographies are presented; includes recent developments of quantum zero, black holes, and string theory; contains a table of contents and an index; includes diagrams, drawings, and photographs

Teaching Suggestions: students can present the issues of each chapter; students can engage in the philosophical debates highlighted in the text

Program of Studies: Applied Math 10 – SO#2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7; Pure Math 10 – SO#1.1, 1.2, 1.5, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6
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