

Connecting Literature with Mathematics

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Overview

Rationale

Objectives

Strategies

Classroom Activities

Annotated Bibliography/Resources

Appendices-Standards

Overview

The ultimate purpose of this unit is for children to make a connection between mathematics and literature. In the last couple of years, I have noticed in my classroom that when I shift from our literacy block to our mathematics block, it seems that I “lose” students. In discussions, I have found that some students feel that they understand reading more than math and have carried that negativity with them through the years. The unit I am designing will be geared towards fourth grade, however, any of the literature books suggested can be adapted to fit most grade levels. Instead of writing day-to-day lesson plans, I want to discuss several books and how they can be incorporated into the mathematics curriculum to make the literature connections. It is my hope to stop punishing children with math instruction that involves hours spent on worksheets, flashcards, timed tests, and never-ending algorithms. It’s time to exchange the sweaty palms, the tears, and the attempting of problems over and over again without knowing the meaning or understanding why, for the meaningful, real-world math experiences involving children’s literature, journal writing, cooperative learning and the creation of their own word problems. When we provide students with motivation, real-world experiences, and meaningful connections, the chances and benefits of success are in everyone’s favor.

Rationale

The purpose of writing this unit was for the intention of finding a way for all students to better understand math concepts. I noticed in my own classroom that when I used a literature book to introduce or help further a learning concept all my students seemed to be a part of the class. The concept seemed to make more sense to them, and they could make a connection. As a teacher, I felt uneasy with

the notion that mathematics is fiction,” but the concepts and procedures of math are all constructions of our minds, products of our attempts to understand our worlds, real and imaginary.” Some mathematical ideas have obvious practical applications in our everyday lives, while other ideas seem very abstract, with little apparent connection to life as most of us experience it. All mathematical ideas, though, take shape through our attempts to communicate, and therefore find their way into our literature. Having an inherent sense of numbers (Dehaene, 1997), we express mathematical ideas in stories, essays, poems, books, and other forms of literature that conveys life experiences, real or imagined. “One way of connecting school mathematics to everyday life, then, is to draw attention to the mathematics embedded in the literature of everyday life, to reveal the mathematics inherent in our students thinking and communication about their life experiences. “

There has been a very strong trend in education recently toward integrating curriculum. The movement has been to develop a better connection between mathematics and children’s literature. The standards movement has inspired part of this movement. In 1989, when the National Council of Teachers of Mathematics (NCTM) published one of the first sets of national teaching and learning standards for a subject area, one of the major areas of emphasis was mathematical communication. (NCTM, 1989, 2000). As part of their mathematical development, students needed to be able to read, write, speak and listen in mathematical terms. “Communication is an essential part of mathematics and mathematics education” (NCTM, 2000). In general, educators agree with this approach but questioned how to join together language and mathematics. The use of literature is an approach I feel teachers can use to provide their students with a variety of experiences in mathematics. The idea is that if students are reading and discussing the problems within the context of a literature book, then they are developing communication skills which will support their development in the area of both mathematics and language arts. (Thiessen, Matthias, & Smith, 1998; Satariano, 1994).

The new updated version of the Everyday Mathematics (The University of Chicago School Mathematics Project) curriculum that we now use in the Pittsburgh Public Schools has realized the importance of linking children’s literature to mathematics. They now suggest books to link math concepts being taught in lessons as an enrichment source or for a means of individualizing a math concept to students. While reading the suggested literature books throughout the program, I have seen a difference in my student’s involvement in learning the concept being taught this year.

Another reason to use literature to teach math is because it is no longer enough for our students to add, subtract, multiply and divide. Instead, they need to solve

problems, reason mathematically, and collect, interpret, and present data. Elementary school mathematics must focus less on activities which develop computation skills and more on activities that promote critical thinking and quantitative reasoning skills.

Many examples in children's literature allow children to explore math in real-life or interesting contexts. For example, in Judith Viorst's (1978) Alexander Who Used to be Rich Last Sunday, children read about how the story's main character squanders away the dollar his grandparents gave to him on a recent visit. A teacher could use this story to promote an exploration of money. Given a dollar and various low-priced objects (pencils, stickers, erasers, folders), how many different combinations of objects can you buy? What is the greatest number of these objects you can get for your dollar? (Schiro, 1997; Thiessen, Matthias, & Smith, 1998).

Stories such as these give students opportunities to use mathematical skills in a context which has meaning for them. These situations often require students to apply mathematical tools that they may be currently learning or already possess (in this example, money recognition, estimation, addition and subtraction). Consequently, the students have to think through the situation and analyze which mathematical approaches and tools make the most sense to use to reach a satisfactory solution. Explorations like these enable students to develop the quantitative reasoning skills that they will need to navigate through these problems.

Many resources have been published to help teachers at all levels find children's literature that connects to mathematics. The NCTM has an extensive annotated bibliography entitled The Wonderful World of Mathematics: A Critically Annotated List of Children's Books in Mathematics (Thiessen, Matthias, & Smith, 1998) which describe over 550 children's books which can be used to explore mathematics. Two similar books have been written by Whitin and Wilde, Read Any Good Math Lately? Children's Books for Mathematical Learning (1992) and It's All In The Story (1995). Several others include Mathtime, Storytime: Math Explorations in Children's Literature (Satariano, 1994) and Books You Can Count On: Linking Mathematics and Literature (Griffiths & Clyne, 1991). These books I have found to be a good starting place to find literature that connects with mathematics. They provide detailed activities with supporting handouts which can be implemented and adapted in K-6 classrooms.

In addition to these resource books, Marilyn Burns has developed a series of children's literature books, called the "Marilyn Burns Brainy Day Books." Each of these books has an explicit mathematical concept woven into the story. For example, the book The Greedy Triangle (Burns, 1994) recounts the tale of a

triangle that is bored with being a triangle. Throughout the story, the triangle tries being other types of polygons (pentagon, hexagon, heptagon, octagon) and eventually decides that being a triangle suits him best. At the end of this book (and all “Brainy Day” books), there is a section for parents, teachers and other adults which discussed the mathematics in the book and how the book can be used to prompt mathematical investigations.

Other resource books give specific activities and lesson plans for integrating children’s literature with the instruction of mathematics. The NCTM has published a simple version of this type of resource entitled How to Use Children’s Literature to Teach Mathematics (Welchman-Tisschler, 1992).

Using literature in math instruction has several advantages. As one California teacher puts it, “unlike traditional math instruction, literature speaks to the heart of the child” (Spann, 1992). Literature provides a way for children to make mathematics learning much more personal. Research has shown that children learn best when it has meaning and usefulness for them. Literature is a way to give math meaning. Using math – related children’s literature can help children realize the variety of situations in which people use mathematics for real purposes.

One of the major elements of mathematics instruction has been to teach children problem solving skills. Literature is an excellent tool for supporting problem solving learning. The book acts as word problems, but they are word problems with interest to children. An example of a book that can be used in this way is Pat Hutchins’ “The Doorbell Rings”. The children in the book have a batch of cookies they are trying to divide among themselves. As the story progresses, more and more friends arrive. They must continually figure out how many cookies each person gets. Sharing cookies is a situation with which all school children can relate and it makes the division problem very real. This book can also be used with other activities to introduce fractions, such as having students role-play the story, write their own stories, or to work out in different ways how many cookies each child would have for various different numbers of children and cookies. Regardless of the method used, these activities use the story as an appealing and meaningful context in which students can develop skills and an understanding of the concept and process of division and fractions. By creating their own similar stories, students are encouraged to both be creative and to communicate about mathematics.

The benefits of the math-literature connection are rooted in integrating the learning of mathematic concepts into contexts that are meaningful to children. (Raymond, 1995). According to Raymond (1995), children’s literature provides a stepping-stone to mathematical understanding. Its ability to motivate students to

learn mathematics illustrates the idea that it does not have to be learned in isolation from other subject areas. Trade books portray mathematics in a different light, as everyday activities, rather than as the rules and procedures that children “have to learn” which do not seem applicable to real-life situations. Through the math-literature connection, “it is hoped that students begin to view mathematics as a natural part of everyday life” (Raymond, 1995).

The challenge of providing experiences that are meaningful for each individual student faces teachers everyday, as they strive to meet the needs of a diverse group of students. “The integration of math and literature provides the ideal opportunity for tapping into the talents of all students no matter what their ability level may be.” According to Thraikill (1994), “the line between good readers and good mathematicians begins to blur and children are more likely to build their confidence in each area focusing less upon what they see as their strengths and weaknesses in school subjects.”

Trade books, especially picture books, can be integrated into any lesson because of their short format. Presenting similar information as textbooks, children’s literature provides a more interesting format as well as themes that are of interest to various age levels. They act as vehicles that help children to apply the information they learn to their own lives as opposed to textbooks, which often include activities that are based on things that kids don’t do, can’t do, or don’t want to do (Murphy, 1999). Picture books provide a more meaningful way for understanding difficult concepts. Books portray specific concepts through diagrams and illustrations, which, for visual learners, can be much more meaningful than purely verbal or numerical explorations. Picture books can be used to introduce a specific concept, develop interest, provide background information and expand understanding of a lesson (Goerss, 1998). “The problem solving process of both literature and mathematics provides a dual opportunity assessment of student’s thinking in mathematics, which is more powerful than assessing either reading comprehension or mathematical understanding separately” (Thiessen, 1996).

The use of children’s books in mathematics enriches overall learning. Mathematics and language skills develop together as students listen, read, write, and talk about mathematical ideas. While enriching mathematics learning, children’s books also enhance reading skills, providing students more opportunities to experience literature as it pertains to different content areas (Gailey, 1993).

The language of mathematics can be divided into four categories of children’s books: counting books, storybooks, number books, and concept books. While not

limited to these categories **Gailey (1993)** offers these to teachers to better classify what the books are intended to teach.

Counting books, reinforce number concepts and can be used to teach any of the arithmetic functions of addition, subtraction, multiplication and division. Widely used in first grade to review the numerals from 1-10, counting books actively engage students in learning. Moja Means One: Swahili Counting Book, by Marjorie Feelings, uses African people in native dress to illustrate the numerals from one to ten. As a multi-cultural extension, it also teaches children the Swahili word for each numeral. Teachers can use the book with children to count such things in the classroom as boys, girls, children wearing blue, etc. Consequently, while the children learn to count, they begin to learn to classify sets of objects and different representations of numbers.

Number books, as their name implies, reinforce a particular number. Examples include My Six Book, by Jane Moncure, and Jeffrey Moss's Five People in My Family. This math-literature connection is vital in teaching beginning readers the importance of labeling. Students will soon strengthen understanding that "6" is the same as "six" is the same as "a picture of six puppies." Lightsey (1996) recommends several songs and rhymes to accompany number books, aiding in their understanding of specific numbers. The song "This Old Man" lends itself to this goal, as children learn they can even act it out. The students have fun and are motivated to learn more, subsequently establishing stronger connections.

To introduce or reinforce **mathematical concepts,** storybooks can also be used. Fairy tales, folk tales or any other story in which the author touches on a mathematical concept can be used. Two Ways to Count to Ten, by Dee may be used as a way to introduce alternative counting methods. In the story, King Lear holds a spear-throwing contest to find an heir to his throne. The first animal to count to ten before his spear hits the ground wins. Finally, an antelope discusses counting by even numbers is quicker and he is made heir to the throne. Students will also come up with other ways such as counting by 5's, laying the foundation for basic discussion. A Remainder of One is one of my favorites. In the story, poor Joe the Ant is always being left out of his squadron of twenty-five ants as they rearrange themselves into lines of two by twelve, three by eight, and four by six. This story illustrates multiplication and division using different arrangements of ants, which can later be reinforced, with the creation of fact families.

Lastly, **concept books** (informational books) are useful in exploring specific mathematical concepts such as time, money, "a million", and fractions. They usually have interesting formats and convey excitement in exploring various mathematical ideas. Schwartz's How Much is a Million? is popular in classrooms to teach the concept of large numbers. When teaching basic place value and then

introducing this book, students are motivated to discuss this “imaginary” number and what exactly it is. One Grain of Rice by Demi provides the basis for a lesson on place value as a review of the tens, hundreds, ones, tenths and hundredths places of a multi-digit numeral. It is also an excellent lesson on the concept of doubling. Eating Fractions, by Bruce shows real children manipulating food to show different fractions. Since the text is simple, emergent readers will enjoy reading and re-reading the book. Similarly, students enjoy making their own food fractions, while sharing and counting them with their classmates.

While it is not necessary to categorize every book, it is important that these books are appropriately used within a mathematics curriculum to ensure student understanding.

Benefits of the Literature Connection

Linking mathematics instruction to children’s literature has become increasingly popular in recent years for a variety of reasons. Some suggest that the literature connection motivates students (Usnick & McCarthy, 1998), provokes interest (Welchman-Tischler, 1992), helps students connect math ideas to their personal experiences (Murphy, 2000), promotes critical thinking (Murphy, 2000), or provides a context for using mathematics to solve problems (Jacobs & Rak, 1997; Melser & Leitze, 1999).

Despite the many suggestions and reasons for incorporating literature into mathematics instruction, however, relatively few formal studies of the benefits of literature-based mathematics have been reported. Hong (1996) did find that kindergartners exposed to story-related mathematics exhibited a greater preference and aptitude for math activities than did those of a comparison group. Whitin and Whitin (2000) explored the ways in which fourth-grade students use story, metaphor and language to develop mathematical thinking skills and strategies, and their book offers ideas for using children’s literature to inspire mathematical investigations and to teach mathematical concepts.

Ways to Use Children’s Literature in Teaching Mathematics

Though many children’s books are specifically about mathematics, such as books about counting or shapes, other books have mathematics embedded with a larger context. These books are generally not perceived as “math books,” but mathematics appears as a natural element within stories, problems, personal vignettes, or cultural events. Welchman-Tischler (1992) have classified the ways to use such books as follows:

- To provide a context or model for an activity with mathematical content.
- To introduce manipulatives that will be used in varied ways (not necessarily as in the story).
- To inspire a creative mathematics experience for children.
- To pose an interesting problem.
- To prepare for a mathematics concept or skill.
- To develop or explain a mathematics concept or skill.
- To review a mathematics concept or skill.

Though any given book could likely be used in multiple ways, the common element in these various approaches is the intent to use literature to provide other mathematical experiences based on real problems or situations of interest to teachers and students.

Objectives

My main objective in teaching this unit is to have students make a connection to mathematics and ultimately, to enjoy it. It is my hope that my students will have a better understanding of problem-solving situations. I believe this unit will help my students make mathematical concepts their own. I hope to take them beyond the concrete situations to explaining math ideas in their own words. “Accountable talk” is a big “buzz” word these days in the elementary school and it is my intention to have my students not only solve problems, but to explain how they came up with their solutions. I want my students to recognize that mathematics is all around them and the more they can connect to it the more sense it will make to them.

Strategies

I plan to accomplish these objectives by using the math - literature connection. In doing so, I plan on using several strategies. By using literature books, I hope to build interest right from the start. Using a K-W-L chart will help students recognize the “known” and then what they need to find out. Retracing a story line will help students work backwards to solve problems. “Think, Pair, Share” is another strategy I will use to develop the “accountable talk” that students need to express how they came up with solutions. I plan on using the math messages in the Everyday Math curriculum to get students thinking of the concepts being taught and to build interest in the lesson.

the board. Underline the “6” and label it “ones”. Explain what the one’s place means.)

Example: “Rani had received 511 grains of rice, only enough for a handful. This time I’d like you to write down the number and underline the digit in the tens place. What number did you underline? Underline the “1” and label it “tens”. Ask the students to define the tens place. Write it on the board next to the tens place. (Continue with numbers throughout the book.)

1. Review the chart throughout the story. Give students additional numbers and ask place value questions. (10 mins.) Ask students specific place value questions and how much the digit is worth.
2. Example: “If I were to give you the number 12,965 (write on board) and ask you to underline the digit in the thousands place, you would underline “2” and below it write the value of that number (2000). If I gave you the number 36,470 and ask you to underline the digit in the hundreds place, what would you underline? What is the value of this number? What if I gave you the number 9.43, what number is in the tenths place? (Explain difference between tenths and tens. Continue with thousandths and hundredths.)

3. Play Human Place Value Game (20 minutes)

Tell students: “Now I think we’re ready to play our game. I’m going to pass out a paper plate to each of you. Some plates are going to be blue and labeled hundredths, some will be red and labeled tenths, and some will be green and labeled ones. They will all have a number on them, 1-9”. Explain that we will all do a few practice problems so we can get the hang of the game.

Example: Ask the students with a red 7, a blue 3, and a green 9 to come to the front of the class. (Teacher will be the human decimal point.) “How could we use these numbers to make the largest possible number? Example: “Change this number so there is a “4” in the tenths place.” (Student with red “4” goes to the front of the room, student with red “7” sits down. “Now we have the number 9.43. Change this number so that there is an “8” in the hundredths place. Change this number so there is a “1” in the tenths place. Change this number so there is a “5” in the ones place.

Play the Game

Place Value Dice Game (20 minutes)

- a. Students are asked to return to their seats
- b. Collect paper plates and pass out game boards
- c. Introduce the dice game.

“For this game, you will need a partner. Turn to the person on your right. This will be your partner. The object of the game is to make the largest number possible. You will take turns rolling the die. Each time a number comes up, every player writes it in one space on his or her game board. Once it is written, it cannot be moved. Who ever has the largest number at the end, wins.”

- d. Teacher demonstrates with a partner.
- e. Students play game.

Literature Book – The Greedy Triangle (Burns)

Lesson Objective: Students will be able to identify and classify polygons.

Anticipatory Set: “Does anybody know what greedy means? Today we are going to read a story about a greedy triangle. See how many different shapes (hexagon, pentagon, octagon etc.) you can recognize in the story.”

Read the story. (As the story progresses, draw the various shapes on the board.) When the story is over, ask the students why the triangle was “greedy”. Is there a moral to the story?

Activity: Students will create a polygon book.

Materials: (per student) Large sheet of construction paper, straightedge, markers.

Directions: Demonstrate folding construction paper (first, like a “hot dog”, then a “hamburger”, then fold into a book). Tell students that they will be making a polygon book and that on every page they are to draw the shapes from the story starting with the triangle and continuing with the various transformations that the triangle makes in the book. Have the students label the polygons, and write the number of sides and vertices that each shape has on the page. Tell the class that the books they make will be a great reference for them as they work through the geometry unit.

Annotated Bibliography/Resources

Braddon, Kathryn L, Hall, Nancy J., and Taylor, Dale. *Math through Children's Literature*. Greenwood Village, CO., Teacher Ideas Press, 1993.

Bresser and Holtzman. Developing Number Sense. Sausalito, California. Math Solutions Publications, 1999.

Burns, Marilyn. About Teaching Mathematics. Sausalito, California. Math Solutions Publications, 2000.

Burns, Marilyn. Math and Literature. Sausalito, California. Math Solutions Publications, 1992.

Chapin and Johnson. Math Matters. Sausalito, California. Math Solutions Publications, 2000.

National Council of Teachers of Mathematics. Principle and Standards for School Mathematics. Reston, Virginia. National Council of Teachers of Mathematics, 2000.

Satariano, P. (1994). *Mathtime, Storytime: Math Explorations in Children's Literature*. Palo Alto, CA: Dale Seymour.

Tischler, Rosamond Welchman. How to Use Children's Literature To Teach Mathematics. Reston, Virginia. The National Council of Teachers of Mathematics, Inc. 2000.

Thiessen D., Matthias, M & Smith, J. (1998). *The Wonderful World of Mathematics: A Critically Annotated List of Children's Books in Mathematics*. Reston, VA: National Council of Teachers of Mathematics.

University of Chicago School Mathematics Project. Everyday Mathematics Teachers Manual, Fourth Grade Volume 1. Chicago, IL., McGraw Hill/SRA, 2004

University of Chicago School Mathematics Project. Everyday Mathematics Teacher's Manual Fourth Grade Volume 2. Chicago, IL., McGraw Hill/SRA, 2004

University of Chicago School Mathematics Project. Everyday Mathematics Teacher's Reference Manual, Fourth Grade. Chicago, IL., McGraw Hill/SRA, 2004.

Whitin, D.J. & Wilde, S. (1992). Read any good math lately? Children's books for mathematical learning. Portsmouth, NH: Heinemann

Works Cited/ References

Haury, David L. Literature-Based Mathematics in Elementary School. 2001
<http://www.ericfacility.net/ericdigests/ed464807.html>

<http://www.carolhurst.com>

Eddy, Meghan *Children's Literature in Mathematics Instruction*
<http://www.abcteach.com/Math/mathTOC.htm>

Hong, H. (1996). *Effects of mathematics learning through children's literature on math achievement and dispositional outcomes*. "Early Childhood Research Quarterly," 11 (4) 477-94.

LaChance, Andrea. *Connecting Children's Literature and Mathematics: An Overview of Ideas, Sources and Resources*.
<http://www.education.cortland.edu/faculty/lachance/Reappointment%20Webfolio/literacys>

Thraillkill, Colleen. "Math and Literature; A Perfect Match" in *Teaching-Pre-K-8* January 1994.

Whitin, David J. and Gary, Cassandra. "Promoting Mathematical Explorations through Children's Literature" in *Arithmetic Teacher*, v41. March 1994.

Whitin, P. & Whitin, D.J. (2000). "Mathematics is language too: Talking and writing in the mathematics classroom." Urbana, IL. And Reston, VA: National Council of Teachers of English, National Council of Teachers of Mathematics.

Literature Books

Burns, Marilyn. (1994). The Greedy Triangle. New York: Scholastic

Demi. (1997). One Grain of Rice: A Mathematical Folktale. New York: Scholastic

Hutchins, Pat. (1986) The Doorbell Rang. New York: Greenwillow

Pinczes, Elinor. (1993). One Hundred Hungry Ants. Boston: Houghton Mifflin

Pinczes, Elinor. (1995). A Remainder of One. Boston: Houghton Mifflin.

Schwartz, David. (1985). How Much is a Million? New York: Lothrop, Lee & Shepard Books.

Viorst, Judith (1978). Alexander Who Used to be Rich Last Sunday. New York: Atheneum.

Mathematics Content Standards

The Pittsburgh Public Schools have adopted Mathematics Standards that are used throughout the entire district. The Math Standards describe what students should know and should be able to do at four grade levels (third, fifth, eighth, eleventh). They reflect the increasing complexity and sophistication that students are expected to achieve as they progress through school. This paper, *Connecting Literature and Mathematics*, adheres to the following standards:

- Standard 1 All students use numbers, number systems and equivalent forms (including numbers, words, objects and graphics) to represent theoretical and practical situations.
- Standard 2 All students compute, measure and estimate to solve theoretical and practical problems, using appropriate tools, including modern technology such as calculators and computers.
- Standard 3 All students apply the concepts of patterns, functions and relations to solve theoretical and practical problems.
- Standard 4 All students formulate and solve problems and communicate the mathematical processes used and the reason for using them.
- Standard 5 All students understand and apply basic concepts of algebra, geometry, probability and statistics to solve theoretical and practical problems.
- Standard 6 All students evaluate, infer, and draw appropriate conclusions from charts, tables, and graphs, showing the relationship between data and real-world situations.
- Standard 7 All students make decisions and predictions based upon the collection, organization, analysis and interpretation of statistical data and the application of probability.

**Everyday Mathematics
Literature Resources
4th Grade**

By Lesson Number:

Title	Author	Less #	Strand
<i>Math Curse</i>	Scieszka, Jon	1.1	Multiple
<i>Shapes, Shapes, Shapes</i>	Hoban, Tana	1.3	Shapes
<i>The Art of Shapes for Children and Adults</i>	Steele, Margaret and Cindy Estes	1.3	Shapes
<i>The Greedy Triangle</i>	Bums, Marilyn	1.5	Polygons
<i>Ed Emberley 's Picture Pie: A Circle Drawing Book</i>	Emberley, Ed	1.6 7.1	Geometry
<i>Twelve Ways to Get Eleven</i>	Merriam, Eve	2.2	Addition
<i>How Much is a Million?</i>	Schwartz, David	2.3 5.8	Numeration
<i>If You Made a Million</i>	Schwartz, David	2.3 5.8	Numeration
<i>Sea Squares</i>	Hulme, Joy N.	3.1	Multiplication
<i>Each Orange Had Eight Slices: A Counting Book</i>	Giganti, Paul	3.1 12.1	Multiplication
<i>Anno 's Hat Tricks</i>	Nozaki, Akihiro	3.11	Problem Solving
<i>National Geographic Atlas for Young Explorers</i>	National Geographic Society 1999	3.5	Problem Solving
<i>Kids are Punny: Jokes Sent by Kids to the Rosie O'Donnell Show</i>	Warner Books 1997	4.2	Problem Solving
<i>Kids are Punny: More Jokes Sent by Kids to the Rosie O'Donnell Show</i>	Warner Books 1998	4.2	Problem Solving
<i>Top Ten of Everything 2000</i>	Ash, R. (ed) DK	4.7	Problem Solving

	Publishing		
<i>Scholastic Kid's Almanac for the 21st Century</i>	Pascoe, E. (ed) and D. Kops	4.7	Problem Solving
<i>In the Next Three Seconds</i>	Morgan, Rowland	5.4 12.3	Measurement
<i>A Remainder of One</i>	Pinczes, Elinor J.	6.4	Division
<i>Gator Pie</i>	Matthews, Louise	7.1 9.3	Fractions
<i>Eating Fractions</i>	McMillan, Bruce	7.1 9.3	Fractions
<i>Do You Wanna Bet? Your Chance to Find Out about Probability</i>	Cushman, Jean	7.11	Probability
<i>Only One</i>	Harshman, Marc	7.2	Fractions
<i>Grandfather Tang's Story</i>	Tompert, Ann	7.3	Shapes
<i>Inside the Amazon</i>	Lessem, Don and Michael Rothman	9.4	Problem Solving
<i>The Brazilian Rain Forest</i>	Siy, Alexandra	9.4	Problem Solving
<i>Rain Forest</i>	Taylor, Barbara	9.4	Problem Solving
<i>Incredible Comparisons</i>	Ash, Russell	9.6	Problem Solving
<i>Shadows and Reflections</i>	Hoban, Tana	10.1	Geometry
<i>Reflections</i>	Jonas, Ann	10.1	Geometry
<i>Round Trip</i>	Jonas, Ann	10.1	Geometry
<i>The Mirror Puzzle Book</i>	Walter, Marion	10.1	Geometry
<i>The Monster Money Book</i>	Leedy, Loreen	10.6	Money
<i>How the Second Grade Got \$8205.50 to Visit the Statue of Liberty</i>	Zimelman, Nathan	10.6	Money
<i>Is a Blue Whale the Biggest Thing There Is?</i>	Wells, Robert E.	11.1	Measurement
<i>What 's Smaller than a Pygmy Shrew?</i>	Wells, Robert E.	11.1	Measurement
<i>Ed Emberley 's Big Green(Orange, Purple, and Red)Drawing Book</i>	Emberley, Ed	11.3	Shapes
<i>The King's Chessboard</i>	Birch, David	11.7	Multiples

Primary Grade Level Children's Literature for Teaching Mathematics Concepts

STRAND	TITLE OF BOOK	AUTHOR
Number Sense, Concepts and Operations	<i>Ten, Nine, Eight</i>	Molly Bang
	<i>How Many Bugs in a Box</i>	David Carter
	<i>Six Brave Explorers</i>	Kees Moerbeek and Carla Dijs
	<i>There were Ten in the Bed</i>	By Child's Play
	<i>What Comes in 2s, 3s & 4s.</i>	Suzanne Aker
	<i>The Right Number of Elephants</i>	Jeff Sheppard
	<i>Every Buddy Counts</i>	Stuart J. Murphy
	<i>Anno's Counting Book</i>	Mitsumasa Anno
	<i>Who Wants One?</i>	Mary Serfozo
	<i>Twelve Ways to Get to Eleven</i>	Eve Merriam
	<i>Rooster's Off to See the World</i>	Eric Carle
	<i>Fish Eyes: A Book You Can Count On</i>	Lois Ehlert
	<i>The Twelve Circus Rings</i>	Seymour Chwast
	<i>Picking Peas for a Penny</i>	Angela Shelf Medearis
	<i>One Hunter</i>	Pat Hutchins
	<i>One Gorilla: A Counting Book</i>	Atsuko Morozumi
	<i>The Line Up Book</i>	Marisaoina Russo
	<i>Ten Black Dots</i>	Donald Crews
	<i>Frog Counting Books</i>	John Liebler
	<i>Animal Numbers</i>	Bert Kitchen
	<i>One Fine Day</i>	Nonny Hogragian
	<i>The Fox Went Out on a Chilly Day</i>	Peter Spier
	<i>More, More, More, Said the Baby</i>	Vera B. Williams
	<i>Fish Eyes</i>	Lois Ehlert
	<i>Frog and Toad Together</i>	Arnold Lobel
	<i>Tuesday</i>	David Wiesner
	<i>The April Rabbits</i>	David Cleveland
	<i>Two Ways to Count to Ten</i>	Ruby Dee
	<i>Seven Little Rabbits</i>	John Becker
	<i>The Icky Bug Counting Book</i>	Jerry Palotta
	<i>How Many How Many How Many</i>	Rick Walton
	<i>From One to One Hundred</i>	Teri Sloat
	<i>Domino Addition</i>	Lynette Long
	<i>The Crayon Counting Book</i>	Pam M. Ryan and Jerry Pallotta
	<i>Ten Beads Tall</i>	By Child's Play
	<i>One Crow: A Counting Rhyme</i>	Jim Aylesworth
	<i>Counting on Calico</i>	Phyllis L. Tildes
	<i>Ready, Set, Hop</i>	Stuart J. Murphy
	<i>Leap Into Math</i>	Jane Keegan
	<i>The Napping House</i>	Audrey Wood
	<i>Two of Everything</i>	Lilly Toy Hong
	<i>Eating Fractions</i>	Bruce McMillan
	<i>Gator Pie</i>	Louise Mathews

Intermediate Grade Level Children's Literature for Teaching Mathematics Concepts

STRAND	TITLE	AUTHOR
Number Sense, Concepts and Operations	<i>Seven Blind Mice</i>	Ed Young
	<i>Goldilocks and the Three Bears</i>	James Marshall
	<i>Always Room for One More</i>	Sorche Nie Leodhas
	<i>A Chair for my Mother</i>	Vera B. Williams
	<i>Sylvester and the Magic Pebble</i>	William Steig
	<i>Each Orange has Eight Slices: A Counting Book</i>	Paul Giganti
	<i>Clocks and More Clocks</i>	Pat Hutchins
	<i>Henry's Important Date</i>	Robert Quackenbush
	<i>How Much is a Million</i>	David M. Schwartz
	<i>The King's Chessboard</i>	David Birch
	<i>Fraction Fun</i>	David A. Adler
	<i>Each Orange has 8 Slices</i>	Paul Giganti
	<i>One Grain of Rice</i>	Demi
	<i>The 500 Hats of Bartholomew Cubbins</i>	Dr. Seuss
	<i>Palindromes and Anagrams</i>	Howard Bergerson
	<i>Henry Huggins</i>	Beverly Cleary
	<i>A Million Fish... More or Less</i>	Patricia McKissack
	<i>Too Hot to Hoot</i>	Marvin Terban
	<i>Think About Shape</i>	Henry Pluckrose
	<i>Sea Squares</i>	Joy Hulme
	<i>Bunches and Bunches of Bunnies</i>	Louise Mathews
	<i>Math Curse</i>	Jon Scieszka and Lane Smith
	<i>Anno 's Mysterious Multiplying Jar</i>	Masaichiro and Misumasa Anno
	<i>Charlie and the Chocolate Factory</i>	Roald Dahl
	<i>Sideways Stories from Wayside School</i>	Louis Sachar
	<i>Counting on Frank</i>	Rod Clement
	<i>Pizza for Breakfast</i>	Mayann Kovalski
	<i>Moja Means One Swahili Counting Book</i>	Muriel Feelings
	<i>If You Made a Million</i>	David Schwartz
	<i>Today I Was Ten (From Don't Ever</i>	Kaye Starbird
	<i>Cross a Crocodile)</i>	
<i>Our Solar System</i>	Isaac Asimov	
<i>The Magic Schoolbus Lost in the Solar</i>	Joanna Cole_	
<i>System</i>	Thomas Heymann	
<i>On an Average Day</i>	Seymour Simon	
<i>Our Solar System</i>	Norton Juster	
<i>The Phantom Tollbooth</i>		

STRAND	TITLE	AUTHOR
Measurement	<i>Frog and Toad are Friends</i> <i>Time Flies</i> <i>The Whipping Boy</i> <i>The Boy of the Three-Year Nap</i> <i>Paul Bunyan</i> <i>Patterns</i> <i>The Relative Came</i> <i>The Crow and the Pitcher</i> <i>There Were Monkeys in My Kitchen</i> <i>Math Curse</i> <i>George's Marvelous Medicine</i> <i>Tuesday</i> <i>Sideways Stories from Wayside School</i> <i>If You Made a Million</i> <i>Pigs will be Pigs</i> <i>Measures and Space</i>	Arnold Lobel Eric Rothman Sid Fleischman Dianne Snyder Steven Kellogg David Kirkby Cynthia Rylant Mary Hill Arbuthot Sheree Fitch Jon Scieszka and Lane Smith Roald Dahl David Wiesner Louis Sachar David M. Schwartz Amy Axelrod David Kirkby
STRAND	TITLE	AUTHOR
Geometry and Spatial Sense	<i>How a House Happens</i> <i>Arrow to the Sun</i> <i>Flat Stanley</i> <i>Anno's Math Games</i> <i>Anno's Math Games II</i> <i>Anno's Math Games III</i> <i>Sideways Stories from Wayside School</i> <i>Grandfather Tang's Story</i> <i>M is for Mirror Book</i> <i>The Mirror Puzzle Book</i> <i>The Phantom Tollbooth</i> <i>Jungle Gym (from Roomrimes)</i> <i>Math Curse</i> <i>Opt</i> <i>Round Trip</i> <i>The Straight Line Wonder</i> <i>Patterns</i> <i>Measures and Space</i> <i>Shapes</i>	Jan Adkins Gerald McDermott Jeff Brown Mitsumasa Anno Mitsumasa Anno Mitsumasa Anno Louis Sachar Ann Tompert Duncan Birmingham Marion Walter Norton Juster Sylvia Cassedy Jon Scieszka and Lane Smith Arlene and Joseph Baum Ann Jonas Mem Fox David Kirkby David Kirkby David Kirkby

<p>Measurement</p>	<p><i>Mouse's Birthday</i> <i>The Best Bug Parade</i> <i>Inch by Inch</i> <i>Is It Larger? Is It Smaller?</i> <i>The Grouchy Ladybug</i> <i>Mice Twice</i> <i>"Smart" from Where the Sidewalk Ends</i> <i>Alexander, Who Used to Be Rich Last Sunday</i> <i>Rude Giants</i> <i>Much Bigger than Martin</i> <i>The Very Hungry Caterpillar</i> <i>Who Sank the Boat</i> <i>Temperature and You</i> <i>Reading the Numbers: A Survival Guide to the Measurements, Numbers and Sizes Encountered in Everyday Life</i> <i>A Giraffe and a Half</i> <i>26 Letters and 99 Cents</i> <i>How Many Feet in the Bed?</i> <i>How Big is a Foot?</i> <i>Picking Peas for a Penny</i> <i>The Tortoise and the Hare</i> <i>Measuring</i> <i>Mr. Archimedes' Bath</i> <i>King Bidgood's in the Bathtub</i></p>	<p>Jane Yolen and Bruce Degen Stuart Murphy Leo Lionni Tana Hoban Eric Carle Joseph Law Shel Silverstein Judith Viorst Audrey Wood Steven Kellogg Eric Carle Pamela Allen Betsy and Guilio Maestro Mary Blocksma Shel Silverstein Tana Hoban Diane Johnston Hamm Rolfe Myller Angela Shelf Medearis Janet Stevens David Kirkby Pamela Allen Audrey Wood</p>
<p>Geometry and Spatial Sense</p>	<p><i>Seeing Shapes</i> <i>Changes, Changes</i> <i>The Shape of Me and Other Stuff</i> <i>Color Zoo</i> <i>The Adventures of Terry Tangram</i> <i>Shapes</i> <i>The Shapes Game</i> <i>The Very Hungry Caterpillar</i> <i>The Greedy Triangle</i> <i>My Very First Book of Shapes</i> <i>Shapes, Shapes, Shapes</i> <i>Circles, Triangles, and Squares</i> <i>What is Symmetry</i></p>	<p>By Playschool Pat Hutchings Dr. Seuss Lois Ehlert By Learning Resources David Kirky Paul Rogers Eric Carle Marilyn Bums Eric Carle Tana Hobin Tana Hobin Mindel and Harry Sitomer</p>

STRAND	TITLE	AUTHOR
Algebraic Thinking	<i>The Button Box</i> <i>The Very Hungry Caterpillar</i> <i>Some Things Go Together</i> <i>The Grey Lady and the Strawberry Snatcher</i> <i>Patterns</i> <i>The Three Billy Goats Gruff</i> <i>Caps for Sale</i> <i>The Doorbell Rang</i> <i>Number Ideas Through Pictures</i> <i>Sam Johnson and the Blue Ribbon Quilt</i> <i>Too Much Noise</i> <i>Eight Hands Round</i> <i>A My Name is Alice</i>	Margarette S. Reid Eric Carle Charlotte Zolotow Molly Bang David Kirkby Marcia Brown Esphyr Slobodkina Pat Hutchins Mannis Charosh Lisa Campbell Ernst Ann McGovern Ann Whitford Paul Jane Bayer Verna Aardema

STRAND	TITLE	AUTHOR
Analysis and Probability	<i>The Button Box</i> <i>Moira's Birthday</i> <i>Sorting</i> <i>Anno's Magic Seeds</i> <i>Don't Forget the Bacon</i> <i>Eating the Alphabet: Fruits and Vegetables from A to Z</i> <i>The Best Vacation Ever</i> <i>Probability</i> <i>Happy Birthday, Sam</i>	Margarette S. Reid Robert Munsch David Kirkby Mitsumasa Anno Pat Hutchins Lois Ehlert Stuart J. Murphy Charles F. Linn Pat Hutchins

STRAND	TITLE	AUTHOR
Algebraic Thinking	<i>Max Found Two Sticks</i> <i>Ox-Cart Man</i> <i>Nine-in-One, Grrl, Grrl</i> <i>Grandfather Tang's Story</i> <i>Sea Witches</i> <i>Loads of Codes and Secret Ciphers</i> The King's Chessboard Too Hot to Hoot <i>The Case of the Stolen Code Book</i> <i>Secret Codes</i> <i>Math Curse</i> <i>Visual Magic</i> <i>Codes for Kids</i> <i>How to Write Codes and Send Secret Messages</i> <i>Solomon Grundy Born on Oneday</i> <i>A Clue in Code</i>	Brian Pinkney Donald Hall Blis Xiong Ann Tempert By Robertson and Gal Paul B. Janeszko David Birch Marvin Terban Barbara Rinkoff Helen Fletcher Jon Scieszka and Lane Smith Dr. David Thomson Burton Albert John Peterson Malcolm E. Weiss Marilyn Singer

STRAND	TITLE	AUTHOR
Analysis and Probability	<i>Jumanji</i> <i>Ramona Quimby</i> <i>Tikki Tikki Tembo</i> <i>Clocks and More</i> <i>Socrates and the Three Little Pigs</i> <i>The King's Chessboard</i> <i>Henry's Important</i> <i>Date Fleet footed</i> <i>Florence Averages</i> <i>Math Curse</i> <i>Sideways Stories from Wayside School Statistics</i> <i>What do you Mean by Average</i> <i>Miss Pickerel and the Weather</i> <i>Satellite Casey at the Bat</i> <i>Do You Want to Bet</i>	Chris Van Allsburg Beverly Cleary Arlene Mosel Pat Hutchins Tuyosi Mori David Birch Robert Quackenbush Marilyn Sachs Jane Jonas Srivastava Jon Scieszka and Lane Smith Louis Sachar Jane Jonas Srivastava James and Barkin MacGregora and Pantell Ernest Lawrence Thayer Jean Cushman

PIGS ON THE BALL-Have students create their own golf course with a variety of geometric shapes and concepts. A legend and key should be given to identify the assigned shapes.

PIGS AT THE MARKET-After reading the book, use the illustrations to discuss with the students the different kinds of candy and the prices. Have students develop their own problems using the candy in the aisles of the market.

GROUCHY LADYBUG-Have student create a book about their day. Use the step book pattern with a clock face in each corner. Have the students include the time of the day and the amount of time that has elapsed between events in their story.

NINE O'CLOCK LULLABY-Use the "step book" pattern to have students indicate activities that would be happening at various times in the USA. (Example: 11:30 Eastern Time-Eating lunch; 10:30 Central Time-Math; 9:30 Mountain Time-Morning Work; 8:30 Pacific Time-Walking to School)

A MINUTE IS A MINUTE-Students can create a book about various things they can do in a minute.

HOW MUCH, HOW MANY, HOW FAR, HOW HEAVY, HOW LONG, HOW TALL IS 1000?-On the hundredth day of school, have students create a book about 100 using this pattern.

SPAGHETTI AND MEATBALLS FOR ALL!-Have students use color tiles to design seating arrangements that are different from Mrs. Comfort's arrangement and will seat 32 people. Let the students use graph paper to record their examples. Let the students find the perimeter and area of each design to determine which one uses the fewest and the greatest number of tables.

IF YOU MADE A MILLION-Have the students write at least 20 things that can be observed on a penny. Have them use complete sentences for their observations.

HOW BIG IS A FOOT?-Have students use the king's foot pattern to measure how long and wide their bedroom is. Then use a tape measure to accurately measure the width and length of their bedroom. In their journal have them tell when it is important to have exact measurements and when it is appropriate to use an estimate. As a family activity, each member of the family could measure a given room and compare results.

THE GREEDY TRIANGLE-Have students cut out each polygon shape from magazines. Write the name of each shape under each picture. In their journal, have each student write an explanation of why a shape with many sides and many angles would roll more easily than a shape with fewer sides and angles.

GET UP AND GO-After reading the book, have each student create their own timeline to illustrate their morning, after school, or night time routine. In the student's journal, have him/her describe which activities take the most time, least time, and any that take the same amount of time.

Writing Ideas

Tongue Twisters can be made using math vocabulary to help students remember vocabulary , terms and definitions.

Ex. Troy tied three strings to the three angles of the triangle in the triarama.

Riddles can be written to help reinforce math vocabulary or concepts. Number riddles can be created using homophones.

Ex. What did the numbers 3 and 5 do on their date? They 8.

Nursery/Jump Rope Rhymes can be used to help students remember math facts, using the sum, product, or quotients as the rhyming word.

Recipes can be used when studying fractions or learning to write directions to solving a problem. Have students bring in their favorite recipe to use. Have students rewrite recipe for a different number of people than the recipe is written.

Literature Connections

THE TWELVE DAYS OF CHRISTMAS-Bring a catalog, let the students cut out objects to use as they rewrite the story. Put the catalog picture on a pop-up section of a book. Use a calculator to figure the total cost of the items. Add interest to the story by making a cumulative total for ea day.

PIGS ON A BLANKET-Give students the small Judy clocks and have them move the hands to indicate the times given in the book. Students can then create a story about elapsed time. Their day may be real or made up. Use the enclosed planning sheet to help students determine the time of different activities and the amount of elapsed time. Students can also indicate the time of

an event by drawing hands on a clock face. (A clock stamp works well for this activity.) Students can also develop stories with elapsed time that describes the Pigs' adventure back home from the beach.

PIGS WILL BE PIGS-Students have fun telling a story about finding money in various places in their home or yard. Use the enclosed money planning sheet to help students make an accurate accumulation of money amounts.

PIGS ON THE MOVE-Students can use a time zone map and plan a trip across the United States after **reading** the book. Measurement is also included as they calculate the distance traveled and the time required to complete the journey.

PIGS IN THE PANTRY-Have students bring their favorite recipe to class. Discuss how to calculate the number of recipes based on the serving size. Have kids pig size their recipe and make a recipe collection. (Students can also use the recipe for Firehouse Chili and reduce the amount needed or increase the recipe for a larger number of people.)

PIGS AT ODDS-Have the students design two games, one that is fair and one that isn't. Let them make pictures of the games and then write a description explainin^g how the games are fair or unfair.