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Literature-Based Supplemental Activities in a Second Grade Classroom

Heidi Stevens

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Literature-Based Supplemental Activities

in a Second Grade Classroom

by

Heidi Stevens

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The National Council of Teachers of Mathematics recommendations and the Washington State Commission on Student Learning Essential Academic Learning Requirements are addressed. The benefits of integrating mathematics and literature are studied. Integrated activities, materials, and a bibliography of children's literature that supplement a traditional mathematics curriculum for primary students are developed. Recommendations for implementing the project are given.

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CHAPTER ONE

BACKGROUND OF THE PROJECT

Introduction

Nationwide curriculum reform is impacting the way all subjects are taught in Washington State. The Washington State Commission on Student Learning (WSCSL) has developed academic goals called Essential Academic Learning Requirements (EALRs). The goals which address mathematics are based upon the 1989 recommendations of the National Council of Teachers of Mathematics (NCTM). The NCTM's four generic standards are mathematics as problem solving, mathematics as communication, mathematics as reasoning, and mathematics as connections (NCTM, 1989). Current practices in teaching mathematics tend to be skill and fact oriented. Many are concerned that students will fail to realize mathematics concepts as they relate to real life applications (Whitin & Wilde, 1992). In order to comply with the WSCSL and the NCTM standards, teachers need to alter the way mathematics is being taught.

Purpose of the Project

The purpose of this project is to provide supplemental mathematics activities to enhance the Silver Burdett and Ginn mathematics curriculum currently being used in the author's school district. Literature-based mathematics activities will be used as supplements. These activities will be

based on literature books that have underlying mathematic themes. Examples of such activities could include working with money to buy supplies from the teacher's store to constructing a house like that of the witch in Hansel and Gretl or measuring classroom items with a giant size foot and Jack's foot (based on Jack and the Beanstalk). These activities will allow students to use mathematics in realistic settings, use manipulatives, and strengthen existing skills in all areas of the curriculum.

This project will consist of two components:

1. Mathematics activities and worksheets based on children's literature which will supplement the Silver Burdett and Ginn mathematics curriculum currently being used in the author's district.
2. A bibliography of children's literature that could be used to supplement a primary mathematics curriculum.

Significance of the Project

This project will provide the author and the author's colleagues with resources and techniques that are more closely aligned with the recommendations of the WSCSL and the NCTM. This project was developed after observing discrepancies between the WSCSL's Essential Academic Learning Requirements and NCTM's standards and the current practices of teaching mathematics in the author's school district. It will allow students to experience mathematics in realistic settings, use manipulatives,

and strengthen existing skills in all areas.

Limitations of the Project

This project will not include all possible activities for each literature book, nor will it provide a complete bibliography of all children's literature that could be used to supplement a mathematics textbook. These activities have been developed for primary teachers as a supplement to an adopted mathematics textbook currently in use. The activities are meant to be a review of skills and application practice not an introduction of new skills. These activities will be aligned with the NCTM's recommendations and the EALRs from the state. They may not, however, be aligned with all states' mathematics outcomes.

Definition of Terms

The terms used in this project are to clarify the author's meaning.

Literature-based activities: Activities based on a selected piece of children's literature that is used to show integration of subjects (such as mathematics and reading)

Manipulatives: Any objects that aid students in mathematical manipulation and computation. They may be in the form of fake money, counters, work mats, etc.

EALRs: Academic goals developed by a state committee that provide educators with common mathematical goals for each student to achieve.

Overview of the Project

Chapter Two will provide a review of related literature which deals with the integration of mathematics and literature. Chapter Three will describe the procedures used to develop and organize the project. Chapter Four consists of the project. It contains mathematics activities and worksheets based on literature that will strengthen students' existing skills in problem solving, communication, reasoning, and connections to real life applications of mathematics. Chapter Four also contains a bibliography of children's literature that could be used to supplement a primary mathematics curriculum. Chapter Five provides a summary and the author's recommendations, and conclusions.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

This chapter will examine the use of children's literature to teach developmentally appropriate mathematics concepts in early childhood education programs. There is much concern in this country about the mathematical competence of our young people. Although studies show a slight improvement in the mastery of basic facts, there still appears to be no marked progress in the areas of problem solving and critical thinking (Whitin & Wilde, 1992). Children's literature can be a powerful way to extend mathematical thinking in the classroom. Books "portray mathematics not as a sea of symbols and potentially frustrating mental tasks that have no meaning for children but as a tool for making decisions and solving problems" (Whitin, 1994, p. 10). Often stories will spur questions about mathematical problems. The primary goal of a mathematical literacy program is to create a learning environment that encourages children to think like mathematicians. To do this, the author focused on three things. The first was the standards, goals, and recommendations of the National Council of Teachers of Mathematics. The second was the Essential Academic Learning Requirements that the Washington State Commission on Student Learning has published. The last was the research and practice of using children's literature to teach basic mathematical concepts.

Early childhood educators recognize the value of children's

literature. They maintain that reading promotes a positive attitude toward reading and a strong desire to read (Schickedanz, 1986; Whitin, 1994). Books are less often used to launch interesting math learning activities. Because books are in every good program, and because we want to help young children learn and enjoy math concepts, we should not waste this excellent resource. Incorporating children's literature into the mathematics curriculum can be justified in several ways. According to Whitin (1994), using literature to teach math concepts provides meaningful context, strengthens math as a language, fosters the development of number sense, integrates subjects, and supports the art of problem solving.

The National Council of Teachers of Mathematics

In the Curriculum and Evaluation Standards for School Mathematics document, the National Council of Teacher of Mathematics (NCTM, 1989) advocates significant changes in mathematics instruction. Four generic standards proposed by the NCTM are problem solving, communication, reasoning, and connections. The NCTM has set five mathematical goals for all students:

1. Students will learn to value mathematics
2. Students will become confident in their own ability
3. Students will become problem solvers
4. Students will communicate mathematically
5. Students will reason mathematically. (pp. 5-6)

The NCTM recommends that students have opportunities to be problem posers as well as problem solvers. Educators are urged to provide children with opportunities to represent mathematical ideas in different ways, such as, numerically, writing, drawing, and discussion. Mathematics is viewed not as a series of rules to be mastered but as a way of thinking. It recognizes the importances of experiences that allow all students to realize that doing mathematics “is a common human activity” (NCTM, 1989, p. 6). The NCTM also advocates the use of children’s books as a vehicle for communicating mathematical ideas.

The Washington State Commission on Student Learning

The Washington State Commission of Student Learning (WSCSL) is another group that has been focusing on reforming the way we teach. The WSCSL has published Essential Academic Learning Requirements (EARLs) for each subject. For mathematics there are five requirements:

1. The student understands the basic concepts and procedures of mathematics, how to use them, and why they work.

To meet this standard, the student will understand and apply: number sense, measurement, spatial sense, probability and statistics, and functions and relationships.

2. The student uses mathematics to define and solve problems.

To meet this standard, the student will: investigate situations by searching for patterns and exploring a

variety of approaches, formulate questions and define the problem, and construct solutions by choosing the necessary information and using the appropriate mathematical tools.

3. The student uses mathematical reasoning.

To meet this standard, the student will:

interpret information from a variety of sources, predict results and and make conjectures based on analysis of problem situations, draw conclusions, support mathematical arguments, justify results, and check for reasonableness of solutions.

4. The student effectively communicates mathematical ideas in both everyday and mathematical language.

To meet this standard, the student will:

read, listen, and observe to access and extract mathematical information; organize and interpret mathematical information; share, explain, and defend mathematical ideas using terms, language, charts, and graphs that can be clearly understood.

5. The student understands how mathematical ideas connect to other subject areas, real-life situations, and career goals:

To meet this standard, the students will:

recognize the relationships among mathematical ideas and topics; identify and apply mathematical thinking and notation in other subjects such as the sciences, art, music, social studies, etc.; understand the connection between mathematics and problem

solving skills used every day at work and home (Washington State Commission on Student Learning, 1996).

Research and Practice

Young children bring a wealth of mathematical experiences into the classroom. One goal of teachers of young children, according to Raymond (1995), should be to tap into those experiences and link the learning of mathematical concepts to contexts that are meaningful to children. Children's literature provides a meaningful context for children. Literature restores a meaningful context to the use of numbers, since mathematical concepts are naturally embedded in story situations (Whitin & Wilde, 1992). Using math-related children's literature can help children realize the variety of situations in which people use mathematics for real purposes. It is hoped that as a result of making connections between literature and mathematics, students begin to view mathematics as not merely a subject area to be learned in school, but as a natural part of everyday life. Children's literature provides an exciting way to investigate concepts and to understand the basic generalizations that underlie a mathematical view of the world (Whitin & Wilde, 1992). Children's literature helps students learn mathematics as well as live it.

Children's literature celebrates mathematics as a language. NCTM (1989) states learning to communicate mathematically as an essential goal for mathematics instruction. Similarly, goal four of the EALRs (1996) states that

“the student effectively communicates mathematical ideas in everyday and mathematical language” (Washington State Commission on Student Learning, 1996, p. 14). Children’s literature celebrates mathematics as a language by encouraging discussion and exploration. It demonstrates that mathematics develops out of human experiences.

Children’s literature fosters the development of number sense. The NCTM recommends that estimation and number sense be considered important goals in school mathematics and lists various dimensions that need to be encouraged: developing number meaning, exploring number relationships with manipulatives, understanding the relative magnitude of numbers, developing referents for measuring common objects, and building a sense about the relative effect of operating on numbers.

Harsh (1987), Hendrickson (1983), and Kraner (1978) have suggested concepts to be introduced at each primary grade level. Many concepts at the kindergarten level are prenumber skills. The trio suggests comparing, classifying, patterns, counting, shapes, developing number concepts, ordinal numbers, conservation of numbers, position, measurement, time, and money as key concepts for kindergarten curriculum. Many of these concepts are the foundation of math application concepts. Counting, classifying, comparing, patterns, number, place value, operation of number, equality, symbolization, time, money, geometry, and measurement are suggested concepts for first grade. The suggested concepts for second grade are comparison, classifying, patterns, counting, number, place value, operations with numbers, time,

money, geometry, and measurement. Some concepts are key at all three levels. The complexity and involvement increases at each level. It fosters the development of number sense.

Mathematics has tended to remain outside the integrated whole, confined to arithmetic taught from a book in a separate period. "Math folk express concern that we tend to teach the parts - arithmetic 'facts' and 'skills' - through meaningless drill so that learners lose the context and so not develop a sense of mathematical functions" (Whitin & Wilde, 1992, p. xi). A number of educators (Burns, 1992; Karp, 1994; Radebaugh, 1981; Rommel, 1991; Sheffield, 1995; Smith & Wendelin, 1981; Thiessen & Matthias, 1992; Welchman-Tischler, 1988 & 1992) encourage making connections between children's literature and mathematics. In general, these educators contend that making connections between mathematics and literature both motivates students to learn mathematics and illustrates the notion that mathematics does not have to be learned in isolation from other subjects areas. Karp (1994), in particular, suggests that "the focus in primary classrooms on children's literature through the whole language approach to reading encourages the elimination of artificial divisions among the subjects through such natural and desirable mixtures as mathematics and storybooks" (p. 87).

Every teacher is frustrated by the lack of time to cover all the curriculum areas to which children should be exposed. For example, teachers are expected to teach mathematics, reading, and high order thinking skills. If

these topics are taught separately more time would be required than if teacher integrated the topics. Integrating curriculum areas not only saves time but also allows children to see that all areas of curriculum are related.

Weaving literature into math is a wonderful way to tap the talents of all students, no matter what their abilities may be. In Thrailkill's (1994) words: "The line between 'good' readers and 'good' mathematicians begins to blur. Children are more likely to build their confidence in each area and to focus less upon what they see as their strengths and weaknesses in school subjects" (p. 64). According to Harsh (1987), children's literature should be chosen carefully using the following criteria:

1. Illustrations and text should be accurate and portray mathematical ideas correctly.
2. Illustrations should be attractive and appeal to young children.
3. Illustrations should be appropriate in size and detail in keeping with the developmental characteristics of the young child.
4. Text should be easily understood and interesting.

A study was conducted by Jennings, Jennings, Richey, and Dixon-Krauss (1992), to test the hypothesis that using children's literature to teach mathematics concepts to kindergarteners improves their math achievement test scores, increases their interest in mathematics, and increases the number of times they use mathematical vocabulary during freeplay. Sixty-one kindergarteners from two school districts in Arkansas were divided into control groups and experimental groups. The intervention that was used on

the experimental groups was literature incorporated into the mathematics curriculum for a period of five months. The control group used a traditional mathematics curriculum. Testing was done at the beginning and ending of the study using the Test of Early Mathematics Ability (TEMA) and the Metropolitan Readiness Test and observations of vocabulary usage during freeplay. The results of the study clearly showed a positive effect of using children's literature to teach mathematics to kindergarten students results of the TEMA showed that the experimental group had an increase from 9 points to 23 points and the control group had an increase from 8 points to 14 points. The experimental group had significantly more growth. Observers tallied specific vocabulary usage during freeplay. The control group used specific mathematical vocabulary 371 times, while the experimental group was observed using specific mathematical vocabulary 2007 times. Comments made by teachers, parents, other significant adults, and the children themselves reflected an increase in their interest in math.

Summary

Researchers of young children know the value of literature and mathematics integration. Mathematics and literature is not an usual combination when integrating subjects. After looking at the recommendations, goals, and standards of the NCTM and the Washington State EALRs it is apparent that the integration of children's literature and mathematics is recommended by the experts. Combining mathematics and

literature provides meaningful context, strengthens math as a language, fosters the development of number sense, integrates subjects, and supports the art of problem solving. This chapter concludes with a few suggestions about how to use literature appropriately with children.

1. Enjoy the story. Don't destroy the magic of the story by interrupting it with mathematical questions.
2. Read the book aloud, several times if the book is short. It is impossible for listeners to catch all the dimensions of the story the first time. They need repeated opportunities to make connections to all parts of the story.
3. Keep the questions open-ended to encourage multiple responses.
4. Encourage children to respond to stories through drama, poetry, written, oral, etc. Each form allows learners to experience mathematics from a different perspective.
5. Integrate mathematical books into all areas of study.
6. Use students as a guide for deciding what to read.
7. Consider the age of the students and the intended use of a book to decide whether to read it orally with a group, read it with a reading group, or silent reading by individuals is more appropriate (Whitin & Wolfe, 1994).

CHAPTER THREE

PROCEDURES OF THE PROJECT

The procedure for this project consisted of several steps. First, the author attended two workshops which inspired this study. The workshops were based on Box It or Bag It and Math Excursions. The Box It or Bag It workshop was taught by Bonnie Isom in the spring of 1996. The Math Excursions workshop was taken in the summer of 1996. This workshop was also taught by Bonnie Isom. Both of these workshops were offered as part the author's district teacher enrichment opportunities.

Second, a background of the project was written which included the purpose and rationale of the study. The author identified inconsistencies between the NCTM and WCSL standards and the Silver Burdett and Ginn mathematics curriculum being used in the author's district.

Third, children's literature titles were chosen. The titles were chosen based on the mathematical content of the book and the author's perceived quality of the book. All of the titles chosen have obvious mathematical themes. Some of the books chosen address several mathematical concepts and others address a single concept. All the titles chosen are part of the Hello Math Reader math series published by Scholastic. Marilyn Burns, who has written several books linking mathematics and literature, was involved with the writing of these books.

Fourth, the author spent two days observing in a neighboring district. The author observed Box It or Bag It and Math Excursions being used in 1st

and 2nd grade classrooms. The author also was able to observe a variety of teaching styles and mathematics curriculum.

Fifth, the National Council of Teachers of Mathematics recommendations and the Washington State Commission on Student Learning's Essential Academic Learning Requirements were considered.

Finally, mathematical activities and worksheets were developed based on the chosen titles. A bibliography of children's literature titles that could be used to supplement a primary mathematics curriculum was developed.

CHAPTER FOUR

THE PROJECT

The project consists of two parts. The first part is literature based mathematics activities. These activities are based on ten books chosen by the author. The chosen titles are all published by Scholastic Inc. and are part of the Hello Math Reader series. Each book covers a specific topic related to mathematics. The author has developed activities to teach the topics in a primary classroom. The author has also aligned each activity to the NCTM goals and the EALRs. Worksheets and supplemental materials have been created by the author. This chapter contains a synopsis, concept list, and activities for each title chosen. Worksheet and supplemental materials developed for each title can be found in the appendices.

The second part of the project contains a bibliography of literature with a mathematical theme. The bibliography is organized by mathematical concept. The author has chosen several titles in each area that aid in teaching the specific concept.

One Hungry Cat

Written by Joanne Rocklin

Illustrated by Rowan Barnes-Murphy

Published by Scholastic Inc.

This story is about a cat named Tom who invites his two friends over for some yummy treats he has made. Tom divides the dozen cookies on the plates to be fair. While waiting for his friends, Tom gets hungry and eats a plate of cookies. He can't figure out how to divide the remaining fairly, so he eats the rest of the cookies. Then Tom makes lemon cake. He divides the cake in half and then in half again. He puts one piece of cake on each plate and eats the remaining one. But, his appetite gets the best of him and he eats half of one of the pieces of cake. To make it fair, he eats half of the remaining two pieces. Then Tom decides the pieces are too small to serve to his friends, so he eats them. He still needs treats for his friends so he makes two blueberry muffins. When his friends arrive, he gives them the muffins. They notice that Tom has nothing and they decide to share the blueberries in the muffins with him. The story ends with confusion on how to divide the blueberries and Tom tells his friends to keep them all for themselves.

Concepts that could be taught using this book are:

- *Measurement
- *Dozen
- *Division
- *Fractions
- *Estimation
- *Graphing
- *Place Value

ACTIVITIES:

1. Read the book in reading groups or have the children read the book silently to themselves. After children have read the book, talk about the concept of a dozen. Ask the children to look around the room and find things in the classroom that show a dozen. After several examples of things are given, explain to the students that they are going to make a "dozen book." Each person will draw a picture of a dozen things and write a sentence telling about their picture. Show them a sample page(see Appendix A). Each sentence needs to have characters, a setting, and an action. (These are a dozen red apples hanging on a tree in an orchard.) This will help review part of a fiction story. After all students have their pictures finished, laminate and make into a classroom book. As homework, ask the students to find things at home that demonstrate one dozen. (NCTM goal 5, EARL math 1.1)
2. After all children have read the book and been exposed to the concept of a dozen, reread the book to the entire group. This lesson will focus on dividing evenly. For this lesson each child will need 12 pretend paper plates (circles of paper) and 12 cookies (paper cookies, Cookie Crisp cereal, or real cookies could be used). Review the term dozen. Ask the students how many plates Tom used in the story (3). Have the students use three plate to divide their cookies evenly. Did their dividing come out the same as Tom's? What if we had 4 plates to fill? Could we do it fairly/evenly? Have students experiment with different numbers of plates? Which can they do fairly/evenly? After several minutes of experimenting, hand out the worksheet(see appendix A) that accompanies the lesson. Explain to children that they are to try each combination to see if it divides fairly/evenly. If it does circle yes, if not circle no. At the close of the lesson, refocus and review which numbers divided evenly into a dozen. If using edible cookies, let the children eat the cookies. (NCTM goals 2, 3, 5; EALR math 1.1, 2.1, 5.3)

3. To build estimating skills, have students estimate how many Cookie Crisp cookies in a jar. After students estimate, graph the guesses. The easiest way may be to graph in 10 or 20 increments (such as 1-20, 21-40, etc.). Use questioning skills to elicit inferences from the students about the graph results. As a conclusion to this activity, have the students put cookies in groups of 10. When all cookies have been counted record the total on the board. Talk about how many tens and ones. (NCTM goals 2, 3, 5; EALR math 1.1, 1.4, 3.1)

4. Reread the story to entire group. Discuss what Tom did with the lemon cake. Hand each student a square piece of paper. Ask them to fold the paper in half to make two halves just like Tom did. Discuss the concept of half. Now ask the children to fold the paper in half again. How many pieces do they have now? How does that compare with what Tom had? This activity leads into a lesson on fractions and the terms whole, halves, and fourths. Ask the children to cut on the folds (they should end up with four squares). Have the children hold up $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{2}$, etc. After several group responses, hand out worksheet (see Appendix A) and explain directions. Students will shade figures according to directions. (NCTM goal 5, EALR math 1.2)

5. As a culminating activity in the classroom, make one of the treats from the story. This activity will provide the children with a chance to measure and review the use of fractions that they learned in the previous lesson. As homework, have the students bring in a recipe of their favorite treat and make a recipe book for each student (see Appendix A). (NCTM goals 1, 2; EALR math 1.2, 5.2, 5.3)

Just A Minute!

Written by Teddy Slater
Illustrated by Dana Regan
Published by Scholastic Inc.

Fred painted a picture of his whole family. He went around to each of his family members and tried to show them his picture. Each of them told him “just a minute.” At the end of the story Fred’s older brother reminds him to walk the dog. He says “just a minute.” A while later his brother comes back and asks him why he hasn’t walked the dog. He said he was only waiting a minute. His brother tells him it was a lot longer than a minute. Fred admits he doesn’t know what a minute is. His family tells him four ways to know how long a minute truly is.

Concepts that could be taught using this book are:

- *telling time (to the hour, half hour, quarter hour, minute, etc.)
- *counting
- *estimation
- *comparison
- *graphing

ACTIVITIES:

1. Read the book to the entire class. As a whole class try using several of the ways to count to a minute. Two counting ways are one, 1,000, two, 1,000, all the way to 60, 1000 or one mississippi, two mississippi, all the way to sixty mississippi. Have the students look at the clock and watch the minute hand go all the way around once. (NCTM goals 1, 2, 3; EALR math 1.1, 2.1, 5.3)

2. This book can be used to introduce a unit on telling time to the hour, half hour, quarter hour, five minutes, or one minute (see Appendix B).
3. Have students recall the lesson in which they learned several ways to count to 60. List on the board. Tell students that now they are going to do an experiment to see how many stars they can draw in one minute. Choose students to come up to the board to draw different types of stars. Discuss which stars would be the quickest to draw. Then discuss ways to draw stars on their paper (either organized patterns or randomly) for the ease of counting. When students are ready, time them for 1 minute. Have them count how many stars they were able to draw. Graph the class results. (NCTM goal 3; EALR math 1.1, 4.2)
4. For time fillers throughout the unit, challenge students to draw, write, perform a task when given one minute. Some activities could include jumping jacks, solving math problems, making lists, drawing something, writing their name, etc. (NCTM goal 1; EALR math 5.3)
5. As independent work, have a one minute timer at a center and allow children to challenge themselves with one minute activities. (NCTM goal 2; EALR math 5.3)
6. As a culminating activity, have the children make a class book comparing things that take more than one minute and less than one minute. A possible fill in sentence could be: _____ takes less than a minute, but _____ takes longer than a minute (see Appendix B). Print each student's sentence on a separate page. Have the students illustrate their sentence. Then laminate and make into a class book. (NCTM goal 4, EALR math 4.2)

Stay in Line

Written by Teddy Slater
Illustrated by Gioia Fiammenghi
Published by Scholastic Inc.

This story is about a teacher who takes her class to the zoo. There are a dozen students in the classroom. The book explores different ways to group twelve objects. The students line up two by two. They march down the stairs in three rows of four. On the bus they sit three to a seat. At the zoo they find other ways to group themselves depending on the activity.

Concepts that could be taught using this book are:

- *Counting by 1's, 2's, 3's, and 4's
- *Multiplication

ACTIVITIES:

1. Before reading this story, give students twelve objects to represent the twelve children in the story. Explain to the class that as you read the story you want them to arrange their items just as the children are arranged in the story. Use an overhead projector to correct display as the children do theirs. Pause after each arrangement to allow students to have time arrange their items. At the end of the story, ask the students to recall ways the children in the story organized themselves. Write ideas on a chart and save for a future lesson. (NCTM goals 3, 4; EALR math 1.4, 2.1)
2. Use the chart from the previous lesson to review the way the children in the story organized themselves. Ask students to identify which ones have the same number of children in each group (1's, 2's, 3's, 4's). After students

have done that , display a chart with four rows with twelve children in each. Leave space in between for writing. If there is one child in each group, how many groups will there be (12)? Using the first row of children, circle twelve groups with a single child in it. Under the row write “12 groups of 1 equals 12” Ask the children another ways the children in the story lined up evenly. after a response is given, circle the groups accordingly on the next line of children. When complete the rows should be labeled: 12 groups of 1 equals 12, 6 groups of 2 equals 12, 4 groups of three equals 12, 3 groups of 4 equals 12. Show students how to write as a multiplication problem. Do several examples on the board starting with a multiplication problem and drawing the appropriate groups. When students are comfortable with concept, pass out worksheet(see Appendix B) allow students to practice independently. (NCTM goals 3, 4; EALR math 1.5)

3. As time fillers throughout the unit, practice counting by 2's, 3's, and 4's. (NCTM goal 2; EALR math 1.1)

4. Have each student brainstorm things that come in 2's, 3's, and 4's (see Appendix C). Have a separate class list for each number. As a class, list things that fall into each category. Teacher writes student responses for about five minutes. Then allow students to write ideas as they think of them in the days following. Review new ideas daily and ask students whether they agree or disagree with the new ideas. (NCTM goals 2, 4; EALR math 1.1, 5.1, 5.2, 5.3)

The Lunch Line

Written by Karen Berman Nagel

Illustrated by Jerry Zimmerman

Published by Scholastic Inc.

Kim has to buy lunch because she left her lunch on the bus. She only has one dollar and she has trouble deciding what to buy at the lunch counter. Finally Kim decides on fish sticks, an oatmeal cookie and apple juice. Before she can order the fish sticks are gone. Her friend takes the last order of fish sticks. At the end of the story, they decide to share their lunches.

Concepts that could be taught using this book are:

*Money

ACTIVITIES:

1. After reading the story, pass out a copy of the menu and worksheet (see Appendix D) to the students. Have them think of as many ways as they can that Kim could have spent her money on lunch. After about 10 minutes list all the different combinations that the students thought of on the board. Next ask the students to choose what they would order for lunch and compute how much it would cost. Have several students report their choices and the cost of their meal. (NCTM goal 3; EALR math 1.2, 2.3, 3.1, 5.3)
2. Have students work in groups of 2-4 for this activity. It is a game called Race for \$1. The object is to be the first person to get enough coins to trade in for a \$1 bill. It's fine to have extra coins, but you must have at least \$1. To play, each group needs two dice, a \$1 bill, and lots of coins (25 to 30)

pennies, 10 to 15 nickels, 10 to 15 dimes, 6 to 8 quarters) Set the dollar bill aside. Put all the coins in a pile. Everyone should take turns.

1. On your turn, roll the dice. The sum tells you how much to take from the coin pile.
2. You can also use your turn to exchange some of your coins. (10 pennies for a dime, 2 dimes and 1 nickel for a quarter, etc.)
3. Give the dice to the next player and follow the same rules.
4. Play until one player has enough to exchange for the \$1 bill.

Remember: You may only exchange when it's your turn. Watch to make sure you agree with what the other players do. (NCTM goals 2, 3; EALR math 2.1, 5.3)

3. As a center activity have flyers from grocery stores and money stamps available for students. Have students cut out pictures of food with prices and stamp the correct prices beside the picture. (NCTM goal 5; EALR math 1.2, 5.3)

Even Steven and Odd Todd

Written by Kathryn Cristaldi
Illustrated by Henry B. Morehouse
Published by Scholastic Inc.

Everything in Even Steven's world comes in even numbers until his cousin Odd Todd comes to visit for the summer. Todd continually upsets Steven's perfectly even world. Todd eats three of Steven's six pancakes that he was saving for his lunch. He rides through Steven's four leaf clover garden. Steven enters a perfect garden contest. When Todd finds out he decides to help by planting one row of cactuses. Steven is very upset, but he ends up winning first prize. First prize is two tickets to Twin Lakes. Finally, one of Todd's ideas pays off.

Concepts that could be taught using this book are:

*Odd/Even

*Counting by 2's

ACTIVITIES:

1. Before reading the story, hand out the worksheet (see Appendix E) to the student. Tell them that while you are reading the story they are to listen and write down the numbers related to each boy in the story. After reading the story, ask the students if they see any patterns (Even: count by two's; Odd: difference of two). List even numbers to twenty and odd numbers to nineteen. Have children practice counting each set. (NCTM goal 5; EALR math 1.1)

2. Two-Handed Grab. Have each student choose a number between 15 and 30. Have students put that many counters in a line. Tell students to put one hand at each end of the line. Say, "Ready, Go!" and students grab a counter from each end. They place the counters they grab in front of them. Keep grabbing from the ends until they are all gone or there is only one left. If they have a counter left over, that means their number was odd. If they grabbed them all, the number was even. This can also be placed at a center after it has been introduced to the whole group. (NCTM goals 3,5; EALR math 1.1, 1.4, 2.1)

3. Two by Two. Have students take some counters and line them up, two by two. If there is a counter without a partner, then the number they started with was odd. If they all have partners, the number is even. After the students have figured out whether they have an odd or an even number of counters, have them count by two to find out the exact number. Can also be done as a center activity. (NCTM 3, 5; EALR math 1.1, 1.4, 2.1)

4. Divvy Up. Give students two sheet of paper. Have them take some counters and divvy them up so there is the same amount on each sheet of paper. Count to be sure. If they have a left over counter, the number they started with is odd. If they shared evenly, the number is even. Can also be done as a center activity. (NCTM 3, 5; EALR math 1.1, 1.4, 2.1)

5. Count by 2's. Explain to the students you are going to tell them an easy way to tell if a number is odd or even besides the previous three activities that required time and counting. Tell them to think of a number. When you count by 2's all the number are even. If you don't say the number when you count by 2's, that number is odd. (NCTM 3, 5; EALR math 1.1, 1.4, 2.1)

A Quarter from the Tooth Fairy

Written by Caren Holtzman

Illustrated by Betsy Day

Published by Scholastic Inc.

The boy in the story lost a tooth and got a quarter from the tooth fairy for it. He decides to buy a monster from his friend Mary. After he has the monster for a while he decides to take it back. Mary gives him back two dimes and a nickel. Next, he decides to buy a spaceship pencil. After a while he decides to return it. The clerk gives him back five nickels. Then, he buys a pair of goggles for swimming from Lupe. They didn't feel right, so he returned them to Lupe. She gave him 25 pennies. Finally, he bought a sticker at the zoo. That didn't feel right either. The clerk gave him back a quarter. When he got back home, he put his quarter under his pillow and bought back his tooth.

Concepts that could be taught using this book are:

*Money

ACTIVITIES:

1. After reading the book have the students recall the four ways that change was made from a quarter in the story. Hand out Change for a Quarter worksheet (see Appendix F) to students and a baggy of pretend money. They are to find at least 10 ways to make change for a quarter. At the end of the lesson, list all the ways that the students thought of (there are 12 possible). (NCTM goals 2, 3; EALR math 1.2)
2. Give each child a bag which contains three pennies, three nickels, three dimes, and three quarters. Have the students reach in without looking and try

to find by feeling the requested coin. When the students become comfortable with this activity, ask them to choose a combinations of coins that equal ten cents, fifteen cents, six cents, etc. (NCTM goals 2, 5; EALR math 1.1, 1.2)

3. For this activity, the students will practice making combinations of coins that equal one dollar. Hand out baggy of pretend coins. Instead of a worksheet this time have the students fold a plain piece of paper so they have 8 boxes. Ask them to think of as many ways possible to show combinations that equal one dollar. Have them draw one combination in each box. They may also turn the paper over and work in the 8 boxes on the back. After students have had enough time to find at least 8 combinations, list all the combinations on the board. (NCTM goals 4, 5; EALR math 1.1, 1.2)

4. At a center, have money stamps and index cards with stickers attached. Beside each sticker, write the price of the sticker. Vary the prices from 1 cent to one dollar. On the back, the students need to stamp the correct amount using the money stamps. After they complete a card, they need to have it checked by a classmate. Save the correctly stamped cards to use as flashcards at a future center. (NCTM goals 2, 3, 5; EALR math 1.1, 1.2)

The Case of the Missing Birthday Party

Written by Joanne Rocklin
Illustrated by John Speirs
Published by Scholastic Inc.

Liz and her brother try to help a lost party goer find the correct house. Her invitation has been chewed up by her hamster. The only clue they have is the address has a five in it. They try to figure out whether the five belongs in the ones, tens, or hundreds place. Together they check all the houses that it could possibly be until, finally, they find the house where the party is being held.

Concepts that could be taught using this book are:

*Place Value

ACTIVITIES:

1. After reading the story, have children help list all the addresses that it could be. Recall the two facts that Liz decided to remember (10 houses on each block and how on the present was all chewed up). How did each of these clues help Liz solve the mystery? What other clues did she use? The children checked 5, 15, 25, 35, and 45 Twig Street. What other numbers end with 5? Liz thought the 5 on the invitation could have been in the tens spot. How many 50-something houses are there? (NCTM GOALS 3, 4, 5; EALR math 1.1, 5.3)
2. What's My Number? Teach the children a guessing game just like the one the children in the story had. Think of a number between 10 and 99 and give a clue (My number has a 5 in the tens place). Have the children try to guess with the number is. Keep track of the number of attempts. After several

times lead by the teacher, have the children work with partners and take turns making up their own riddles (see Appendix G). (NCTM goal 3, EALR math 1.1, 3.3)

3. Place Value Game- This game is for two to four people. The goal is to make the highest three-digit number possible. This game is best taught in small groups. Each player need a sheet of paper and a pencil. Also, cut up ten small slips of paper, and number them from 0 to 9, and put them in a bag. Then each student needs a game worksheet (see Appendix G).

1. One player reaches into the bag (without looking) and removes a slip of paper. Let everyone see the number on it.
2. All players write the number on their papers. You can put it in one of the boxes to make a three digit number. Or you can throw the number away by putting it in the extra box. Once you write a number, you can't move it to another box.
3. Put the number slip back in the bag. Now another player draws a slip. No peeking!
4. Repeat steps 2 and 3 until each player has written four numbers and has filled all four of his or her boxes. The winner is the player with the highest three-digit number.

You can change the rules so that the player with the lowest number wins. Or move to four digit numbers when the students are ready to be challenged. (NCTM goals 3, 5; EALR math 1.1, 3.3)

The Fattest, Tallest, Biggest Snowman Ever

Written by Bettina Ling
Illustrated by Michael Rex
Published by Scholastic Inc.

Jeff wants to be the best at something. He thinks of many things to do with his friends that he can be the best at. Each time one of his friends is always better than him. Finally, he finds something he is best at. The can build the fattest snowman. To test his theory he uses several non-standard forms of measurement to prove his snowman is fattest. The next day, he discovers that his snowman has changed and now his is the tallest. The third day both snowmen were puddles of water. Finally, Jeff's friend tells him he is the best thinker.

Concepts that could be taught using this book are:

- *Standard units of measurement
- *Non-standard units of measurement
- *Comparison
- *Estimation

ACTIVITIES:

1. After reading the story, have the students recall all the ways that Jeff and Maria measured the snowman. Give the students a piece of paper and ask them to fold it so it has eight boxes. Explain to them that they are going to measure eight things in their desk. They are to measure each thing three different ways. They will measure using paper clips, inches, and centimeters. Do a few examples on the board. Pass out rulers and paper clips and have the children begin.

2. Review the measurements from yesterday. Explain to the children that today they will work in pairs to measure their bodies with paper clips. Hand out ditto (see Appendix H) of measurement questions.

How many paper clips tall are you?

How many paper clips long is your arm?

How many paper clips go around your wrist?

How many go around your waist?

How many paper clips long is your foot?

How long is your pinky finger?

What else can you measure?

Have students measure each other and record their results. (NCTM goal 1, EARL math 1.2, 5.2, 5.3)

3. Hand out a ball of yarn to each student. Tell them they will be cutting to pieces of yarn off of their ball. The first piece will show how tall the teacher is and the the second will show how tall they are. Each student will also need two pieces of masking tape to label their pieces of string. First, have them cut off a piece that show how tall the teacher is. When they have done that they need to attach the tape at one of the ends and write their name on it. Collect all those pieces and put them in a pile. Next, have them cut a piece that shows how tall they are. This is a guess, they may not stand up an measure. Have them label their pieces. Collect these pieces also. On the board, tape the pieces that represent the teacher. Tape the pieces so that the end without the tape touches the floor (that way the teacher will be able to tell which pieces were closest). Next, tape the children's pieces from longest to shortest. Call out the names in order from longest to shortest. Have the children look to see if they are in order from tallest to shortest. (NCTM goal 5; EARL math 1.2)

Slower Than A Snail

Written by Anne Schreiber
Illustrated by Larry Daste
Published by Scholastic Inc.

A little girl and her big brother are running through the park. The big brother is ahead of his sister. He yells to her “Hurry up! You’re slower than a snail!” She then begins to point out to him how she compares to everything around them. She is smaller than an elephant and bigger than a poodle. She’s lighter than a ton of bricks and heavier than a duck. At the end of the story she tells him that she “is larger than somethings and smaller than others.” But there is one thing that she is not and that is “slower than a snail.”

Concepts that could be taught using this book are:

- *Sorting
- *Comparing

ACTIVITIES:

1. After reading this book have the students list the antonyms from the story (heavy/light, tall/short, etc.) Start a list of antonyms. As the students generate ideas, add them to the list. (NCTM goal 4; EALR math 1.2, 4.3)
2. Using the list of antonyms that the students generated, have them make a book about themselves. Students should use at least four different pairs of antonyms to tell about themselves. Students illustrate after sentences are approved by adult. (NCTM goal 4; EALR math 4.3,5.2)

3. **Sorting Buttons:** Give students a bag of buttons. Ask them to separate all the buttons according to color, holes, size, etc. When teacher thinks students are comfortable with sorting activities, move on to using Venn diagram to sort buttons. Teacher needs to pass out copies of Venn diagram for each student (see Appendix I). Draw a big Venn diagram on the board. Ask a student to state an attribute of a button (could be size, color, number of holes, etc.).

Write that attribute on one side of the Venn diagram. Ask the students to put all the buttons that fit in that category in a pile away from the others. Ask another student to give you another attribute of a button (it can't be related to the first one, for example, small and large). Write that attribute on the other side of the Venn diagram. Ask the students to put all the buttons that fit into that category into the pile with the first group. Have them put all the rest of the buttons away (to keep them from getting mixed up). Ask them to put their buttons in their Venn diagram according to where they go. Before they do explain that if a button fits into both sides, it needs to go in the middle. After doing this once with the teacher, have students experiment on their own. (NCTM goal 5; EALR math 1.4, 4.3)

4. At a center, have several different related objects that the children can use with the Venn diagram, such as shells, coins, keys, writing utensils, etc. (NCTM goal 5; EALR math 1.4, 4.3)

The Silly Story of Goldie Locks and The Three Squares

Written by Grace Maccarone

Illustrated by Anne Kennedy

Published by Scholastic Inc.

This story is about the original Goldie Locks' great-great-granddaughter. She goes into the house of the three squares. Their house is shaped like a pentagon. In the bowls is pasta, shaped like triangles, rectangles, and squares. Their chairs are shaped like a triangle, a circle, and a rectangle. Their beds in the shapes of a circle, a triangle, and a rectangle. The three squares come home and she wakes up scared. but she still remembers the shortest distance between two points is a straight line.

Concepts that could be taught using this book are:

*Geometry

ACTIVITIES:

1. After reading this book, have children recall all the shapes that were mentioned. Ask children to search the room for objects that are the same shapes and record them on the worksheet (see Appendix J). What are some other objects that are those shapes? Generate a list of ideas. (NCTM goal 5; EALR math 1.3, 5.2, 5.3)
2. Using pre-cut shapes have students create a picture using the shapes. After their picture is complete have them write about their picture and share their picture with the class. (NCTM goals 2, 4; EALR math 1.3, 4.1, 4.3)

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CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Nationwide curriculum reform is impacting the way all subjects are taught in Washington State. The author noticed inconsistencies between the adopted mathematics curriculum used in the author's district and the recommendations of the National Council of Teachers of Mathematics and the Washington State Commission on Student Learning's Essential Academic Learning Requirements. This project was designed to provide supplemental mathematics activities to enhance the Silver Burdett and Ginn curriculum currently being used in the author's district. First, the author attended several workshops related to mathematics. Second, research was done to validate the author's initial question as to the benefits of integrating literature and mathematics. From that research, a background study was written that includes a purpose and rationale for the study. Third, children's literature book were chosen. The titles were chosen based on the mathematical content and the author's perceived quality of the book. Fourth, the author spent two days observing in a neighboring school district to observe a variety of curriculum and teaching techniques. Finally, mathematical activities and worksheets were developed. The activities have been aligned with the National Council of Teachers of Mathematics recommendations and the Washington State Commission on Student Learning's Essential Academic Learning Requirements. The author also developed a bibliography of

children's literature titles that could be used to supplement a primary mathematics curriculum.

Conclusions

The author has used most of these activities in the classroom. The activities that interested students more were ones in which they had to create or manipulate something. The less interesting lessons for students were those where the children had to do worksheets that accompanied the lesson. The author feels the worksheets were less successful because the mathematics curriculum the students are accustomed to is worksheet based. The students responded well to the lessons and were more excited about math time than usual when they knew they were going to do one of the literature-based lessons.

The author also noticed that the less-able readers were not as hesitant as usual to join in the reading because they were confident in their mathematics skills. The author noticed that the students would reread the books used in the mathematics lesson several times. The students were also observed finding mathematics concepts in a variety of books and sharing their findings with the teacher and other classmates. The author noticed the children using mathematics in other areas as a result of these activities. The children started writing mathematics problems during writing time and noticing mathematics questions in social studies and science. As a result of utilizing these activities, the author concludes that literature-based mathematics activities

are a worthwhile supplement to the school district's adopted mathematics curriculum.

Recommendations

The author has several suggestions to enhance this project. The first would be to use a wider variety of children's literature titles. The author felt that the Hello Math Reader series did not provide enough experiences with some mathematical concepts. There are many other books available that concentrate on single concepts.

The author's second recommendation is to develop at least five hands-on activities to accompany each book. Each time the children read or hear the story, they notice something new. Some of the units were not long enough and the concepts was not covered very well. More manipulative activities would make these lessons more effective. The children already are exposed to enough pencil-paper activities where they are required to practice the same skill over and over.

The author also recommends having sets of these books to read with the children in groups. This proved most effective when tried in the classroom. During literacy time, the class is combining mathematics with literature. This allows for true integration of curriculum areas. These books also promote the writing of story problems. The author suggests the addition of more writing components into these activities.

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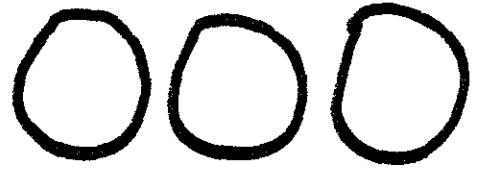
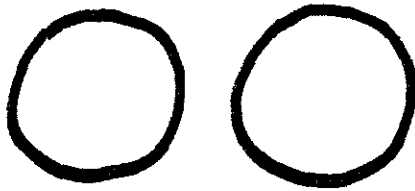
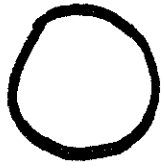
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APPENDIX A

These are a dozen red apples hanging
on a tree in an orchard.

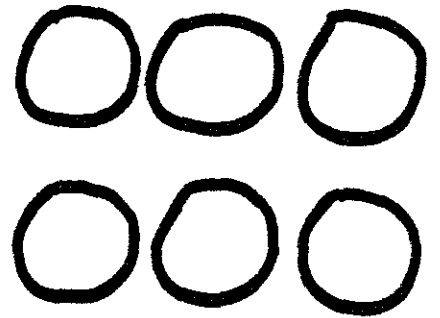
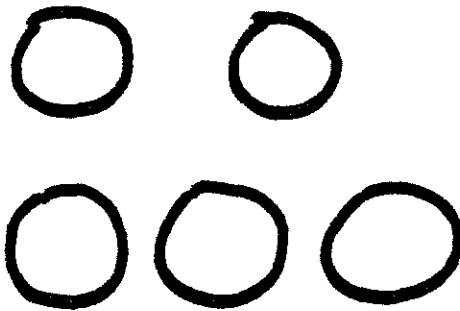
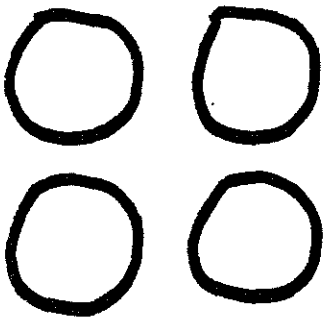
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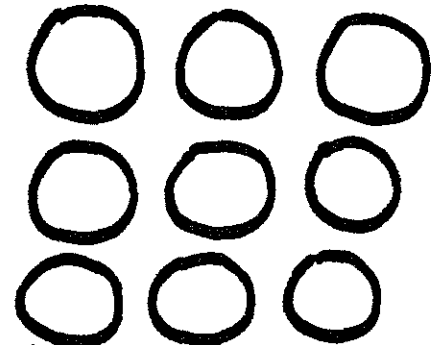
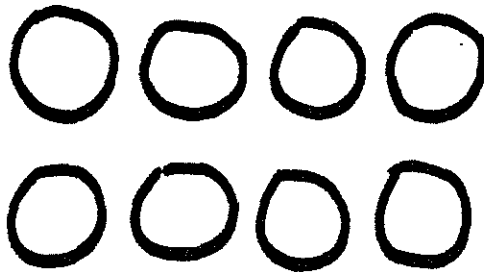
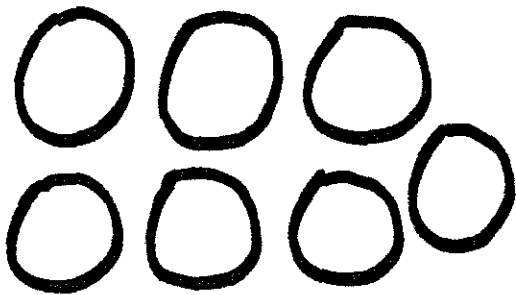
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Yes No

Yes No

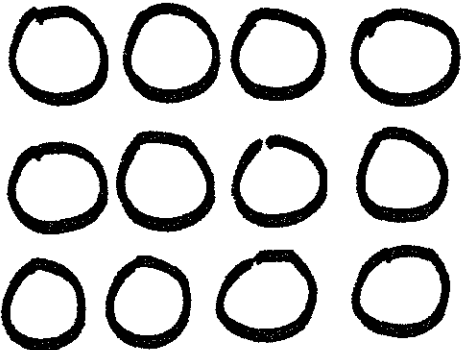
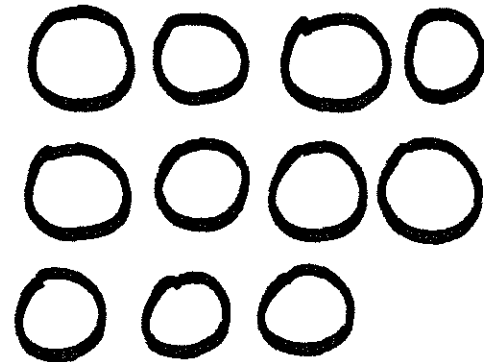
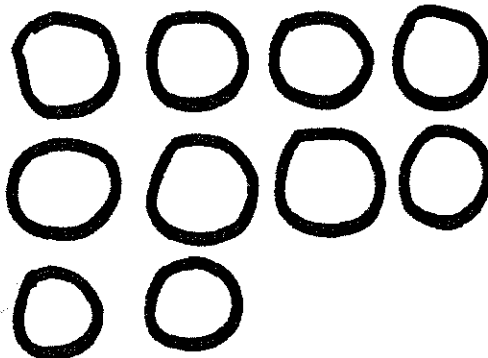
Yes No



Yes No

Yes No

Yes No



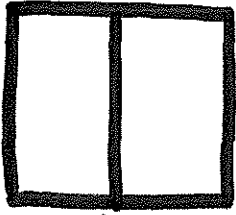
Yes No

Yes No

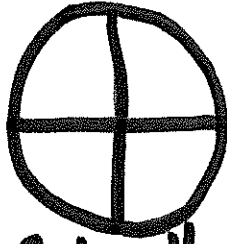
Yes No

Name _____

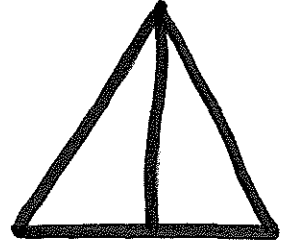
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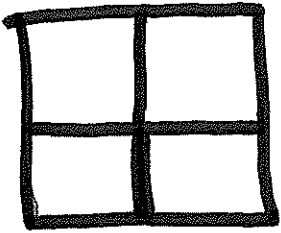
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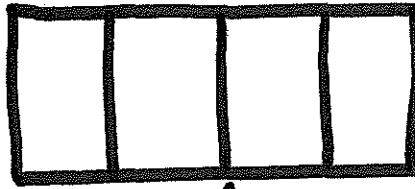
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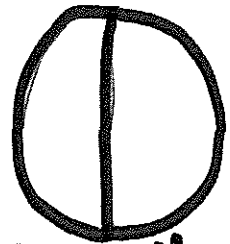
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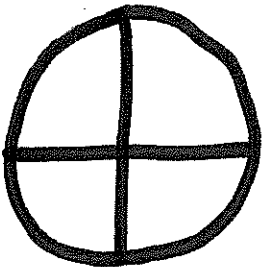
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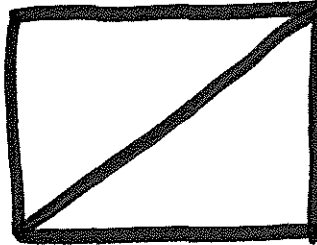
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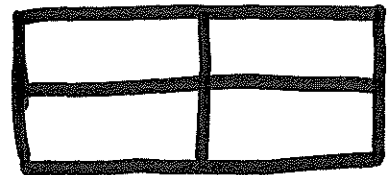
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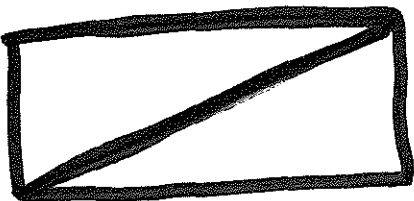
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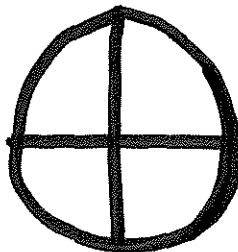
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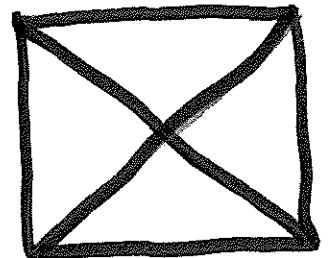
Color $\frac{1}{4}$



Color $\frac{2}{2}$



Color $\frac{3}{4}$



Color $\frac{1}{4}$

Our Favorite Treats

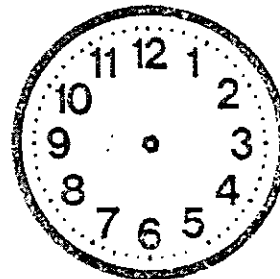
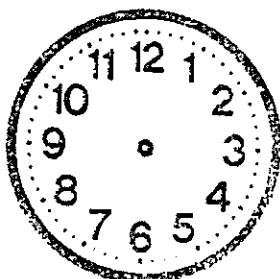
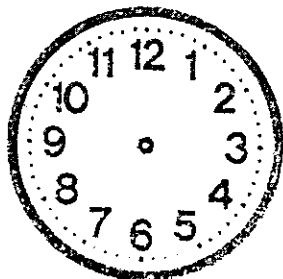
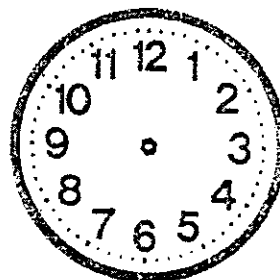
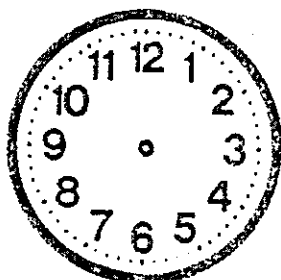
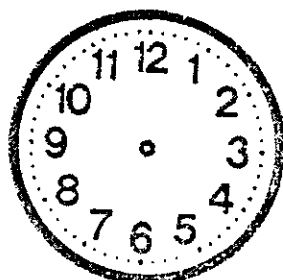
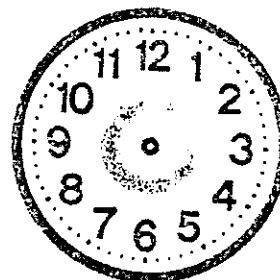
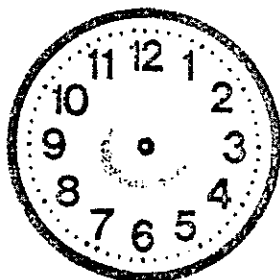
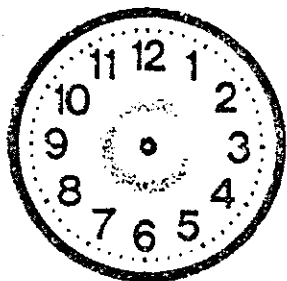
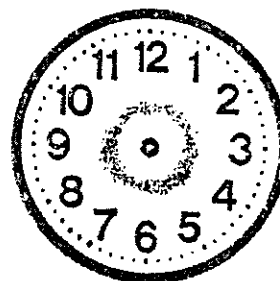
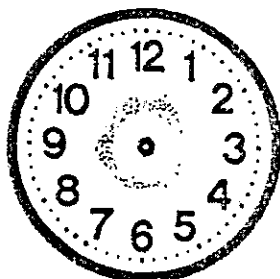
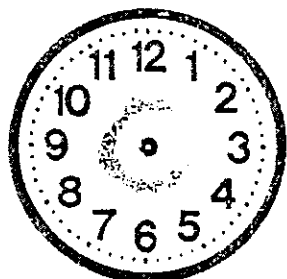
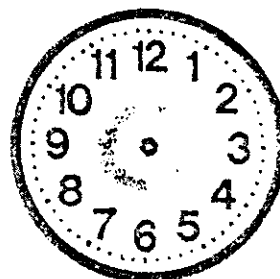
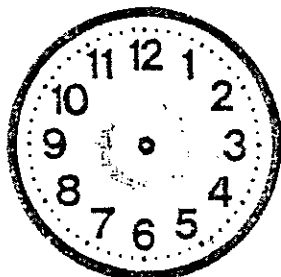
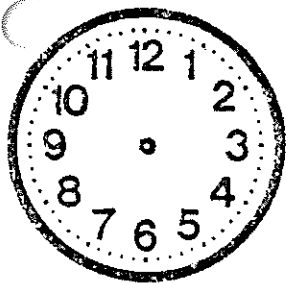
by

Miss Stevens' 2nd grade class

APPENDIX B

Name _____

Date _____



_____ takes less
than a minute, but _____
takes longer than a minute.

APPENDIX C

Name _____

What comes in 2's, 3's, and 4's?

2's

_____	_____
_____	_____
_____	_____
_____	_____

3's

_____	_____
_____	_____
_____	_____
_____	_____

4's

_____	_____
_____	_____
_____	_____
_____	_____

APPENDIX D

Name _____

The Lunch Line

What can Kim buy?

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

APPENDIX E

Name _____

Even Steven and Odd Todd

Numbers Steven Likes

Numbers Todd Likes

APPENDIX F

Name _____

Combinations of a quarter

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

APPENDIX G

Name _____

What's my number?

1. _____

11. _____

2. _____

12. _____

3. _____

13. _____

4. _____

14. _____

5. _____

15. _____

6. _____

16. _____

7. _____

17. _____

8. _____

18. _____

9. _____

19. _____

10. _____

20. _____

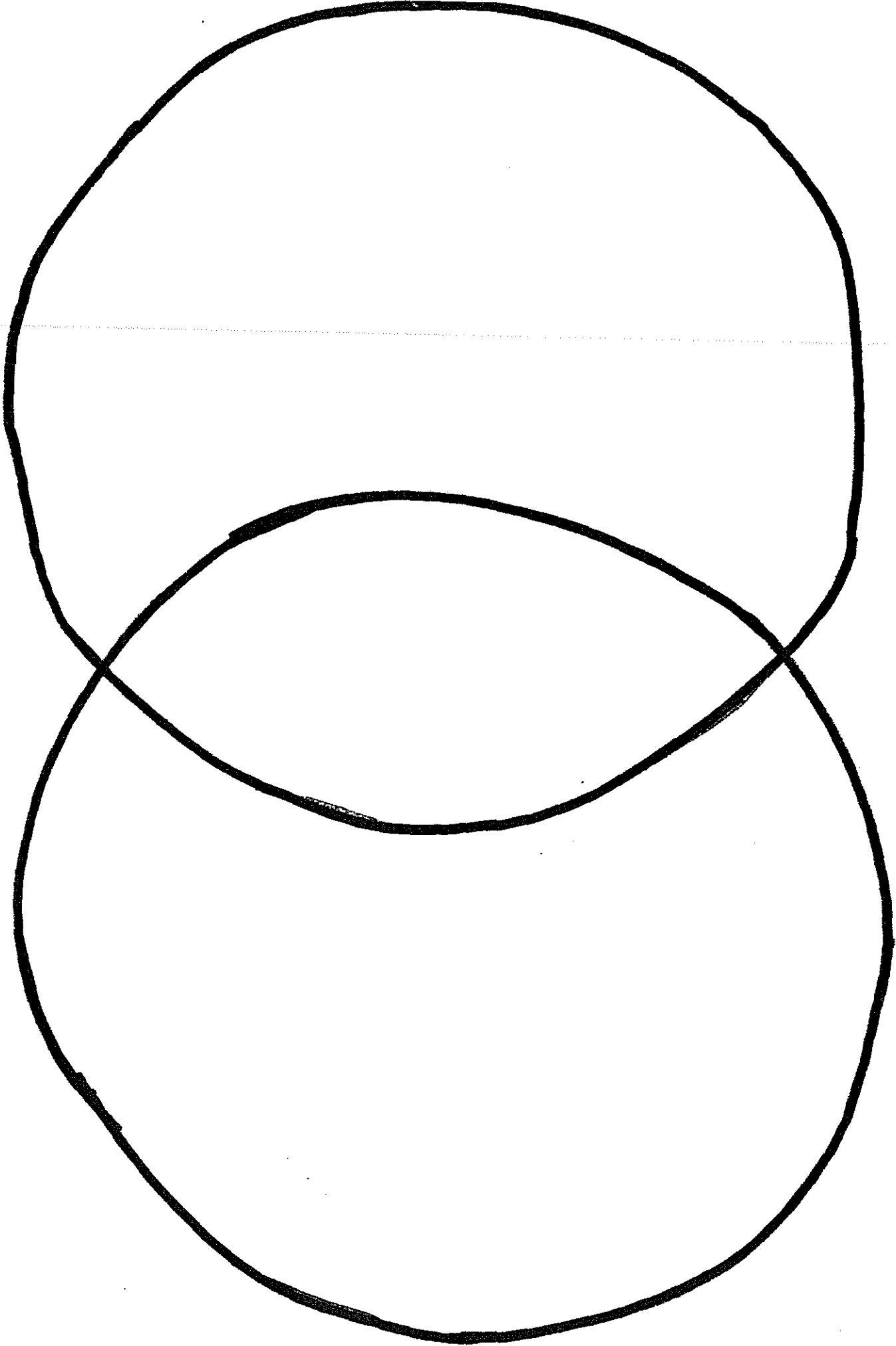
APPENDIX H

Name _____

Paper clip measuring

1. How many paper clips tall are you?
2. How many paper clips long is your arm?
3. How many paper clips go around your waist?
4. How many go around your wrist?
5. How many paper clips long is your foot?
6. How long is your pinky finger?
7. What else can you measure?

APPENDIX I



Venn Diagram

APPENDIX J