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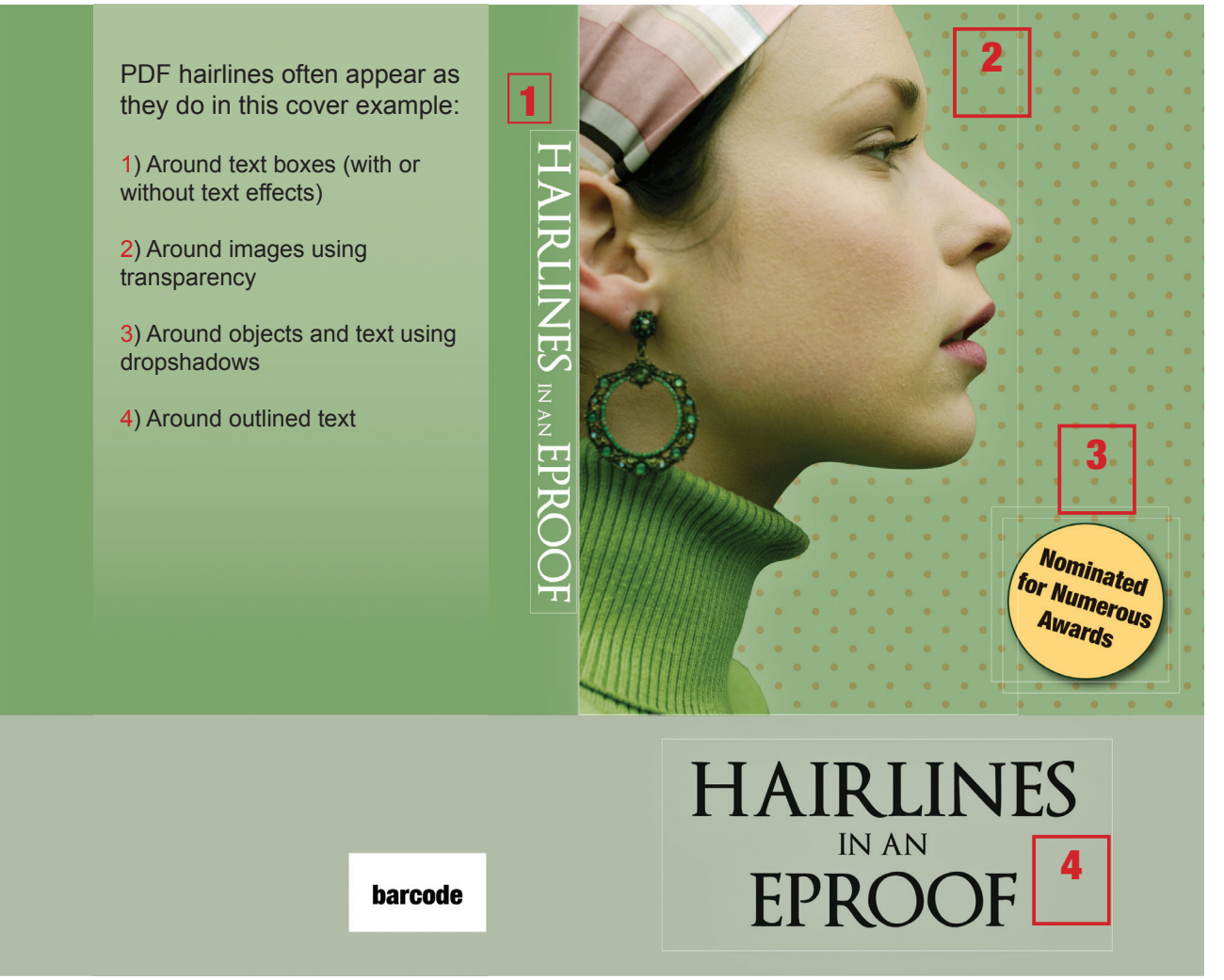

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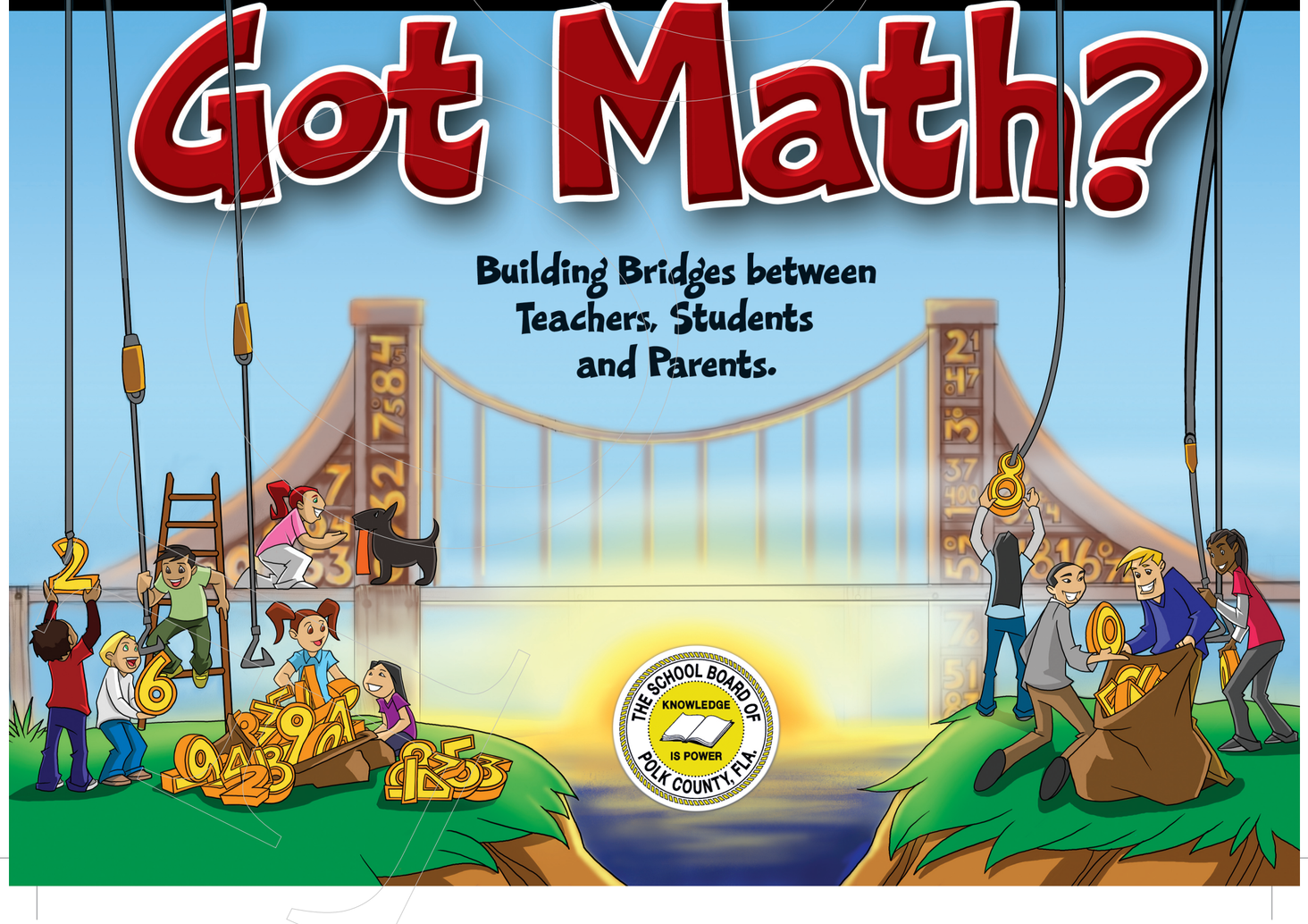
Got Math?

Building Bridges between Teachers, Students and Parents.



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Got Math?

The creation of ***GOT MATH!*** is a shining example of some of the ground breaking work taking place in the Polk County Florida school system's 21st Century Community Learning Centers Grant program. Six school sites under the direct supervision of Senior Coordinator Brenda Kearse, participated in a pilot program of seeing how middle and elementary school kids would build on their math skills through the creativity, impact of literacy, and their artistic abilities as its foundation. With research and mathematical analysis as a backdrop, Mrs. Kearse developed strategies to see how kids would perform as teachers of math, using math vocabulary from past Kaplan and FCAT tests that seemed to stump inner city kids causing a delay in understanding and failure.

The bridge of learning between parents, teachers and students is a fundamental one that has to be connected in the 21st Century. Using the same old practices for a new generation will only garner old results. Kearse recognized the significance that continued low achievement would have on the students, and took bold moves of working with an Educational Publishing company to comprise a project that will not only help positive production of skilled students, but would also garner an unprecedented side effect; self confidence, high self esteem, a sense of accomplishment and igniting an initial flame of daring to go outside the box. We encourage parents, to work with their children by using the *'Mathematician Note Pad'* included to discuss how you learn math and view commonly used math terms from nationwide standardized test. It's a fulfilling experience for any classroom, household and child. Share the magic of math!

– Brenda Kearse,
Senior Coordinator-21st CCLC

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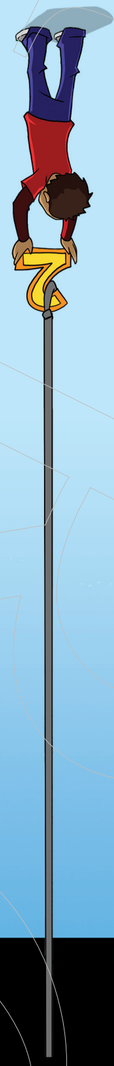

As a Site Coordinator for the 21st Century Community Learning Center Grant (Building Bridges program), it gives me great joy to observe the excitement of our students working on a book that stems directly from their individual creativity. The proud behavior expressed through the students' actions as they used literary and creative skills to complete each section proved that children took their education seriously, and are committed to learning. All children have the capacity for high achievement if teachers are willing to guide and supervise as they did through the Got Math? Publication.

—JOHNNIE THOMAS: Snively Elementary School Teacher, 21st CCLC Afterschool Program

I am floored by the enthusiastic comments from students working on the math problems for Got Math? Everyone really enjoyed Mrs. Kearse's positive attitude in administering the pilot tests and her dedication to children and education. Thanks for sacrificing your time; we have so little of it these days to solve real world problems.

—KARA HOLT: Bartow Middle School Teacher, 21st CCLC Co-Site Coordinator

With Mrs. Brenda G. Kearse as Senior Coordinator of the 21st Century Community Learning Center Program, the program blossomed inspiration into a bright light enhancing many opportunities for growth. She has given me the outlook on the future possibilities and improvements that could be achieved for 21st CCLC, the lives of the children positively affected and in life. It's been my pleasure to serve under the leadership of Mrs. Kearse and look forward to the continued enhancement of the 21st Century Community Learning Centers Program.

—KATHY MCKEAN: Secretary III, 21st CCLC

On a classroom visit, I was able to show the students how to use practical relevant examples to their lives like video games, going to the movies and music, to understand how that correlates to math, using the artistic and creative methods Kearse implemented, and the light bulbs went on. Kearse and the 21st CCLC Grant Program truly understood and met the need of the children…that's what has been lost.

—ISAAC ROSIER, JR.: IRJ Financial Services, College Planning and Financial Educator

On a brief informal interview with some of the ESE students who participated, we found a sense of pride. Students stated that they understood more about how math is used in elections and how important numbers can be and how they are now realizing the relevance in Math in places like the polls on Election Day. Some students stated that writing a math problem was harder then they thought because they had to make sure the information given could be used to come up with a solution, and that writing a math problem also made them think of the steps one has to take and in what order to be able to solve the problem correctly.

On a personal note, from a teacher's perspective, I think this project made the students realize that they need to pay attention to **how** a question is being asked as well as to **what** is being asked. The joy of watching them understand and be able to explain what the concepts involved in the problem were and why they had a difficult time coming up with some of these answers were amazing. We need to raise the bar in approaching what we require of our students and incorporate higher level thinking problems.

—NIDIA CRUZ: Westwood Middle School , Math Teacher Trainer/ Co-Site Coordinator.

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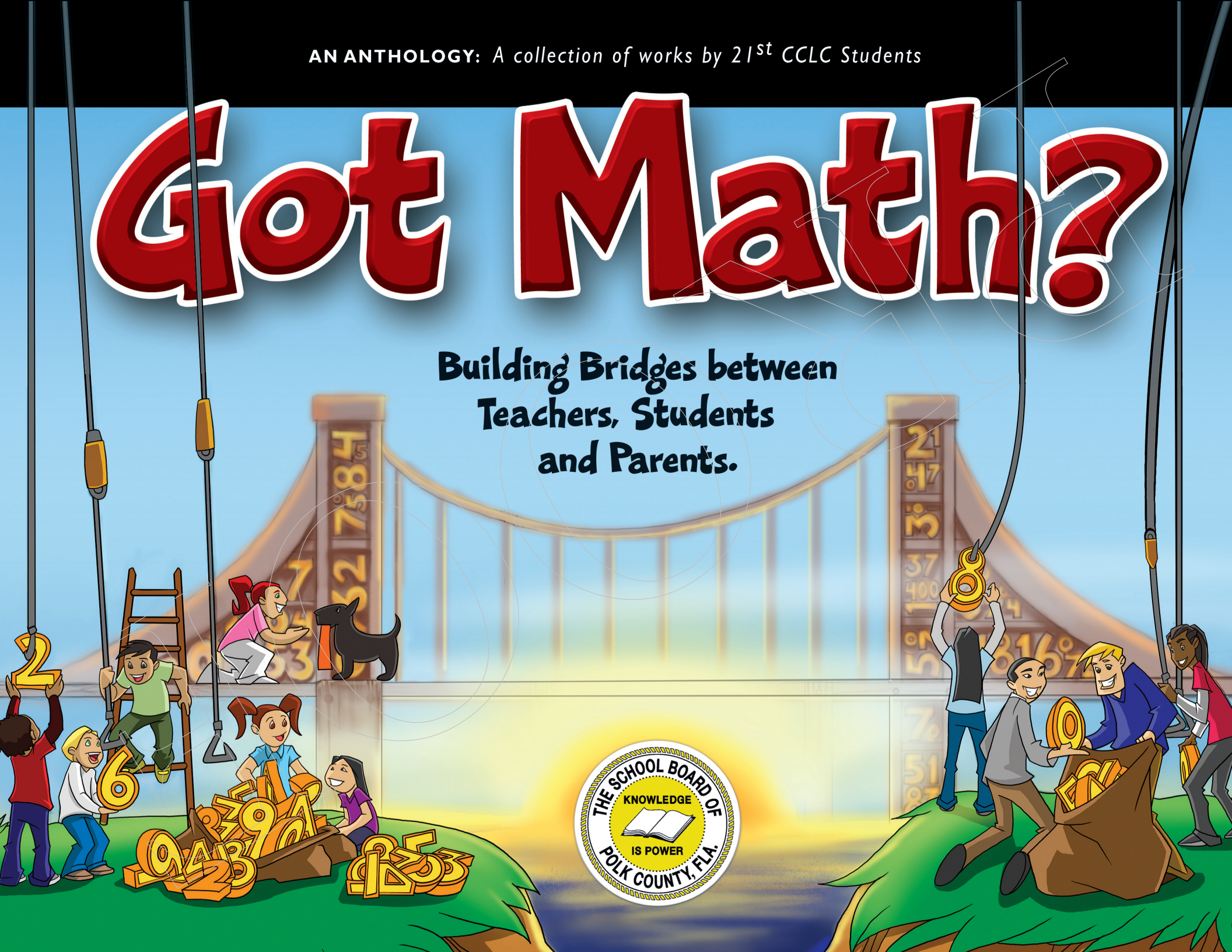

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AN ANTHOLOGY: *A collection of works by 21st CCLC Students*

Got Math?

Building Bridges between Teachers, Students and Parents.

Universal Write Publications LLC

Anthology Math Compilation: Building Bridges

GOT MATH?

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First Edition

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PROOF

PROOF

FOREWORD

The education of today's students is a matter of serious concern. Many times, the instruction provided during the regular school day does not meet the needs of students in their quest to become proficient. Additional academic support during the after school hours becomes an integral part of supplying that encouragement, motivation and time. As an added bonus, the staff of after school programs research alternate strategies to support the instruction of the regular school day. Thus, learning takes place in an environment that appears to resemble constructive play, allowing learning to be disguised to the student while ensuring additional opportunities for learning to take place.

The 21st Century Community Learning Centers (CCLC) Grant is one such program. Under the Directorship of Mrs. Brenda Kearse, the focus for the 2008-2009 school term has been mathematics. The use of his academic arena, connecting it with the other disciplines, permits teachers to work with students using extra-ordinary methods to encourage more in-depth learning to occur. Through the development of this book, *"GOT MATH: Building Bridges between Students, Teachers and Parents"*, students have taken a thorough look at Algebraic Thinking benchmarks and concepts on the elementary and middle school levels to ensure a deeper understanding. Via this vehicle, students have used their knowledge to breakdown word problems using recommendations from the new National Math Advisory Panel to help others understand the problem solving strategies that are relevant to the lives of the students. This vehicle will serve as a means to help others to learn.

This project also helps others to realize all students do not learn in the same way. Students' learning styles must come into play and opportunities for teaching and learning must address the visual, auditory and/or kinesthetic learner, while also taking into consideration the Multiple Intelligences. Planning and teaching to address each of these in each lesson promotes proficiency of all students.

Special thanks go to the principals, site coordinators, and staff of the participating 21st CCLC after school sites: Crystal Lake Elementary, Gibbons Street Elementary, Berkeley Charter Elementary and Snively School of Choice, along with Bartow Middle School and Westwood Middle School. The commitment and efforts of each of the staff members have made this project not only a reality, but also a beneficial learning experience for each participating student, parent, and teacher.

Gail McKinzie, Ph.D.
Superintendent, Polk County Schools
Polk County, FL

Gail McKinzie, Ph.D.

Superintendent

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Florida's 21st Century Community Learning Centers Grant Funds

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Tiffany Herrin, State Grants Coordinator

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Bartow Middle	Danny Adams	Kara Holt & Janeane Maxwell
Berkley Elem	Randy Borland	Christa Buckhalter
Crystal Lake Elem	Joe Griffin	Phil Anderson & Johnnie Hogan
Gibbons Street Elem	Ava Brown	Laura Allgood & Diane Rullo
Snively Elem	Dr. JoAnne McKinney	Johnnie Thomas & Sharon Griffin
Westwood Middle	Jose Perez	Nidia Cruz & Dave Werner

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CALL TO ACTION

Many community leaders joined the school district in establishing a mission statement "to ensure rigorous, relevant learning experiences that result in high achievement for our students." The 21st Century Community Learning Centers (21st CCLC) grant program under the leadership of Brenda Kearse, Senior Coordinator in the Polk County school district has been committed to focusing on this mission by addressing Goal 2 of our district strategic plan.

Goal 2 is titled "*Opportunity to Learn*." The goal states that "we will ensure students realize their highest potential." Their potential is being realized as a result of this student publishing project. The 21st CCLC district team helped students to develop life skills and the discipline that leads to success. As a result of analyzing the student performance data, the 21st CCLC district team sought approval from the Florida Department of Education 21st CCLC Leadership to publish a book of math problems that focused on the Algebraic Thinking strand of the Sunshine State Standards. This project is building the confidence of our students to write, speak, draw, and sing.

The students, parents, and teachers that volunteered for this project focused on learning how to solve algebraic thinking problems. Lesson plans from the Kaplan Achievement Planner Company were used to provide differentiated learning experiences. Additional lessons were developed that incorporated an inquiry method for problem solving using the "The Math Examiner Notepad." Each volunteer was then asked to write a new word problem that was relevant to their lives. It is these questions that form the backbone of this book. Students were given the opportunity to use their artistic skills in developing their math literacy skills. At the end of the book is a dictionary of highly tested math terms from the state high stakes test. The students not only included the definition of the word but also used their artistic talents to draw a symbolic representation of the word.
The 21st CCLC program's name is "*Building Bridges*." This project is building bridges between parents, students, and teachers as they work collectively on these targeted math benchmarks and is evidence of high quality programming in the arts from a mathematical perspective.

This activity required students to work together with their peers, parents, and teachers in teams. This positive learning environment increased leadership skills, self-confidence, and their ability to develop strong positive relationships with peers and adults. I sincerely feel that this project has impacted the lives of all of the stakeholders involved at our 21st Century Community Learning Centers sites: Bartow Middle, Berkley Elementary Charter, Crystal Lake Elementary, Gibbons Street Elementary, Snively Elementary, and Westwood Middle.

Sherrie B. Nickell, Ed.D.
Associate Superintendent
Learning

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The Mission of Polk County Public Schools is to ensure rigorous, relevant learning experiences that result in high achievement for our students.

CALL TO ACTION

SHERRIE B. NICKELL, ED.D.
Associate Superintendent
Learning

INTRODUCTION

Education is the door to so many opportunities! Career doors open daily with unforeseen occupations. Consequently, it is of the utmost importance that the education of our students is taken seriously.

The publishing of this book, GOT MATH? Building Bridges between Students, Teachers and Parents, will hopefully serve as a springboard to these involved students of Polk County Schools as they learn to participate in publishing. While some may feel the spark for journalism, others may understand the need for teachers of math. Still others may be destined for fields like architecture, engineering, research, and the list goes on. There is no ceiling in the realm of possibilities for our students.

This project, under the direction of Mrs. Brenda Kearse, has provided students and staff the challenge and learning experience of understanding problem solving strategies. These strategies have been internalized by students in such a way that affords them the opportunity to present them so others may learn from their explanations and examples. While it has been a learning endeavor, it has been a fun-filled experience disguised as constructive play. This project, and other innovative approaches to learning, are what captures students' minds and connects them to learning that develops a thirst for knowledge that lasts a lifetime. Although it has been created by students, I foresee parents and teachers learning from the students' work.

As the Senior Director who supervises Polk County's 21st Century Community Learning Center (CCLC) grant, I applaud the students and staff for a job well done! It is because of your work that others will see another avenue to pursue learning in a creative manner.

For those who are preparing to read and understand math from this text, read, go forth and conquer this bridge of math like you never have before. Great experiences await those who are not afraid to try to gain knowledge in a variety of ways.

Charlene Richardson-Brinson
Senior Director, Elementary Schools

Charlene Brinson
Senior Director
Elementary Education

PREFACE

The idea for *"GOT MATH: Building Bridges between Students, Teachers, and Parents"* was born out of the dire need to see improvements on math benchmarks and standardized tests in the 21st Century Community Learning Centers (21st CCLC) Program in Polk County, Florida. It took many hours spent reading the research literature on students' math performance at the elementary and middle school levels to realize the vast need for understanding math concepts as it relates to literacy and education. Conducting research on learning has been a focal point in my personal and academic research over the past seven years. Over the past year while reviewing routine assessments and pulling academic math stats of students participating in the 21st CCLC, Grant Program, I realized that we had an opportunity to test the research in a real world environment. As the Program Director, part of my overall goal is to identify the strengths and weaknesses of our program. It is also my direct and indirect responsibility as custodian of the young minds we shape and the need to instill within them the tools and abilities necessary to become productive members of society and successful students, that we go above and beyond what has already been tried and failed and undertake new and creative means of implementing constructive ways of teaching math as it relates to the use of their learning styles by incorporating English language and literacy skills. With the aid of my Secretary/Evaluation Assistant, Kathy McKean, we set into motion a plan to review all data on the students within our program.

The data analysis included student demographic information, Florida Comprehensive Achievement Test (FCAT) data, Kaplan Achievement Planner data, and report card data. It became evident that the six remaining sites in our program would have achieved higher standings in the state if their Math scores were increased. When conducting site visits of the program, it also became evident that there was limited attention given to math in the after-school program. This was one of our great need areas.

Universal Write Publications LLC, an Educational Publishing Imprint, shared their vision of how student publishing with a focus on literacy, could impact the student achievement of our Building Bridges program. The concept of combining the research from our office with the need to build math vocabulary and to enhance higher achievement on tests like Kaplan and the FCAT was made possible by forming a partnership with Universal Write Publications LLC. This provided a new dynamic approach that has never been done but proved to add a source of motivation while helping students learn while playing the role of teacher.

Implementing a vision and paving a new path was first met with opposition. But my call to action was driven by research-based practices, which indicates-- students need more: more input, more opportunity; and more help. With a new Presidential administration paving the way in groundbreaking ideals, I urged my staff to follow suit and stay firm on implementing the project. Working hand in hand with the members of the 21st CCLC Advisory Board (Senior Director, Principals, Site Coordinators, parents, and community leaders), in addition with Kathy McKean, we created a means of encouraging children to learn math by writing examples of word problems using their background literacy knowledge. This was a chance for them to take what they have learned and to transform it into something

Brenda Kearse

Project Director / Grant Writer

new. The new approach was designed to change their beliefs about math word problems by having them write math word problems in their voice.

Each site approached the project from different angles. Some had group meetings involving all students in the program, some targeted a select group of students, some teachers personally decided to take students under their wings. It was these teachers who sent letters home to parents informing them of the project.

The state standards used in this book focus on Florida's math benchmarks under Algebraic Thinking. These standards were chosen because some school curriculum maps don't cover these concepts until after the students have completed the state's high stakes test. By introducing the concept in the after-school program, it was our desire to monitor the improvement of our students across all 21st CCLC after-school sites.

The first section of the book includes an explanation of the benchmarks and examples of how our students made the word problems come alive for them. The section ends with examples of word problems and activities that can be used at home by parents or a significant adult in a child's life. The second section includes a glossary of highly tested math terms. Some terms even have examples of symbolic representations of terms hand drawn by our students. Research indicates that retention of terms is increased when students draw pictures to represent the meaning of the terms. This strategy was an opportunity for the students that like to draw. The third and final section of the book contains an example of how teachers and parents can help students think through a math word problem.

None of these activities would have been possible without the support of Kay Fields, School Board member, Gail McKinzie, Superintendent of Schools, Sherrie B. Nickell, Associate Superintendent of Learning, Charlene Brinson, Senior Director of Elementary Education and the dedication of the principals and after-school staff at Bartow Middle, Berkley Elementary Charter, Crystal Lake Elementary, Gibbons Street Elementary, Snively Elementary, and Westwood Middle. Special thanks must also be given to Kathy McKean, Johnnie Thomas, Janeane Maxwell, and Denise Rosier for reminding me that education is not about the struggle we go through but about the learning that takes place for our students as a result of our actions.

Brenda G. Kearse
21st CCLC Project Director

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December 19, 2008

"Got Math" will be a great resource for parents, teachers, and after school program providers to encourage children to master the necessary math skills they will need in school and in their lives as they become adults. Math underlies and influences every facet of life.

Math originated as a means of recording amounts and has become much more complex and sometimes challenging for parents and students to understand. "Got Math" will help students master Algebraic Thinking skills that they will need in elementary and middle school to ensure that they are successful in math in high school and in their adult life.

This book will serve as a valuable resource for parents and providers that need a hands-on reference for helping children understand the concept of word problems and math terms while providing actual examples of math word problems. Brenda Kearse and the 21st Century staff are to be commended for developing a tool that will benefit many families, children, and classrooms. What a great investment for parents, teachers, and after school providers!

Sincerely,

Kay Fields
School Board Member
District 5

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The Mission of Polk County Public Schools is to ensure rigorous, relevant learning experiences that result in high achievement for our students.

LETTER OF COMMENDATION

KAY FIELDS

School Board Member

DATA ANALYSIS OVERVIEW

Data driven decision making is not a new concept. What is new, is how the Polk County Schools 21st Century Community Learning Centers (21ST CCLC) program used current student data to inform improvement initiatives at the site and program level.

At the beginning of the school year the following steps were taken:

a. Schools received from our program office a spreadsheet showing the names of the students at each site that scored at Levels 1 and Level 2 in the areas of Reading and Math on the prior year's Florida Comprehensive Achievement Test (FCAT).
b. Principals and Site Coordinators were asked to recruit these targeted students into the 21st CCLC Building Bridges program.
c. Notification was submitted to all private schools in the county informing them of our program sites and the possibility of their students within the school boundaries (program sites) also attending the program.
d. Data from the first administration of the Kaplan Achievement Planner benchmark assessments were analyzed in the content areas of Math and Reading.

I was given the task of setting up spreadsheets to make the data user friendly. After the Project Director reviewed the data, it became evident that the students enrolled in our program had made improvements in the area of Reading but lagged behind the district and state average in math. This information was shared at our Advisory Board meeting.

Mrs. Kearse began to research the new set of skills that were recommended by the National Math Advisory Board (2008) that was formed as a result of Executive Order 13398 of President Bush. She also identified the best practices for teaching math skills to reluctant learners.

In alignment with the school district's mission statement to ensure rigorous, relevant learning experiences that result in high achievement for our students, she began to develop a shared vision of high expectations with the Site Coordinators in our program. It was here that the idea for a book based on the collaboration of teachers, parents, and students was born.

The program sites were given a set of Florida Sunshine State Standards (Algebraic Thinking) to focus on for nine weeks. After teaching the concepts, parents, teachers, and students were given the opportunity to write word problems based on their experiences using the *Mathematician Note Pad.* The students participating in the program were given the opportunity via a contest to title the book. Weeks later, Universal Write Publications, LLC submitted a beautiful cover depicting the bridge between parents and teachers in the process of improving student academic achievement. The winning title was "GOT MATH!"

After each administration of the Kaplan assessments, a comparison was made to the original baseline data in reading and math. Data was also gathered quarterly on report card grades in Math, Read-

Kathy McKean
Executive Assistant to
Brenda Kearse

ing, Language Arts, and Science. I designed spreadsheets that were emailed to the program sites for Site Coordinators to enter the requested data which also included attendance information, discipline data, and knowledge of physical fitness/wellness concepts. I then learned how to pull the data from the district's Genesis Student Data Management System. This relieved the Site Coordinators from having to complete this task during subsequent quarters. The data will be used to complete a summary evaluation of each site and the overall program effectiveness at the end of the year.

As a result of this publishing project, we have been able to construct a list of lessons learned:

a. Some teachers did not feel comfortable in teaching the designated *Algebraic Thinking* standards.
b. Some adults (parents and teachers) were facing their fear of math as they helped student complete entries for the book.
c. Most students in grades 3 through grades 8 created math problems involving the addition of whole numbers.
d. Students with strong support from parents or teachers submitted high quality entries that were on or above grade level.
e. Students must be introduced to math vocabulary in earlier grades to foster familiarity with the words when they begin to read word problems.
f. Some math terms held different meanings for some students based on their prior experiences.

The collective work of the partnership between the Project Director, Site Coordinators, the staff of Universal Write Publications, and I ignited creative ideas to engage students with "Algebraic Thinking" concepts while also improving their writing skills in "GOT MATH!"

The process of gathering, analyzing, and reporting data has given all of us a clearer picture of how to effectively implement the objectives in our grant application.

OVERVIEW

"Success in a technologically advanced world is possible only with mathematical power. To read the newspaper, achieve higher paying jobs, or understand the effects of clear-cutting the old growth forests, one must be able to think mathematically in a powerful, conceptual way" (Moss, 2006, p.1).

In order for economic prosperity in the United States to be enhanced, all students must be given the opportunity to learn algebra in a meaningful way. This learning must start early.

The algebra that must be introduced to students in pre-K through 8th grade focuses on patterns, relationships and functions, and the various representations----symbolic, numeric, and graphic—to help make sense of and communicate about all sorts of mathematical situations.

The more students interact with these concepts and become comfortable with these ideas and methods of representation, the more they will begin to use them in other mathematics classes, not just in a study of algebraic ideas.

"GOT MATH: Building Bridges between Students, Teachers, and Parents" was written to be a tool to connect students, teachers, and parents as they work together to help all students master "Algebraic Thinking" concepts in grades kindergarten through eighth grade. The key to providing students with an equal opportunity to acquire this mathematical power starts by giving them the opportunity to learn math vocabulary early and to write word problems in their own words after learning a new math concept.

Chapter One and Chapter Two includes a brief introduction to the concepts. Then each chapter includes student examples of word problems written in their voice based on what is relevant to them.

Chapter One focuses on Algebraic Relationships. "Algebraic Relationships" requires students to work with a wide range of patterns, relations, and functions. Patterns can be found in numbers, shapes, and pictures. The purpose of this chapter is to help students see patterns in their everyday world and to help them explain the characteristics of the pattern verbally and in writing.

Chapter Two focuses on Solving and Interpretation of algebraic expressions , equations, and inequalities. Students might be required to find solutions involving graphs and formulas. Students at an early age must be introduced to some of these concepts even while they are participating in playful activities.

Chapter Three contains math terms. These words should be incorporated into a child's vocabulary even before they start to pronounce words clearly. The more they hear the terms and see how family members use the terms, the more likely the terms will become part of their list of words used. Examples of how students used their artistic skills to draw symbolic representations of some key terms will be shared.

Appendix A contains a sample of a worksheet titled "Math Examiner's Note Pad". The note pad is composed of research based strategies that if used with children will help strengthen their problem solving skills.

Brenda Kearse

Project Director / Grant Writer

(1) Children will be given an opportunity to draw a picture to help them clearly visualize the intent and solution of the problem.
(2) They will then be asked to focus on the meaning of terms when used in math word problems.
(3) Some high stakes tests will require students at certain grade levels to bubble their answers into a grid. This task is very similar to adults being required to bubble in their candidate of choice when voting. When looking at the number of ballots that are thrown out of the election process, this is still a skill that must be mastered by all.
(4) Students are then asked to share what they are thinking when solving problems. This process of thinking out loud will provide students with an opportunity to develop critical thinking skills.
(5) The next activity will require students to identify the type of strategy they used to solve the problem. Teachers use a variety of teaching strategies to help students learn math concepts, but students need to know the name of the strategy as they learn how to maneuver through the math land mines.
(6) The last activity requires students to talk to family members and friends to identify similar situations in the real world of the child and their family.

This sheet can be used by teachers and parents/guardians daily to strengthen students' critical thinking skills when solving math problems.

We stated previously that this is an experimental project geared towards finding what level each student has already attained in mastering "Algebraic Thinking" concepts. Initially, we wanted to have documents from all grade levels showing how students interact with algebraic thinking concepts especially when confronted with them in the form of a word problem.

Based on our review of the final documents, we have learned that much needs to be done to continually provide our students with an opportunity to interact with math in their everyday lives. Students must be given the opportunity to draft math problems in their own voice in order for the problems to be relevant to them. Once they see that math exists all around them, they will then be able to transfer this knowledge into problem solving skills in order to complete common math problems found in their textbooks and on high stakes tests.

It was apparent that students that were guided by either a parent or a teacher were able to complete their book entry properly and provided a tangible document for teachers to determine if they were operating on grade level.

One of the main objectives of this project was to help parents, students, and some teachers overcome the fear associated with mastering math concepts which is an emotional block formulated early due to improper exposure to math. President Barak Obama often reminds us that this is a defining moment in our history. He said, "We know that the nation that out-educates us today will out-compete us tomorrow." We at Polk County Public Schools Building Bridges after school program take this charge

seriously, for if we don't provide parents and teachers with an opportunity to help students become aware of the commonly tested math vocabulary in their everyday lives, who will? Our students can no longer opt out to say that it is ok for them not to learn math as long as they are capable of reading. There is no acceptable excuse for failing. This project is our way of making math numeracy just as important as reading literacy. Our children must learn these skills early if they are to compete globally with international students for the same jobs and services.

The National Council of Teachers of Mathematics (NCTM) has as their slogan, "Do math and you can do anything." It is our hope and desire that by sharing the work of the students in our 21st Century Community Learning Centers – Building Bridges program, more children will be able to do math and go on to take advantage of all opportunities in this new globally connected world. This is just the beginning.....

Brenda G. Kearse, 21st CCLC

Project Director

proof

ALGEBRAIC THINKING

WHAT IT IS AND WHY IT MATTERS

Essentials on education data and research analysis

By: Carla Thomas McClure
Cited from District Administration
The Magazine of School District Management

The average score for eighth-graders on the latest National Assessment of Educational Progress (NAEP) was the highest ever, but only 39 percent scored at or above the proficient level (Lee, Grigg, & Dion, 2007). Even fewer high school seniors (23 percent) were proficient (Grigg, Donahue, & Dion, 2007). "The sharp fall off in mathematics achievement in the U.S. begins as students reach late middle school, where, for more and more students, algebra course work begins," the National Mathematics Advisory Panel said in 2008 in its final report.

District Implementation:

Changing instructional practice requires extensive supports for teachers.

Helping students conceptualize arithmetic in a way that anticipates the thought patterns needed in algebra is the emphasis of an approach called "Prelude to Algebra." The Prelude approach grew out of a study of the types of mistakes students typically make in algebra. These mistakes can be traced back to students' inadequate and improper understanding of basic arithmetic operations. Two long-term studies have shown that the approach is effective with remedial students at the college level. Now, with funding from the Tennessee Department of Education, some Tennessee middle school teachers are being trained in the Prelude approach.

"Many students run into trouble when asked to manipulate fractions and negative numbers, cancel factors, simplify exponents, and solve linear equations," says Steven Lay, a Lee University professor who co-developed Prelude to Algebra. "The Prelude approach doesn't emphasize a static model in which two numbers such as 2 and 3 combine to form a third number, such as their sum, 5. Instead, the emphasis is on how one number, say 2, changes into another number, say 5, by joining the operator +3. This subtle change in orientation has been used to introduce algebraic thinking to students as early as the second grade, and it has shown great promise with middle school teachers participating in the Tennessee program."

The training model used so far in Tennessee includes an intensive two-week summer institute, a foundational set of teacher resources, and two follow-up professional development sessions. Teacher feedback has been enthusiastic. Even so, participants would like additional training and more opportunities to see the model in practice. This is not surprising. Research shows that it takes a significant amount of time to study and implement new practices. States and districts will need to plan accordingly. -Joy Runyan

According to the Math Panel, preparing more students for success in algebra and beyond will require the K8 math curriculum to emphasize three critical foundations (whole numbers, fractions and

some aspects of geometry). Also, math instruction should address all three elements of proficiency (conceptual understanding, computation and procedural fluency, and automatic recall of facts). One approach to making the math curriculum more cohesive (another of the Math Panel's recommendations) is to develop students' algebraic thinking at all grade levels.

A Paradigm Shift:

Readers won't find the phrase "algebraic thinking" in the Math Panel's report, but researchers and others have used the term to describe "particular ways of thinking, including analyzing relationships between quantities, noticing structure, studying change, generalizing, problem solving, modeling, justifying, proving, and predicting" (Cai & Knuth, 2005).

Asking teachers to develop students' algebraic thinking represents a paradigm shift in the teaching of mathematics. In the past, math curricula have emphasized arithmetic (calculation) in elementary school and algebra (e.g., exploration of patterns and use of symbolism) in middle school. This sequence makes the transition from arithmetic to algebra difficult for many students because it requires them to make various adjustments. For example, when students study algebra, they no longer focus merely on calculating numerical answers but on understanding and representing relationships through the use of both letters and numbers (Kieran, 2004).

For students, the change in emphasis between elementary and secondary school can create a conceptual barrier to mathematics achievement. To remove this barrier, a new paradigm is evolving in math education—one that calls for teachers at all grade levels to help students develop "habits of mind that attend to the deeper underlying structure of mathematics" (Katz, 2007).

Helping Teachers Make the Shift:

The National Research Council reports that the ability of K12 teachers to effectively select tasks and guide student thinking "is highly dependent on teachers' knowledge of mathematics, pedagogical content knowledge, and knowledge of students in general" (Bransford, Brown, & Cocking, 1999). Unfortunately, not all math teachers are well prepared to teach the content. A recent analysis of the 2003-2004 Schools and Staffing Survey found that 22 percent of secondary school math classes are taught by teachers who didn't major in math and are not certified to teach it. In high-poverty schools, the percentage (41 percent) nearly doubles (Ingersoll, 2008). Shifts in the way mathematics is taught will require shifts in teacher preparation, support and professional development.

According to the Math Panel's random national survey of algebra I teachers, student preparation for algebra seems especially weak in three areas: rational numbers, word problems, and study habits. The Math Panel called for research on the use of full-time math teachers in elementary schools to improve students' preparation for algebra. Also recommended is professional development that helps

teachers understand how the content they teach is connected to what students have already learned and what they will learn next.

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BENCHMARKS FOR THE CRITICAL FOUNDATIONS

The members of the National Mathematics Advisory Panel established by President Bush via Executive Order 13398 in their final report recommend the following benchmarks in preparing students for successful completion of Algebra.

Fluency With Whole Numbers

- By the end of Grade 3, students should be proficient with the addition and subtraction of whole numbers.
- By the end of Grade 5, students should be proficient with multiplication and division of whole numbers.

Fluency With Fractions

- By the end of Grade 4, students should be able to identify and represent fractions and decimals, and compare them on a number line or with other common representations of fractions and decimals.
- By the end of Grade 5, students should be proficient with comparing fractions and decimals and common percents, and with the addition and subtraction of fractions and decimals.
- By the end of Grade 6, students should be proficient with multiplication and division of fractions and decimals.
- By the end of grade 6, students should be proficient with all operations involving positive and negative integers.
- By the end of Grade 7, students should be proficient with all operations involving positive and negative fractions.
- By the end of Grade 7, students should be able to solve problems involving percent, ratio, and rate, and extend this work to proportionality.

Particular Aspects of Geometry and Measurement

- By the end of Grade 5, students should be able to solve problems involving perimeter and area of triangles, and all quadrilaterals having at least one pair of parallel sides (i.e., trapezoids).
- By the end of Grade 6, students should be able to analyze the properties of two-dimensional shapes and solve problems involving perimeter and area. They should also be able to analyze the properties of three-dimensional shapes and sole problems involving surface area and volume.
- By the end of Grade 7, students should understand relationships involving similar triangles (National Mathematics Advisor Panel, 2008).

PROOF

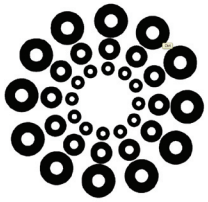
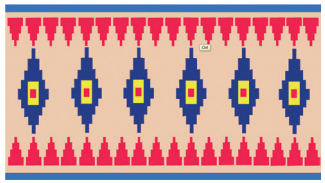
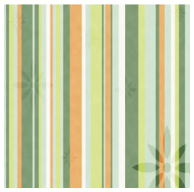
CHAPTER ONE

Algebraic Relationships

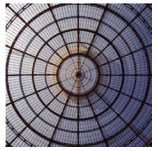
PROOF

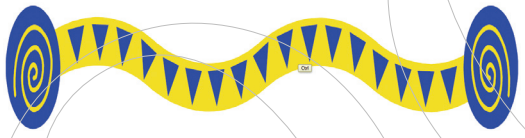
BIG IDEA: Finding patterns in everyday life situations

Logical patterns exist and are a regular occurrence in mathematics. They can be recognized, extended, and generalized with both words and symbols. The same pattern can be found in many different forms.

Patterns are found in physical and geometric situations.



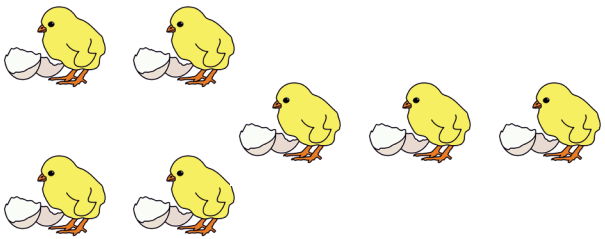


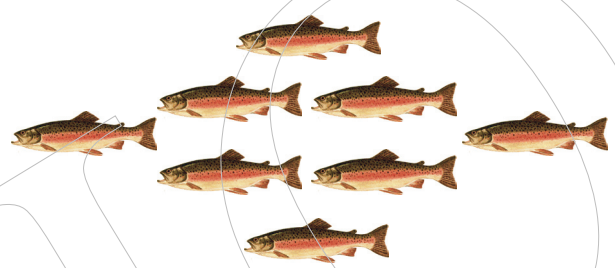
Patterns are found in numbers. 2,4,6,8,10,___ 1,3,5,7,___

Parents must now start to help their child master counting before entering kindergarten.

1 2 3 4 5 6 7 8 9

Count the pictures, and write the answer in the box





PROOF

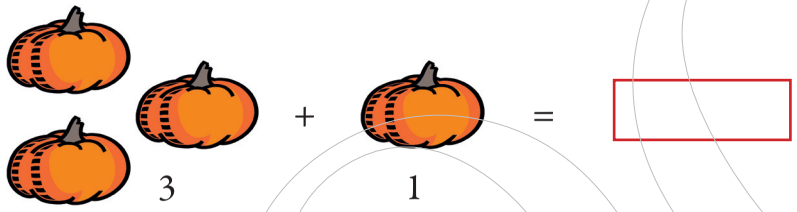
Once parents help their children learn to count numbers then they can play the following number games as early as kindergarten.

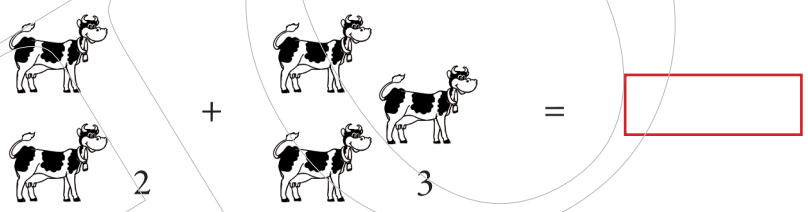
Fill In the Missing Number

3, __, 5 __, 3, __ __, 4, __ __, 2, __ __, 2, 3 1, 2, __

Parents can use pictures from old magazines to create activities like the ones below to teach young children how to add.

Add the numbers, and write the answer in the box





It is important that students in first grade learn to add one digit numbers fluently. Parents can play simple addition games to help them commit these facts to memory.

Proof

Add the numbers, and write the answer in the box

3 + 1 = ☐

1 + 2 = ☐

3 + 2 = ☐

1 + 4 = ☐

4 + 1 = ☐

4 + 4 = ☐

As students learn to count from 1 to 100, they can then be challenged with identifying number sequences.

Arithmetic Sequences

An Arithmetic Sequence is made by adding some value each time.

Examples:

1, 4, 7, 10, 13, 16, 19, 22, 25, ...

This sequence has a difference of 3 between each number.
The pattern is continued by adding 3 to the last number each time.

3, 8, 13, 18, 23, 28, 33, 38, ...

This sequence has a difference of 5 between each number.
The pattern is continued by adding 5 to the last number each time.
The value added each time is called the "common difference"

PROOF

What is the common difference in this example?

19, 27, 35, 43, ...

Answer: The common difference is 8

The common difference could also be negative, like this:

25, 23, 21, 19, 17, 15, ...

This common difference is -2
The pattern is continued by subtracting 2 each time.

Geometric Sequences

A Geometric Sequence is made by multiplying by some value each time.
Examples:

2, 4, 8, 16, 32, 64, 128, 256, ...

This sequence has a factor of 2 between each number.
The pattern is continued by multiplying the last number by 2 each time.

3, 9, 27, 81, 243, 729, 2187, ...

This sequence has a factor of 3 between each number.
The pattern is continued by multiplying the last number by 3 each time.

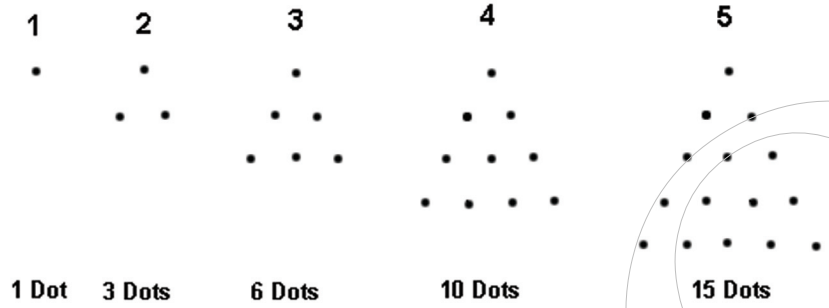
PROOF

Special Sequences

Triangular Numbers

1, 3, 6, 10, 15, 21, 28, 36, 45, ...

This sequence is generated from a pattern of dots which form a triangle. By adding another row of dots and counting all the dots we can find the next number of the sequence.



Square Numbers

1, 4, 9, 16, 25, 36, 49, 64, 81, ...

The next number is made by squaring where it is in the pattern.
The second number is 2 squared (22 or 2×2)
The seventh number is 7 squared (72 or 7×7) etc

Cube Numbers

1, 8, 27, 64, 125, 216, 343, 512, 729, ...

The next number is made by cubing where it is in the pattern.
The second number is 2 cubed (23 or 2×2×2)
The seventh number is 7 cubed (73 or 7×7×7) etc

HOOD

Fibonacci Numbers

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

The next number is found by adding the two numbers before it together.
The 2 is found by adding the two numbers in front of it (1+1)
The 21 is found by adding the two numbers in front of it (8+13)
The next number in the sequence above would be 55 (21+34)
Can you figure out the next few numbers?

Make your own Number Patterns

You can make your own number patterns using coins or matchsticks. Here is an example using coins:

Size=1	Size=2	Size=3	Size=4
1 Coin	6 Coin	15 Coin	28 Coin

How many coins would you need when Size=5 ?

Can you make a formula that will tell you how many coins are needed for any Size? For example Size=20? The formula may look something like

$$\text{Coins} = \text{Size} \times \text{Size} + \ldots$$

Entry #1

Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE what is the next number or symbol in the pattern: XOXOOXOOO

Draw symbolic representation of a possible solution..... XO (1) XOO (2) XOOO (3) next XOOOO (4)

Key Terms/definition or picture: pattern

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes

number bubbles

What were you thinking when solving this problem? Discuss with a friend: I needed to first see the pattern: an x followed by one zero, an x followed by two zeroes, then x followed by three zeroes so the next one is an x followed by four zeroes

What strategy did you use? patterns

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I will start to look around for patterns in designs of buildings.

Full Name Brooke Dismuke Site: Berkley Grade _____ Date _____

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Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE The girls basketball team were having a fund raiser. In 2 hours they made $2.50. How much money did they make in 14 hours?

Draw symbolic representation of a possible solution.....

2 hr.	2.50
4 hr	5.00
6 hr	7.50
8 hr	10.00
10 hr.	12.50
12 hr	15.00
14 hr	17.50

Key Terms/definition or picture

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes

number bubbles

$17.50

What were you thinking when solving this problem? Discuss with a friend: I had to make a chart showing that they made $2.50 every 2 hours until they got to 14 hours

What strategy did you use? pattern building

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I can solve problems this way every time I see a pattern being built. For example a pattern in the design of a brick sidewalk.

Full Name Elizabeth Dellas Site: Barlow Grade _____ Date _____

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Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE Destiny is painting a pattern on her bedroom door. What is the next picture in her pattern?

Draw symbolic representation of a possible solution.....

□△○□△○□△○

The next picture is □

Key Terms/definition or picture

pattern

sequence

Whole-Number Grid

answer boxes

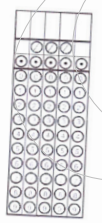
number bubbles

Percent Grid

%

Decimal and Money Grid

$.



What were you thinking when solving this problem? Discuss with a friend: There were 3 different shapes that repeated over and over again. Therefore the next picture had to be the first picture in the set of 3 pictures

What strategy did you use? looking for similar things repeating

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

We can use this as a game outside on the sidewalk with colored chalk. I could start a pattern and my friend could figure out the next picture in the sequence

Allison Peterson+

Full Name Mr. Anderson Site: CLE Grade _____ Date _____

Teacher

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CHAPTER TWO

BIG IDEA (Tables & Graphs)

BIG IDEA: A VARIETY OF REPRESENTATIONS SUCH AS DIAGRAMS, NUMBER LINES, CHARTS, AND GRAPHS CAN BE USED TO ILLUSTRATE MATHEMATICAL SITUATIONS AND RELATIONSHIPS.

Pie Chart

These representations help in conceptualizing ideas and in solving problems.

Tables

Sometimes, you can simply report the information in a table.
A table is a very simple way to show others the results. A table should have a title, so those looking at it understand what results the table shows:

Table: The Favorite Colors of My Class				
Yellow	Red	Blue	Green	Pink
4	5	6	1	4

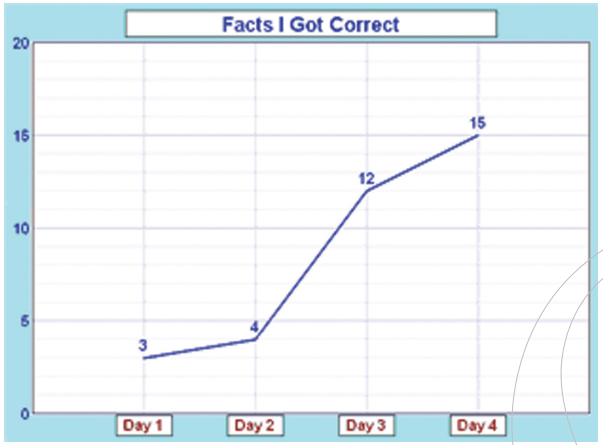
DRAFT

Graphs

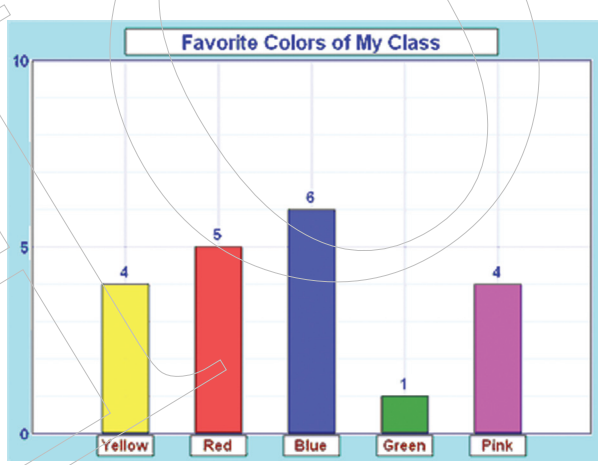
There are many different types of graphs.

Three of the most common are:

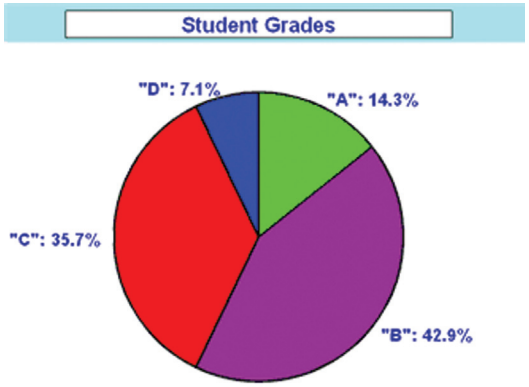
Line Graph - Used to show information that is somehow connected (such as change over time)



Bar Graph – Used to show relative sizes of different results:



Pie Chart - Used most often to show survey data that is to be reported in percentages.



The Tailor

A tailor stitches 4 shirts every day. It takes him 2 hours to stitch a shirt. Each shirt uses 10 buttons and has two pockets. Each shirt costs the tailor $ 2 and he charges the customer $ 5.

1. How many pockets does the tailor stitch in 33 days?

Answer: _____

2. How many shirts does the tailor stitch if he uses 630 buttons?

Answer: _____

3. How many dollars does the tailor collect from his customers in 10 days?

Answer: _____

4. How many dollars does the tailor earn as profit in 15 days?

Answer: _____

5. How many hours does the tailor work in 30 days?

Answer: _____

ANSWERS: (1) 254, (2) 63, (3) 200, (4) 180, (5) 240

To help students become familiar with word problems, help your child by talking through how to solve problems like the ones listed below.

Problem solving techniques are improved by helping your child draw a picture to represent the key parts of a word problem.

It is important that students learn key math vocabulary words at home.

1. There are 28 cakes. Each cake is cut into 6 parts. Each part is further cut into 2 pieces. How many cake pieces are there in all?

2. The Professors at the State University drank 151 cups of tea yesterday. They drank 32 cups in the morning and 26 in the afternoon. How many did they drink in the evening?

3. Michael has a collection of 173 books. He donated 10 books last year and 30 books this year. How many books does he still have?

4. A school has 4 dining halls. Each dining hall has 11 tables. If there are four children to each table, how many children stay for lunch?

5. Last month, Jack worked for 174 hours, Greg worked for 122 hours, and Edward worked 33 hours more than Jack. How many hours did they work altogether?

ANSWERS: (1)336, (2)93, (3)133, (4)176, (5)503

Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE I drove my Ferrari 10 miles on Monday, 20 miles on Tuesday, and 25 miles on Wednesday. How many miles did I drive altogether?

Draw symbolic representation of a possible solution.....

Monday - 10
Tuesday - 20
Wednesday - 25
55
altogether means add
10 + 20 + 25 = □

Key Terms/definition or picture
altogether

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes
number bubbles

What were you thinking when solving this problem? Discuss with a friend: If I add the number of miles I drove each day altogether I would get the total miles

What strategy did you use? Addition

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I could use the same strategy to figure out the number of gallons used for the week

Full Name Adilen Gomez Site: Bartow Grade _____ Date _____

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Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE There are 3 different team helmets on the shelf. How many different ways can you arrange them?

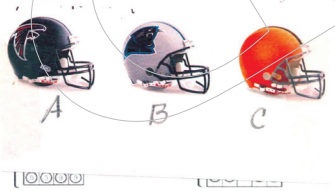
Draw symbolic representation of a possible solution.....

A < B - C A B C
  C - B A C B
B < A - C B A C 6 ways
  C - A B C A
C < B - A C B A
  A - B C A B

Key Terms/definition or picture
probability

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes
number bubbles



What were you thinking when solving this problem? Discuss with a friend: If I started with A there are only two ways I could arrange all 3 with A being the first helmet. So if I start with B there are only two ways to line up all 3 helps. The same if I start with C helmet.

What strategy did you use? drawing a pattern

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I could use this strategy if I had 3 shirts and 2 pair of pants and I wanted to figure out how many different outfits I could put together

Full Name Adrian Bustos-Fernandez Site: Bartow Grade _____ Date _____

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Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE Bill likes to play fantasy football. His team has already scored 62 points and only his kicker has not played yet. His kicker gets 3 points for every field goal he scores. If k represents the number of field goals he kicks, write an expression to represent team's final score:

Draw symbolic representation of a possible solution.....

62pts + 3 times number of goals kicker makes

62 + 3K

Key Terms/definition or picture

expression

variables

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes

number bubbles

%

$

What were you thinking when solving this problem? Discuss with a friend: Every time the kicker makes a goal the team gets 3 points; I could write it has 3+3+3... or if k represents the number of goals made I could write 3K. Then if I add that to 62, I would get the teams final score

What strategy did you use? writing solution into words then writing an expression

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I don't really know. Maybe anytime I need to count coins instead on adding the amount for each I could multiply the total number of coins by how much the coin is worth.

Full Name Allyson Peterson Site: CLE Grade _____ Date _____

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Entry #1

Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: Multiplication

SOLVE Amanda is running in a race she gets $25.00 every two miles now Mark more will she get if she runs 3 miles?

Draw symbolic representation of a possible solution.....

25.00 x 3 = 75.00

Key Terms/definition or picture

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes

number bubbles

%

$75.00

What were you thinking when solving this problem? Discuss with a friend: I was thinking that $25.00 times 3 equaled $75.00.

What strategy did you use? Multiplication

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I was running in a race and I didn't get money but I got a ribbon and a reward. That's how this problem relates to me.

Full Name AmandaSue Burdette Site: Berkley Grade 5th Date 12.5.08

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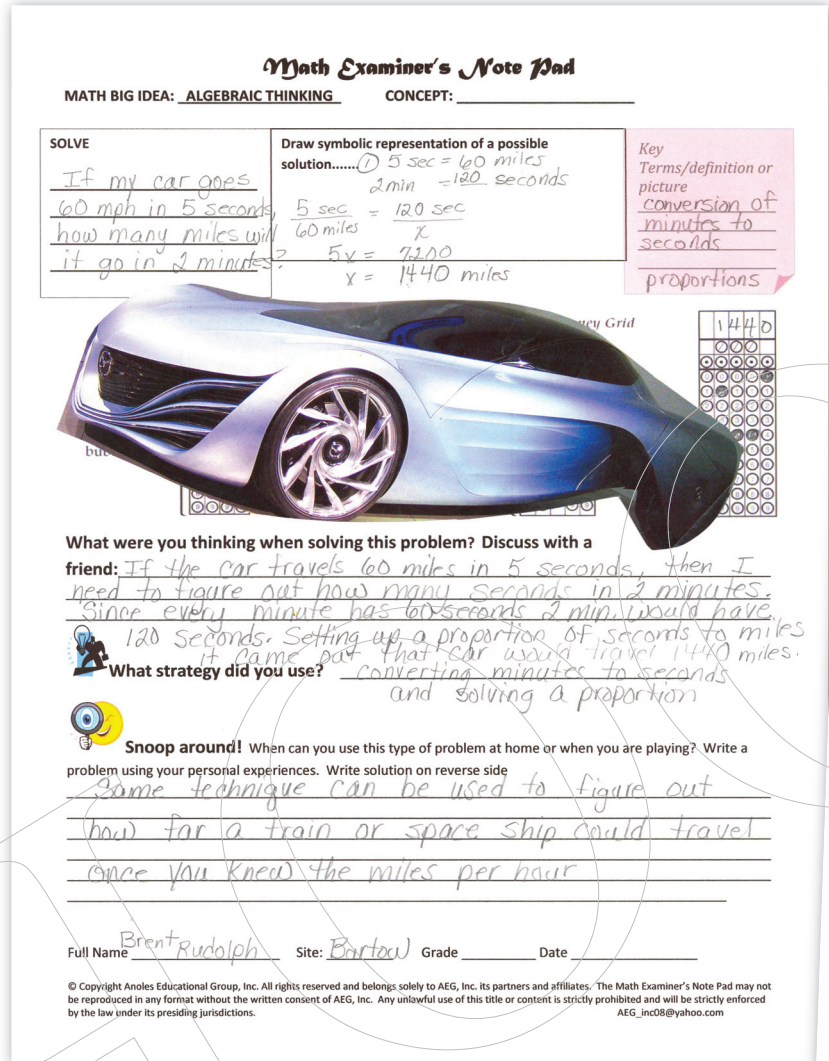

Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE

If my car goes 60 mph in 5 seconds, how many miles will it go in 2 minutes?

Draw symbolic representation of a possible solution.....

① 5 sec = 60 miles
2 min = 120 seconds

$\frac{5 \text{ sec}}{60 \text{ miles}} = \frac{120 \text{ sec}}{x}$

$5x = 7200$

$x = 1440$ miles

Key Terms/definition or picture

conversion of minutes to seconds

proportions

What were you thinking when solving this problem? Discuss with a friend: If the car travels 60 miles in 5 seconds, then I need to figure out how many seconds in 2 minutes. Since every minute has 60 seconds 2 min. would have 120 seconds. Setting up a proportion of seconds to miles it came out that car would travel 1440 miles.

What strategy did you use? converting minutes to seconds and solving a proportion

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

Same technique can be used to figure out how far a train or space ship could travel once you knew the miles per hour

Full Name Brent Rudolph Site: Bartow Grade _____ Date _____

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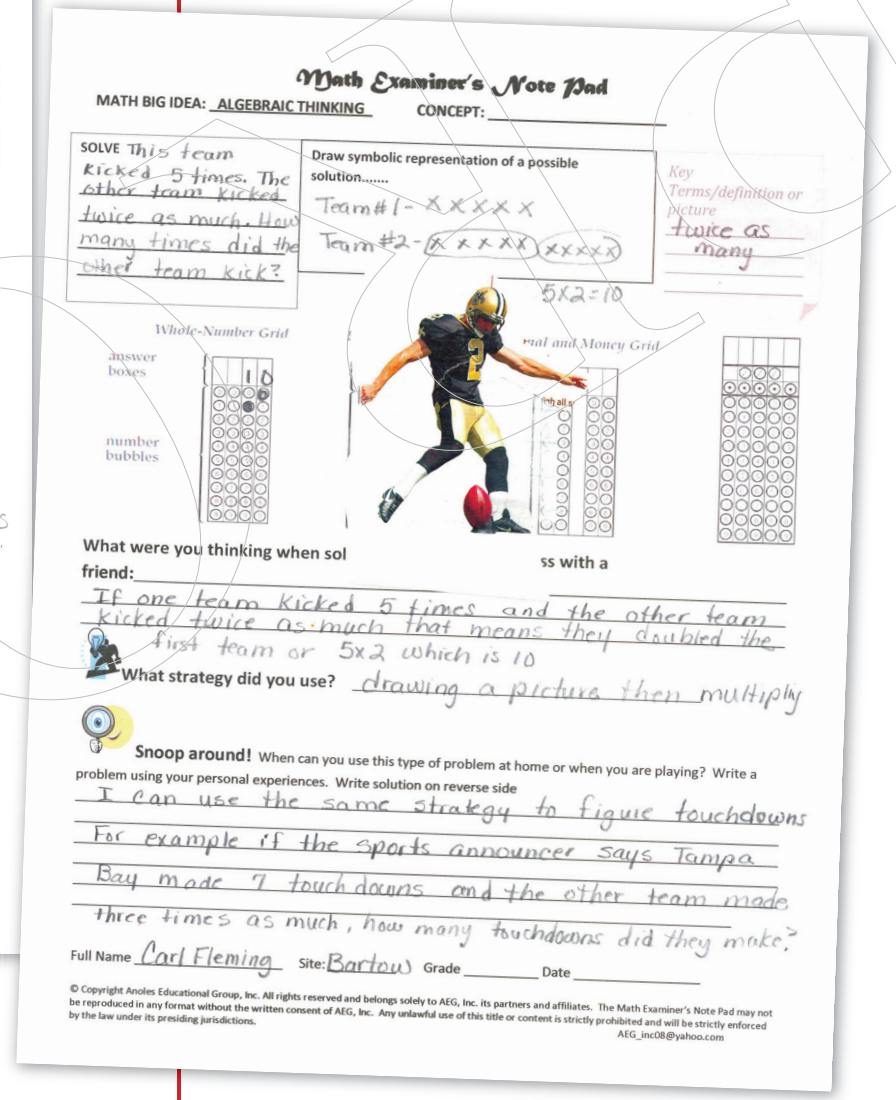

Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE This team kicked 5 times. The other team kicked twice as much. How many times did the other team kick?

Draw symbolic representation of a possible solution.....

Team #1 - XXXXX

Team #2 - XXXXX XXXXX

5x2=10

Key Terms/definition or picture

twice as many

What were you thinking when sol ss with a friend: If one team kicked 5 times and the other team kicked twice as much that means they doubled the first team or 5x2 which is 10

What strategy did you use? drawing a picture then multiply

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I can use the same strategy to figure touchdowns For example if the sports announcer says Tampa Bay made 7 touch downs and the other team made three times as much, how many touchdowns did they make?

Full Name Carl Fleming Site: Bartow Grade _____ Date _____

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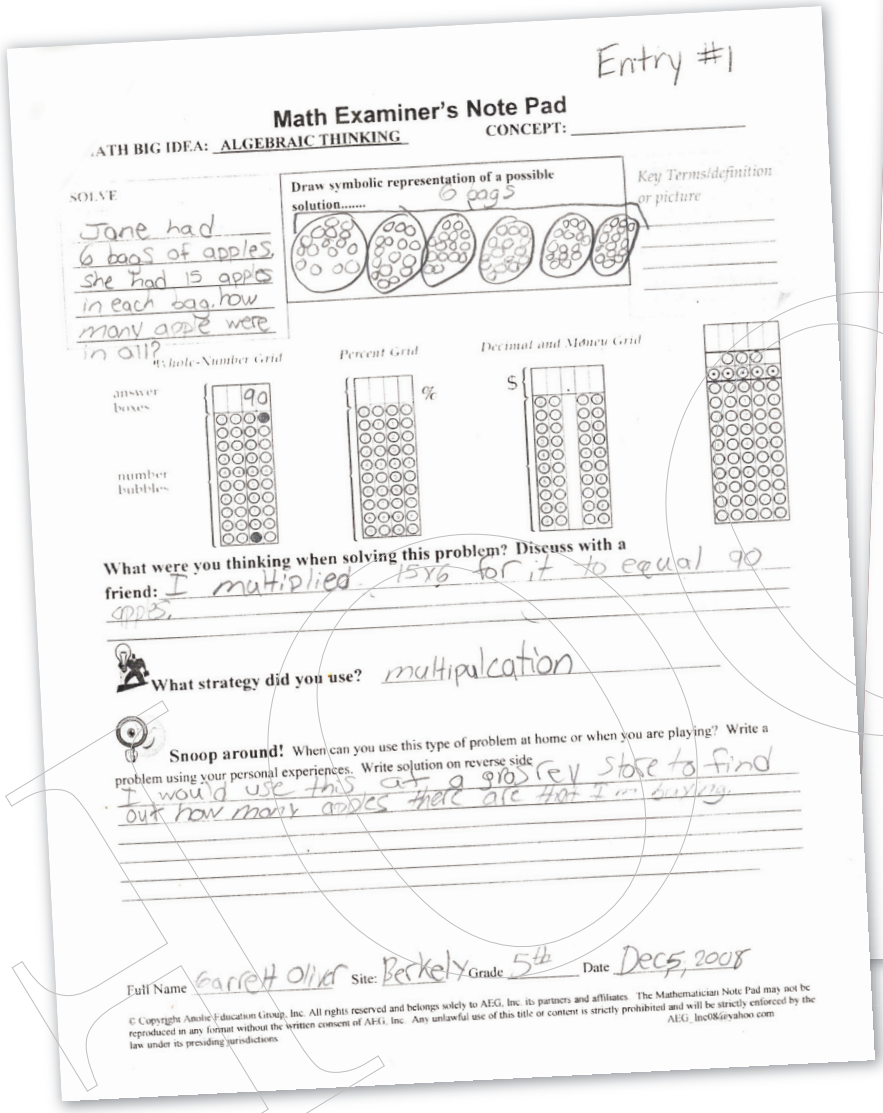

Entry #1

Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE Jane had 6 bags of apples. She had 15 apples in each bag. how many apple were in all?

Draw symbolic representation of a possible solution..... 6 bags

Key Terms/definition or picture

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes: 90 | % | $

number bubbles

What were you thinking when solving this problem? Discuss with a friend: I multiplied 15x6 for it to equal 90 apples.

What strategy did you use? multipulcation

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I would use this at a grosrey store to find out how many apples there are that I'm buying.

Full Name Garrett Oliver Site: Berkely Grade 5th Date Dec5, 2008

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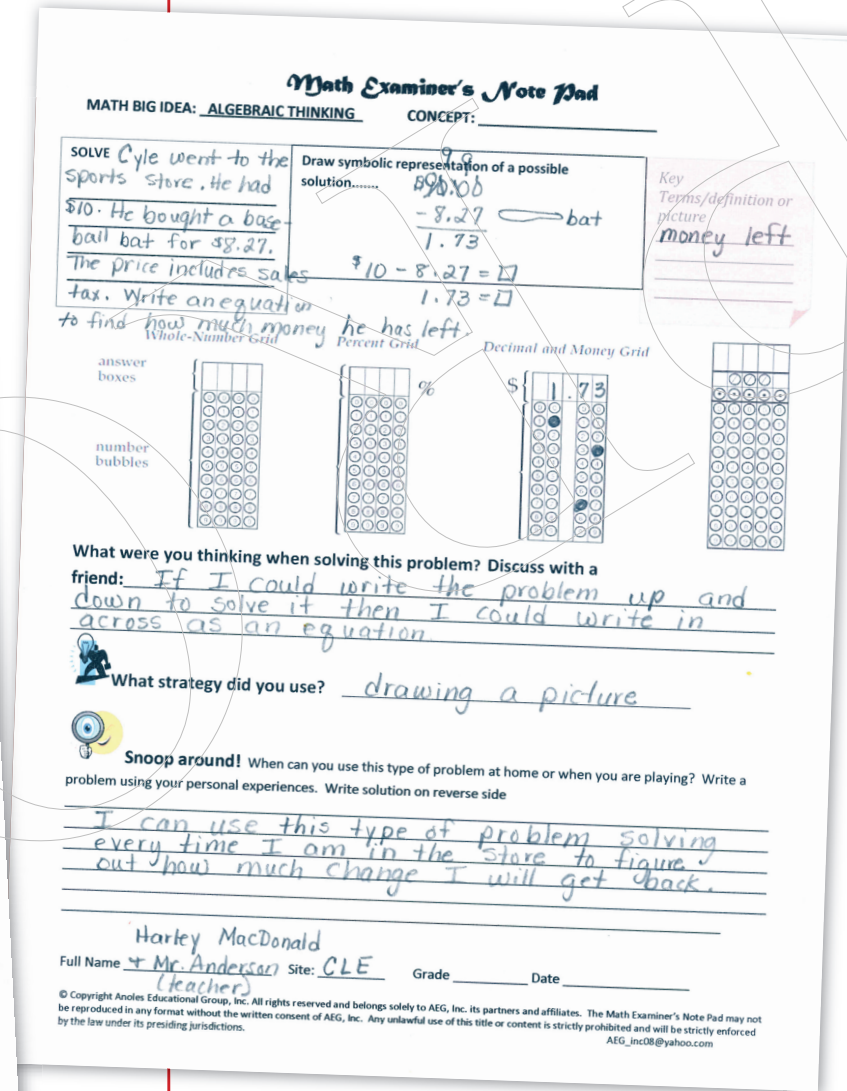

Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE Cyle went to the sports store. He had $10. He bought a baseball bat for $8.27. The price includes sales tax. Write an equation to find how much money he has left.

Draw symbolic representation of a possible solution.....

$10.00
-8.27 bat
1.73

$10 - 8.27 = ☐
1.73 = ☐

Key Terms/definition or picture: money left

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes: % | $ 1.73

number bubbles

What were you thinking when solving this problem? Discuss with a friend: If I could write the problem up and down to solve it then I could write in across as an equation.

What strategy did you use? drawing a picture

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I can use this type of problem solving every time I am in the store to figure out how much change I will get back.

Full Name Harley MacDonald + Mr. Anderson (teacher) Site: CLE Grade _____ Date _____

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Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: Number Sense

SOLVE

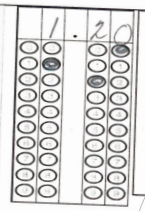
If 10 fish have 12 fish each how many fish in all

Draw symbolic representation of possible solution.....

See Attached

Key Terms/definition or picture

In all, patterns



Fill in the grid with your answer.....

What were you thinking when solving this problem? Discuss with a friend:

drawing what you see, counting each baby fish, add by counting by 2's

What strategy did you use? adding and multiplying

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side.....

Full Name Jocelyn Disla Site: Snively Grade 3 Date 12/8/08

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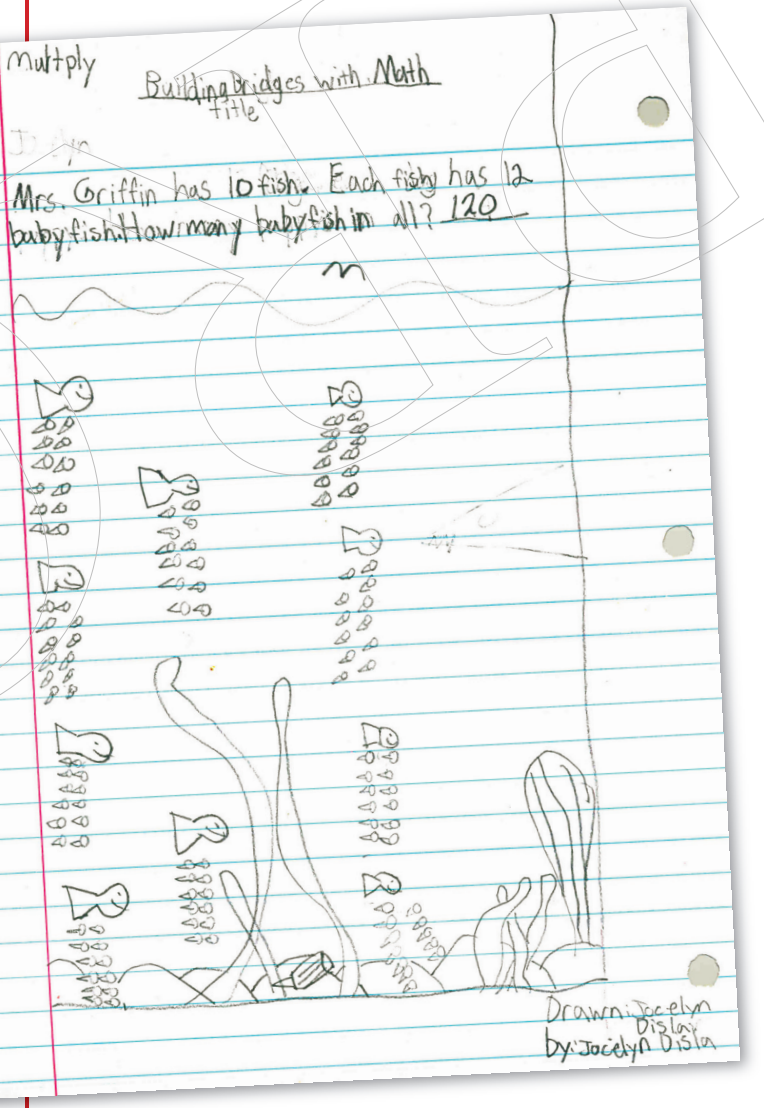
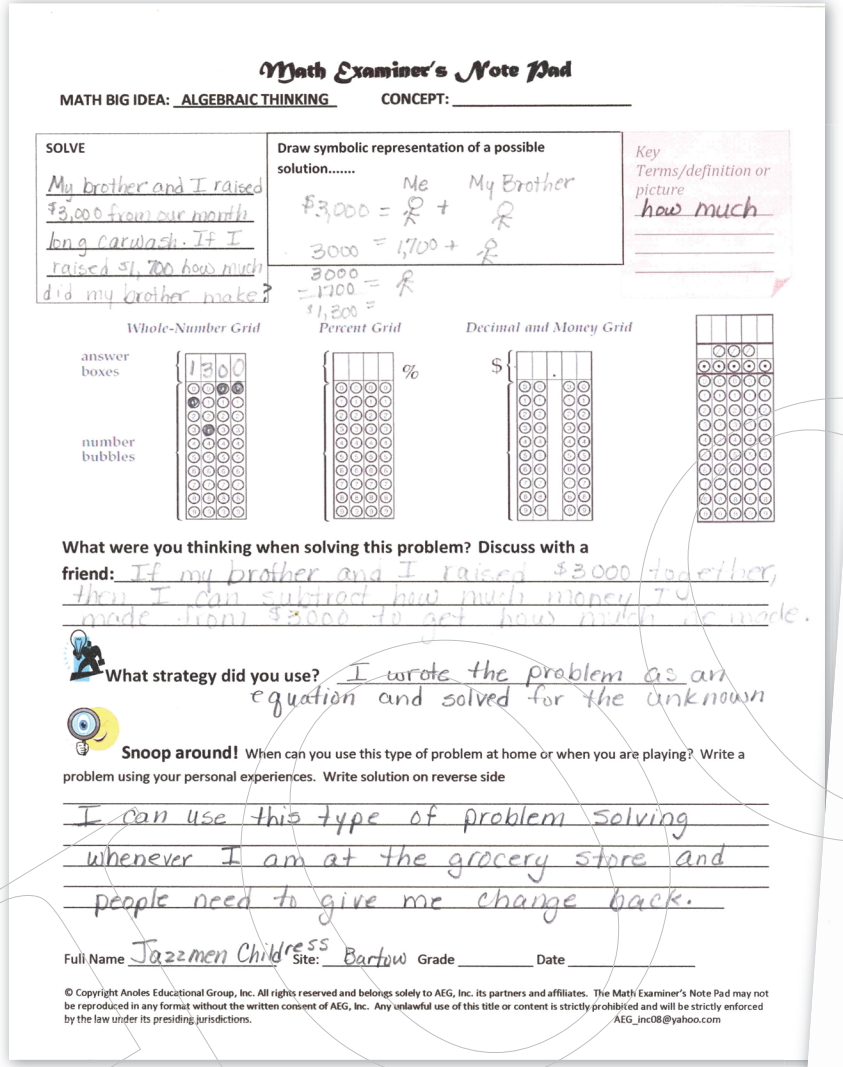
Multply

Building Bridges with Math
title

Mrs. Griffin has 10 fish. Each fishy has 12 babyfish. How many babyfish in all? 120



Drawn by: Jocelyn Disla



Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE

My brother and I raised $3,000 from our month long carwash. If I raised $1,700 how much did my brother make?

Draw symbolic representation of a possible solution.....

Me My Brother

$3,000 = ♀ + ♀

3000 = 1,700 + ♀

3000 − 1700 = ♀

$1,300 =

Key Terms/definition or picture

how much

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes

number bubbles

1300 | % | $

What were you thinking when solving this problem? Discuss with a friend: If my brother and I raised $3000 together, then I can subtract how much money I made from $3000 to get how much he made.

What strategy did you use? I wrote the problem as an equation and solved for the unknown

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I can use this type of problem solving whenever I am at the grocery store and people need to give me change back.

Full Name Jazzmen Childress Site: Bartow Grade _____ Date _____

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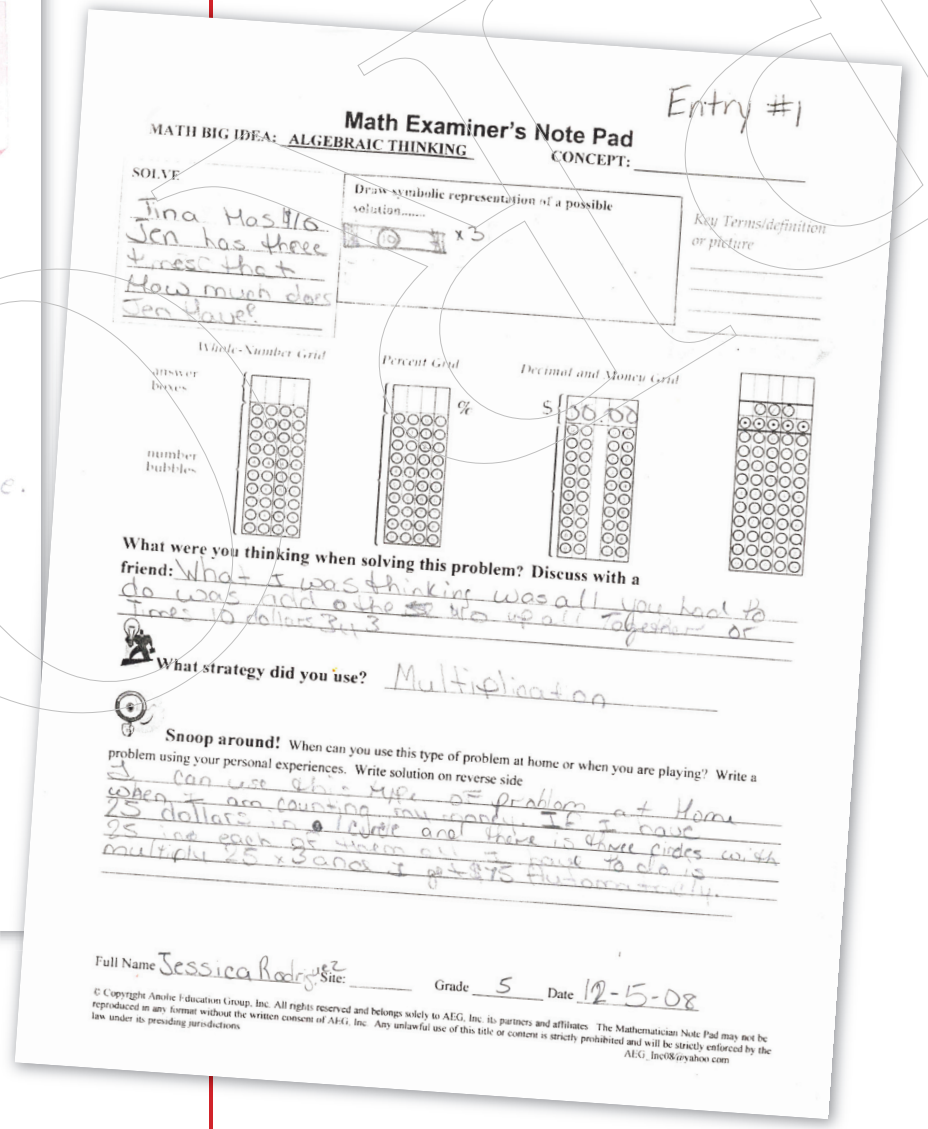

Entry #1

Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE

Tina Has $10 Jen has three times that How much does Jen have?

Draw symbolic representation of a possible solution.....

10 x3

Key Terms/definition or picture

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes

number bubbles

% | $ 30.00

What were you thinking when solving this problem? Discuss with a friend: What I was thinking was all you had to do was add o the $10 up all Together or Times 10 dollars By 3

What strategy did you use? Multiplication

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I can use this type of problem at Home when I am counting my money. If I have 25 dollars in a circle and there is three circles with 25 in each of them all I have to do is multiply 25 x3 and I get $75 automatically.

Full Name Jessica Rodriguez Site: _____ Grade 5 Date 12-5-08

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Entry #1

Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE

5x6=30

Draw symbolic representation of a possible solution.....

or

Key Terms/definition or picture

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes

number bubbles

%

$

What were you thinking when solving this problem? Discuss with a friend: 5 groups of 6

What strategy did you use? making an array or 5 groups of 6

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

When I'm trying to figure out how many copies to make for the class, getting materials ready, passing out a snack to figure out how many each child can have.

Full Name Jill O'Leary Site: Berkley Grade 2nd Date 12.8.08

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Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE The band drove 3,600 miles from DC to Texas and then 4,400 miles from Texas to Oregon. If it takes $150 to fill up their RV and their RV holds 50 gals and will go 400 miles on a tank. How much money did they spend on gas through the whole trip.

Draw symbolic representation of a possible solution.....

DC → Texas = 3600

Texas → Oregon: 4,400

Total 8000

400 | 8,000 — 20 tanks

20 tanks x $150 = 3000

Key Terms/definition or picture

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes: 3000

number bubbles

%

$

What were you thinking when solving this problem? Discuss with a friend: If we add the miles together the total trip is 8000 miles. If we divide 400 miles per tank into 8000 we get 20 times we would need to fill up. If each fillup cost $150 each that would be $150 x 20 = $3000

What strategy did you use? working together as a team

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

We could use this strategy any time we have multiple step problems

Kartik Amin+

Full Name Demetrio Henderson Site: Bartow Grade _____ Date _____

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Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING **CONCEPT:** _____

SOLVE There are 4 tires on the Dodge. Every 2 years, the owner has to replace all 4 tires. At the end of the 10th year how many tires would have been bought for the car

Draw symbolic representation of a possible solution.....

2	4
4	8
6	12
8	16
10	20

Key Terms/definition or picture
patterns
Charts

Whole-Number Grid ... Decimal and Money Grid

answer boxes

number bubbles

20

What strategy did you use? Strategies for patterns

What were you thinking when solving this problem? Discuss with a friend: every two years add 4 more tires

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

Number patterns like this can be used to figure out how many light bulbs you will need to buy in an apartment complex if all bulbs are guaranteed to work for 6 months.

Roberson

Full Name Ke Shaun Site: Bartow Grade _____ Date _____

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Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING **CONCEPT:** _____

SOLVE San Francisco won 4 games in 2007, 10 games in 2008, and 6 games in 2009. How many games did they win all together over those 3 years?

Draw symbolic representation of a possible solution.....

2007 - 4
2008 - 10
2009 - 6
20

altogether means add

Key Terms/definition or picture
altogether

Whole-Number Grid ... Percent Grid ... Decimal and Money Grid

answer boxes

number bubbles

20

%

$

What were you thinking when solving this problem? Discuss with a friend: If they won 4, 10, and 6 games all I would need to do is add all the numbers together to get the total.

What strategy did you use? addition

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I could use this strategy to also figure the total passing yards of a quarterback.

Full Name Kenneth Clayton Site: Bartow Grade _____ Date _____

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Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE the following expression if n=8

n+(13-n)÷5

Draw symbolic representation of a possible solution.....

n+(13-n)÷5
8+(13-8)÷5
8+(5)÷5
8+1=9

Key Terms/definition or picture
expressions
Substituting
order of operations

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes: 9
number bubbles

What were you thinking when solving this problem? Discuss with a friend: first I need to substitute the number 5 in place of the n. Then I need to remove the parenthesis. Then do the division before doing the addition.

What strategy did you use? PEMDASFLTR

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

Full Name Keosha Cox Site: _____ Grade _____ Date _____

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Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE There wer 10 keys on the key chain. My mom took one for her car and my sister took one for her bike. My dad came back and put his key on the chain. Then Grandma came back and put her key on the chain. How many keys were on the key chain?

Draw symbolic representation of a possible solution.....

10 keys 9
-1 Mom +1 Grandma
9 10
-1 sister
8
+1 dad
9

Key Terms/definition or picture
order of operations

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes: 10
number bubbles

What were you thinking when solving this problem? Discuss with a friend: if I write out the steps it will be easy to see what happened

What strategy did you use? order of operations

Snoop around! When can you use this type of problem at home or when you are playing? W... problem using your personal experiences. Write solution on reverse side

This problem required me to listen carefully to each step. The same thing when people give you more than one thing to do at one time

Kierstem B

Full Name Summer Tilly Site: Bartow Grade _____ Date _____

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Math Examiner's Note Pad

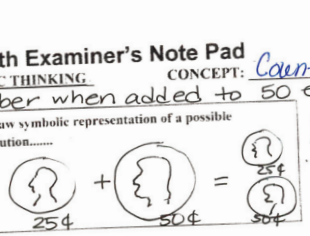
MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: Counting Money
: what number when added to 50 equals 75?

SOLVE

$x + 50 = 75$

$x = 25$

Draw symbolic representation of a possible solution.....



Key Terms/definition or picture: coins

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes: 25

number bubbles

What were you thinking when solving this problem? Discuss with a friend: what number plus 50 = 75

What strategy did you use? subtracting

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

If I have 50¢ what amount of money do I need to add to get 75¢

Full Name Viola Frazier Site: Snively Grade 3rd Date 12/8/08

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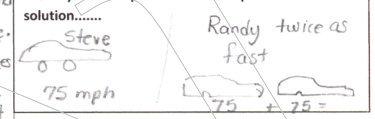
Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT:

SOLVE Steve and his friend Randy was having a race. Steve was going 75 miles per hour and Randy is going twice that speed. How fast was Randy going?

Draw symbolic representation of a possible solution.....



Key Terms/definition or picture: twice

Whole-Number Grid | Percent Grid | Decimal and Money Grid

answer boxes: 150

number bubbles

What were you thinking when solving this problem? Discuss with a friend: If Randy was going twice as fast as Steve that meant he was going 2 times Steve's speed so 2 x 75 = 150

What strategy did you use? drew a picture and wrote an expression

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

I can use this strategy every time I hear something is twice something else.

Full Name Zykkorrya Medler Site: Bartow Grade _____ Date _____

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Math Examiner's Note Pad

MATH BIG IDEA: ALGEBRAIC THINKING CONCEPT: _____

SOLVE

$60m = 180$

Draw symbolic representation of a possible solution.....

$60m = 180$

$\div 60 \quad \div 60$

$m = 3$

Key Terms/definition or picture

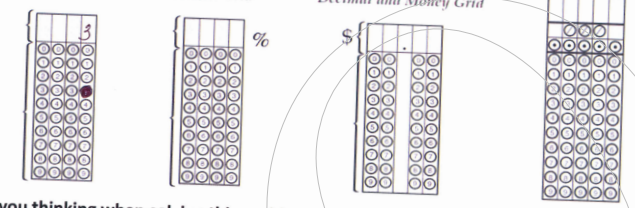
Variables

solving equations

Whole-Number Grid *Percent Grid* *Decimal and Money Grid*

answer boxes

number bubbles



What were you thinking when solving this problem? Discuss with a friend: When you solve equations you must perfor the same operation to both sides of the equal sign. So I am going divide both by 60 so m=3

What strategy did you use? using variables

Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

This can be used any time you have a math sentence (an equation) with one part you are trying to figure out (the unknown).

Full Name Jamea May Site: Westwood Grade _____ Date _____

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AEG_inc08@yahoo.com

CHAPTER THREE

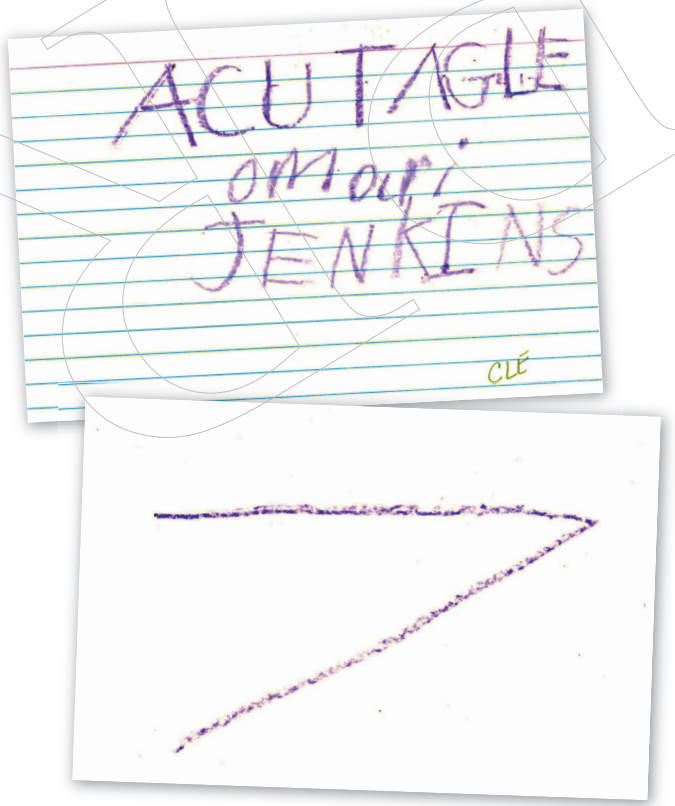
Math Vocabulary/Glossary

Math Vocabulary/Glossary Introduction:

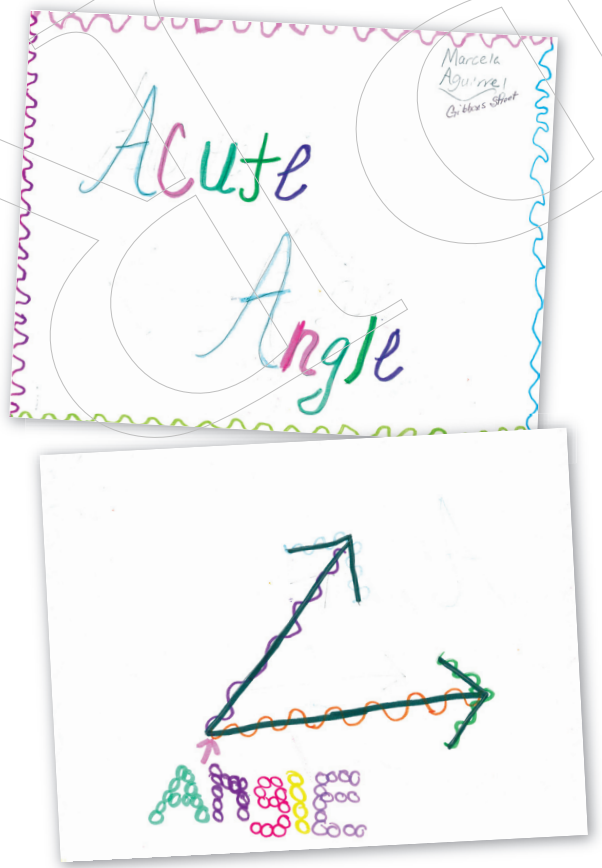
Learning math terms starts when a child hears a parent/guardian or significant adult using the word in context. For example, to teach a little one the concept of more than, you can start by teaching them the words "I love you". When they respond, you reply with "I love you more". More is a math concept that implies "greater than". So find ways to use each of the words listed below. Check the word off after your child uses the word properly.

Glossary

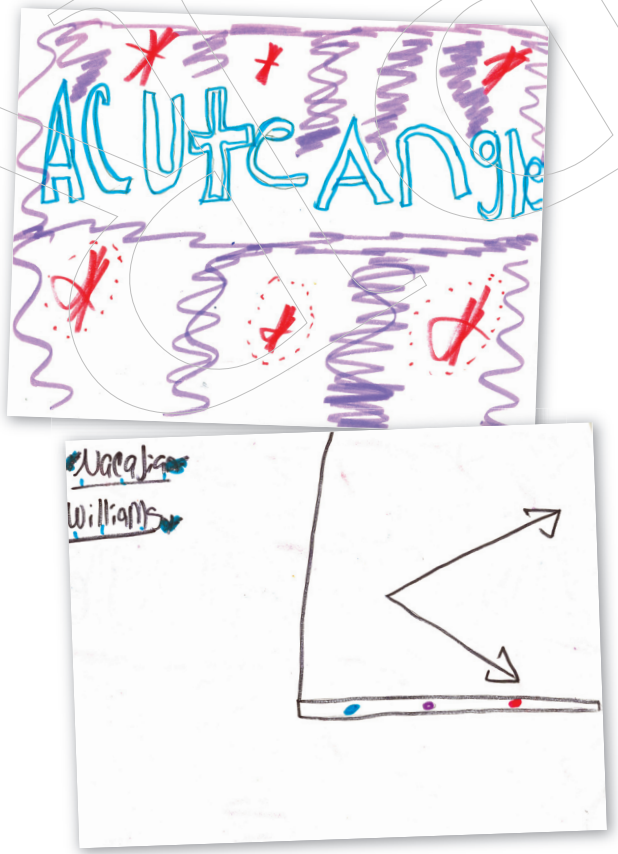
- Acute Angle- An angle that measures less tan 90degrees and greater than 0.
- Addend- Any number being added
- Algebraic Equation (inequality) - A mathematical sentence containing variables in which tow expressions are connected by an equality (inequality) symbol.
- Algebraic Expression – An expression containing numbers and variables (e.g., 7x), and operations that involve numbers and variables (e.g., 2a+4). Algebraic expressions do not contain equality or inequality symbols.
- Algebraic rule- A mathematical expression that contains variables and describes a pattern or relationship.
- Angle- Two rays extending from a common end point called the vertex. Angles are measured in degrees.
- Area- The measure, in square units, of the inside region of a closed two-dimensional figure (e.g., a rectangle with sides of 4 units by 6 units has an area of 24 square units).
- Axes (of a graph) - The horizontal and vertical number lines used in coordinate plane system.
- Axis- The singular form of axes.
- Bar graph- A graph that uses either vertical or horizontal bars to display data.
- Base (geometric) – The line or plane of a geometric figure, from which a height can be constructed.
- Break- A zigzag on the x- or y-axis in a line or bar graph indicating that the data being displayed do not include all of the values that exist on the number line used. Also called a squiggle.
- Capacity- The amount of space that can be filled in a container. Both capacity and volume are used to measure three-dimensional spaces; however, capacity usually refers to fluids, whereas volume usually refers to solids.
- Chart- A data display that represents information in columns ad rows.



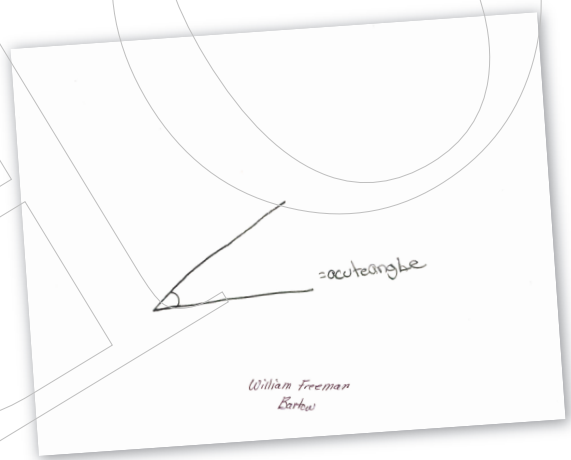
- Circle graph- A data display that divides a circle into regions representing a portion of the total set o data. The circle represent he whole set of data.
- Closed figure- A two-dimensional figure that divides the plane in which the figure lies into two parts-the part inside the figure and the part outside the figure (e.g., circles, squares, rectangles).
- Composite Number- A whole number that has more than two factors.
- Congruent- Figures or objects that are the same shape and size.
- Coordinate Grid or Plane- A two-dimensional network of horizontal and vertical lines that are parallel and evenly-spaced; especially designed for locating points, displaying data, or drawing maps.
- Coordinates- Numbers that correspond to points on a coordinate plane in the form (x,y) or a number that corresponds to a point on a number line.
- Customary units- The units measure developed and used in the United States. Customary unites for length are inches, fee, yard and miles. Customary units for weight are ounces, pounds, and tons. Customary units for volume are cubic inches, cubic feet, and cubic yards. Customary units for capacity are fluid ounces, cups, pints, quarts, and gallons.
- Diameter- A line segment from any point on the circle passing through the center to another point in the circle.
- Difference- A number that is the result of subtracting two numbers.
- Divisible- A number capable of being divided into equal parts without a remainder.
- Divisor- The number by which another number is divided.
- Equation- A mathematical sentence in which two expressions are connected by an equality symbol. See also algebraic equation (inequality).
- Expression- A collection of numbers, symbols, and/or operations signs that stands for a number.
- Extraneous Information- Information that is not necessary to solving the problem.
- Face- One of the plane surfaces bounding a three-dimensional figure; a side.
- Function- A relationship in which each element of one set has one assigned element in the other set.
- Height- A line segment extending from the vortex or apex of a figure to its base and forming a right angle with the base or plane that contains a base.
- Indirect measure- The measurement of an object through the known measure of another object.
- Intersection- The point at which two lines meet.
- Inverse operation- An action that undoes a previously applied action. For example, subtraction is the reverse operation of addition.

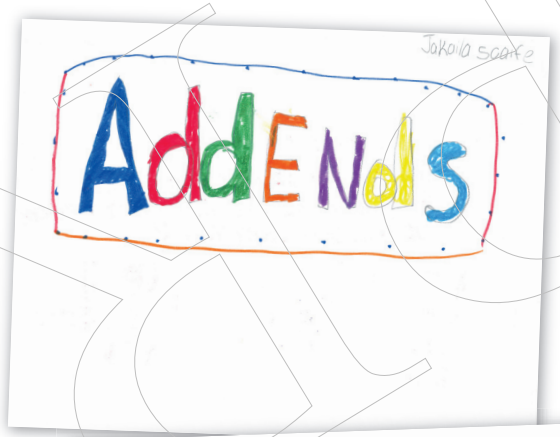


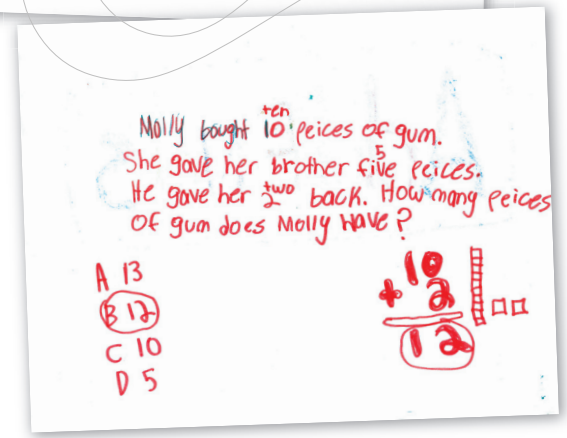
- Labels (for a graph) - The titles given to a graph, the axes of a graph, or to the scales on the axes of a graph.
- Length- A one-denominational measure that is the measurable property of a line segment.
- Likelihood- The chance that something is likely to happen.
- Line- A collection of an infinite number of points in a straight pathway with unlimited length and having no width.
- Line graph- A graph that displays data using connected line segments.
- Line segment- A portion of a line that consists of a defined beginning and endpoint and all the points in between.
- Mass- The amount of matter in an object.
- Mean- The Arithmetic average of a set of numbers. It is also a measure of central tendency.
- Median- The middle point of a set of rank-ordered numbers where half of the numbers are above the median and half are below it. It is also a measure of central tendency.
- Mode- The score or data point found most often a set of numbers. There may be no mode, one mode, or more than one mode in a set of numbers. It is also a measure of central tendency.
- Natural numbers (counting numbers) – 1, 2, 3, 4, 5.....
- Nonstandard units of measure- Objects such as blocks, paper clips, crayons, or pencils that can be used to obtain measure.
- Number line- A line on which numbers can be written or visualized.
- Obtuse angle- An angle that measures more than 90 degrees but less than 180 degrees.
- Organized data- Data arranged in a display that is meaningful and that assists in the interpretation of the data.
- Parallel Lines- Two lines in the same plane that are a constant distance apart. Parallel lines have equal slopes.
- Perimeter- The distance around a polygon
- Perpendicular- Two lines, two line segments, or two planes that cross to form a right angle.
- Place value- The position of a single digit in a number.
- Plane figure- A two-dimensional figure that lies entirely within a single plane.
- Point- A specific location in space that has no discernible length or width.
- Product- The result of multiplying numbers together.
- Quotient- The result of dividing two numbers.



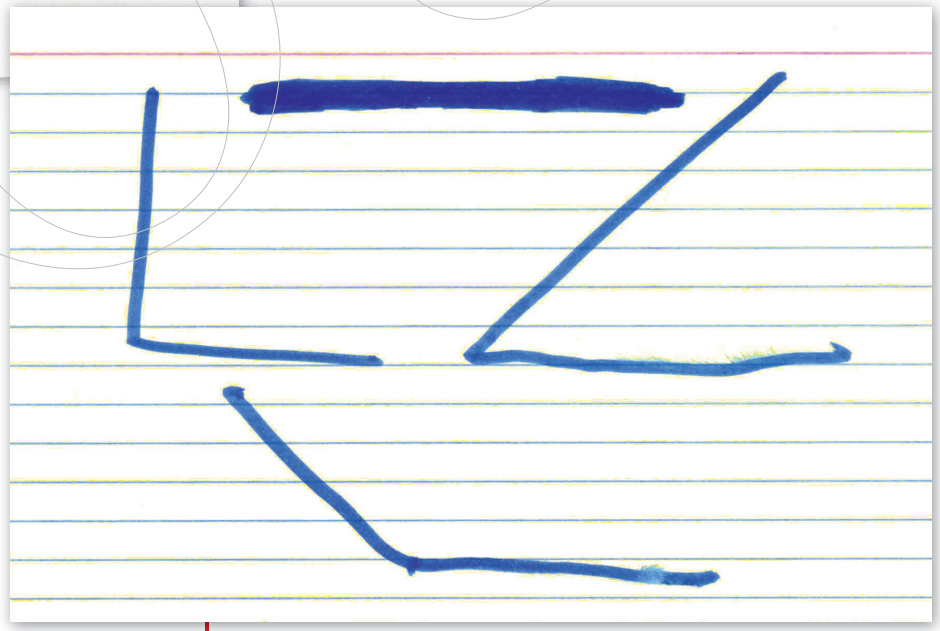
- Radius- A line segment extending from the center of a circle or sphere to a point on the circle or sphere. Plural: Radii.
- Randomly (chosen) - An equal chance of being chosen.
- Ray- A portion of a line that begins at an endpoint and goes on indefinitely in one direction.
- Regular polygon- A polygon that is both equilateral (all sides congruent) and equiangular (all angles congruent).
- Relative size- The size of one number in comparison to the size of another number or numbers.
- Right Angle- An angle that measures exactly 90 degrees.
- Scale- The numeric values, set at fixed intervals, assigned to the axes of a graph.
- Scale model- A model or drawing based on a ratio of the dimensions for the model and the actual object it represents.
- Stem-and-leaf plot- A graph that organized data by place value to compare data frequencies.
- Sum- The result of adding numbers together.
- Tree Diagram- A diagram in which all the possible outcomes of a given event are displayed.
- Trend line- A line on a graph indicating a statistical trend.
- Variable- Any symbol, usually a letter, that could represent a number.
- Weight- Measures that represent the force of gravity on an object.
- X-axis- The horizontal number line on a rectangular coordinate system.
- Y-axis- The vertical number line on a rectangular coordinate system.





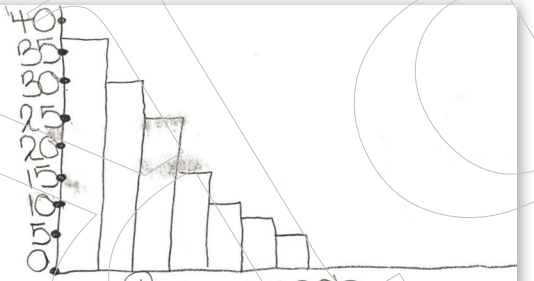


Bracey
Angle

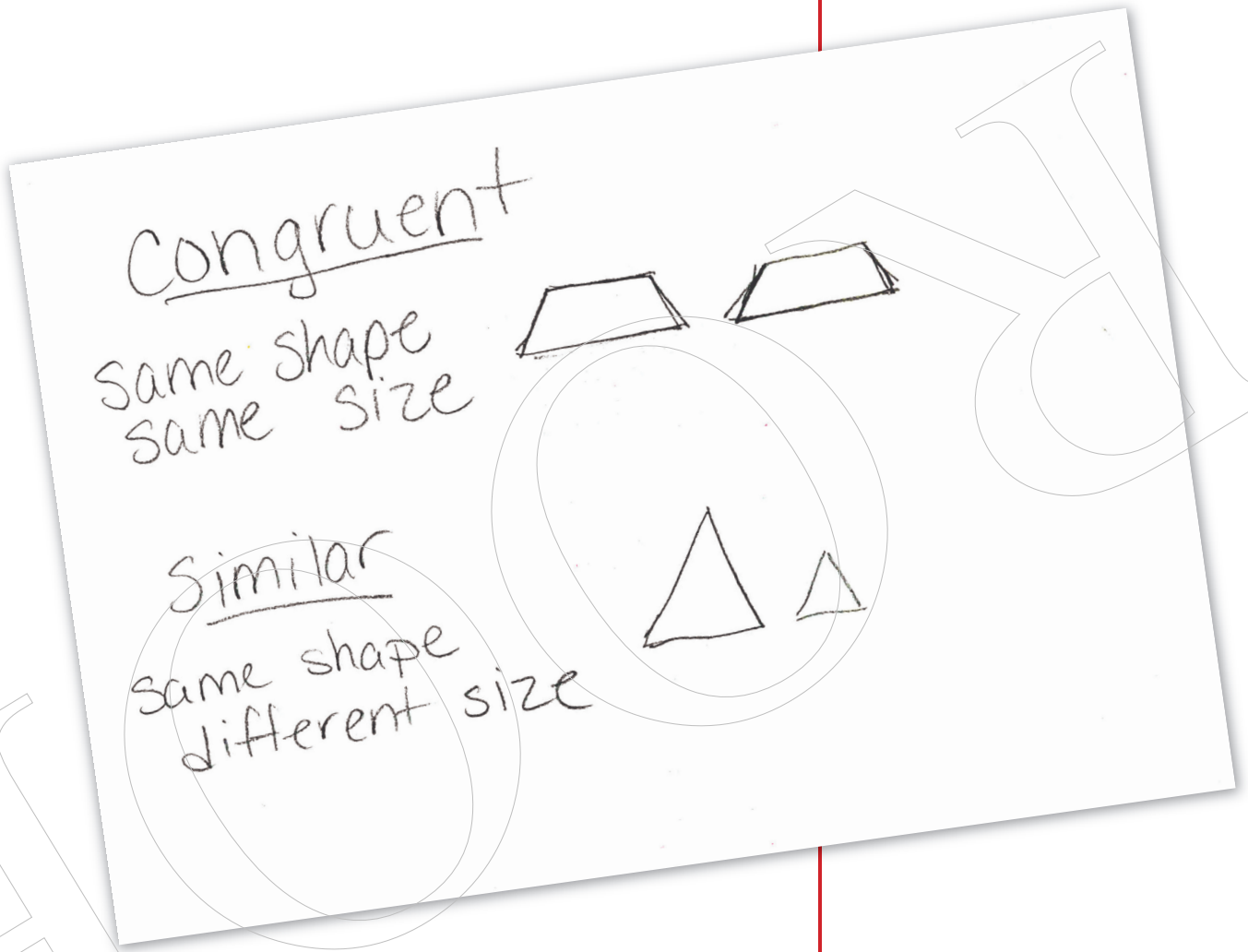


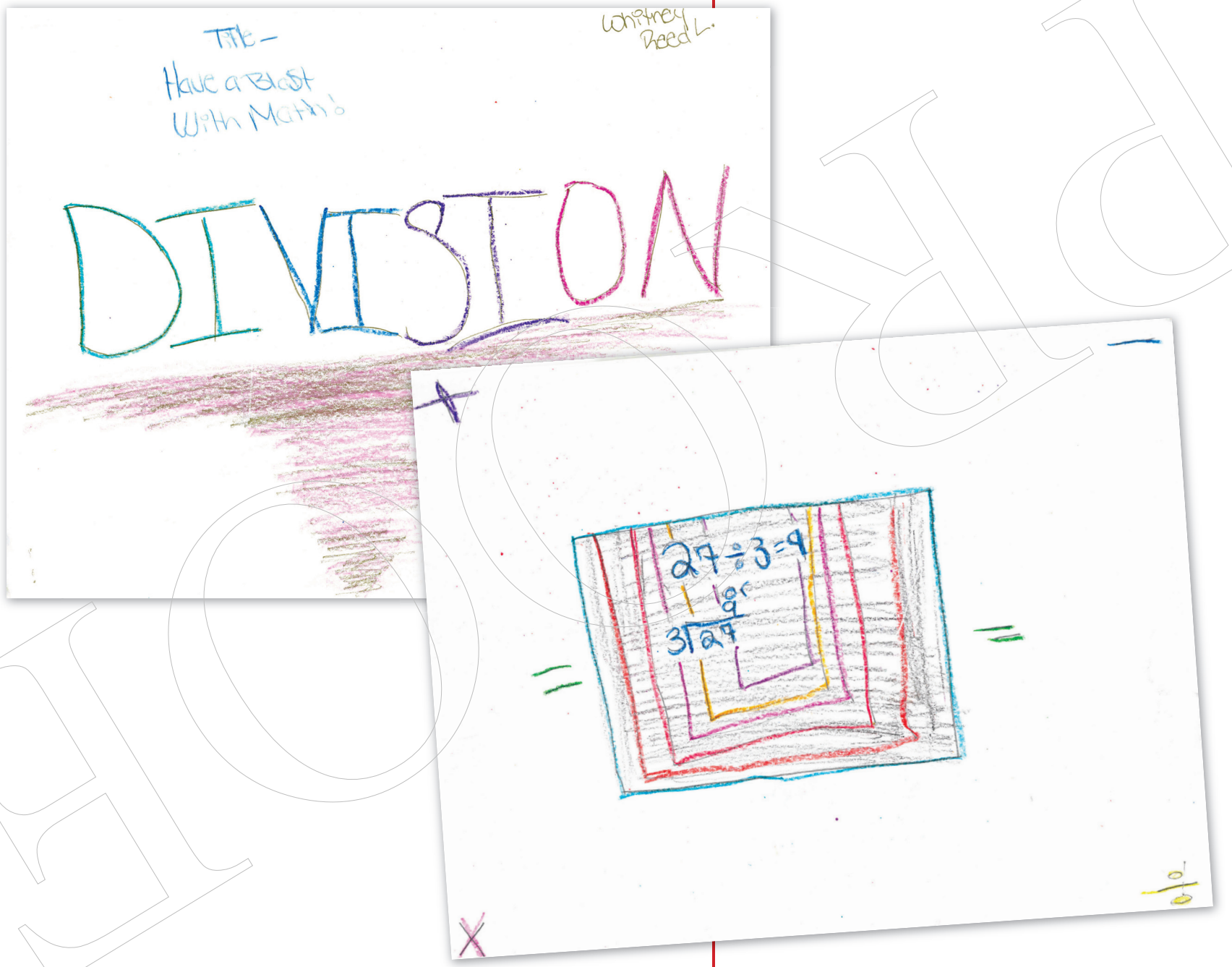
Bar graph - A graph that uses either vertical or horizontal bars to display data

Bar graph -

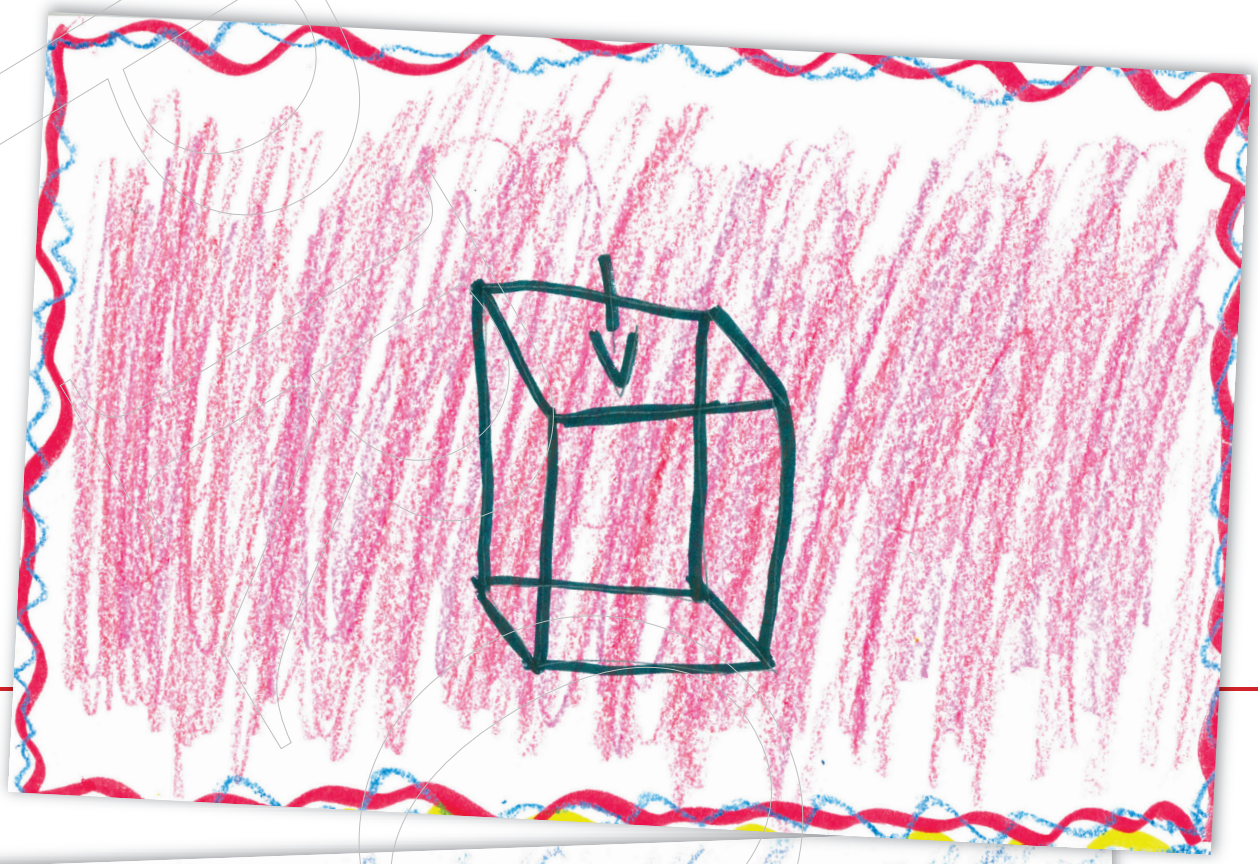


Taidra Cunningham
Bartow

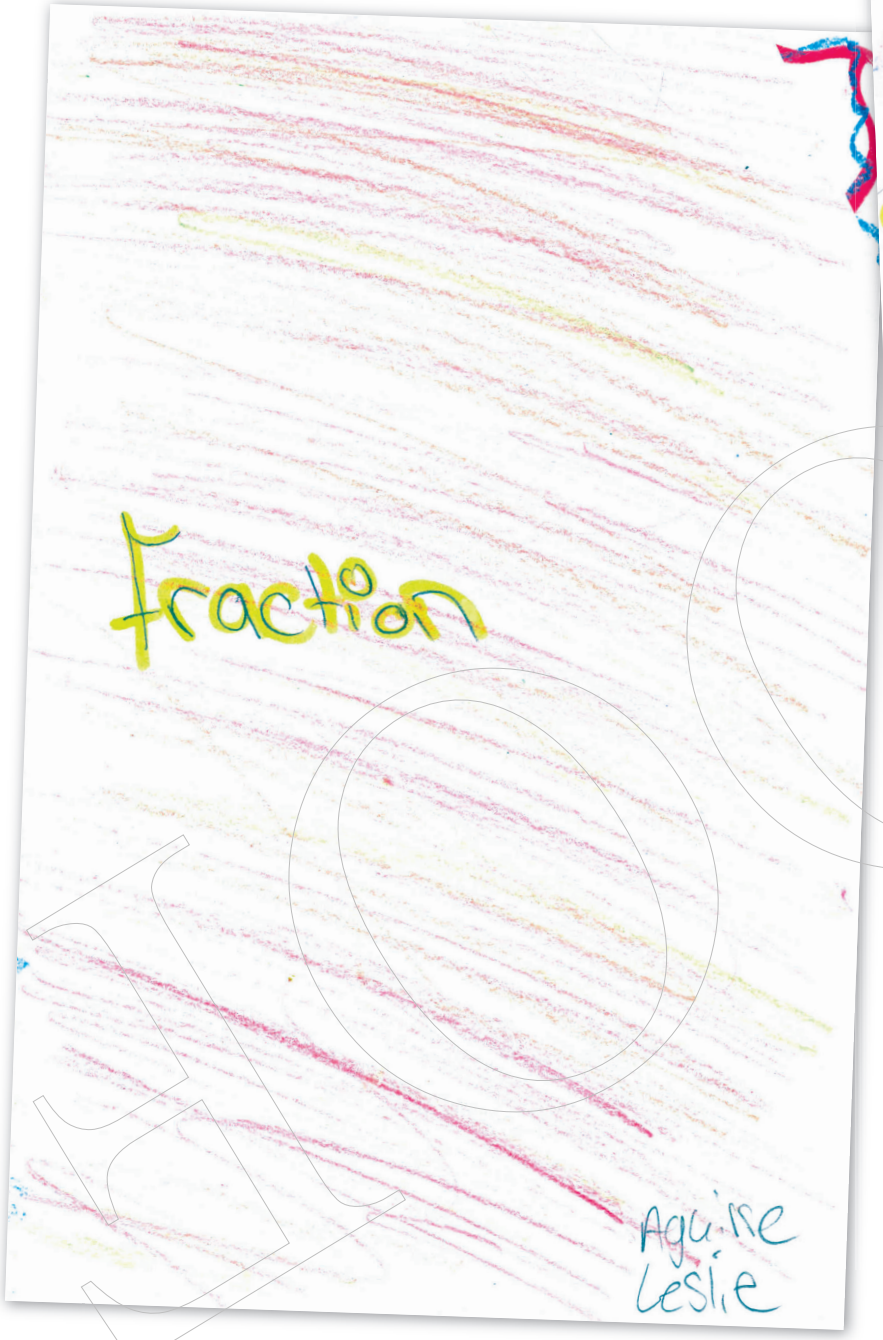

Congruent
same shape
same size
Similar
same shape
different size


Title –
Have a Blast
With Math!
Whitney Reed L.
DIVISION
27÷3=9
9r
3 27

Equation
difference
Jakaila !
10x9=90
20-5=15



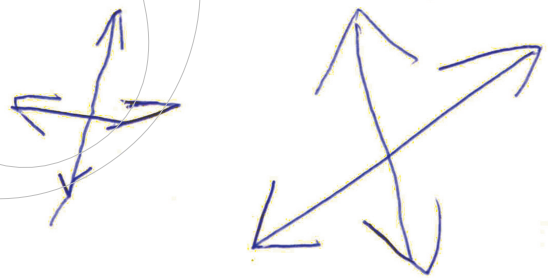
face


fraction
Aguirre
Leslie

1
2

Taliyah

Intersecting



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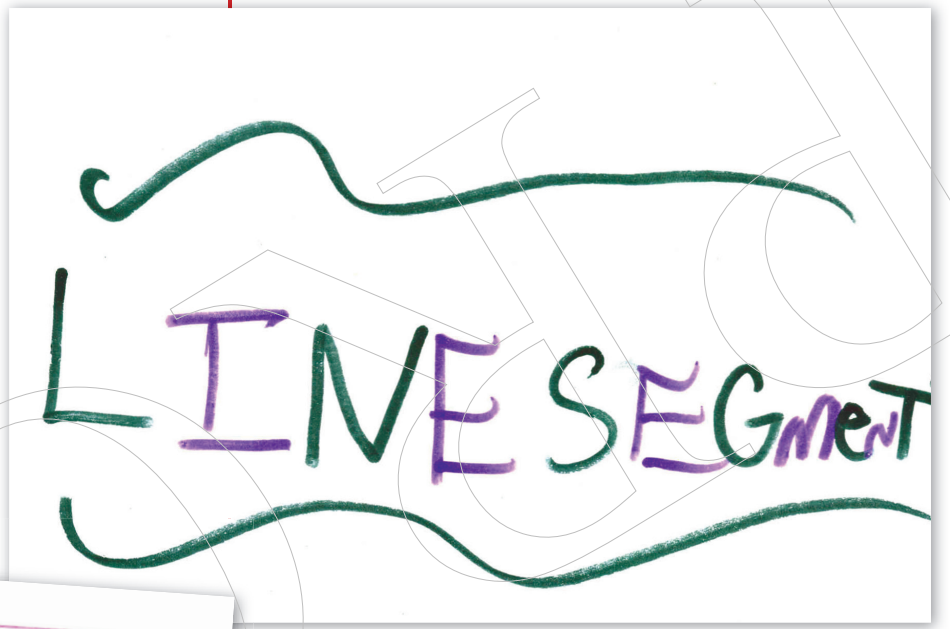
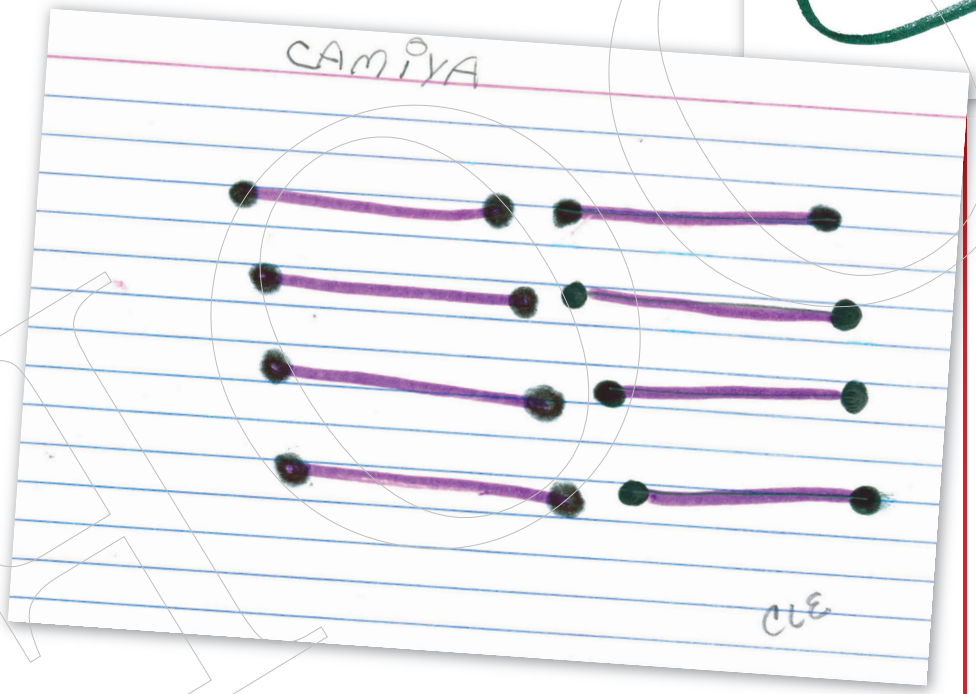
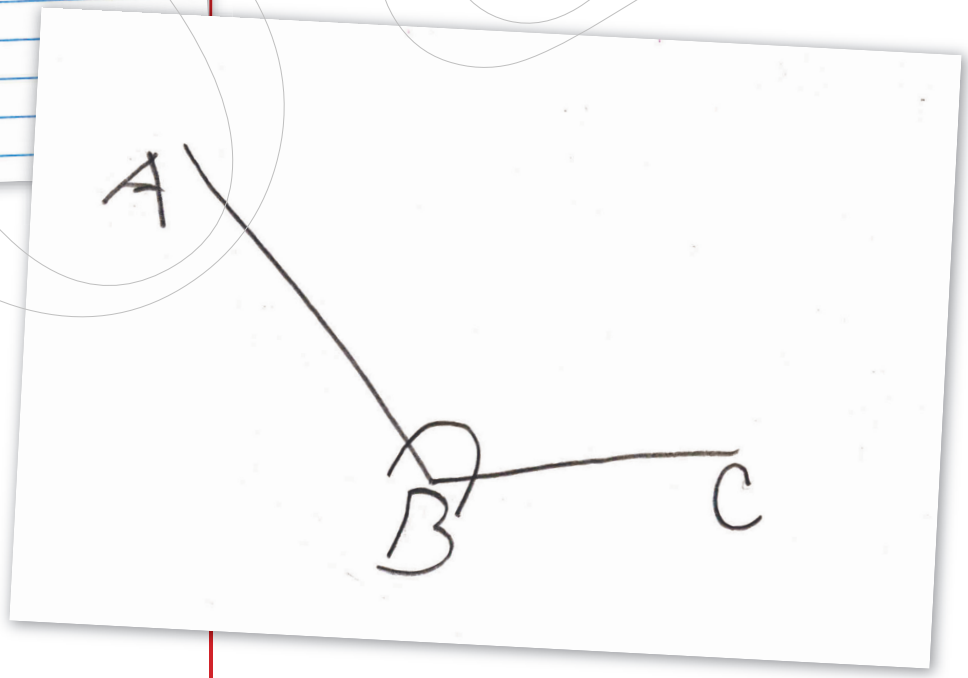
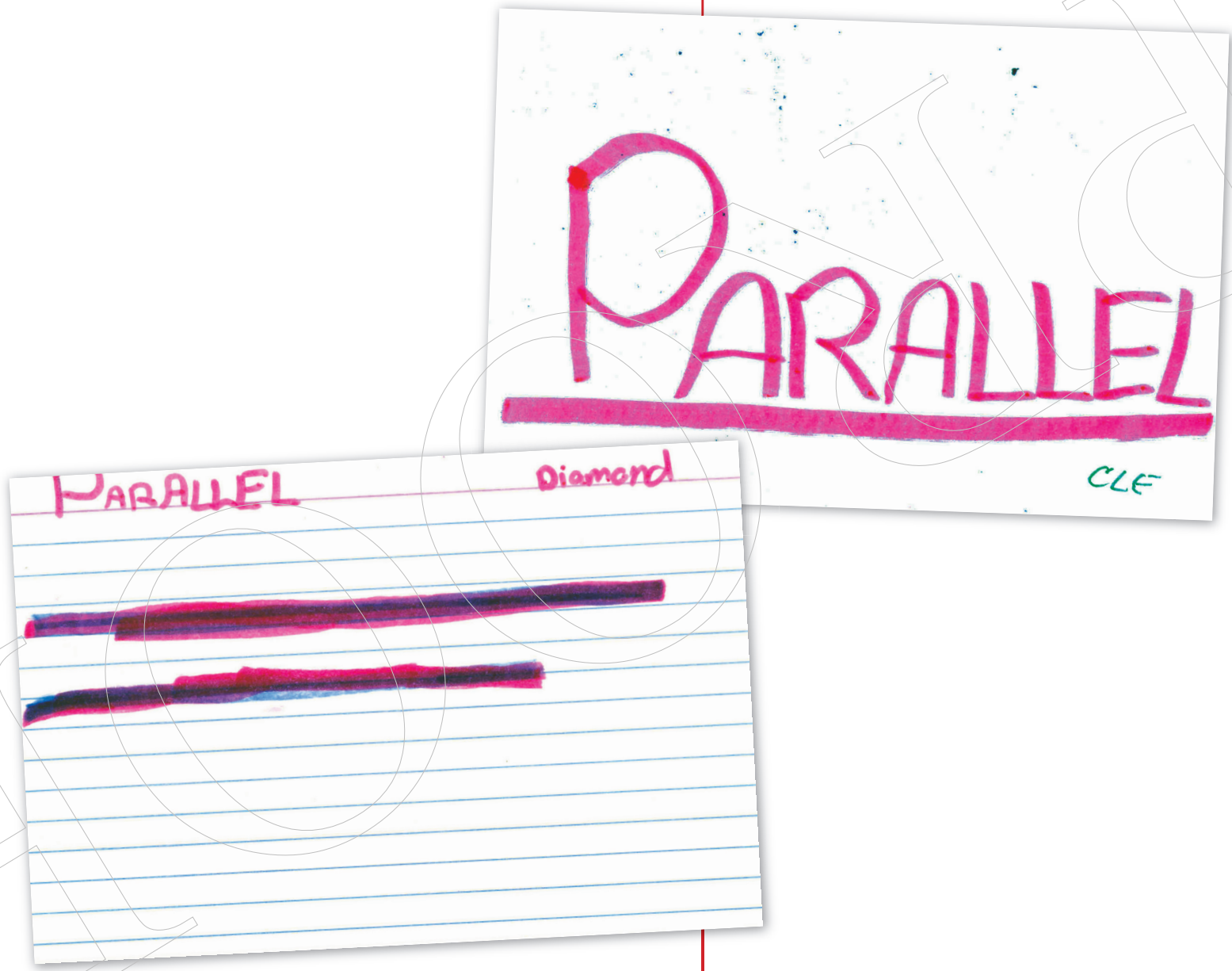

LINESEGMENT


CAMiYA

Keyshawn

OBtuse Angles




PARALLEL
CLE
PARALLEL
Diamond

Pi = (TT = 3.14)

Elizabeth Bravo
Bartow

addend

6 + 3 = 9 — sum / answer

Place value

TH	,	H	T	O
1	,	6	2	5

Picture form

expanded form 1,000 + 600 + 20 + 5

word name one thousand six hundred twenty-five

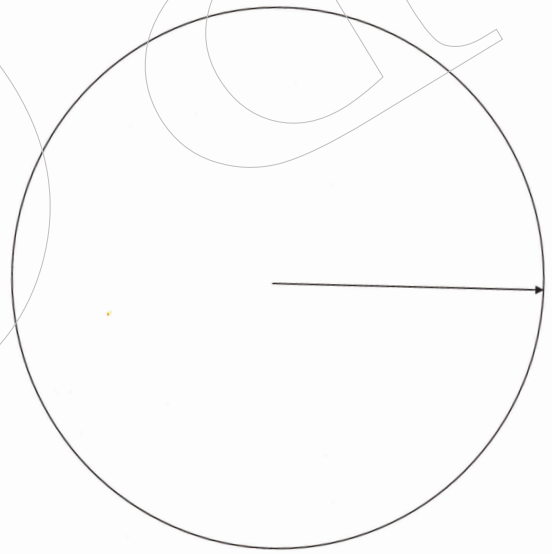
Jill O'Leary
Berkley

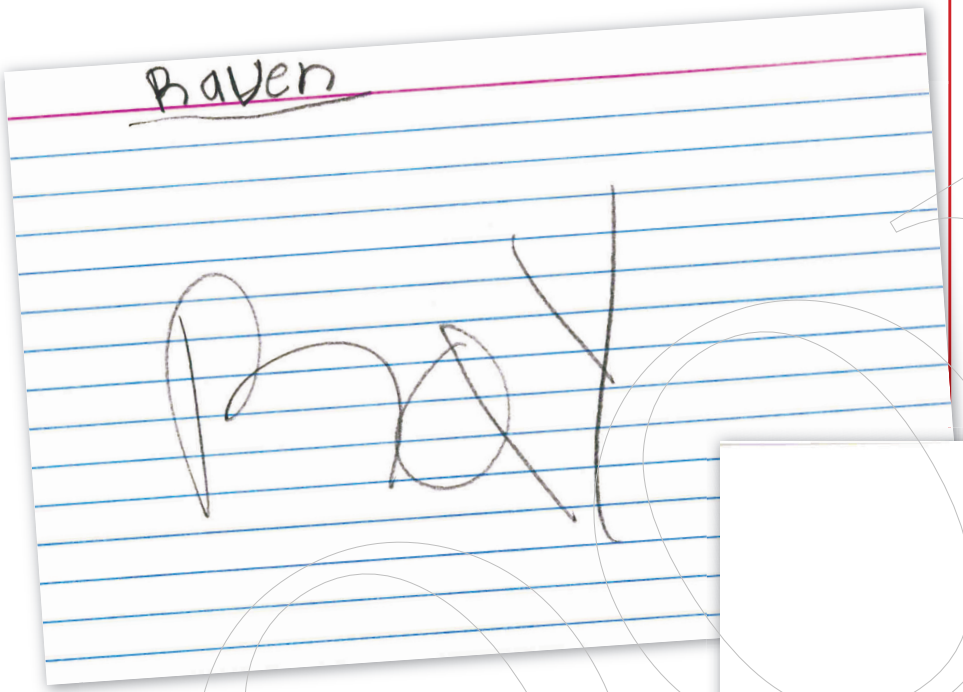
Math Vocabulary

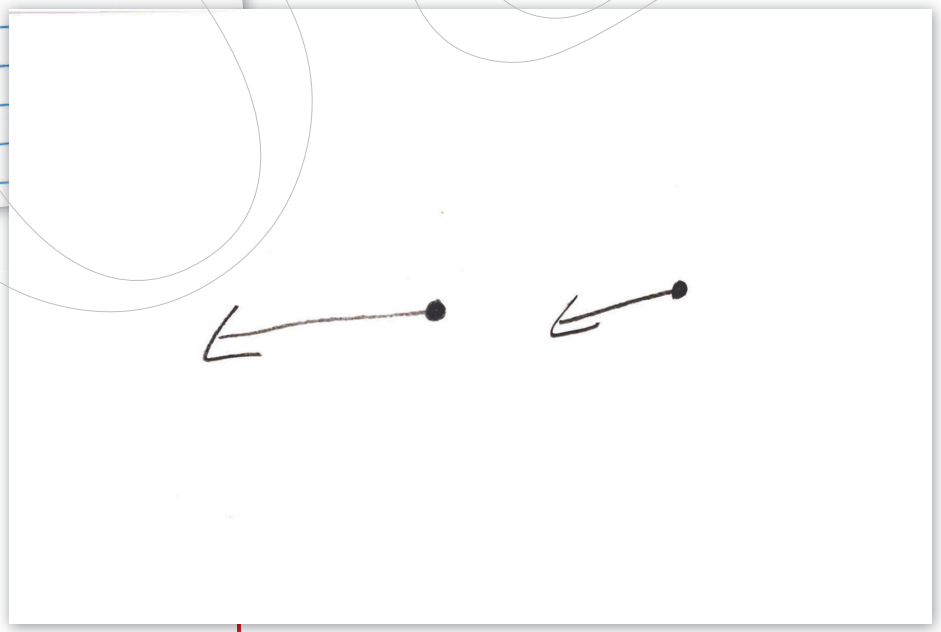
RADIUS

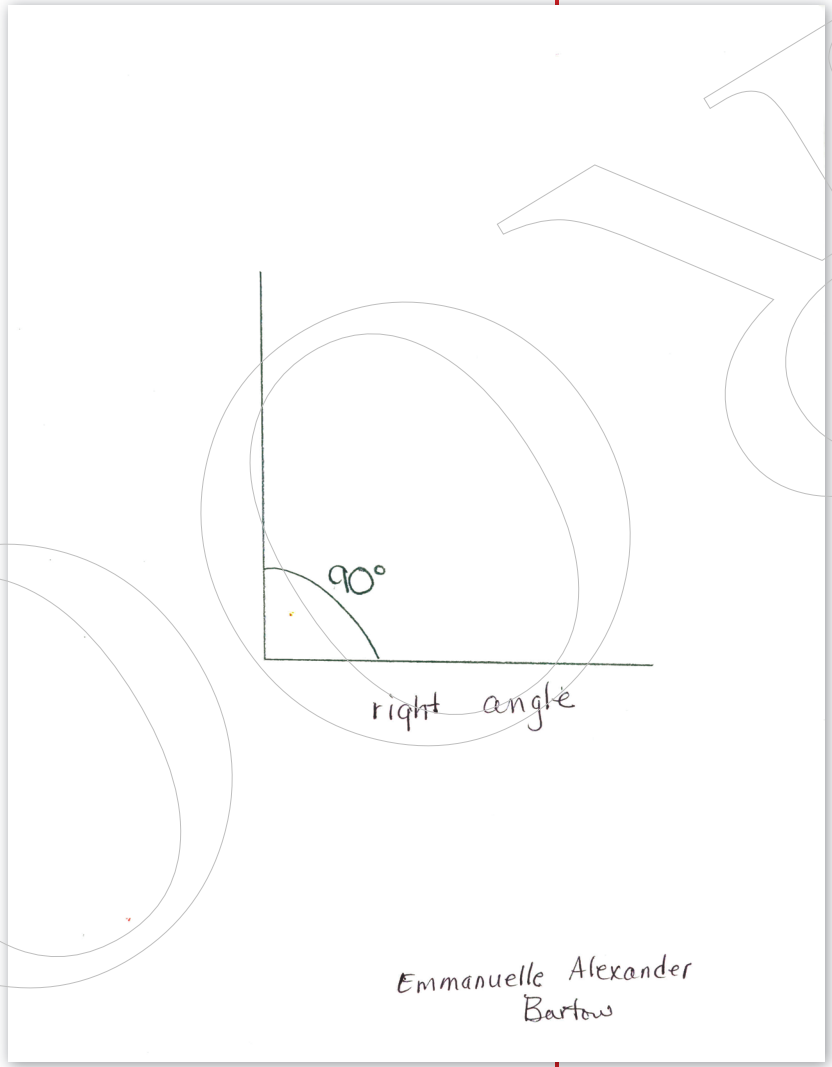
A LINE SEGMENT EXTENDED FROM THE CENTER OF A CIRCLE

Zachiel Marsh




Raven
pay




90°
right angle
Emmanuelle Alexander
Bartow

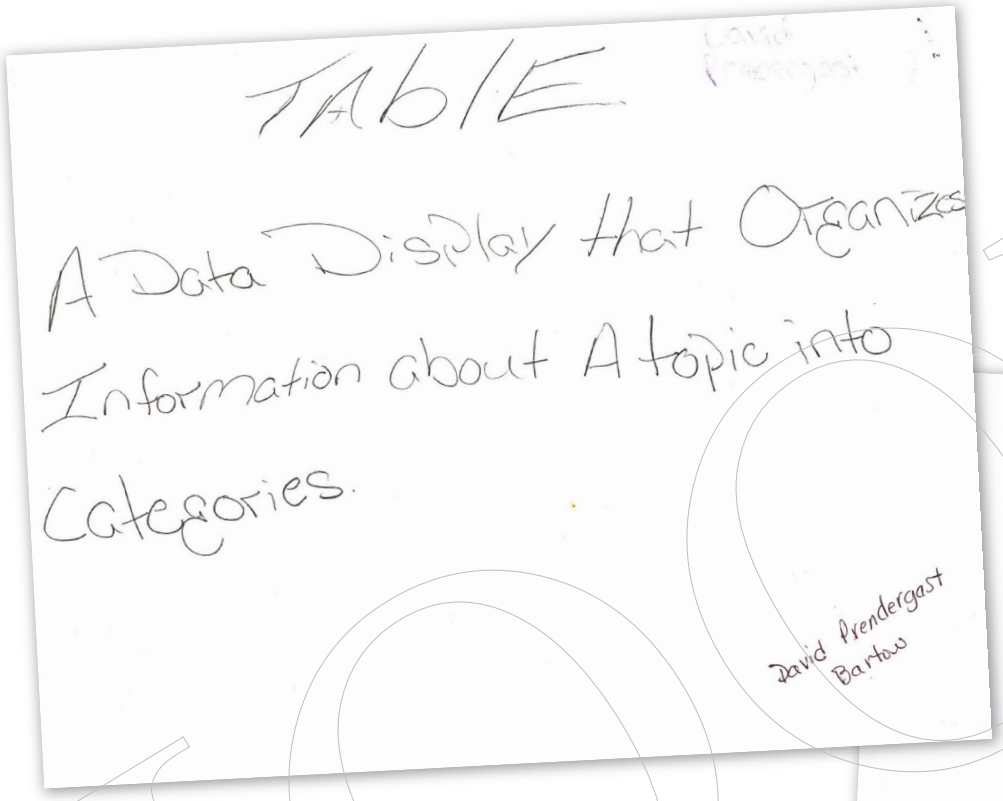


TABLE
A Data Display that Organizes
Information about A topic into
Categories.
David Prendergast
Bartow

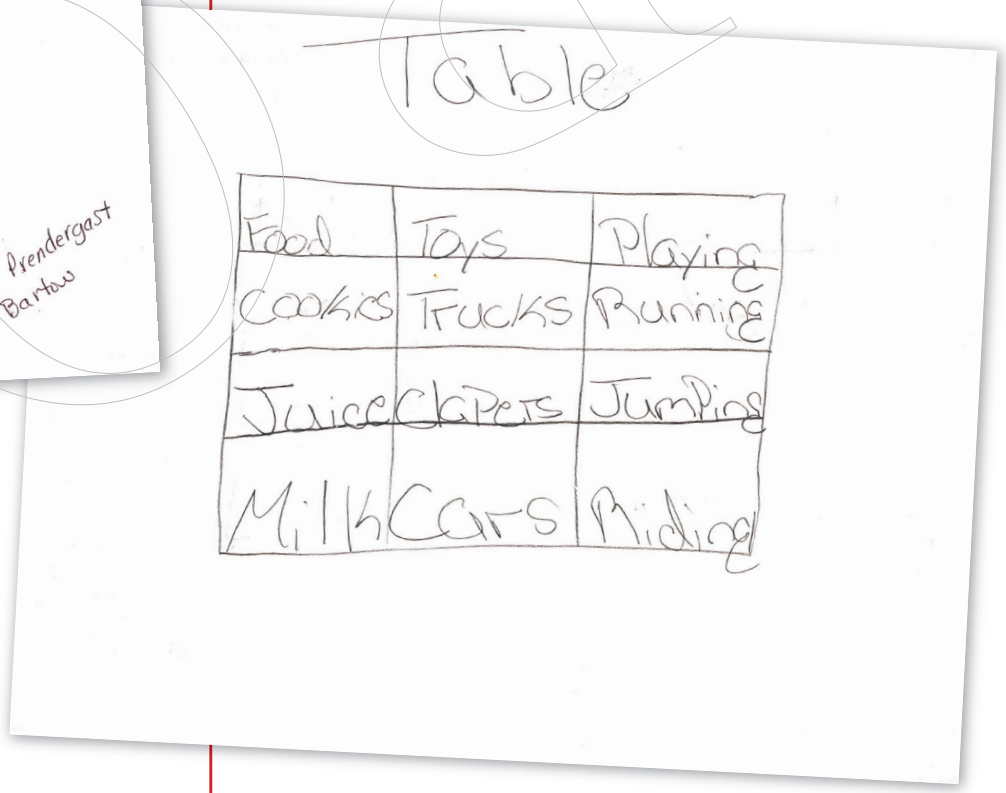
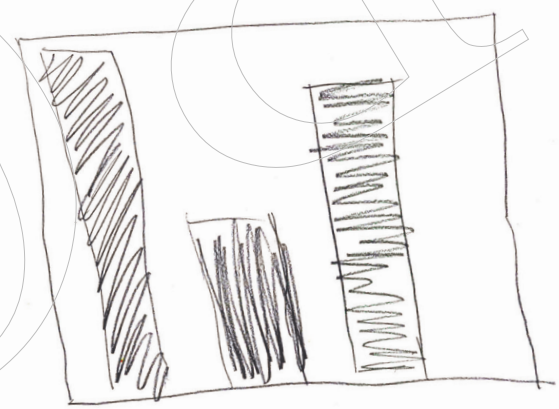


Table
Food
Toys
Playing
Cookies
Trucks
Running
Juice
Clothes
Jumping
Milk
Cars
Riding

Bar graph a graph that uses either vertical or horizontal bars to display data

Alex Torres
Barton



DIFFERENCE

A number that is the result of subtracting two numbers.

10
-10
0

3 – 0= 3

Norma Sanchez

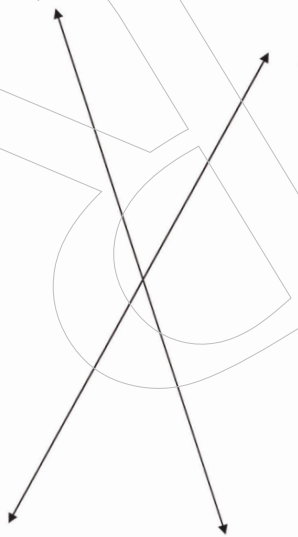
Snively

Intersecting Lines

Lines that cross at one point

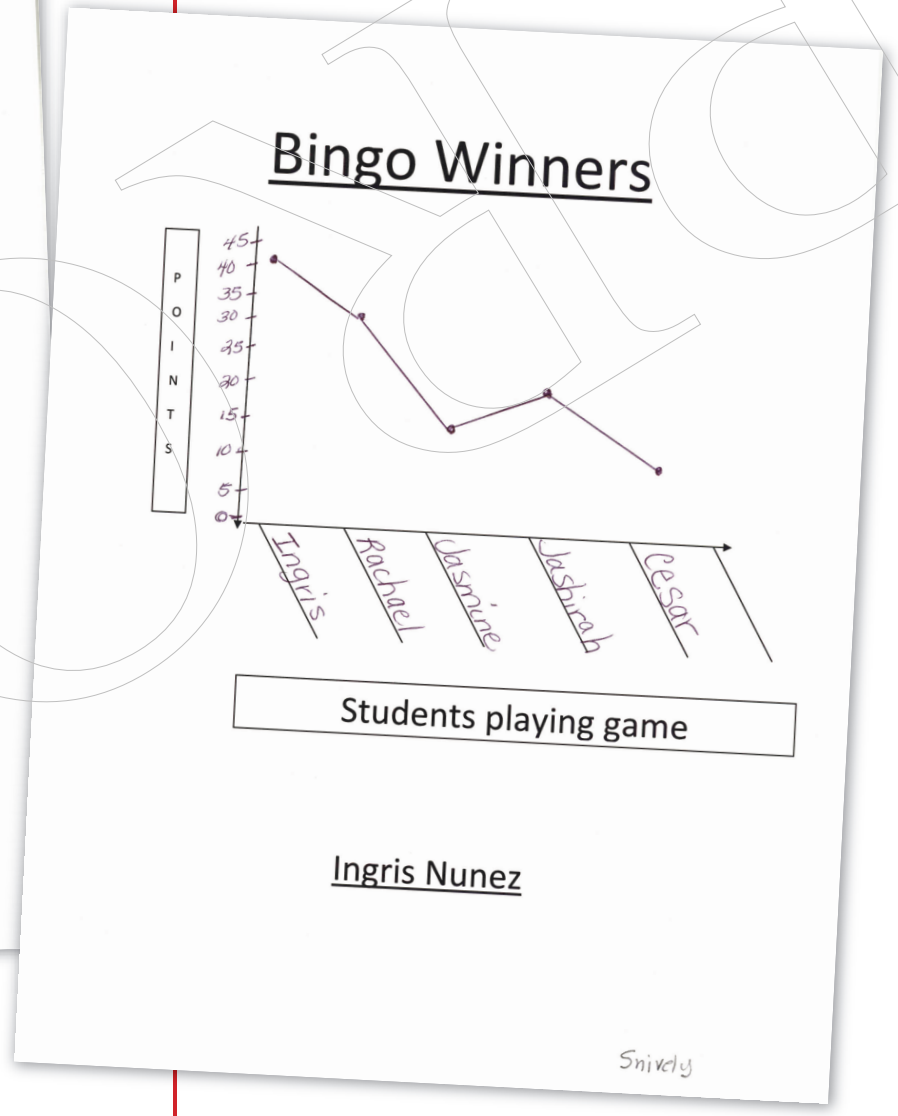
Liz Guzman

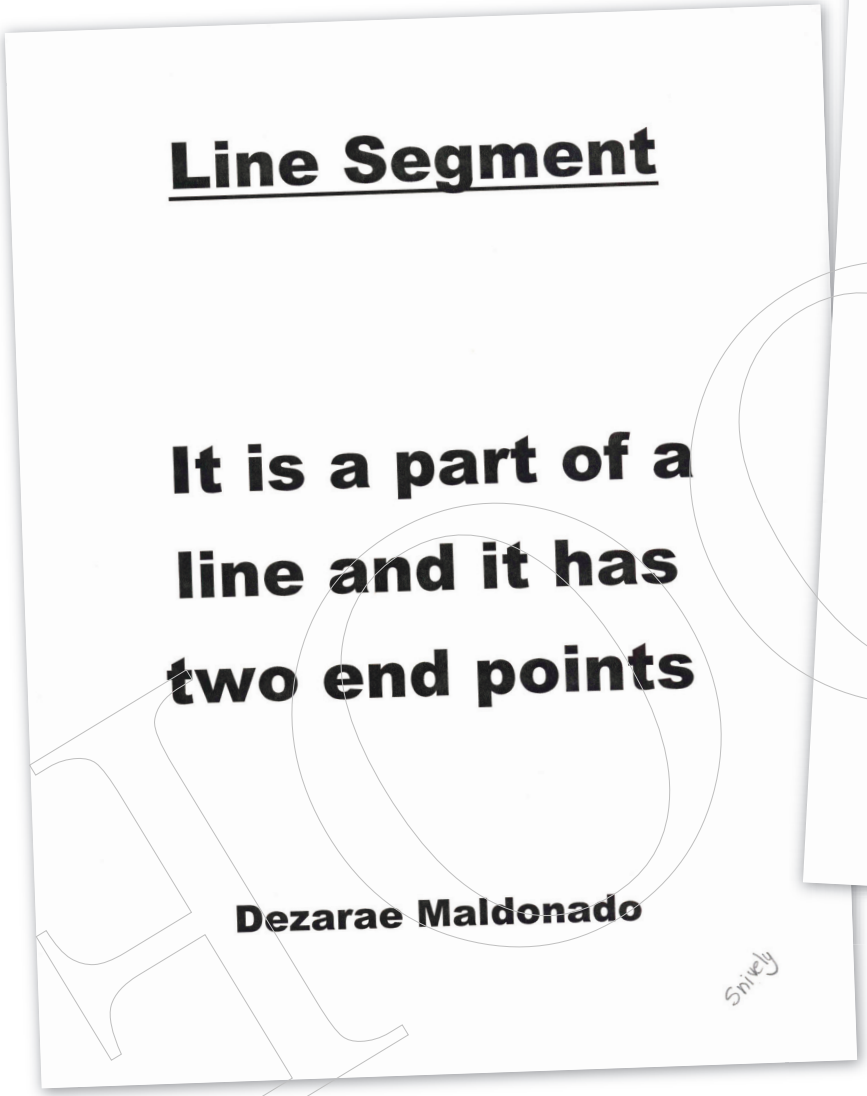
Shively

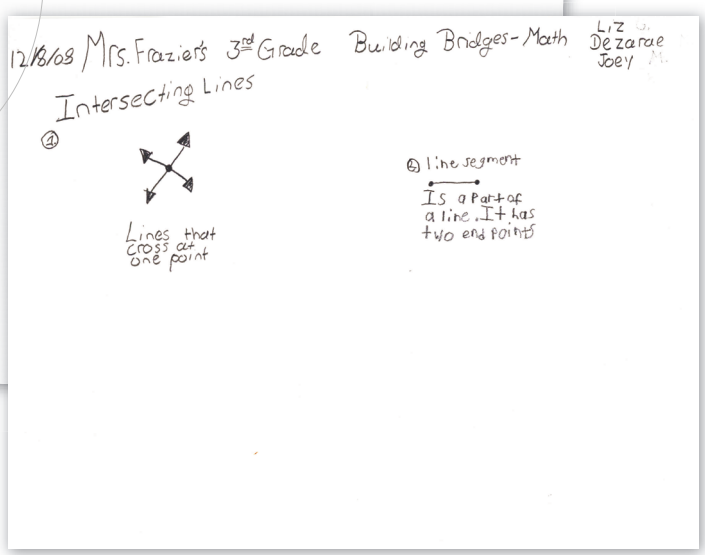


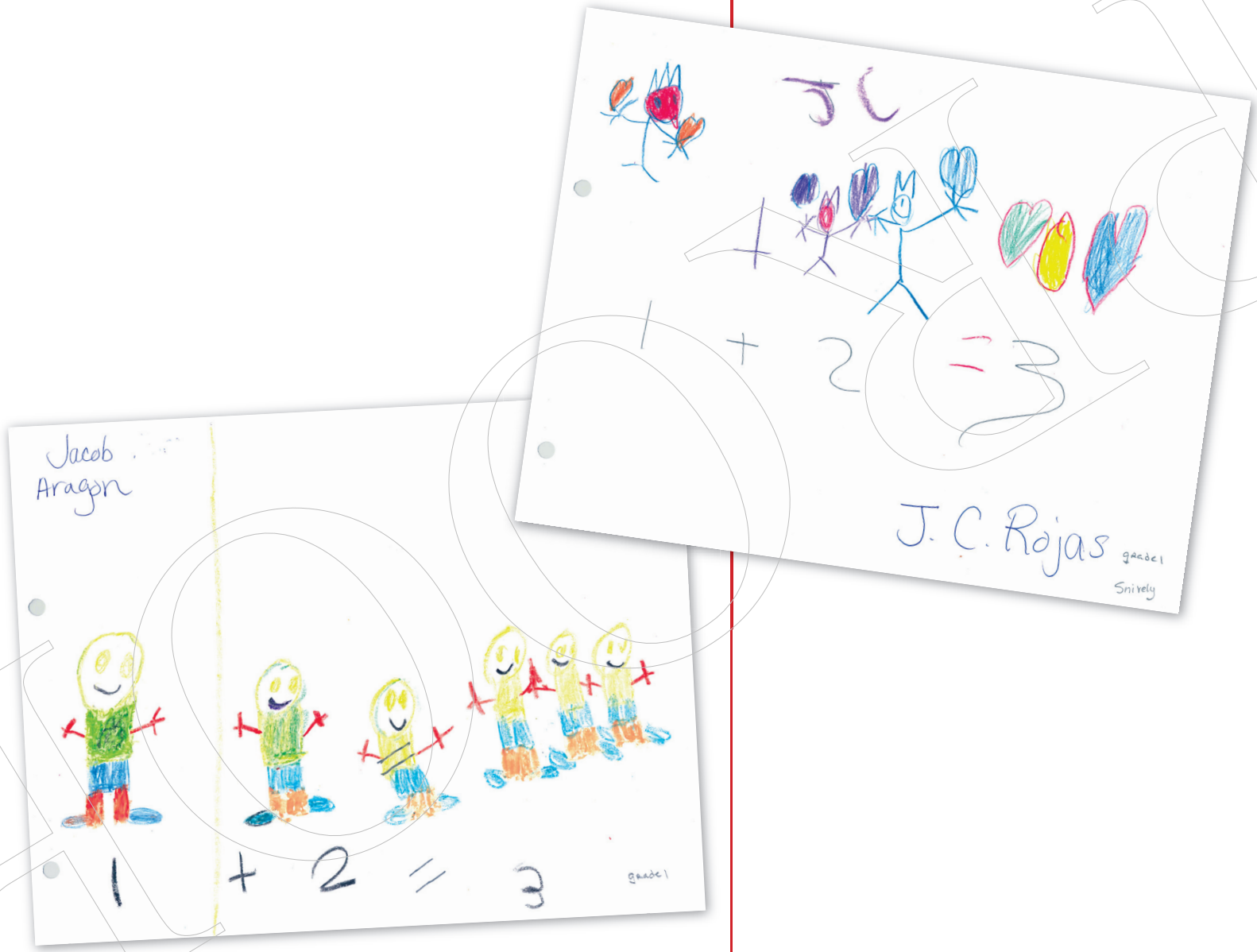
LINE GRAPH

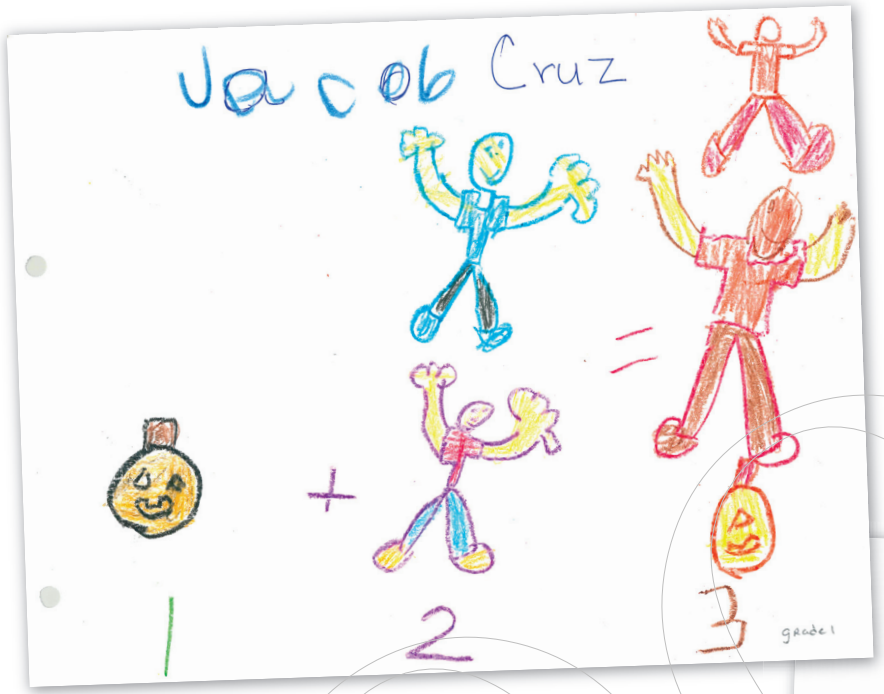
A line graph that displays data using connected line segment

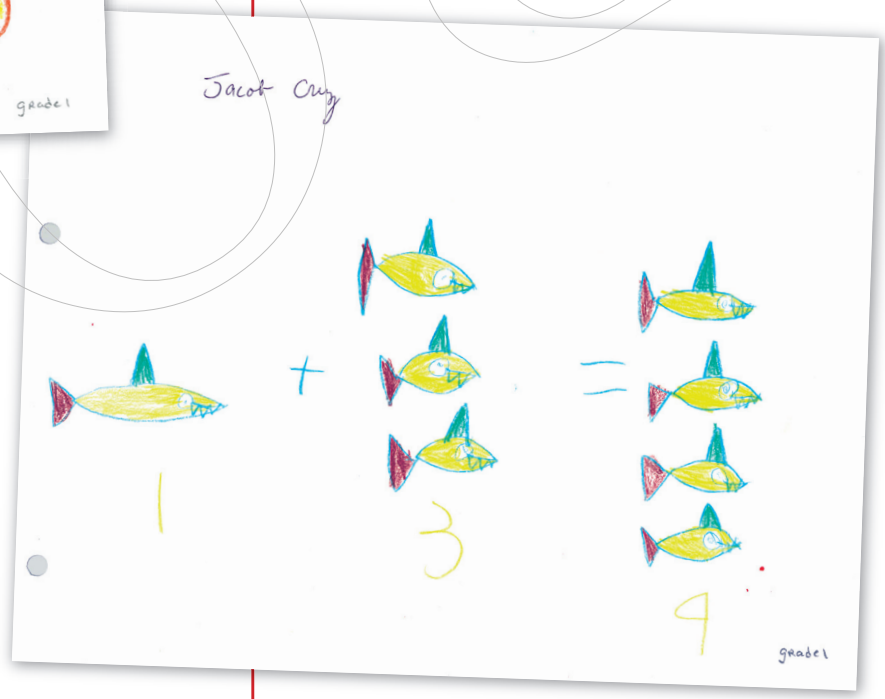



Line Segment
It is a part of a line and it has two end points
Dezarae Maldonado
Snively

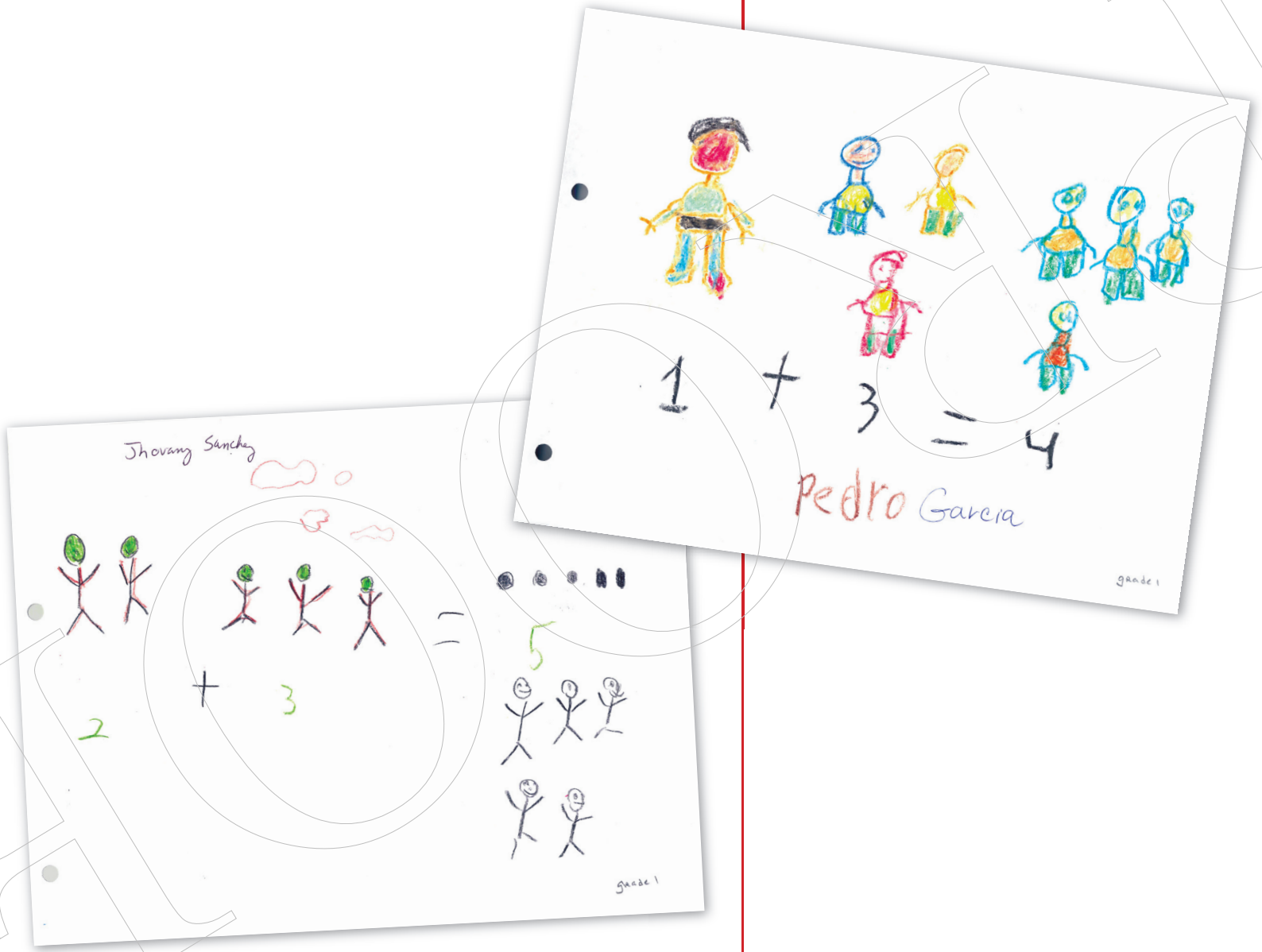

12/8/08 Mrs. Fraziers 3rd Grade Building Bridges-Math
Liz
Dezarae
Joey
Intersecting Lines
Lines that cross at one point
Line segment
Is a Part of a line. It has two end points


Jacob
Aragon
1 + 2 = 3
grade 1
J. C. Rojas
grade 1
Snively





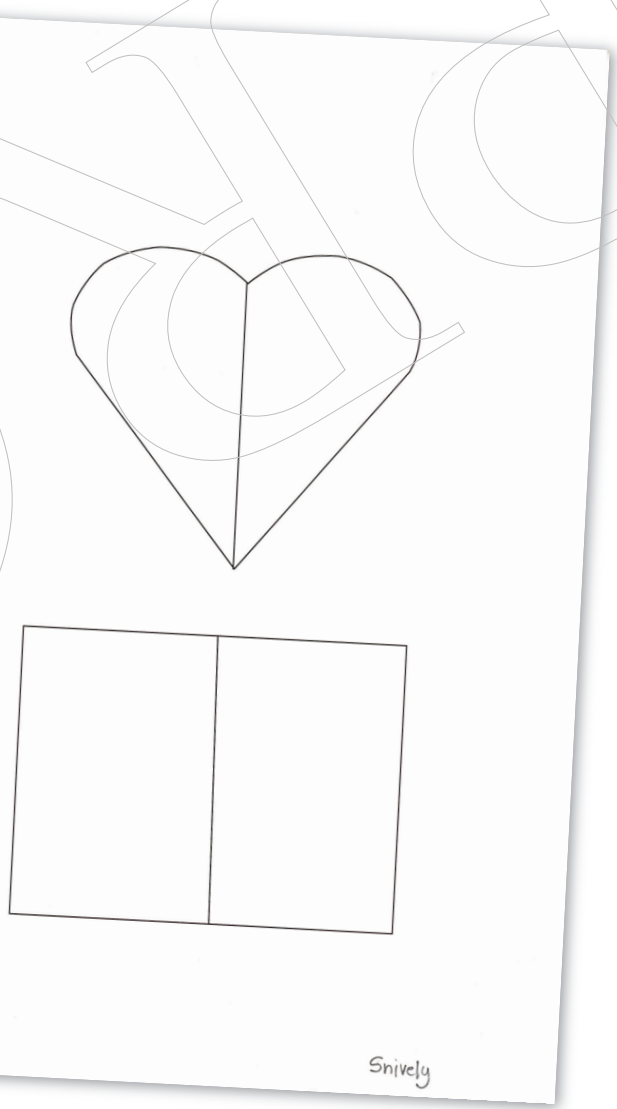
PROOF


1 + 3 = 4
Pedro Garcia
grade 1
Jhovany Sanchez
2
+ 3
=
5
grade 1

Symmetry

A term describing the result of a line drawn through the center of a picture

Maricela Ortega



PROOF

STUDENT TESTIMONIES

The Building Bridges after school Program helped me to understand that math is life. Everything is will be easier because I have experienced now been exposed to a lot of hard and easy problems that will help me to as I get older. If it were not for all the teachers and site coordinators here at the 21st CCLC after school program at my school, I would not be as prepared. Thank you!

Adileni Gomez
Bartow Middle School
Grade 6

By working on Got Math through the 21st Century After School Program, I was able to learn hands on equations that helped me in my math class.

Laquill Mason
Bartow Middle School
Grade 7

The Building Bridges After School Program helped me be smarter about math and gain knowledge that I did not already know. Math Problems are much simpler than they seem, but they can help our lives in a big way. If a sign say to go left in 3.5miles, I will recognize that is math and understand it.

Elizabeth Dellas
Compass Charter Middle School
Grade 6

These Algebraic Expressions that I have learned by working with the Goth Math? Book has influenced my life because it helped me to be ahead of the game in my math classroom as well as helps me to solve personal problems. I am excited I get to be published in a Math Book through the 21st Century program.

Kartik Amin
Bartow Middle School
Grade 7

Ever since I began doing math in my after school program, I have been doing much better in school and have really improved on my fractions. I am glad the 21st Century Building Bridges Program chose my school to be published in the book.

David Prendergast
Bartow Middle School
Grade 7

The after school program at my school has really helped me do better in math, because at first, I didn't know my times table, or how to divide. The teachers showed me how easy it was so I wouldn't be stuck and confused. Now, I understand and am not ashamed anymore when my teacher calls on me in class.

Andrea Merricks
Bartow Middle School
Grade 7

good

APPENDIX

Math Examiners Notepad

Math Examiner's Note Pad

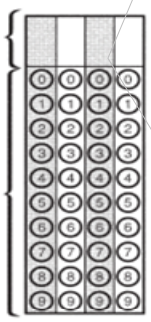
MATH BIG IDEA: _ALGEBRAIC THINKING_ CONCEPT: _____

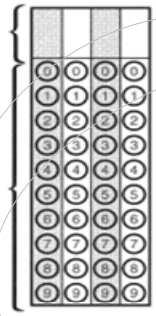
SOLVE	Draw symbolic representation of a possible solution.....	*Key Terms/definition or picture*
_____		_____
_____		_____
_____		_____
_____		

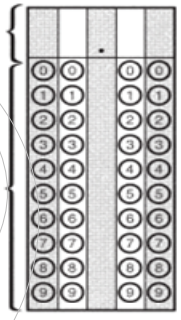
Whole-Number Grid *Percent Grid* *Decimal and Money Grid*

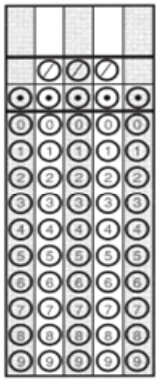
answer boxes

number bubbles









What were you thinking when solving this problem? Discuss with a friend:_____

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What strategy did you use?

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Snoop around! When can you use this type of problem at home or when you are playing? Write a problem using your personal experiences. Write solution on reverse side

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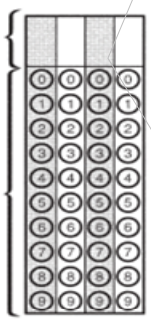

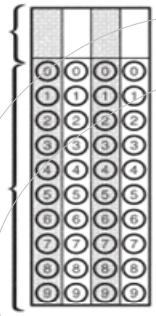

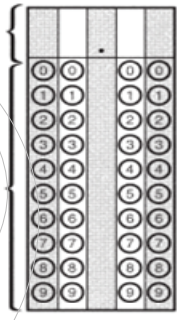

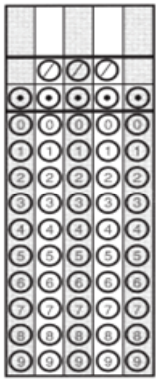

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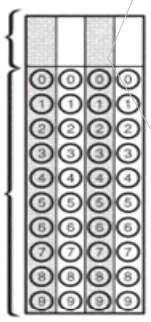

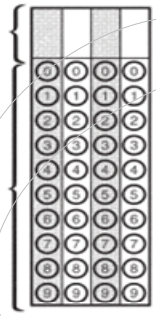

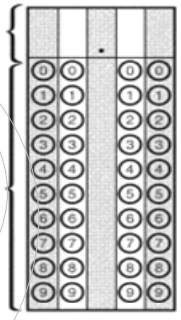

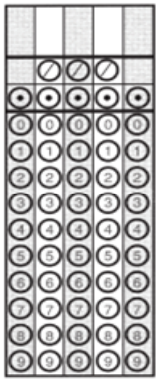

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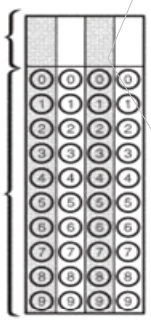

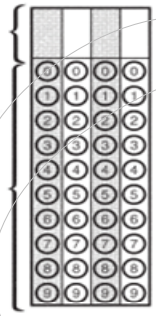

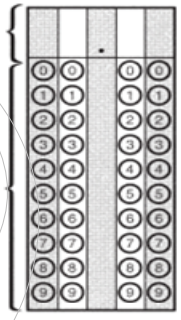

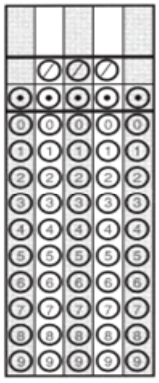

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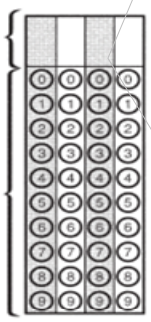

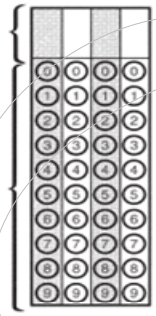

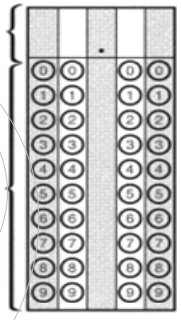

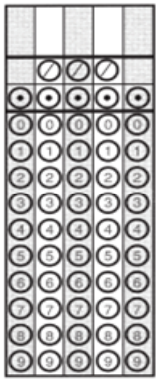

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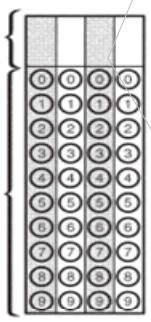

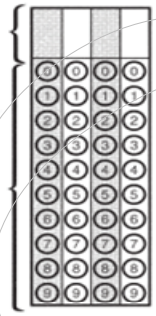

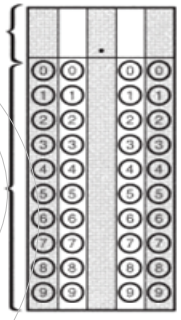

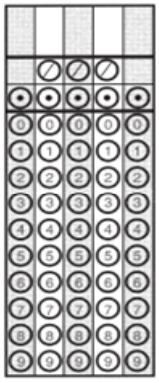

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PROOF

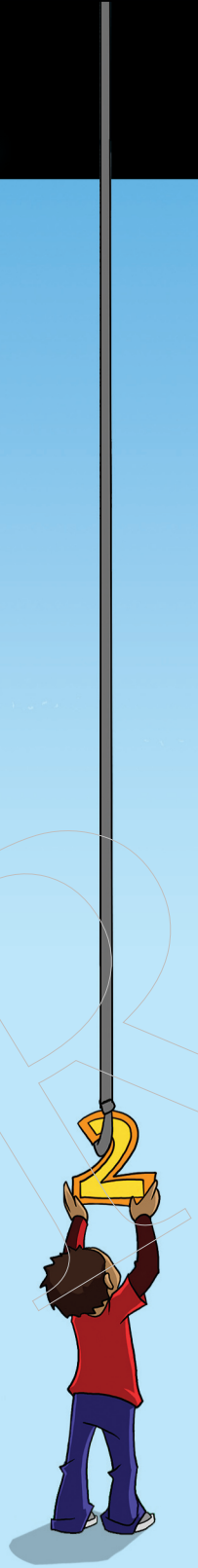
Got Math?

The creation of ***GOT MATH***! is a shining example of some of the ground breaking work taking place in the Polk County Florida school system's 21st Century Community Learning Centers Grant program. Six school sites under the direct supervision of Senior Coordinator Brenda Kearse, participated in a pilot program of seeing how middle and elementary school kids would build on their math skills through the creativity, impact of literacy, and their artistic abilities as its foundation. With research and mathematical analysis as a backdrop, Mrs. Kearse developed strategies to see how kids would perform as teachers of math, using math vocabulary from past Kaplan and FCAT tests that seemed to stump inner city kids causing a delay in understanding and failure.

The bridge of learning between parents, teachers and students is a fundamental one that has to be connected in the 21st Century. Using the same old practices for a new generation will only garner old results. Kearse recognized the significance that continued low achievement would have on the students, and took bold moves of working with an Educational Publishing company to comprise a project that will not only help positive production of skilled students, but would also garner an unprecedented side effect; self confidence, high self esteem, a sense of accomplishment and igniting an initial flame of daring to go outside the box. We encourage parents, to work with their children by using the *'Mathematician Note Pad'* included to discuss how you learn math and view commonly used math terms from nationwide standardized test. It's a fulfilling experience for any classroom, household and child. Share the magic of math!

-- Brenda Kearse,
Senior Coordinator-21st CCLC

Cover Art : Leon Harmon
Cover Design: AuthorSupport.com



As a Site Coordinator for the 21st Century Community Learning Center Grant (Building Bridges program), it gives me great joy to observe the excitement of our students working on a book that stems directly from their individual creativity. The proud behavior expressed through the students' actions as they used literary and creative skills to complete each section proved that children took their education seriously, and are committed to learning. All children have the capacity for high achievement if teachers are willing to guide and supervise as they did through the Got Math? Publication.

—Johnnie Thomas: Snively Elementary School Teacher, 21st CCLC Afterschool Program

I am floored by the enthusiastic comments from students working on the math problems for Got Math? Everyone really enjoyed Mrs. Kearse's positive attitude in administering the pilot tests and her dedication to children and education. Thanks for sacrificing your time; we have so little of it these days to solve real world problems.

—Kara Holt: Bartow Middle School Teacher, 21st CCLC Co-Site Coordinator

With Mrs. Brenda G. Kearse as Senior Coordinator of the 21st Century Community Learning Center Program, the program blossomed inspiration into a bright light enhancing many opportunities for growth. She has given me the outlook on the future possibilities and improvements that could be achieved for 21st CCLC, the lives of the children positively affected and in life. It's been my pleasure to serve under the leadership of Mrs. Kearse and look forward to the continued enhancement of the 21st Century Community Learning Centers Program.

—Kathy McKean: Secretary III, 21st CCLC

On a classroom visit, I was able to show the students how to use practical relevant examples to their lives like video games, going to the movies and music, to understand how that correlates to math, using the artistic and creative methods Kearse implemented, and the light bulbs went on. Kearse and the 21st CCLC Grant Program truly understood and met the need of the children…that's what has been lost.

—Isaac Rosier, Jr.: IRJ Financial Services, College Planning and Financial Educator

On a brief informal interview with some of the ESE students who participated, we found a sense of pride. Students stated that they understood more about how math is used in elections and how important numbers can be and how they are now realizing the relevance in Math in places like the polls on Election Day. Some students stated that writing a math problem was harder then they thought because they had to make sure the information given could be used to come up with a solution, and that writing a math problem also made them think of the steps one has to take and in what order to be able to solve the problem correctly.

On a personal note, from a teacher's perspective, I think this project made the students realize that they need to pay attention to **how** a question is being asked as well as to **what** is being asked. The joy of watching them understand and be able to explain what the concepts involved in the problem were and why they had a difficult time coming up with some of these answers were amazing. We need to raise the bar in approaching what we require of our students and incorporate higher level thinking problems.

—Nidia Cruz: Westwood Middle School , Math Teacher Trainer/ Co-Site Coordinator.

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