GEORGIA COUNCIL of TEACHERS of MATHEMATICS
GCTM

REFLECTIONS

Vol. LI No. 1 Winter 2005

In Memorium

Dr. Billy Earl Bompart

1934 - 2004

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REFLECTIONS

Vol. LI No. 1 Winter 2005

SPECIAL REFLECTIONS

REGULAR REFLECTIONS

New Beginnings

President's Desk

by Dottie Whitlow
GCTM President

I am honored to begin my term in service to you as the President of the Georgia Council of Teachers of Mathematics. This is a new beginning for me and I hope to serve well, and grow and learn during our time together.

Over the course of a lifetime career in education, we naturally experience 25-30 new beginnings. These are imposed on us with the start of each new school year. But who says that we can only have new beginnings or new years in the fall? Why not more frequent new beginnings? Twenty-five new starts just might not be enough for a lifetime!

New beginnings can occur any time. They start with a change of one's mind or of one's heart. They happen when we are faced with realities and challenges that force us to change what we are doing, such as adding new members to our families, getting information about our health, moving to a new town or city, holding friends' and families' hands and hearts while they cope with tragedy or loss, or facing realities about our situations, lives, or habits.

What about our careers? New beginnings can also start there with a change of mind or a change of heart. My approach to grading homework changed when one of my 8th grade students, 13 years old and 8 months pregnant, asked me for help. When she arrived home from school the day before, her mother had sold the dining room furniture for her latest drug adventure and left her at home with 3 children under the age of 7 to care for. Checking on the younger children that day, we learned it was the first time during the school year they had arrived to school on time. She had made it happen.

That day, my head and my heart made me realize that though I thought homework was one of the most important features to learning, it was the last thing on the minds of many children living with adults who do not do what they should for their children. You know such children. You know their names and faces. In many cases there is no "well-lit, quiet place, with sharp pencils" to study and work at home. So, with my change of mind and heart, I decided that homework would only "help" the students who did it, and refused to let my students dig themselves into an endless hole of failure due to a daily string of zeroes from undone and incomplete homework.

My point is not that you should change your homework practices, but to illuminate a situation in which I decided to make a new beginning. I didn't wait until the following August to make this change. You can change your life when you change your mind.

New beginnings can be equated to change. It is such a curiosity to watch teachers as we meet change. When I ask teachers what they want for their students each year, they often reply, "for them to grow and learn." When I ask if they want their students to be the same in May as they are in September, they say, "no." Well, if they are not the same, then they are changed.

So change—lasting, positive change—is the essence of our work with students. Then why are we, the teachers, generally reluctant to change or try new things in our practices and classrooms? Of course, some of you are reading and saying, "That's not me! I signed the 'I am still learning!' banner at the GCTM

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annual conference this year." You are to be thanked, commended, and cloned! You need to reach out to encourage and support others.

But many of us are reluctant to change. How do I know this? I know this from many perspectives. One is the fact that the Georgia Council of Teachers of Mathematics is the thirteenth largest affiliate of the National Council of Teachers of Mathematics (NCTM). This means that of ALL the mathematics organizations in the nation and world that are affiliated, associated, related, and connected to the NCTM, we are one of the largest. Yet, no matter how you cut the rankings, ratings, and scores, our state posts mathematics achievement scores that are at the bottom of the heap of the 50 states.

What I am left to imagine from these two sets of incongruous data is that many of us must be watching and nodding at the research, developments, and changes in mathematics teaching and learning but not altering our practices to change and improve our students' mathematics achievement.

Perhaps some may still be waiting to see if the demands and expectations will fade. The NCTM standards came out in draft in 1987. Anyone still waiting has waited nearly a career's worth of years! Those of us committed to continuous learning, who have been implementing research-based best practices, need to reach out and support others. By our sheer number of members, we can and *should* be making more of a difference.

Another perspective I have comes from visits to schools and teachers around the state. Through my job, I have logged over 110,000 miles on my car—and many more with air travel—to work, discuss, and support teachers, schools, and systems with the implementation of research-based best practices in mathematics education. Change is hard. But just as the research informed us, when applied, these best practices produce results!

What is the biggest change/new beginning that we face in Georgia? The state of Georgia has brand new Georgia Performance Standards (GPS). Do you know what else GPS commonly stands for? Global Positioning System. Yes, not only will the GPS offer specificity and clarity to teachers and learners all over Georgia about expectations for learning, but it also has the potential to "position us globally." Throughout the nation, districts, schools, and organizations have adopted performance standards, but Georgia is the first *state* to do so.

Last summer, GCTM offered a geometry academy designed for the geometry of the 6th grade GPS and high school. Next summer, we will do the same to support the roll-out of 7th grade, high school, and the primary grades. Come be a learner with us! **Invest in your new beginning!**

Remember: a new beginning starts with a changed mind, a looming and unpleasant consequence to maintaining the status quo. There are potential new beginnings with every semester, every month, every week—each day! One of the most negative, devastating reports we can deliver to a parent is, "S/he won't even try." What about you? Are you willing to try?

When will you start your new beginning?

Change your mind; change your life.

Memories of Bill Bompart

In Memorium

Dr. Edward Pettit, colleague

(excerpt from Bill's retirement "roast")

"I have known Bill Bompart for 25 years, first as a colleague, then he was my boss, then I was his boss, a couple years later he became my boss's boss, finally he is my most recent boss's boss. And if he had worked one day after July 1, he would be back to being my boss. But if we could talk him into teaching a math course next year, I could be his boss's boss.

Besides the ASU relationship, he and I have a number of interconnections. He and my father graduated from the same seminary, though about twenty years apart. His daughters babysat for both of my children. His grandson and my son graduated from high school together and both attended Augusta State and Georgia Tech. So over the years we have had numerous casual conversations about our families.

There is something that connects mathematicians to gambling, namely statistics. But it seems to be more than just an academic topic or discipline. With Bill, I noticed that when he went almost anywhere to a professional meeting he usually found a way to go via Las Vegas or Reno. He used Saturday layovers and 2 for 1 nights in hotels so that it didn't cost the department any more money. But it was interesting to have to approve a travel request with an itinerary for a trip to St. Louis that included two nights in Las Vegas.

Last week in the Augusta Chronicle article he mentioned that he will still be giving talks at professional meetings. My expectation is that for a number of them there will be an unusual route going to or coming back from the conference that somehow goes through Nevada."

Dr. Nancy Brown, student

I first met Bill Bompart in 1968 when I entered college at what is now Augusta State University where Dr. Bompart was assigned to me as my college advisor. Through my college years Dr. Bompart was my guide and my teacher for several math classes who became a friend as well. Later as I worked on my Master's Degree, my friendship with Bill deepened as he taught me even more mathematics and became my cheering committee as I struggled to juggle my several roles as teacher, mother, wife, and student.

A few years ago as I contemplated returning to school to pursue a doctorate, I called Bill to chat. I mentioned that I was considering working toward a doctorate and that I was concerned that I would be 53 years old when I finished. Bill, in his inimitable way, asked me how old I would be in 5 years if I did not pursue the doctorate and encouraged me to "go for it." Both he and I were delighted when I found out that I could include him in my doctoral committee.

What a kind and supportive friend he was during this process. I would send him parts of my writing by e-mail which he would print out, edit, and return to me. I told him once that I knew that I owed him a supply of red pens since he had used at least a dozen editing my writing. If you asked me how I would describe my relationship with Bill I would tell you that Bill was like a most favored uncle. I truly loved him and I know that he loved me. Bill was a once in a life

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Georgia DOE

Georgia Performance Standards Explained

by Carolyn Baldree
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Wow! I hope that you are as excited as I am with the GPS Training that has taken place for the past three months. It has been well received, and I am more convinced than ever that our mathematics teachers are A-No. 1. Following are some of the most frequently asked questions I received during the training, along with their answers.

How will the State maintain and guarantee a viable curriculum since the Board approved only the Standards and Elements and not the tasks, student work, and teacher commentary?

The Curriculum and Instruction Division has a task posted for every standard being rolled out this year. During the System Level Training this year, participants will be asked to submit student work samples, teacher commentary, and additional tasks. The C&I Division is setting up a peer review process before posting on the web. By the beginning of Implementation Year 2, there will be additional tasks and student work posted to guide teachers in planning and implementation. This process will be ongoing and will continue as teachers work with the new curriculum and when new content areas are phased.

How many or what percentage of the elements must be successfully completed for a student to "meet standard"?

It is important to remember that the standards must be met by the end of the year. A student should not be judged on a single assignment on whether or not he or she has met the standard. The elements are not discrete learning units, or do they form a checklist of skills that must be mastered. Teachers will have to make judgments as to whether a student has mastered a concept, not whether he or she demonstrated a skill, in order to determine whether a student has met the standard.

Will the GPS be aligned with the College Board Standards? (SAT, etc.)

The GPS will be aligned with the Springboards Curriculum published by the College Board for preparation for the SAT.

What is being tested the standard or the element?

The standards are tested at the element level. The Testing Division will be developing CRCT and EOCT Content Descriptions that will outline what will be tested in the new GPS and it will be published Spring 2005. Nevertheless, all standards are assessable and should be assessed at the classroom level. Remember, the requirement for performance standards is that students must produce evidence of learning.

What are ways for students to determine if they have mastered the standard and can move to the next level?

Students will need to be taught what the standards are and can be given tools such as rubrics that clearly define expectations. Students should set their own learning goals and begin to self-asses their own progress. Students should be shown samples of student work that meets the standard so that they can have examples of what is expected for meeting the standard.

Will the EOCT be aligned to the GPS?

Yes.

Will the CRCT and EOCT be performance-based assessments? No.

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Kudos All Around

Executive Director

by Larry Elbrink
Executive Director
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Our congratulations are due to Cathy Franklin, the Program Committee, the GMC Board and all who helped make Rock Eagle '04 such a huge success. I want to especially recognize Shanti Howard for serving as the Georgia Mathematics Conference Board Chair during this past year. Becky King will assume the duties of Conference Board Chair for 2005. Becky has much experience with the conference and will guide the Board well. Also, Dr. Lynn Stallings is retiring as Conference Coordinator after a terrific job these past years. Nickey Ice is assuming the duties of Conference Coordinator with the 2005 conference. If you have any suggestions or would like to help with the conference in any way, I am sure Becky and Nickey would love to hear from you.

Another milestone in assistance to the membership was accomplished at the '04 Conference. GCTM has become a Professional Learning Unit provider. Over 200 participated in the PLU program at Rock Eagle. As with the former Staff Development Unit program, PLU credits allow a teacher to renew their certificate with credits earned in an approved program and also approved by their local school system. The process worked well for this first year. We will be evaluating the process and your input will be of help. If you have any suggestions for how the process could be improved or any comments in general, please contact me at lelbrink@accessatc.net or via mail at the corporate office address. Also in addition to the conference and the academies we need to know what other opportunities for PLU credit that you, the membership, would like to see sponsored by GCTM.

GCTM has become a Professional Learning Unit provider.

Dr. Dottie Whitlow is beginning her two year term as President of GCTM and I know that Dottie will be looking for your support as GCTM continues to develop as a positive force for excellence in mathematics education in Georgia. All of our officers solicit your input and support as they lead GCTM during the transition to the new Georgia Performance Standards.

Last but certainly not least, congratulations and thanks are due to the retiring officers of GCTM. Dr. Tom Ottinger inspired, kept us moving, and sometimes pulled us along in revising the structure and operation of GCTM. Tom is now serving as (immediate) Past President.

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time kind of friend and I am truly glad that I knew him. His influence on my life is immeasurable.

Susan Craig, student and friend

Dr. Bompart came to Augusta College the quarter I began my freshman year there. He was my advisor, both undergraduate and graduate level, and taught me at least 6 of my courses. He was an exceptional teacher who loved mathematics and humor (a very dry humor), as we well know. Most importantly, he was a man of integrity which was beyond reproach. Always having a smile for every-

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Ask & Reflect

Questions, Graphs, & Glyphs: Engaging Ways to Teach Data Analysis to Young Learners

by William O. Lacefield, III, Ed.D., Assoc. Professor of Mathematics Education, Mercer University, Tift College of Education, LACEFIELD_WO@Mercer.edu

According to the National Council of Teachers of Mathematics, instructional programs from pre-kindergarten through grade 12 should facilitate students' formulation of questions that can be addressed with data; the collection, organization, and displaying of relevant data to answer such questions; the selection and use of appropriate statistical methods to analyze data; and the development and evaluation of inferences and predictions that are based on data (National Council of Teachers of Mathematics, 2000).

In the past, data analysis was too often neglected in the early grades. However, children are naturally curious about the events they experience and about the world in which they live, prompting them to raise a variety of questions: "How many?" "What kind?" "How much?" "Which of these?"

Innovative and creative teachers recognize that these questions are effective starting points for exposing young learners to the importance of gathering and thinking about data.

Young children enjoy designing questions about their families, their classmates, their pets, and events they have experienced:

"What types of pets do fellow students have?"

"How many people are in each student's immediate family?"

"How do classmates travel to school—by walking, carpooling, or riding the bus?"

"What are children's favorite kinds of dessert?"

"What after-school pastimes do students enjoy—sports, arts and crafts, watching television, reading, or other activities?"

"How many books does each student read in a month?"

Knowledgeable teachers capitalize on young learners' penchant for asking questions by planning and implementing lessons that allow for the collection, organization, and discussion of data. Graphs and glyphs provide rich opportunities for children in the early grades to represent collected data..

> Knowledgeable teachers capitalize on young learners' penchant for asking questions . . .

A graph summarizes data in a concise and pictorial form. Many graphs used in early elementary classrooms are bar graphs of one form or another. Beginning in pre-kindergarten and continuing through all of the elementary grades, teachers should find creative ways to integrate graphing in many of the lessons that they teach, always being mindful of children's development and the age-appropriateness of activities.

Generally, graphing experiences progress through four overlapping stages: concrete, concrete-pictorial, pictorial-abstract, and abstract (Cathcart, Pothier, Vance, & Bezuk, 2003). Young learners' early graphing experiences should involve constructing graphs with concrete materials. Concrete materials are the actual objects being examined, not pictures or abstract representations of the objects. In their initial experiences with graphing, students might be asked to com-

pare only two events or things.

For example, each child might be asked to remove one shoe. The teacher could then facilitate the construction of a graph on the floor of the classroom. (Shower curtain liners make excellent backgrounds and help to focus students' attention to the data being represented.) Shoes could be categorized according to type (laces versus no laces), according to color (white versus not white), or according to another chosen dichotomous characteristic (open-toed versus closed-toed, for example).

A similar graph could be developed based on students' favorite fruits. The items placed on the floor graph would be real pieces of fruit (apples and oranges, for example), rather than pictures of fruit.

As students become comfortable with creating and observing graphs that compare two events or things, the teacher might add more categories. With the shoe graphing activity, for instance, students might categorize shoes into three groups: tennis shoes, dress shoes, and sandals.

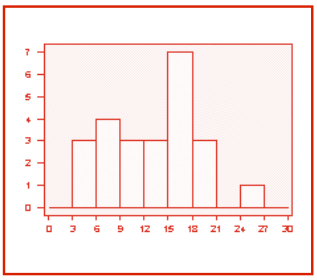
Additional concrete graphs could be designed using students themselves as concrete representations. The teacher could facilitate the creation of "human bar graphs" based on children's gender, hair color, eye color, type of clothing worn, or other characteristics of the teacher's or students' choosing.

Regardless of the items that are used in a concrete graph, the teacher must be careful to align objects so that they show one-to-one correspondence. When using a shower curtain liner as a background, for instance, the teacher might want to use colored masking tape to create a grid. Each object would be placed in a rectangle on the grid, making it easier for observers to identify the numbers of objects in each category. If children did not have designated places in which to set objects, they might position objects in one row very close to one another and objects in another row more spread apart. In this case, students who have not developed the ability to conserve number quantities under varied configurations might indicate that a row with large spaces between objects contains more objects than a row in which objects are placed tightly together, even though the opposite might be true.

After students have been involved in a variety of activities using concrete graphs, the teacher may help students to make a transition to the concrete-pictorial stage. In this stage, students might discuss and explore questions similar to those from the concrete stage, but graphs can be created using pictorial representations of concrete objects. Following a class discussion of students' favorite types of ice cream, for example, each learner could draw and color an ice cream cone containing his or her favorite flavor (perhaps from a limited number of choices). When comparing hair color, each child could be given a small square of paper on which to draw his or her face and hair. To explore students' choices among after-school activities, children could draw pictures of themselves participating in sports, reading

or watching television. In each of these examples, the pictures would be used to create bar graphs. The teacher and students would still need to be careful to show one-to-one correspondence among the categories included on each graph.

As elementary students mature, they develop the ability to create, examine, and discuss pictorial-abstract graphs, in which, for instance, a red square might represent an apple and a yellow square might represent a banana. Eventually children become ready for the abstract stage of graphing, in which one-to-one correspondence is replaced with a one-to-many correspondence. In an abstract graph, for example, one square on a bar graph might represent ten people.



Regardless of the level at which students are functioning, teachers should encourage students not only to pose questions and create graphs, but also to reflect upon data being shown in graphs. Many rich questions can arise from a graphing experience. In the favorite ice cream flavor lesson, for instance, the teacher might ask:

> What fruit was selected as the favorite of most people?
>
> How many more students selected an apple than selected an orange?
>
> Why do you think fewer people selected oranges as their favorite fruit?
>
> How do you think the graph might change if we included Mrs. Brown's class in our graph-making activity?

Students could respond to such questions—or compose questions of their own—in their math journals, thus beautifully connecting data analysis and communication (which NCTM definitely advocates).

Glyphs allow students to represent or communicate data in meaningful and individualized ways. A glyph is a form of picture graph. Glyphs can be incorporated into lessons for all of the elementary grades, as their elements can easily be modified based on the maturity and academic level of a particular group of children. To extend the fruit theme discussed previously with regard to graphing, a teacher might ask students to create an apple glyph that would reveal information about themselves. Each child might be given a large white cut-out in the shape of an apple. Students could be asked to color their apples red if they live in a house, green if they live in an apartment, or yellow if they live in a mobile home. The colors of the stems of the apples could be used to indicate how students get to school. Black stems could represent walking to school; brown stems could represent riding the school bus; green stems could represent carpooling. Students could be asked to color and glue green leaves to the stems, with the number of leaves representing the number of people in their home.

Of course, the types of glyphs and the bits of data to be displayed on glyphs represent endless possibilities, limited only by teachers' own imaginations. Once students have created glyphs, teachers might display them on a bulletin board or mural and use them as

starting points for discussions, creation of graphs, and problem solving opportunities. For example, a class of students could observe apple glyphs (as described above) and use the numbers of leaves on each apple to construct a graph depicting the numbers of people who live in each student's home. Glyphs could also provide opportunities for practice of basic skills. A teacher might ask, for instance, "How many more students live in houses than in apartments?" "What number do we get if we add the number of walkers to the number of carpoolers?" Again, the possibilities are limitless.

Indeed, graphs and glyphs provide meaningful opportunities for exploring questions, gathering and depicting data, and reflecting upon such data. Teachers of young children know that students do not typically come to elementary school with innate abilities to articulate and refine questions, to consider various ways of collecting information, or to select appropriate manners of organizing and displaying data. Rather, children construct these abilities through hands-on, minds-on experiences, cooperative learning opportunities, class discussions, and nurturing guidance and support from teachers and other adults.

Data analysis continues to establish its importance in the early childhood and elementary curricula. As educators, we should embrace the teaching of data analysis as a wonderful opportunity to develop critical thinking and problem solving abilities within our young students!

References

Cathcart, W. G., Pothier, Y. M., Vance, J. H., & Bezuk, N. S. (2003). Learning mathematics in elementary and middle schools. Upper Saddle River, NJ: Merrill Prentice Hall.

National Council of Teachers of Mathematics. (2000). Principles and standards for school mathematics. Reston, VA: NCTM.

Bill Bompart CONTINUED FROM PG. 5

one and asking "Whatcha' know?" He was a member of GCTM and NCTM and knew their value to the classroom teacher. He insisted we join at the time we received our degrees.

I can remember meeting someone at an NCTM meeting and they asked where I had gone to school. I figured they probably wouldn't know where Augusta, GA, was, let alone the college there. They responded with a smile and called Bill's name and said that they knew my mathematics preparation was top notch at Augusta College, because they knew him and knew of his excellence and high standards.

It is certainly a time of sadness for GCTM. Bill served as President, frequent speaker and Executive Secretary after Gladys Thomason and before Edith Maxwell. I remember him showing me the Apple II+ which GCTM provided him to maintain the data base and membership files. He was so proud to be so up-to-date technologically.

We have all lost, too soon, a dear friend and a staunch supporter of GCTM and mathematics education in our area and state. I'll bet there are a few new number theorists in the heavenly choir today and they all have smiles on their faces from the mathematical jokes and puns to which they are being subjected.

Math History

THE HUMAN EQUATION: "Isaac Newton: Mathematical Mystic"

by Keith Luoma
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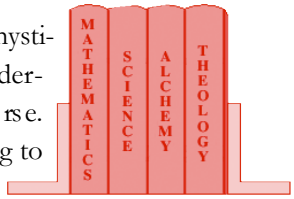
When we look back from our vantage point here in the twenty-first century, we are sure to admire the great Isaac Newton for his many achievements in mathematics, both pure and applied. After all, Newton invented an entire branch of mathematics—Calculus—and he applied mathematics to a wide-range of physical problems, including the study of motion, gravity, and light.

Based on this analysis, it is easy to imagine Newton devoting every waking moment to the study of mathematics and science. For Newton, however, mathematics was only one road to knowledge. In his quest for understanding, he also ventured far into the mysterious realms of theology and alchemy. In fact, Newton probably spent more time investigating these subjects than mathematics.

> "Nature and Nature's laws lay hid in night, God said, Let Newton be, and all was light."
> —Alexander Pope

Newton pored over the Bible and the writings of the early Church Fathers in an effort to reclaim the teachings of "primitive Christianity" (Christianity as practiced before the formulation of the various creeds). He eventually adopted the viewpoint of Arianism, which held that Christ was God's first creation—divine, but not equal to God the Father.

Newton was also obsessed with biblical prophesy. He combed the prophetic books of the Bible, especially Daniel, in an attempt to predict the end of the world. Newton believed that the design of Solomon's Temple encoded a mystical blueprint for understanding the universe. He spent years trying to crack that code.



When he was not studying scripture, Newton could often be found performing alchemical experiments. Alchemy, as practiced by Newton and many other leading scientists, blended chemical experiments with mystical rituals and arcane symbolism. Alchemists searched for the elusive "philosopher's stone," a substance which could supposedly turn base metals into gold. Although some alchemists dreamed of getting rich, others, including Newton, sought moral and spiritual purification. If the recipient were "pure in heart," the philosopher's stone would become an "elixir of life," granting personal immortality to the one who ingested it.

Newton took care to keep his theological and alchemical studies to himself. In England, freedom of religion was non-existent, and a belief in Arianism was illegal. The same was true of alchemy: the church condemned it as an occult practice, and the government feared it, citing the obvious monetary upheaval that would result if the alchemists were successful.

Newton's nonscientific interests are sometimes downplayed in accounts of his life, and it is possible that some biographers were embarrassed by his involvement in these matters.

Did Newton's involvement in these mystical studies influence his mathematical and scientific work? Newton believed that the

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Bulletin Board Ideas

Picture This

PUZZLE

by Debra Mitchell, Peach County High School

Make large puzzle pieces cut from posterboard. These should be 2 pieces that fit together. On one, put a term to be learned in this unit, and on the other put the definition and/or picture. As you present each word during the chapter, have a student put the term with its definition, and the board will change before their eyes.

This fulfills the "Word Wall" required by some schools, as well as the "Learning Focused" specifications.

WHOSE LINE IS IT ANYWAY?

By Amber Donnell, East Lauren High

Cut out the letters for the title, placing them in the middle of the board. On strips of paper elsewhere on the board have 5-10 graphs of lines on graph paper. Make them bold. Then on other strips of paper, all mixed in, have the 5-10 equations that represent those graphs. As a warm up or class activity, have students pair up the graph with the equation. This can be done all at once or one at a time.

WORD WALL OF TERMS

by Hillary Kalis and Donna Greenwood, Peachtree Ridge High School

The Word Wall of Terms can be unit-driven or year-long. Print terms on index cards and place them on the wall as you cover them in class. The definition and/or picture can be under the card, and the card hinged to be raised and lowered. This allows assessment of terms without covering the board. The board can be decorated by the students as the unit or chapter progresses, or it could be decorated with fake brick to look like a wall.

Newton CONTINUED FROM PG. 8

universe is a product of a rational Creator, so he expected to find rational solutions to the questions he investigated. And as for his work in alchemy, philosopher Will Durant has written that "perhaps he was seeking some law or process by which the elements could be interpreted as transmutable variations of one basic substance. We cannot be sure that he was wrong."

Newton, in spite of all his discoveries, never stopped viewing the world as a place of wonder. As an old man he wrote, "I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble, or a prettier shell than ordinary, while the great ocean of truth lay all undiscovered before me."

ON THE WEB

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Lesson Plans

Using Children's Literature to Teach Mathematics

by Melissa Cravey & Kim Glover, students of Dr. Billy Lacefield & Dr. Mary Kay Baccallo

The following are excerpts from a workshop presented by the students of Dr. Billy Lacefield and Dr. Mary Kay Baccallo, at the Georgia Mathematics Conference, 2004. Each lesson contains activities that correlate to the NCTM Principles and Standards. We welcome your feedback as you adapt these lessons to your classroom.

Can You See the Red Balloon?
S. Blackstone (1997)
Barefoot Books, Cambridge, MA.
Lesson plan by Melissa Cravey.

Summary

Different colors and objects are represented in this book. "The reader is asked to pick out objects of different colors in each picture, plus the black-and-white cow that appears on each page" (Blackstone).

Activities

1. The children will create a graph as a whole group, using colors in the book. They will be asked the question, "What is your favorite color" (red, white, purple, gray, green, pink, yellow, black, or none)? Then each student will approach the graph and place a mark in the box provided, using the color marker of their choice. For example: if their favorite color is pink, the student will use the pink marker and place a dot on the graph. After every student in the class has participated, we will go over the results of the graph *(Data Analysis and Probability)*.
2. The children will use a teacher-made file folder game called the "Pattern Play." "This game provides practice in recognizing and forming patterns" (Beech, 37). The game will be available in the math center. Its object is to match the appropriate pattern in the appropriate row. The patterns will be developed using objects in the book. This game is designed for two players. There is a pattern game board and pattern cards. Each player picks a card from the deck of cards and tries to match the pattern of each row. If the correct object that is needed to complete the pattern is not on the card, the card is placed at the bottom of the deck. After completing a pattern, the children tell the order of their objects in the pattern *(Connections)*.
3. This activity is called Pentominoes. There will be color tiles or squares of the colors represented in the book. The object of the game is to develop two congruent shapes and all possible arrangements using the color tiles or squares. Form the students into groups of three. Have them place the arrangements made onto graph paper and trace their patterns. After all arrangements are made, have the students cut out the patterns and lay them flat using the arrangements found. This activity helps students visualize the relationship of objects in space, and develop a sense of spatial relationship *(Geometry)*.

4. Using the favorite color graph in the whole class effort, have the students develop a bulletin board using a pattern of color crayons and pictures of children representing the number of children and their chosen color. For example: if three children like the color red, there will be three crayons created by the children and they will place them in the red row. Each child will be asked the question after completion of the board, "How many children liked the color _____?" The picture of the child will be placed on the crayon made to represent their favorite color *(Number and Operations)*.
5. The teacher will create or find objects of the color representing the items in the text. In groups of two or three the students will be on a scavenger hunt. The object of the game is to see how many items each group can find in approximately ten minutes. They will write down what object they found and where they found it on a piece of paper. After ten minutes, they will go back to their groups and compare with other groups on how many objects were found. Then, as a whole group, they will develop a picture graph representing the objects and how many groups found that specific object. After completion of the graph there will be questions to answer using the picture graph. For example: How many groups found the red balloon and the white moon? When added together how many is that? *(Communication, Numbers and Operations)*.

The Big Honey Hunt
S&J Berenstain (1962).
Random House Inc, new York.
Lesson plan by Kim Glover.

The five mathematical ideas for this presentation are based on the children's literature book called, *The Big Honey Hunt*. The main characters in the book are the Berenstain Bears, Papa Bear and Small Bear. Mama Bear sends Papa Bear and Small Bear to go get some honey from the honey store. Papa Bear is determined to show Small Bear the clever way to get honey. Throughout their honey hunt excursion, they keep running into trouble. Finally, after being chased by bees, Papa Bear decides that the best way to get honey is at the honey store—right where Mama Bear told him to go in the first place.

Measuring Honey

The teacher will ask the students, "What is the best form of measurement to use to measure honey? An inch, a meter, or a cup?" After the teacher takes a vote from the class, he or she will demonstrate each form of measurement with the honey. After each demonstration, the teacher will ask the students if they think that form of measurement is appropriate. Finally the teacher will ask the students why they think a cup would be the best form of measurement to use *(Measurement)*.

Comparing the Amount of Honey in Different Containers

(Piaget's Conservation Theory)

The teacher will have two separate measuring cups with 1/4 cup of honey in each. The teacher will pour 1/4 cup of honey into a large clear bottle. The teacher will then pour the other 1/4 cup of honey into a smaller and thinner bottle. The teacher will ask the students which bottle has more honey or if they have the same amount. To reinforce this concept, the teacher can demonstrated a few more examples using different materials *(Patterns and Relationships)*.

Even and Odd Numbers

After the students construct their honeybees and the teacher reviews odd and even numbers, the students will be placed in different groups. Each person in the group will identify how many black stripes they have on their honeybees. The teacher can walk around the room and randomly ask if they have an even or odd number of stripes. As a group the students will add up all of their stripes. They will determine whether their group has an odd number of stripes or even number of stripes *(Numbers and Operations)*.

It's a Honeybee

The students will be given different shapes such as yellow, black, and white circles and thin black rectangles to construct a honeybee. Before the students construct the bees, on a sheet of paper they can identify what shapes they were given and how many of each *(Geometry)*.

Bar Graphs

The teacher will demonstrate on the board or overheard, how to construct a bar graph. Each group will tell the teacher their total number ofr stripes, and then the teacher will complete the graph based on the information given regarding groups and number of stripes. Next, the students will be required to construct their own graph. The teacher will promote higher level thinking by asking what other information they can use for their graphs. For example they can use the number of stripes each person in their group has or the number of circles each group number has *(Problem Solving)*.

Al's Applets

math.bu.edu/DYSYS/applets/index.html: Many applets (interactive drawings to illustrate a concept) are available on this site to explore fractals, chaos, and iterations of all types.

www.ies.co.jp/math/java/index.html: Some applets on this site are free, but many more are available for a fee. The free use does not include permission to use on your web page.

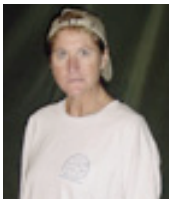
archives.math.utk.edu/visual.calculus/: This site provides a tutorial for Pre-Calculus and Calculus by topic. There are concise explanations as well as visualizations.

www.frontiernet.net/~imaging/math_is_a_game.html: This applet provides unique 3-D looks into many standard objects. Choose the wire-frame capability to let you see inside!

GEORGIA MATHEMATICS CONFERENCE 2004

Picture Gallery

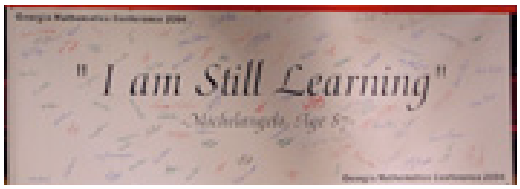
Rock Eagle 4-H Conference ground was the scene of some exciting mathematics this past October. There were friendly faces from all over the state, and some blank stares from as far away as Montana!



There were snakes to see and hold,
and quilts to admire and learn how to make;

There were kisses and smiles
and speakers everywhere!

Our former president is now "past," and our new president has a message!

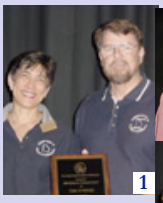


The bottom line is this: As teachers of mathematics, we should never stop learning, and we must pass that on to our students.

Many thanks to the Georgia Mathematics Conference committee for their hard work, and let us all make plans to be back next year.

Awards & Congratulations

1. Gladys Thomason: Tom Ottinger
2. John Neff: Linda Nash
3. Dwight Love: Debbie Poss
4. Friend of Mathematics: Eric Greene
5. Teacher of Promise: Dawna Stubbert
6. Excellence in Teaching: Sally Meyer, Christie Lewis, Danielle Yawn



"TODOS" Part 2

Specific Classroom Activities to Enhance the Learning of the English Language Learner

by Cheryl Hughes
GCTM Council Publications Editor
chughes@gctm.org

In the last issue we began a three-part series on TODOS, one of the newest affiliates of NCTM. The mission of TODOS is to advocate for an equitable and high quality mathematics education for all students, in particular Latino/Hispanic students, by advancing the professional growth and equity awareness of educators. The first article was a discussion on language and how to help students broaden their mathematical vocabulary in a new tongue—English. In this issue we will suggest activities that will enhance the learning and understanding of the English Language Learner.

When students transfer into our schools, we, as teachers, do not actually know what they were taught during the previous years of their education. In every country, schools vary in academic content, just as teaching styles and class contents vary. Therefore, every teacher must consider possible "gaps" that may hinder the learning experience of every new student that comes into his/her dassroom. Students coming from other countries have several variables in their previous experiences that could factor into the learning equation. Many countries have unregulated and inconsistent curricula, and there are some in which children are not even required to attend school. So even if a child did attend school, he/she may not have attended regularly, and may not have had quality teaching.

It is our responsibility as teachers to determine where each student is in the learning process, and raise him/her to greater heights. For the English Language Learner (ELL), the current academic level may not be easily ascertained. One way we can assess students is through classroom activities.

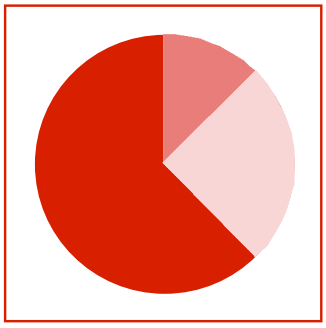
> For the English Language Learner (ELL), the current academic level may not be easily ascertained. One way we can assess students is through classroom activities.

Through observation during group work, teachers have opportunity to see the strengths and weaknesses in their new students and record them for future reference.

Cooperative learning can be a positive experience for the ELL student, especially once he/she is comfortable with the group. Many times students communicate with other students more comfortably than with teachers. So, in the context of group work, teachers may notice that ELL students relax, and their knowledge may be more obvious.

Group activities that are often successful with ELL students are building or creating things, problem solving, and cooperative jigsaw-type problems. These often allow teachers a glimpse of what ELL students have learned in the past.

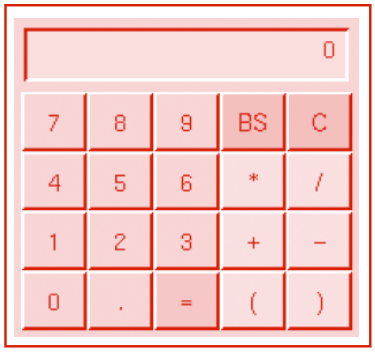
> Use group or partner activities to assess prior knowledge.



Drawing graphs to solve problems, or drawing pictures to illustrate a problem also may be more comfortable for ELL students than trying to explain or write sentences. When students watch a teacher graph and understand what the instructions are asking them to do, they may join in with those class activities quickly.

Technology can be a problem for ELL students, depending on their economic and family situation. The students' knowledge in this area greatly depends on their prior situation. Teachers should ask about this, if possible, and should assist in suggestions for learning and/or acquiring technology needed for the class. This may be true for calculators as well as computers.

Teaching ELL students presents similar challenges to those encountered while teaching English-speaking students. Just as students learn in various ways, so they participate more readily in one type of activity over another. To see the ELL student at his best, activities used in the classroom should be varied. The "performance" of the ELL student on some activities can even be used as informal assessment, especially when the language barrier is great.



With ELL students, activities that make them the most comfortable will allow teachers to assess their prior knowledge and allow them to be active learners.

Writers Needed

The *Reflections* staff is seeking articles on issues of interest to teachers of mathematics in Georgia.

Please submit your article electronically in Microsoft Word, including your name, title, email address, school, and a phone number where you can be reached. Include work site at the end of your article, as well as any recommended web sites and readings.

Manuscripts relatred to the upcoming themes will be given priority, but articles on any facet of mathematics education will be considered.

High resolution electronic phototographs (jpeg or tiff), original artwork, or examples of student work to accompany articles would also be welcomed. If submitting student work or pictures of students, be sure to include a statement that permission for publication from the students and their parents is on file at the school.

Coming Up in *Reflections* . . .

April

Summer Suggestions & Technology in the Mathematics Classroom

Deadline: February 15

August

Advice to new teachers & Partnering with Parents

Deadline: June 15

Submissions and queries should be emailed to Cheryl Hughes at hughesgctm@aol.com.

Australian Guest Author

The Language and Process of Problem Solving in Mathematics

by W.L. Marsland (Bachelor of Education—Middle School) Western Australia Education Dept. Inquiries to chughes@gctm.org

Problem solving is an integral part of the mathematics curriculum in Australia today, as in other curriculum learning areas. The process of solving a problem of course begins with the problem itself:

Step 1: Is the problem "real"?

Students are most engaged in positive learning when they feel a problem is relevant in the reality of life. Through guidance, teachers can assist and ensure their students obtain the skills to see the relevance of a problem. Therefore, teachers must take time to know their students' mathematics needs and how the problem will relate to them practically later in their lives.

It is important that teachers and students effectively communicate with one another about the importance of the problem to be solved. This is the first step in understanding of language and rocess of problem solving," not only in mathematics, but, in all areas of the curriculum.

> "This is the one statement my students will remember vividly in years to come. *The language and process of problem solving is as much about the journey as it is about the destination."* —W.L. Marsland, 2004

Step 2: Defining the Problem

As pro blem-solving questions may tend towards lengthy explanations in words rather than in numbers, students must also be effective readers to complete their competency in the learning area of mathematics.

Students must be able to read the problem in context and recognize the relevant facts of the problem, disregarding unnecessary parts. This in itself is a skill the student learns with active participation in problem solving.

Students may need reassurance that omitting the irrelevant parts of the problem is "the right thing to do." However, with practice students, learn to disregard any information that is non-essential to the outcome of the problem.

Some students rephrase the question in full sentences, others in points according to the keywords or phrases they glean as relevant to the problem. Either method is a precursor to solving the problem.

Step 3: Planning the Mathematical Attack

With the problem defined, students are free to identify the kind of mathematical attack necessary to solve the problem.

Students are encouraged to recognize that there are problem solving strategies that can assist them greatly in planning a viable solution. A clear concept of the problem language will make choosing appropriate strategies much less stressful to the student.

These strategies include those of guess and check, drawing diagrams to represent the problem, using graphic representations, trial and error, constructing tables, working backwards, locating examples of similar problems that can be worked through, etc. The strategies named are not finite but they allow students to make informed choices in planning to solve problems.

The type of mathematics used to solve the problem must also be chosen, e.g. addition, subtraction, linear functions, etc.

Therefore, planning a sound strategy, cou-

pled with a sound knowledge of the type of mathematics to be employed to solve the problem, are essential facets of the students' problem solving toolkit.

At this point it is vital to link the understanding of language to the potential of solving problems accurately.

Step 4: Articulation & Visual Production of the Problem

Effective definition and planning for problem solving are crucial components and their importance to the final solution is not to be underestimated. The student's thoughts and ideas must be recorded visually and in a written format so the student can successfully follow producing a solution to a problem.

Step 5: Logical Reasoning & Computation of the Problem

The reasoning and computation of problems was previously seen as the most important part of solving problems in mathematics. The emphasis on only this aspect of solving problems made assessment and reporting on the progress of a student a relatively simple act; it is, however, only part of the process of problem solving.

By feeling more confident in the language of the problem, the student sees the problem as less formidable. The student, having defined, planned, and recorded the path to solving the problem, is now in a favorable position to solve that problem. He/she can now successfully apply all of his/her previous planning by producing a more informed attempt at solving the problem.

Once logical reasoning and computations are articulated, drawn, estimated, verified, practiced, and checked, the problem is available for further scrutiny.

The final answer to the problem is also established during this phase of problem solving. Once again the "language" used and how it is comprehended, remain relevant to the final outcome of the problem.

Step 6: Investigating other Options

The "repetitious" nature of many mathematical skills meant that a student could respond with accurate answers to algorithms and other problems, but the student lacked the skills of independent thought provided in understanding the language of the problem in the first place.

By investigating further options for a solution to a problem, the student becomes skilled in using the language and process of problem solving to go beyond the problem and to consider the implications of the problem in other situations.

During the process of investigating alternative solutions to the same or similar problems, the student internalizes their own aptitude for language and understandings in many situations they will face everyday. A student then becomes capable of self-discovering other patterns within a mathematical context and using the insight they gained in one problem to solve others.

Step 7: Evaluation

Evaluation is a useful tool for reflection and assessment of student understanding and application to a problem.

It is most significant when the student themselves is involved in this process, and when the student is able to take a step back from their own work and honestly reflect on the effectiveness and accuracy of it.

The evaluation process is not judgemental;

CONTINUED ON PG. 23

Free Resources

Free Mathematics Instruction Text—Environmental Print for Middle Grades

By Faith H. Wallace, Ph.D., Asst. Professor of Adolescent Education & Literacy, Kennesaw State University, fwallac1@kennesaw.edu
Mary Cherry, Karen Koellner Clark

With the Georgia Professional Standards encouraging teachers to foster reading across the content areas, mathematics teachers might find themselves questioning text sources that support complex mathematical content in ways that are also rich in literacy. This is not surprising as text suggestions that meet these requisites (complex mathematical thought and rich literacy) for mathematics are often difficult to find.

Harvey and Goudvis (2000), in their book, *Strategies That Work*, offer a comprehensive annotated bibliography of not only informational texts for science and social studies sorted by content, but also fiction and poetry for each topic when applicable. However, they offer no titles for math. *Read Any Good Math Lately? Children's Books for Mathematical Learning, K-6* (Whitin & Wilde, 1992) offers a comprehensive list of tradebooks with an emphasis on mathematical content. However, as the title suggests, the audience is targeted at K-6 and, therefore, many middle grades topics are not included, such as algebra and statistics.

Mathematics methods course textbooks such as *Elementary and Middle School Mathematics—Teaching Developmentally* (Van de Walle, 2004) include suggestions for the use of particular tradebooks to support learning of mathematical content, but the selection for the more complex topics at the middle grade level is slim. Magazines with a focus on mathematical content are not as easily accessible as ones with current events and history or science (Harvey, 1998; Stoll, 1997; Tunnell & Jacobs, 2000). *Discover* magazine focuses on science and technology and is easily found at a local bookstore. Yet, *Quantum,* a magazine dealing with everyday mathematical and scientific phenomena, is only available through a yearly subscription and has a target audience of advanced placement high school students (Stoll, 1997).

> **Environmental print or real time text such as advertisements, containers, and junk mail are in great supply and rich with mathematical text.**

If such resources are difficult to find, how do we support reading across the content within mathematics instruction? The answer is simple—the use of environmental print. Environmental print or real time text such as advertisements, containers, and junk mail are in great supply and rich with mathematical text. Researchers and reformers alike have endorsed the use of environmental print in one way or another. For instance, after reviewing the research dealing with reading in mathematics, Hoover and Nolan (1993) advocate using non-print material as well as providing "the context of a realistic situation rather than a textbook exercise" (Hoover & Nolan, 1993, p. 71). Further, the National Council of Teachers of Mathematics (2000) specifically advocates the use of tradebooks and environmental print.

Environmental print is one vehicle to promote student construction of knowledge within mathematics since there is not one

authority within the text. Quite the opposite, environmental print offers the opportunity to examine competing authorities. This, in turn, provides the opportunity for students to bring in their unique mathematical ideas and experiences and then support the notion of mathematical discourse, argumentation, debate, and socially constructed ideas with deep mathematical insight. Students are more apt to do this as they are provided familiar contexts so that they are not lost in the technicalities of mathematics. They can relate the print to their own experiences and see beyond the context into the mathematical implications, particularly when issues of money are of concern. Further, reading takes on an important role when students engage in activities using environmental print because they have to read for a variety of purposes, particularly when fine print is involved.

We felt so passionately about the possibility of infusing mathematics instruction with environmental print that over the course of three weeks we each collected print in the form of junk mail. In addition, Mary (second author) asked her sixth-grade students to collect their own print during that three-week period. By collecting print from a wide-variety of participants, we ensured a realistic sense of what a classroom teacher might be able to collect and use within her classroom. This is because some of our junk mail is situation specific. Marketers target solicitations to be sent to the "right" audience. Parents receive solicitations dealing with parenting and children. Dog owners receive mail about training, boarding, and pet supplies. In addition, people order magazines that are relevant to their lives and typically subscribe to mailing lists aligned with their interests.

At the end of our collection, we had 395 individual pieces of environmental print that provided a realistic sense of what a variety of people receive at their homes. We first sorted these pieces by type of print: advertisement, solicitation, informational, and service update. Then, we sorted each piece of print by mathematical content. To determine what content to focus on, we used the NCTM content strands to categorize print. These categories include whole numbers, fractions and decimals, measurement/geometry, statistics/probability, and algebra.

We found our 395 pieces of junk mail covered most topics in a middle-grades mathematics textbook. The examples of environmental print were rich in mathematical thought and provided a necessary context of realistic situations. Here, we offer just some of the possibilities of using environmental print in the middle grades mathematics classrooms.

Informational Texts: Sports

Collecting the sports section on a daily basis during a season of a particular sport can be one way to teach probability, statistics, data analysis, ratio, proportion, and percents. Using sports as a way to teach these topics is not new, but what is often missing is the literacy component—reading about injuries, trades, disputes and such is an integral part of determining probability, interpreting statistics, and ranking teams. As students investigate problem solving using newspaper articles and statistics to predict

outcomes and rankings of sports teams, students investigate problem solving using newspaper articles and statistics to predict outcomes and rankings of sports teams, students are able to debate mathematical ideas with innovative perspectives based on print that they previously would not have considered. These debates require students to justify their mathematical ideas based on real contexts and a variety of solutions and ideas are presented based on students' careful analysis of environmental print on hand.

Department Store Advertisements

One unit might use a department sale advertisement from the local newspaper as a context for problem solving. These advertisements provide students with a familiar context, but they must read the fine print critically to avoid pitfalls such as wanting to purchase something that is not on sale, how to deal with items that were already marked down, the duration of the sale, and return policies. The notion of rate and percent can be capitalized on during this unit of examining department store advertisements. Many department stores offer a percent off already marked down items for students to examine different ways that discounts are given.

CD Club Letter Solicitations

One example that captures the interest of most middle school students are the CD and Video/DVD club advertisements that offer 10 CDs or DVDs for one dollar. Students can compare and contrast

multiple CD club offers. This compare and contrast activity takes into account the small print which includes requirements after the acceptance of the free CDs, shipping and handling not discussed up front, and the quantity of CDs that have to be purchased within a particular time frame. This type of solicitation can be used across grade levels as students might use measures of central tendency or ratios to examine the details of cost per CD. And more advanced students can consider when they would break even for the different clubs. To this end, algebra can be used for students to construct tables, graphs and determine the equations of lines as a way to justify their solutions for the best CD club.

Furniture Advertisements

Furniture advertisements are filled with descriptions, often basic and lacking persuasive or appealing language. While every advertisement is not rich in language an activity asking students to fill a room in their house with furniture, given a budget would provide opportunities to solve budget and design problems using addition and subtraction of decimals, finding percent, and geometry and measurement concepts such as perimeter and area and spatial reasoning. Students would have to use precision as they figure dimensions of a room using standard units of measure and spatial reasoning through estimation and proportionality of different furniture pieces selected. This activity could be extended by requiring students to use the stores featured financing program which is usually described on the advertisement itself. At this point students would not only be reading rich language, but also mak-

ing decisions based on percent comparisons, statements of accrued interest, minimum purchases, and other fine print stipulations such as down payments.

Sports Equipment Solicitations

Sports equipment solicitations were richer in text. Products were frequently described in detail requiring consumers to make decisions based on their personal needs and preferences. Similar to the purchasing of furniture activity described, students could practice adding and subtracting decimals by purchasing goods for a camping or hiking trip. Since the weight of most of the camping and hiking materials in the solicitation are given in standard units of measurement, students could make decisions about the materials they will purchase and pack according to prices and the weight or capacity of the desired products, and the location and time of year of the trip being taken. This activity would allow students to relate the concept of combining measurements to their lives, a connection most textbooks fail to make.

Environmental print is a resource that can enhance problem solving in a multi dimensional way. There are many possible competing authorities that the reader can use to justify mathematical thinking. It is a simple resource that is abundant in quantity and underlying mathematical ideas. Using environmental print as a source of rich text to supplement mathematical tasks is a simple solution to a complex problem.

References

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Problem Solving CONTINUED FROM PG. 8

it is an opportunity for the student to consider and pose questions of themselves that they may have missed in the midst of the problem solving process. It is a chance to reflect on how difficult or simple a problem was to solve. It is a further opportunity to assess and congratulate themselves on their own success using the language and process of problem solving.

"Mathematics is not a deductive science—that's a cliche. When you try to prove a theorem, you don't just list the hypotheses, and then start to reason. What you do is trial and error, experimentation, guesswork."

—Paul R. Halmos, *I Want to be a Mathematician*, Washington: MAA Spectrum, 1985.

Good Job!

Cranium Cracker Report

Congratulations to the following students who submitted correct answers to the last Cranium Crackers. We received many excellent solutions to our problems, and we are very proud of our Georgia students.

Benefield Elementary School

Mrs. Moore – 2nd grade
Julia Simpson
Marquis Wilson
Vanessa Leon
Sayanab Yonis
Ajani Stone
Chelsea Wagner
Nicolas Johnson

Crisp County Middle School

Mrs. Abercrombie
Charles Glover – 7th grade
Chris Wells
Dylan Simpson
Mason Clark – 6th grade
Tyler Gladney – 6th grade
Shannon Clark –8th grade
Dallas Gray – 8th grade
Vance Handley –8th grade
Kody Franks – 8th grade

Crooked River Elementary School

Mrs. Parrott/Nutt
Aaron Czeiszperger – 5th grade
Devon Tenney – 5th grade
Mrs. Marker/Scherck
Analyss DelBoccio – 2nd grade

Elm Street School

Mrs. Williams
Elizabeth Hernandez – 5th grade

Fayetteville Intermediate School

Mrs. Rape
Jacob Ingram – 4th grade

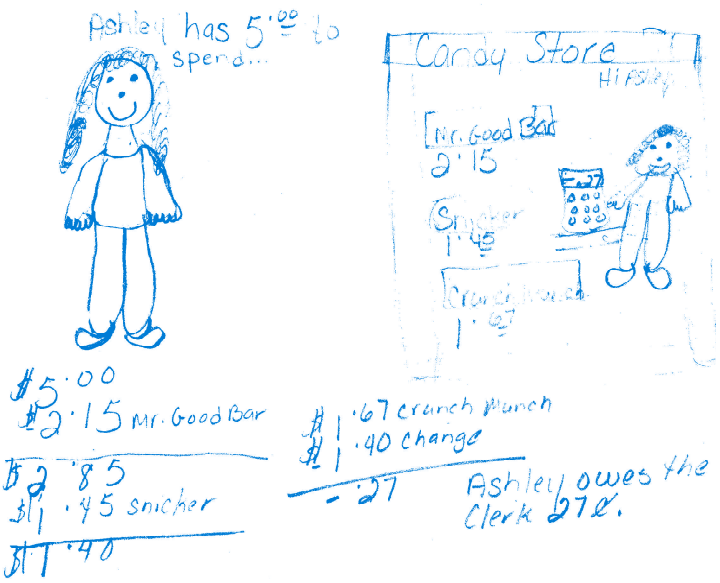
Landmark Christian School

Mrs. Hughes
Emily Roberts – 9th grade

This solution to the K-2 Cranium Cracker was submitted by Chelsea Wagner who is in Mrs. Moore's 2nd grade class at Benefield Elementary. Notice the great drawings.

Congratulations, Chelsea!

Ashley had $5. She bought 3 different kinds of candy. One kind was $2.15, one was $1.45 and the other was $1.67. How much change did she get from the store keeper?



New Cranium Crackers

Try These

K–2: LEAP FROG

Draw a picture to illustrate this:
A little green frog is sitting at the bottom of the stairs. She wants to get to the tenth step, so she leaps up 2 steps and then back 1. Then she leaps another 2 steps and back 1. How many leaps will she have to take, if she follows this same pattern, till she reaches the tenth step?

Grades 3–5: HOW MUCH DIRT?

Draw a picture to go with your calculations:
How many cubic inches of dirt are there in a hole that is one foot deep, two feet wide, and six feet long?

Grades 6–8: LETTER VALUES

If each of the letters A, B, and C represents a different digit, what is the MINIMUM value of $\frac{ABC}{A+B+C}$?

(in ABC, A is the hundreds digit, B is the tens digit, and C is the ones digit - - they are not multiplied)

Grades 9–12: FACTORIALS!

Evaluate $101! - \frac{100!}{99!}$

See page 26 for submission guidelines.

Cranium Crackers Submission Guidelines

1. Each student should print neatly at the top of their paper: His/Her Name, Teacher's Name, Grade, School.

2. Submit one answer per student and one student per page.

3. All students whose answers are correct will see their names listed in the next issue of REFLECTIONS. They will also receive a special prize from their teacher.

4. Some students, whose work is submitted in each category, may have their work published in the next issue of REFLECTIONS. To be selected for publication, the student's work muse be creative, correct, and legible. With their work must be a release signed by their parent or guardian, saying: "This work of my son/daughter, _____, may be published in REFLECTIONS, the quarterly publication of the Georgia Council of Teachers of Mathematics, with my child's name, grade, and school."

5. Send to:
   Mrs. Cheryl Hughes
   Landmark Christian School
   50 W. Broad Street
   Fairburn, GA 30213

GEORGIA MATHEMATICS EDUCATION TRUST (GMET) Yearly Report

The following is a list of donations made from Nov. 1, 2003 through Oct. 31, 2004. Total donations for this past year were $5,127.

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GPS Training CONTINUED FROM PG. 4

Can you provide more examples of what a standards-based classroom looks like through video?

The GPS Strategic Plan does include work with the Georgia Public Broadcasting to video tape model classrooms for use by schools in Georgia. There are also online courses under development that will incorporate video clips and pictures.

How do the new GPS fit into textbooks adopted with the QCC?

The textbook is not the curriculum; however, it is a resource for teaching the curriculum. The Division of Curriculum and Instruction coordinates the textbook adoption cycle for the state. In mathematics, there are both conceptual and content changes. The high school math implementation is far enough away for publishers to develop textbooks. Textbook companies are required to correlate their series to the state curriculum at the time of adoption.

There is an implementation gap between 5th and 6th grade mathematics—will there be students unprepared?

The Mathematics Department in the Division of Curriculum and Instruction has developed a transition plan for grade levels such as 6th grade that will have students arriving without all the prerequisite skills needed this year. The Division of Curriculum and Instruction will be handling that through the 6th grade System Level Training for mathematics teachers/coordinators.

What is being done to include teacher prep programs (colleges and universities) in shifting to the new Georgia Performance Standards?

The GDOE has worked closely with the Board of Regents during the development of the GPS. There must be some differences made at the teacher preparation level, and BOR has made assurances that the teacher preparation institutions will prepare teachers for standards-based education. College personnel will receive GPS training.

Where is the technology in the performance-based, standards-based, authentic learning?

Technology is integrated into the standard in each content area. Technology provides tools for learning, and both the standards and the tasks will reflect opportunities for students to use technology toward that end.

Current Membership Statistics
(as of December 2004)

	North West	North East	Central West	Central East	Metro West	Metro East	South West	South East	Out of State	Out of State	Total
Life Members	28	49	70	68	89	41	42	69	14	14	470
Members	87	106	294	169	280	407	264	120	4	4	1731
Students	14	10	42	90	50	15	2	4	0	0	227
TOTALS	129	165	406	327	419	463	308	193	18	18	2428

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Membership Form

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