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SABES

The Rose Problem

By Patricia Donovan

The Rose Problem, a popular math activity for ABE classrooms, presents a familiar buy/sell situation in a way that generates multiple solutions and paths of reasoning. This activity asks students to solve a problem in their own way and to share results with others in the class. It also encourages those who struggle with math to dramatize or diagram the situation as they see it—a useful approach for the mathphobic. The Rose Problem provides a springboard for math-based communication. It invites students of all levels, teachers included, to enter the situation to figure it out. Sharing solutions allows everyone to see new ways of approaching a problem that can be solved by focusing on unit pricing, division, proportions, or algebra. Seeing multiple solutions fosters flexibility and efficiency as well as accuracy.

The Rose Problem

Erin bought some roses to make money for a gift she wanted to buy. She paid $6.00 for every 12 roses she bought. Later, Erin was charging $6.00 for 8 of them. She sold them all and made a profit of $12.00. How many roses did Erin buy and sell?

At Notre Dame Adult Education Center in South Boston, three solutions for The Rose Problem emerged during a division lesson. Though unique in framing or solving the problem, each method reveals proportional reasoning either directly or indirectly.

Turn to page 3 to see how students answered the problem!

FOREWORD

When we think of ABE, we historically think of instruction based on literacy and language acquisition. But things are changing, and the field is better for it. Like our British, Canadian, and Australian counterparts, we are now beginning to recognize, value, and highlight math instruction in ABE programs and classrooms. In Massachusetts, SABES has been sponsoring a statewide math initiative to build and invigorate a systemic approach to teaching ABE math. A variety of data, including national research reports and anecdotal feedback from adult students and teachers, speaks to the need for more intensive math instruction. New approaches to teaching math, including constructivism and more problem-based methods, have found their way into ABE classes, allowing for more flexibility for a variety of learning styles.

We hope this issue appeals to the math-savvy and the math-shy alike. As editor, I approached this issue of Field Notes *with far less trepidation than I approached the last math issue a few years ago. As a former math-phobe who would shake in my boots with the memory of equations I could never fathom, I have found acceptance for different ways to solve math problems that may not jump to algorithms as a first line of attack. Drawing pictures, counting on fingers, and talking things out are all acceptable ways of doing math, I have found. It's not cheating, despite how angry this would make my math teacher Miss Macy, I'm sure....*

The math teachers I have worked with in putting this issue together are some of the most sharp, dedicated, creative, and reliable I have met in the field, and I am indebted to them for accepting my knowledge gaps and for providing me with the scope necessary to pull this issue together. Read on for some practical and reflective information about math and about becoming numerate. We have even included a glossary of math terms toward the end to look up math words that often appear in the sometimes mysterious "discourse of numbers."

A special thank you goes to Patricia Donovan who made a substantial contribution to this issue.

As always, we welcome your feedback in the form of letters to the editor, submissions, or emails.

Three Solutions to The Rose Problem

The answers to The Rose Problem found in the boxes below emerged from students at the Notre Dame Education Center in South Boston. All names have been changed to protect student anonymity. All students, other than Miguel, appeared to have difficulty at first understanding the problem. For this reason, you might want to read the problem out loud at first, and then have a student volunteer to explain the problem in his or her own words or to dramatize it before the class attempts to answer it.

Noreen's Method
(unit cost + proportion)

- Find out how much profit Erin made on each rose.

- Bought 12 roses for $6 = 50¢ ($0.50 each)
  Sold 8 roses for $6 = 75¢

- ($0.75 each). So Erin made 25¢ on each rose.

- 2 roses = 50¢, 3 roses = 75¢, 4 roses = $1, 12 x 4 = 48

Monique's Method
(unit cost including dividing to find
how many blanks in a blank)

- 6 ÷ 12 = .50 divided to find the cost of one

- 6 ÷ 8 = .75 divided to find the selling price of one

- 12 ÷ .25 = 48, each one is 25¢ profit, so divide to find how many of those in total

Miguel's Method
(Canceling out and proportion, as he drew it)

XXXX | XX
XXXX | XX

She buys a dozen roses. If she sells 8 for $6.00, she covers her cost leaving 4 free.

XXXX OO
XXXX OO } $3.00

The 4 free ones (o) give her $3.00 because eight gave her $6.00.

XXXX OO
XXXX OO } $3.00

XXXX OO
XXXX OO } $3.00

XXXX OO
XXXX OO } $3.00

$3 + $3 + $3 + $3 = $12, so 4 dozen or 48 roses

What Does It Mean?

The use of proportional reasoning is clearly visible in options one and three, Noreen's and Miguel's. Noreen finds the unit profit then builds the ratio until she figures out how many roses are needed to make $1 profit. She is able to abstract that four roses equal $1, so she needs 12 times that to get her targeted profit. Thus, she needs 48 roses. Noreen clearly sees that an increase in the number of roses is matched by an increase in profits. If need be, she could build her ratio all the way to 48 roses =$12. Miguel relies fully on proportional reasoning, and a bit of commercial experience. As a business person, he figures that the first task is to cover expenses. He sees that Erin covers her cost by selling eight roses, leaving her four on which to profit. He further reasons that if she sold eight for $6, then the four left (half of eight roses) will yield sales of $3. The reasoning is elegant. He then sees that she needs to repeat her sales four times to yield the $12 target profit. The result: she needs to sell four dozen, or 48 roses. Monique's use of proportional reasoning is less evident. In what appears to be the most efficient solution to the problem, Monique determines the unit profit, then looks to find the number of those 25-cent profits in $12. Here, the more formal proportional reasoning surfaces. Her equation: 12 ÷ .25 = 48 seems to simplify the more formal proportion 12:x :: 1:.25. She uses her equation to answer the question: How many single rose profits are there in $12 of profit?

The Rose Problem...
Continued from page 3

This is the same as thinking: one rose makes 25¢ profit, so __ roses makes $12 profit. The relationship between the two variables, roses and profit, is transparent. There will be one value for profit for each value of roses.Of course, finding the unit rate is key to all three solutions. Knowing to do this is, in itself, reflects proportional reasoning. Find the unit rate, and you can find the corresponding value for any number of items. A graph would demonstrate this beautifully. Not all students were able to access proportional reasoning. At least one student kept losing track of roses and profit as she tried to build the ratio from profit on one rose to profit on two, to profit on three, etc. She did not see a direct relationship between the two variables and was unable to continue the ratio on her own to reach a solution. This student, like many others, needs to develop an intuitive sense of proportion. Activities such as doubling recipes, as well the use of manipulatives to observe the relationship concretely are ways teachers can help students in this situation. "The four free ones give her $3 because eight gave her $6."

Patricia Donovan is the math initiative coordinator for SABES and the editor of the Problem Solver. *She can be reached at <pdonovan@worlded.org>.*

This article was reprinted from The Problem Solver ,7 (1) winter 2004 .To read more issues of The Problem Solver, go to<www.sabes.org/curriculum/math/math-resources1.htm#pubs>.

The Problem Solver: Useable, Approachable, Practical, Research-Based

If you are a math teacher and you don't know about *The Problem Solver*, get thee to the Internet as soon as possible and check out this resource. If you are an ABE or ESOL teacher with an interest in doing more math with your students,check out *The Problem Solver*. This resource, based on prevailing trends, research, and pedagogy in math for adults is a must-have resource. It's fun, interesting, and accessible, even for the math-resistant. Goto <www.sabes.org/curriculum/math/math-resources1.htm#pubs>.

Stop Me If You've Heard This One!

1. Math problems? Call 1-800-[(10x)(13i)2][sin(xy)/2.362x].

2. Q: What do you get if you divide the circumference of a Jack-o-lantern by its diameter?
A: Pumpkin Pi!

3. Teacher: "Who can tell me what 7 times 6 is?"
Student: "It's 42!"
Teacher: "Very good! And who can tell me what 6 times 7 is?"
Same student: "It's 24!"

4. The chef instructs his apprentice: "You take two thirds of water, one third of cream, one third of broth..."
Apprentice: "But that makes four thirds already!"
Chef: "Well, just take a larger pot!"

The MAPT: New Assessments Match Up with ABE Frameworks

BY DREY MARTONE

ABE programs in Massachusetts now have math and reading assessments that better match instruction.

The recently developed Massachusetts Adult Proficiency Test (MAPT) measures ABE learners' knowledge and skill in math and reading so their progress in meeting educational goals can be evaluated. Most important, the knowledge and skills measured by MAPT come directly from the Massachusetts ABE Curriculum Frameworks. Massachusetts ABE practitioners were deeply involved throughout the MAPT development process.

MAPT is designed to measure learners' educational gains for state monitoring and federal accountability under the National Reporting System (NRS). Learners' MAPT scores and score gains can be aggregated to provide meaningful summative measures of program effectiveness.

Who Developed the MAPT?

The Center for Educational Assessment (CEA) at UMass and ACLS (with input from SABES) worked together to assemble test development specification committees for the MAPT. Separate committees were created for the MAPT for mathematics and numeracy and for the MAPT for reading. Following the development of the specifications for each test, item-writing

workshops were convened across the state for ABE teachers and administrators. This past spring, over 200 Massachusetts ABE teachers and administrators were trained to write items targeted to the test specifications (and to specific objectives within the curriculum frameworks). These activities led to the production of over 2,000 test items that

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Practice MAPT Test Question, GED-Bridge to College

According to the graph below, how many cars did Bob sell in April?

○ **25 cars**
○ **33 cars**
○ **58 cars**
○ **63 cars**

Car Lot Sales

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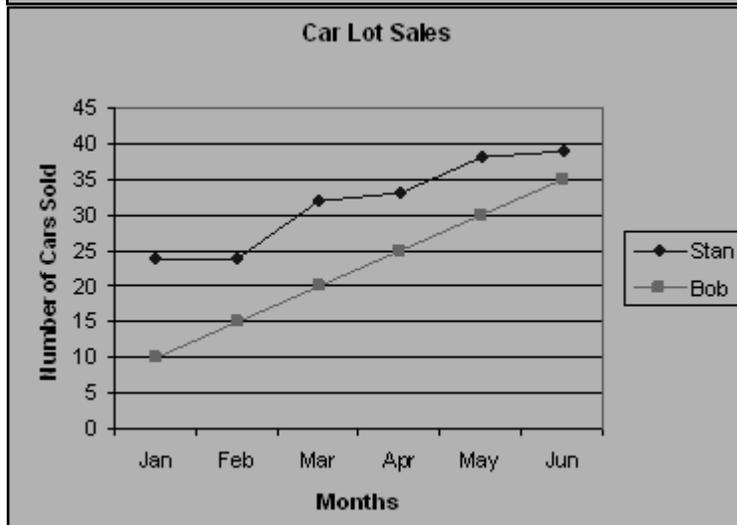
made up the initial pool of potential pilot test items for the MAPT.

As the item pool for each test was created, committees were assembled to review items for content quality. Quality criteria included technical accuracy, psychometric quality, and appropriateness for adult learners. The review committees also rated items to determine how well the item measured the objective to which it was matched. Items were then edited and selected

for pilot testing. Following pilot testing, the statistical functioning of the items was evaluated and the most appropriate items were selected. These items then underwent sensitivity review (examination of bias, etc.) and content validity review by Massachusetts ABE teachers.

Finally, the resulting pool of appropriate test items was subjected to standard setting studies to determine the cut-scores on the MAPT that corresponded to the education functioning levels established by the NRS. The result of the test development process is an adaptive test that tailors each sequence of items to the specific learner taking the test by targeting items to the proficiency of the learner. This type of test design is very well-suited for the ABE community, which requires a single assessment that measures a large span of ability.

Taking the MAPT Online

Since July, ABE learners have been taking the MAPT over the Internet. Teachers across the state participated in a three-hour training to learn how to administer the MAPT. The training materials are also available on the ACLS Web site. Trained teachers are given a password to view the MAPT system, but they cannot view the actual tests. After the intake process, learners with a SMARTT ID can then

The MAPT …

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log on and access the complete MAPT system: sample questions, practice tests for both reading and mathematics, and the operational tests for reading and mathematics.

Practice tests are available at every learning level for each subject area and each contain 20 items. Practice tests are designed to help learners and teachers see sample content at each level, as well as to provide a way for teachers to ensure that the technology in their classroom or computer lab is sufficient for administering the MAPT. The sample questions include four questions in each subject area that walk the students through some basic tools and terms needed to take the assessment. When the learner completes a MAPT, a score report is displayed on the screen that includes their scale score, the MAPT subject, and their frameworks level. Learners can then talk with their teacher about their progress with respect to their educational goals. Scores are automatically uploaded to the SMARTT system so they no longer need to be manually entered and sent.

From creation through evaluation, the Massachusetts ABE field has been extensively involved in the development and modification of the MAPT. The result is an assessment that reflects the Massachusetts ABE curriculum frameworks and connects to what teachers are seeing and doing in their classrooms.

Drey Martone is the senior research fellow at the Center for Educational Assessment at UMass Amherst. She can be reached at <dreymartone@educ. umass.edu>.

Stephen G. Sireci, codirector of the Center for Educational Assessment at UMass Amherst, and Peter Baldwin, senior research fellow at the Center for Educational Assessment, contributed to this article.

Math Anxiety Bill of Rights

By Sandra L. Davis

I have the right to learn at my own pace and not feel put down or stupid if I'm slower than someone else.

I have the right to ask whatever questions I have.

I have the right to need extra help.

I have the right to ask a teacher or tutor for help.

I have the right to say I don't understand.

I have the right to not understand.

I have the right to feel good about myself regardless of my abilities in math.

I have the right not to base my self-worth on my math skills.

I have the right to view myself as capable of learning math.

I have the right to evaluate my math instructors and how they teach.

I have the right to relax.

I have the right to be treated as a competent person.

I have the right to dislike math.

I have the right to define success in my own terms.

A Peek Inside Massachusetts ABE Math Classes: How and What Do They Teach?

By Patricia Donovan

What does math instruction look like in Massachusetts* ABE math classes? This year SABES decided to discover the answer. As part of its three-year math initiative, SABES piloted an environmental scan survey. The state's approximately 150 Department of Education-funded ABE programs received electronic and paper copies of the survey. Nearly one-third of the programs (49) responded, and 63% of respondents added written comments with their surveys. Read on to discover what these programs revealed about the state of ABE math instruction.

Math Instruction Availability

Here in Massachusetts, math instruction increases as the literacy level of students increases. That is, higher level ABE classes get more math instruction. However, if you are an ESOL student, chances are you'll receive math instruction only within the context of another class subject. (Written comments from ESOL programs indicated that "saying large number, fractions, decimals, mixed numbers, etc." was important, but many ESOL students have high computational levels.) A number of ESOL programs indicated that the inclusion of problems related to time and money were extremely useful for their students. In addition, several programs indicated a desire to increase the mathematics content in their programs.

Math Instruction Availability (could check more than one)

Program Level	No math instruction	Instruction included as appropriate within other subject contexts	Included regularly in scheduled class time	Included in independent, separate classes that are optional.	Included in independent, separate classes that are required.	GED Tutorial (quick review)
ESOL	17%	80%	7%	0%	0%	0%
ABE	3%	18%	76%	0%	7%	0%
Pre-GED	3%	8%	82%	3%	6%	0%
GED	3%	8%	86%	3%	6%	11%

Math Topics Taught

While the Massachusetts ABE Math Curriculum Frameworks and the National Council of Teachers of Mathematics (NCTM) and the Adult Numeracy Network (ANN) emphasize the importance of all math at all levels, Massachusetts has a way to go before it fulfills this mission. According to the SABES environmental scan results, students must reach the pre-GED level before they can expect to encounter graphs, measurements, or pattern recognition/description. And even at the pre-GED level, they have nearly a one in four chance of not experiencing those subjects.

Everyone, it seems, focuses on number sense. The Frameworks, NCTM, and ANN do not discourage the development of number sense; rather they encourage the learning and reviewing of number concepts and facts within the context of all mathematical topics. For instance, counting by 10's can be practiced within graphs or as a pattern in a multiplication table.

Math Topics Taught

Program Level	Number Sense	Statistics & Probability	Geometry and Measurement	Patterns, Functions, & Algebra
ESOL	50%	33%	17%	17%
ABE	97%	39%	33%	33%
Pre-GED	95%	79%	79%	68%
GED	86%	92%	96%	100%

Main Methods of Math Instruction

One conclusion we can reach from this scan is that the higher the level of education, the more textbook drills students do in class. We can also conclude that about 65 per cent of ALL classes, ESOL included, engage students with teacher-made practice drills. Inquiry-based instruction (this includes project-based learning, investigation problems, etc.) and computer-based instruction are used much less frequently than drill practices.

The practice of relying primarily on drill practices opposes the recommendation of the Massachusetts Math/Numeracy Frameworks and the NCTM Standards. These policy documents support instruction focused on problem solving, reasoning, communication, and connections (within mathematical subjects and among all academic subject areas). A respect for evidence and the ability to express reasoning in a variety of ways—verbally, pictorially, graphically - should be developed through problem solving situations that are developmentally and mathematically appropriate, according to the Frameworks, NCTM's Standards, and ANN.

Main Methods of Instruction (could check more than one)

Program Level	Textbook practice/ drills	Teacher-made practice drills	Textbook inquiry/investigations/ problems	Teacher-made inquiry/investigations/ problems	Computer-based programs
ESOL	47%	68%	22%	56%	29%
ABE	67%	63%	40%	37%	21%
Pre-GED	70%	64%	52%	52%	31%
GED	79%	62%	59%	56%	39%

Book Review

Freakonomics: A Rogue Economist Explores the Hidden Side of Everything by Steven D.Levitt & Stephen Dubner

REVIEW BY ALEXIS GREENBLATT

*D*o teachers cheat on standardized tests so that it will look like their students are passing? What is the real economic structure behind drug dealing, and why is it more profitable to work at Wal-mart? What do the names we give our children mean for their future success?

Freakonomics, by Steven D. Levitt and Stephen J. Dubner is an entertaining and educational look at the economics of some seemingly mundane parts of our lives. For anyone who is intimidated by the thought of reading about economics, this book will be a relief.

Freakonomics will not demystify the stock market, but it will give you a clever and well-researched glimpse into what Levitt calls, "the hidden side of everything." *Freakonomics* is written simply enough to read with pre-GED students, but by no means is it simplistic in its content.

Levitt presents theories on topics about which he has a "blazing curiosity" such as why the crime rate started declining in the early 1990s. He suggests that this drop was directly related to the legalization of abortion in 1973, and then in a logical, credible, fact-based manner he examines the top eight theories on why the crime rate fell, including innovative policing strategies, increased reliance on prisons and the aging of the population. Levitt simply and unapologetically explores questions about topics that are sensitive and intriguing without trying to please anyone. He doesn't really claim to KNOW anything, but he presents facts and lets the reader see the patterns, if they emerge, and draw his or her own conclusions.

Using This Book in the Math Classroom

In Chapter 3, "Why Do Drug Dealers Still Live with Their Moms?" Levitt looks at the economics of drug dealing. Having spent time in housing projects where crack was sold, he noticed that most of the crack dealers lived with their mothers. To explore this curious reality, he found a researcher, PhD

student Sudhir Venkatesh, who had taken the time to live among this community and who could reveal the secrets of this industry. What Venkatesh showed is that within the drug dealing/gang world there are practices that mirror the ostensibly legitimate structures of a typical capitalist enterprise. There are franchises of a main organization, secretaries who keep detailed records showing itemized expenditures for the business, and a pyramid- style hierarchy with very few, but powerful leaders at the top and many underpaid workers at the bottom. The math lesson comes in when you decide how you want to work with the figures that he presents.

Levitt presents wage figures for the gang members from leader to foot soldiers:

- Gang leader: $8,500 per month or $66 per hour, tax free.
- Three officers:$700 per month or $7 per hour.
- Foot soldiers: $3.30 per hour.

Levitt also considers other factors besides low pay into his observations of why drug dealing is a terrible job. He looks at the likelihood of being arrested, wounded, and/or killed; this section lends itself to math problems related to probability. He also looks at how much a foot soldier in the drug-dealing world has in common with a McDonald's burger flipper. This kind of information leaves room for lessons on budgeting, calculations for money allocation in a business, disparity in earnings, business planning, supply and demand, and years of education compared with rate of pay. Read the book and lessons will emerge.

Freakonomics is a readable and discussion-provoking book that will inspire the most burnt out teacher to create clever lessons for the critically thinking student. This is the anti-text book that is meant to make economics accessible to regular people.

Alexis Greenblatt teaches ABE, GED, ESOL, NNL, and Spanish at the Hampshire County House of Correctons where she has taught for seven years. She can be reached at <Alexis.Greenblatt@hsd.state.ma.us>.

Book Review

The Man Who Loved Only Numbers: The Story of Paul Erdos and the Search for Mathematical Truth *by Paul Hoffman*

Review by Amy Stamm

Paul Hoffman's biography of eccentric mathematical powerhouse, Paul Erdos (pronounced "air dish"), is a great resource for expanding the scope of a GED mathematics class. Erdos was the most prolific mathematician in history, publishing 1,475 academic papers and working on more mathematical problems than any other mathematician before or since. Through the lens of Erdos's life, Hoffman weaves a history of mathematical ideas that opens nonmathematicians' eyes to the wonder of numerical patterns and problems. Unlike Sylvia Nasar's biography of mathematician John Nash, which requires a sophisticated understanding of mathematical concepts, or Rebecca Goldstein's biography of logician Kurt Godel, which relies on insider philosophy and logic references, Paul Hoffman's account of Erdos does not depend on a sophisticated mathematical vocabulary to enjoy. In addition to Hoffman's clear and accessible explanations of mathematical problems, his biography provides abundant evidence of the collaborative nature of mathematicians' work. In tracing Erdos's constant, inspired collaborations with other mathematicians across the world, Hoffman gives a living illustration of the benefits of solving math problems in a cooperative setting.

My GED students and I read Hoffman's book together as part of our math class, and through that collective effort, our discussions about math and explorations of mathematical questions quickly deepened. Students were initially pulled in by Hoffman's descriptions of Erdos's daily absentminded genius blunders. In one example, a thirsty Erdos, wondering how to open a carton of tomato juice, finally stabbed the side of it. His friend, János Pach, arrived home to what he thought was a gruesome trail of blood in his kitchen. Even though they were entertained by these stories, several students expressed

bewilderment at why anyone would choose a life of math. Students couldn't relate to Erdos's singular focus. However, pretty soon students were helping each other to understand the prime number patterns and other problems in which Erdos was so interested, and I could sense their becoming captivated by math in a way that took themselves by surprise.

As we read Hoffman's biography together, we stopped at each description of a historical mathematical problem and worked through a basic understanding of it together. In one class, for example, we diagrammed "the sieve of Eratosthenes," described on page 35 of Hoffman's book. We made a list of all the consecutive positive integers starting with 2 that would fit on our blackboard. The sieve works like this: Circle the first prime number, 2. Then cross off all multiples of 2. You arrive at the next prime number, 3. Cross off all multiples of 3, and

you're left with the next prime number, 5. After crossing off all multiples of 5, you find the next prime number, 7, and so on. My GED students were amazed by this exercise. They were almost giddy discovering this simple and reliable way to predict each consecutive prime number. The process of working through this and the other mathematical pat-

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Paul Hoffman's account of Erdos does not depend on a sophisticated mathematical vocabulary to enjoy.

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terns laid out by Hoffman sparked spontaneous, engaged questions about numbers and led to animated, high-energy discussions about mathematical concepts.

Hoffman's book helps to develop in students three key components of critical inquiry: curiosity, collaborative problem solving, and historical contextual knowledge. Curiosity is not given enough attention in pedagogical theorizing, but it is the linchpin of adults' decisions to continue with education. In addition to building students' curiosity, Hoffman's portrayal of mathematicians' different abilities and collective strengths helped to inspire an atmosphere of collaboration within our class. Sometimes our class would spend long periods working through problems that grew out of those in the book. Because many of the problems that Hoffman lays out are complex, students needed each

A Peek Inside …

Tools (Manipulatives) Available in Math Cl Math Materials

Lots of Massachusetts adult education classes have available calculators and rulers. However, less than three quarters of classes have graph paper available to students and only about one half of classes have tape measures or fake money for students to measure with or demonstrate problem solving. When it comes to the use of conventional math manipulatives, available in many K-12 school systems (Base 10 Blocks, Pattern Blocks, Unifix Cubes, Counting Chips), only about one third of adult programs are well-stocked.

One interesting conclusion we might reach from this data involves the connection of mathematics with reading and writing. Only about one fourth of programs have math story books on hand and only about 10 per cent use math journals. Writing across the curriculum is *de rigueur* in

Importance of Math for Students

Massachusetts adult education programs recognize the importance of math for most or all students. The higher your literacy level, though, the more important math becomes for you, apparently. Given what we understand about the development of math skills—it takes time and it takes repeated experiences to cement conceptual understanding as well as efficiency, fluency, and flexibility (Frameworks), it appears the state needs to put more emphasis on mathematics at lower literacy levels.

Importance of Math for Students

Program Level	Not Important	Important for Some	Important for Most	Important for All
ESOL	0%	39.3%	17.9%	42.9%
ABE	0%	5.9%	17.6%	76.5%
Pre-GED	2.6%	2.6%	5.3%	89.5%
GED	2.6%	2.6%	0%	94.7%

Tools Available in Math Class

Program Type	Base 10 Blocks	Calculators	Counting Chips	Graph Paper	Asst. Meas. Tools	Math Story Books	Math Journals	Metric Meas. Tools	Fake $
ESOL & ABE	36%	83%	21%	68%	70%	26%	11%	30%	51%

Program Type	Pattern Blocks	Protractors	Rulers	Scales	Tape Measures	Yardsticks	Other
ESOL & ABE	36%	51%	79%	15%	53%	36%	Dice, geoboards Flash

most progressive school systems these days. We are left to wonder if adult education classes might benefit from greater attention to this practice, especially since writing GED scores, like math GED scores, are noticeably lower than scores on other GED tests.

Importance of Ability to Teach Math

Do adult education programs take notice of whether or not teaching candidates can teach mathematics? Not if you teach English as a second language. However, if you're applying to teach in an English- speaking adult education class, nearly 90% of programs indicate that they give your math teaching ability serious consideration.

Is ability to teach math considered in hiring new teachers?

Program Type	0 (not at all)	1 (a bit)	2	3	4 (a lot)
ESOL	13.8%	58.6%	20.7%	3.4%	3.4%
ASE	0%	5.7%	5.7%	48.6%	40%

Application Idea

At a staff meeting, take a look at the data presented in the tables in this article. What conclusions can you draw about your pro

Massachusetts has long been a leader in the field on adult mathematics instruction. It was the first state in the nation to institute math learning and teaching standards (1994). Information from the SABES math environmental scan indicates that Massachusetts adult education field still has some changes to undergo.Changes supported by the data and the standards documents guiding curriculum development include the following:

■ Increased emphasis on teaching all math topics at all levels (see*Massachusetts Adult Basic Education Curriculum Framework forMathematics and Numeracy*

■ Increased emphasis on mathematical problem solving, reasoning, communicating, and connecting at all levels

■ More math instruction at lower levels

SABES hopes to reissue the math environmental scan every year of the Math Initiative. With luck, even more programs will respond, so we can get an even clearer picture of what's happening with adult math instruction and what needs to happen.

Patricia Donovan is the coordinator of the SABES Math Initiative. She can be reached at <pdonovan@worlded.org>.

Using Math in the ESOL Classroom

BY ALEXIS GREENBLATT

Every ESOL teacher understands that a lack of basic literacy in the student's native language lends unique challenges to learning a second language. ESOL students who missed out on cultivating an academic foundation have a magnified challenge in learning not only English, but in learning other subjects like math, science, and writing. This observation, which I realize is not a new one, led me to incorporate math into my ESOL classroom as a part of my language curriculum.

In my ESOL training, we learned that numbers should be taught just like colors, food and body parts. Perhaps in ESOL classrooms where the students have a background in math, all that they need is English language practice. However, in my classroom, which is in a correctional facility and where my limited English speakers are almost exclusively Latino, that is not the case. Many of my students come from from a common background where they either left school because they were working in Puerto Rico or they were left behind by the education system when they arrived in the United States. Either way, most of my Latino students need more than just language skills, and the incorporation of math into the ESOL curriculum has helped to fill in the gaps that were left when their formal education ended.
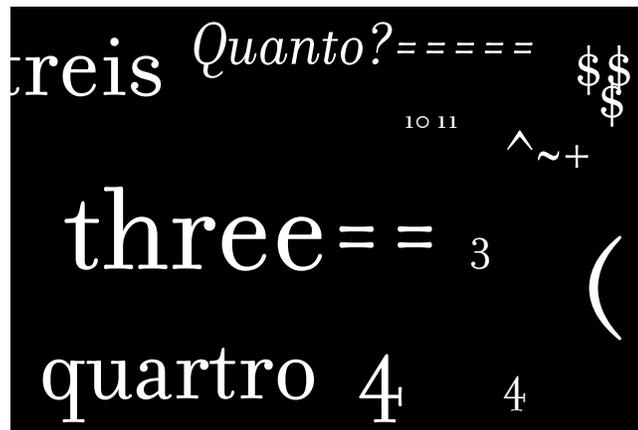
An Experiment with Math

As an experiment one day, I gave my ESOL students the same work that I had given to my ABE class. We worked as a group on place value, rounding numbers, and writing numbers out as words. I realized that just like in my ABE class, these skills were lacking for the ESOL students in both Spanish and English. The lesson progressed into a regular math lesson, with the focus not necessarily on learning English, but simply on learning, and the English happened naturally.

The break from the typical ESOL lesson was refreshing. My older students can't always see their progress in English. However, the math provided a finite, discrete set of vocabulary and skills they could manage and master, and they could feel successful while doing it. The math lesson offered a change from a focus on grammar, vocabulary, and pronunciation. This change was invigorating because it focused on a skill that was underdeveloped in their first language, and that helped them to feel that they were making progress in a concrete area.

The positive outcomes of integrating math lessons in the ESOL classroom are numerous. My students report that they feel "like real students," and they say that learning math will help them "to get good jobs." One man said that doing math reminded him of being a young boy in school, before he got in trouble, and that was a positive memory for him. The inclusion of math into the ESOL classroom is the key that has been missing from my ESOL curriculum. In order to succeed, my students need every advantage they can gain from their time in jail, and I am convinced that learning math as part of the English curriculum will provide them with an edge that they did not have on the streets.

Alexis Greenblatt teaches ABE, GED, ESOL, NNL, and Spanish at the Hampshire County House of Correctons where she has taught for seven years. She can be reached at <Alexis.Greenblatt@hsd.state.ma.us>. >.

The Man Who Loved ...

other to understand them. When students read chapters on their own outside of class, they had a much more difficult time following the math woven through the book. In addition to promoting collaborative learning, the history of mathematical ideas that Hoffman weaves through the biography provided a context that is missing in most math classes, and I found that this context created in students a different relationship to numbers than they are able to have if they see math only as it relates to their immediate surroundings. Reading about math is an underutilized way to transform ABE classrooms, and Paul Hoffman is a great place to start.

Amy Stamm is an ABE/ASE/GED teacher at the Hampshire County Jail, and she loves math. She can be reached at <A.Stamm@hsd.state.ma.us>

GED Testing Service Shares Its Data

By Patricia Donovan

Tom Mechem, Massachusetts GED chief examiner, and Patricia Donovan, SABES staff development specialist and math initiative coordinator, attended the three-day GED Mathematics Training Institute in Washington, DC in August. They presented parts of that institute at Network 2006 in a presentation titled "Jumping GED Math Hurdles. Here are some of their reflections.

Which of the following GED tests is most commonly failed by test takers?

- Test 1: Writing
- Test 2: Social Studies
- Test 3: Science
- Test 4: Interpreting Literature and the Arts
- Test 5: Mathematics

If you selected Test 5: Mathematics, you are correct! "Passing rates on the math exam were … the lowest among the five academic subject areas." (Klein, 2006). That's right. More people across the nation fail the math exam than any other GED exam. The same is true in Massachusetts.

Tom Mechem, Massachusetts GED chief examiner, reviewed state test scores and discovered that most people who were close to passing the test battery, but failed, failed because of their math scores (51 percent). But why?

The August 2006 GED Mathematics Training Institute, developed by the federal Office of Vocational and Adult Education (OVAE), provided insights into the areas of consistent difficulty for GED test-takers. There were three: Geometry and Measurement, Applying Basic Math Principles to Calculation; and Reading and Interpreting Graphs and Tables. Mechem's review of Massachusetts' test results supported the national findings and indicated that "If teachers could do one thing—help students learn to read and interpret graphs—they would be helping many of their students pass the GED math test."

Research findings were compiled by the GED Testing Service using 2004 data from three operational test forms. Researcherslooked at the top 40% of the most frequently missed test items, which represented 40 percent of the total items on the test forms. The questions were equally distributed between those from Part 1 of the test (with the calculator) and from Part 2 (without calculator use).

measurements for similar figures and how to compare the differences between the original and new, similar figure.

> *More people across the nation fail the math exam than any other GED exam. The same is true in Massachusetts.*

Math Test Hurdles

Geometry and Measurement

Test candidates often could not select the correct procedure to solve a problem; accurately construct mathematical formulas to represent characteristics of different geometrical figures; or modify and apply their knowledge to solve complex problems. All this means students need work on the following:

- **Recognizing visual clues**
Students need to understand that any shaded figure indicates an area problem; any figure shown in outline form only indicates a perimeter problem and know that if two angles look equal on the GED test, they are; and if two angles look different, they are.

- **Calculating areas by partitioning**
Students need to know how to take an L shaped figure, for instance, and break it into two rectangles and know that any complex shape GED presents can be broken up a number of ways.

- **Comparing properties of geometric problems**
Students need to know how to apply proportional reasoning to find

- **Using the Pythagorean Theorem**
Students need to know how to calculate the length of the missing side of a right triangle and avoid common conceptual errors such as adding rather than multiplying within the $a^2 + b^2 = c^2$ formula. They also need to understand that no side in a triangle can be greater than the sum of the other two sides (in a 3-4-5 right triangle, the hypotenuse could not be 8, for instance).

- **Understanding the relationships between angles and parallel lines**
Students need to know that any angles that lie along a straight line total 180 degrees.

- **Substituting to solve a problem:**
Students need to know that numbers can be substituted into formula options presented as test answers to see if they yield the area, perimeter, or volume of the figure.

Applying Basic Math Principles to Calculation

Candidates often make careless errors that can be easily avoided and need to be proficient at estimating as well as calculating precisely. They also should be able to replace a vari-

GED Testing Service...

Continued from page 12

able with a reasonable number to test alternatives offered as answers , especially in Part 1. Learners can be helped in the following ways:

■ **Fractions**

Students should know the benchmarks or how to find $\frac{1}{4}$, $1/_3$, $\frac{1}{2}$, and $\frac{3}{4}$ of whole numbers and how to determine if an answer is reasonable or not (it should be closer to 1 than $\frac{1}{2}$, for instance).

■ **Decimals**

Students should know how to use the calculator to operate with decimals.

■ **Percents**

Students should know how to estimate or calculate 10 percent or 25 percent of a quantity and know how to calculate percentage increases and decreases.

■ **Square Roots**

Students should know how to use the calculator to square or find the square root of a number and how to estimate the square root of a non-perfect square by using known squares, and realize that decimal answers for squares will only be required on Part 1 of the test.

■ **Exponents**

Students should know that an exponent raises a base to a power and is not the same as multiplying ($4^2 = 4$ x 4 NOT 4 x 2), negative exponents represent decimal (small) numbers, not negative numbers in both scientific and conventional notation, and how to convert from one expression to the other ($4(10)^2 = 4$ x 10 x 10).

GED Sample Question

In the following diagram of the front view of the Great Pyramid, the measure of the angle PRQ is 120 degrees, the measure of the angle PQR is 24 degrees, and the measure of the angle PST is 110 degrees. What is the measure of the angle RPS in degrees?
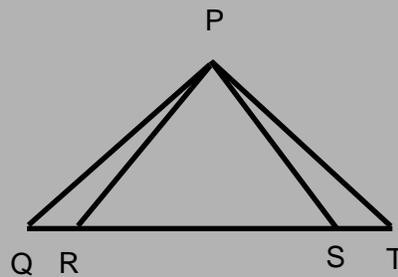
Reading and Interpreting Graphs and Tables

Test candidates would benefit from being familiar with the different types of graphical representations used on the GED test and acquiring strategies for working with the data they contain. In particular, learners need to know the following:

■ **Transitioning between text and graphics**

Students should know how to translate text into graphical formats.

■ **Interpreting and comparing graphical data**

Students should know how to read and interpret graphs with and without scale or detailed units of measure, select and interpret table values contained within multiple graphs, and distinguish rates of change represented on a single graphic (often financially related) and compare rates of increase for two or more plots of information.

■ **Interpreting and selecting tabular data for computation**

Students should know how to distinguish between pertinent and irrelevant information.

Helping learners develop the mathematical understanding that leads to better GED scores can be as simple as telling and showing these pitfalls to the most able students. More often, it means discerning the conceptual and procedural understandings that underlie these pitfalls and working on them developmentally. It means, for instance, inviting learners to categorize types of graphs and communicate regarding distinguishing characteristics; develop a graph vocabulary list; gather data to construct different graphs; and write stories from simple graphs, then more complex graphs while applying knowledge of benchmark fractions ("it's about half way up the y-axis, so it starts at about 50"), patterns (entries in this table seem to be going up by 100's, so I'd guess that in three days, the amount would increase by 300), and other mathematical practices.

Preparation for the GED mathematics test must improve if math is to lose its distinction as the biggest hurdle to receiving a GED.

Patricia Donovan is the coordinator of the SABES math initiative. She can be reached at <pdonovan@worlded.org>

Reference
Klein, Steven, 2006, Data analysis report: Identifying skill gaps and topics for the GED mathematics training institute, GED Mathematics Training Institute, U.S. Department of Education Office of Vocational and Adult Education Division of Adult Education and Literacy, p. 2-1.

Profile of GED Math Test Takers

- Average Age: 24.7 years
- Gender: 55.1% male; 44.9% female
- Ethicity: 52.3% White; 21.5% African American' 18.1% Hispanic Origin; 2.7% American Indian or Alaska Native; 1.7% Asian and 0.6% Pacific Islander/Hawaiian.
- Average Grade Completed: 10.0
- Math Score for All U.S. GED Completers: median (460); mean (469)
- Math Score for All U.S. GED Passers: median (490); mean (501)
- Missed Math Items for "Near" passers and "Not Near" testers: Same in type
- Selected Math Distracters for "Near" passers and "Not Near" testers: Same in type

Students Express Their Experiences With Math

By Barbara Goodridge and Marilyn Moses

Using a Mind Map: Marilyn's Experiences

To get a sense of students' thoughts and feelings about math, and to assess possible issues and attitudes, I often give them a short "mind map" activity in our first class together. In this year's GED classes, I specifically asked for six responses. I didn't want too many but certainly more than one. They had just a few minutes to do this. Using an image of the map on an overhead, I asked each person for the first thing that comes to his or her mind about math. I recorded the responses on my mind map. Next, I asked each person for one more word, number, picture or idea that he or she would like me to know.
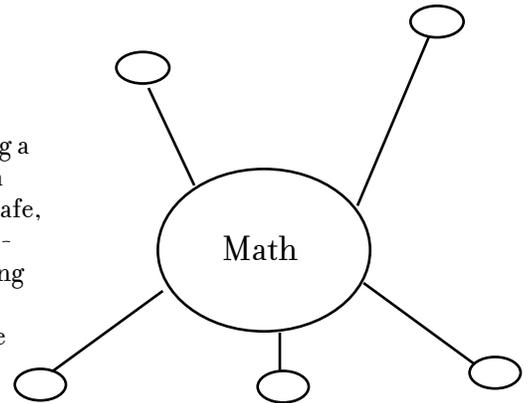
Responses

As I recorded their responses on my mind map, I tried to group the responses by positive or negative emotions or academic response. The emotions overruled and most were negative! See students' actual responses in the chart in the next column. The results were very similar in the next GED class.

Implications

Suddenly students did not look so fearful and nervous; they were shouting out that they felt the same way. The activity opened up conversation in an otherwise very quiet, apprehensive first class. Using the mind map was an eye opener for me. I was amazed that so many of the class had such negative reactions to math. It gave me an opportunity to acknowledge their feelings in a non-threatening way. I asked why they thought so many had such negative reactions to math. Some said they just didn't get it; some said it was due to mean teachers; others

remembered boring drills. Using a mind map in this way can make a great foundation for building a safe, welcoming, and nurturing atmosphere in a math class, thus helping students relax and become more open to trying to learn math once again.

Students' Reactions to Their Math Experiences		
Negative	**Neutral**	**Positive**
Help!	Division	Fun
Hard	Decimals	Excited
Oh man!	Numbers	Love math
I hate math	Geometry	Like it when I get it
Mind boggling	Different language	Helpful
Confusing	Uncertain	
I don't understand	Knowledge	
Difficulty solving	Multiplication	
Uncomfortable	Word problems	
Dumbfounded	Money	
Fear	Algebra	
Frustrated	Puzzled	
What's the point?"	Formula	
Don't want to do it	Need to understand	
Don't call on me!		
Stressful		
Division		
☹		
Frustration		
I can't stand it!		
Here we go again		
Depressed		
Headache		
Boring		

Go to page 25 for a more detailed math mind map and to read about Barbara Goodridge's student reactions.

Students' Math Memories

By Amy Stamm and her students

I asked my ASE math students to write about a math memory in class. I told them it could be a good or bad memory, as long as it was striking to them. I then asked them to think about what their math memories told them about how they learn math: Under what circumstances did they learn math best, and under what circumstances did

they feel they could not learn math well? This exercise was part of a larger effort to engage students in reflection about their experiences so they would make conscious decisions about their learning process. Analyzing good and bad memories as a group gave students new ways to understand what lies behind their

emotional responses to particular experiences. We had a great class talking about people's memories and figuring out what they meant in terms of pedagogy and learning styles.

Amy Stamm is an ABE/ASE/GED teacher at the Hampshire County Jail. She can be reached at <A.Stamm@hsd.state.ma.us>


Rico's Struggles

I remember being in school and struggling so much with math that I hated it, but in another sense I loved working with measurement and wood. I really didn't have an interest in math until I started working in "die cutting" printing and with wood. I have had many options of working, but math has prevented me. I have learned that math is a very important part of life and wherever I go I need to have some math skills because in measurement, even a 15/16 can spoil a lot of good wood! I see how important math is for work, money, computers and even to work at Burger King. The world relies on math. So math has given me the desire to continue learning and working with math. *—Rico*
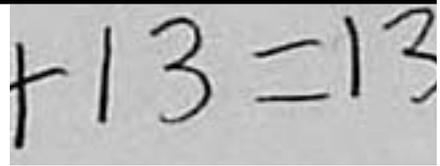

No More Math Problems

I remember when I was in third grad in school I had a lot of problems with math. So I went in special ed class. I didn't like that class at all. That class helped me a lot in math and began a new life in math for me. It made me like math now and look forward to harder math problems to be a smarter person inside. Math was my weak point at one time, but no more in this lifetime. Without math you can't go anywhere in your life. Everyone needs math to go through everyday life. I don't think that I have a problem with math anymore thanks to my teachers in my life.

—Steven
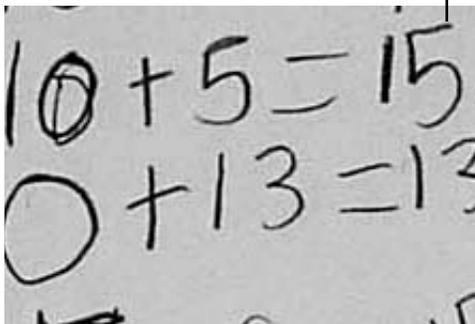
Different Ways to Solve Problems

The memory that I have about math is that there's so many different ways of solving a problem. Like one day I was so frustrated trying to figure out a problem and I just couldn't figure it out. Then I got more mad when Amy tried to show me and I still couldn't get it right, then Carl tried to show me another way and it just seemed more crazy and difficult, so I sat down and relaxed for a little bit. Then when I went back to it with Alexis and she showed me another way of doing it and I finally got it. I solved the problem. This memory affected me in a way that I wanted to give up in math. This experience taught me that the math isn't always easy, but if you keep trying you will eventually get it, and if you don't get it one way, you might get it another way. What makes me want to learn about math is wanting to have my GED. *—Luis*
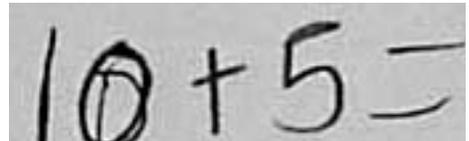
I Used to Hate Math

I've been in school for the past seven months. At the beginning of my sentence I thought that I could do something good with my time while being incarcerated. Every Monday we got math. Amy, our teacher, helps us a lot. The Monday math class is a little hard for me. My feelings towards math have changed. I used to hate math. Today I appreciate all the help that the teacher has given me. I also know that by learning math I can help my son with his homework in the future. Plus, I want to study construction or drafting and I know I got to know my math good. By my achieving this, I know I will get a good job upon my release. *—Wally*

Games! Prizes! Sing-a-Longs! Math Circus

The second annual math circus was held at the Network 2006 conference in Malborough, Massachusetts, on October 25, 2006. As part of the SABES Math Initiative, the circus offered a variety of activities illustrating ways to make math teaching engaging, practical, and even amusing. Games, math problems, activities, and even sing-a-longs created a festive and relaxing atmosphere for learning and teaching math.
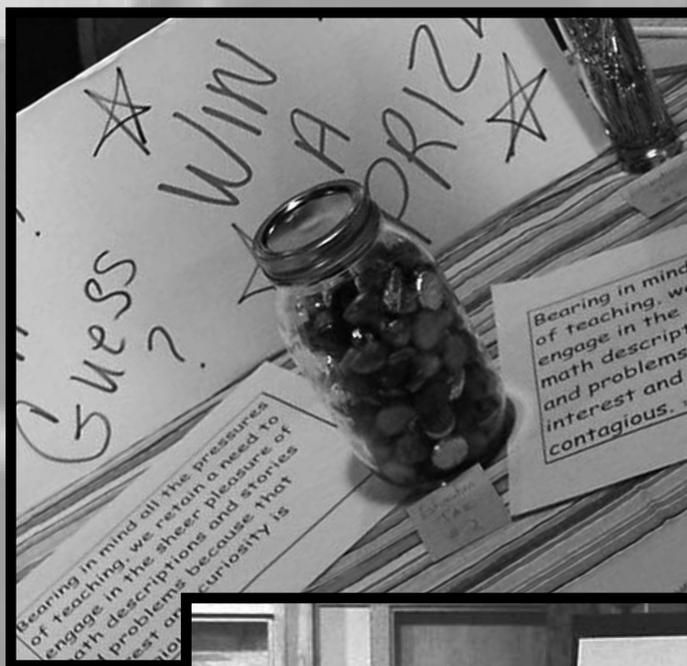
Participants were drawn to the estimation activities with the promise of a prize...
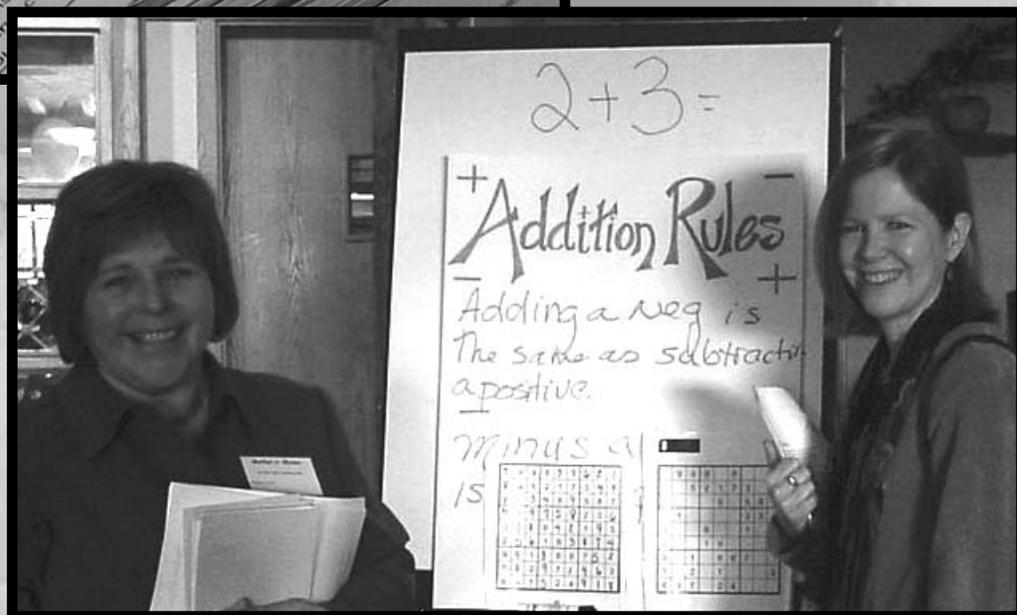
Marilyn Moses and Jane Schwerdtfeger review math posters.

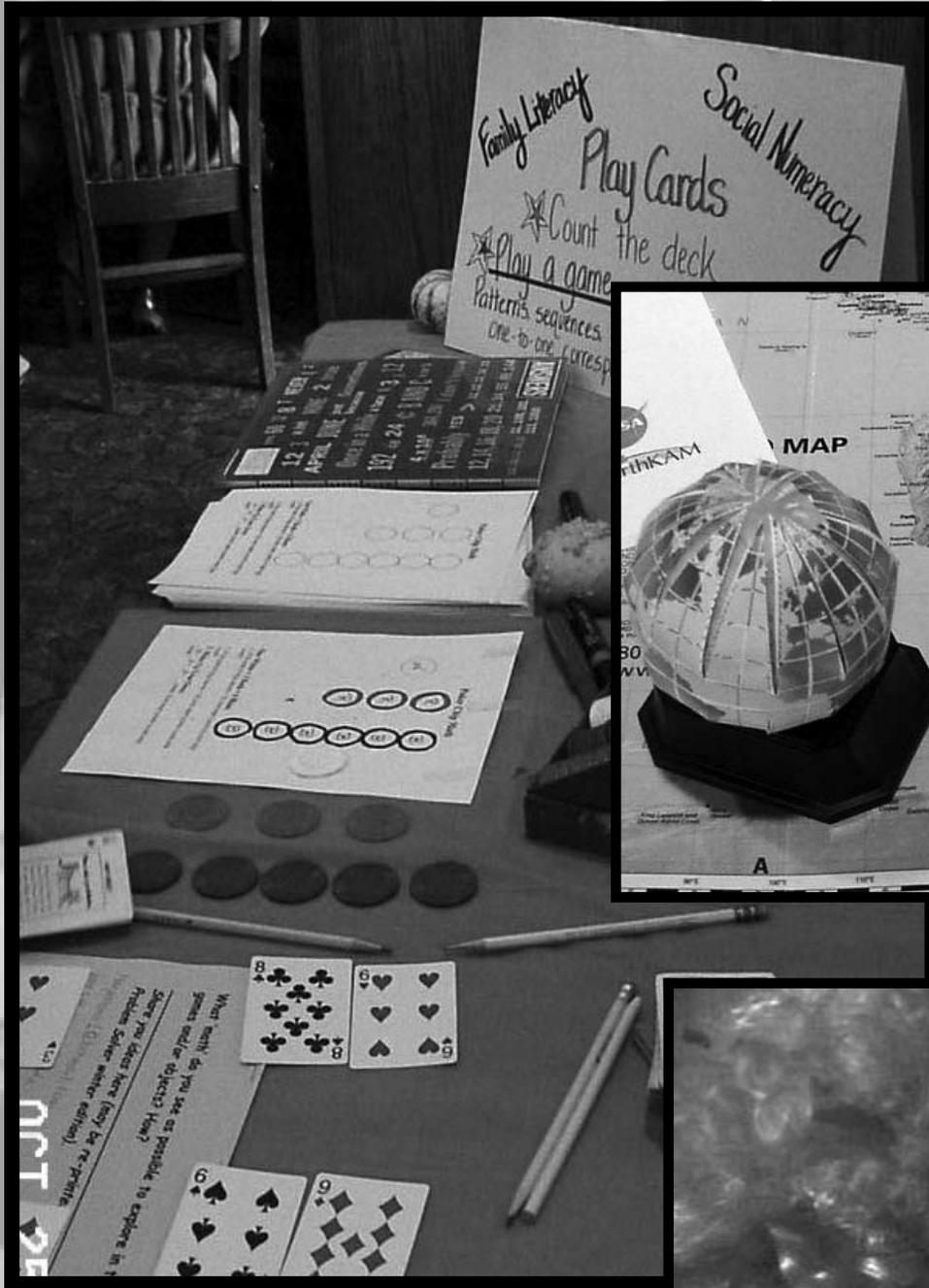# Entertains and Educates at Network 2006

Creating globes from tennis balls, playing family math games...

Patricia Donovan, coordinator of the SABES Math Initiative, dons a circus wig to bring humor into math lessons and activities.

The Math Framework: Clarifying Terms

BY SHIRLEY LYONS

The Massachusetts Adult Basic Education Curriculum Framework for Mathematics and Numeracy, based on real-life needs of ABE learners, was developed and field-tested by a team of ABE practitioners with years of experience in ABE and in math. This fabulous resource, recently published on line in its most updated version, can be accessed at <www.doe.mass. edu/acls/frameworks/>.

Since the terminology of the Framework is complex, some explanation is useful.Here is a clarification of the most important terms used when discussing the Framework.

Components of the Math Frameworks

The math Framework is organized into the following categories:
- Core concepts
- Guiding principles
- Habits of mind
- Content strands
- Standards
- Benchmarks

Core Concepts

The core concepts describe the skills adult learners need in order to succeed in math. These include:

1. Problem Solving
Being able to take the math concepts that have been learned and apply those skills to real-life problems

2. Mathematical Reasoning:
Knowing why a solution is correct, determining if an answer makes sense, or being able to question whether given information is reasonable are key evaluation skills.

3. Mathematical Decision making: Being able to sift through information they are constantly bombarded with, decide what is valuable or valid, and using it in a meaningful way.

4. Mathematical Communication:
Being able to discuss mathematical knowledge with others beyond the classroom

Math Framework

Core Concepts

Guiding Principles

Habits of Mind

Content Strands

Standards

Benchmarks

Proficiency Levels

5. Mathematical Connections:
Relating new skills to something the learner has mastered in the past or that is related to his personal life

6. Critical Thinking Skills:
Accuracy, efficiency, and flexibility. These skills allow the learner to apply his knowledge to new problems or slightly different situations, and to solve problems in more than one way.

The Six Guiding Principles

These principles outline components of good math instruction. They include:

1. Curriculum
Curriculum should be developed based on real life, preferably with applications based on the experiences of your learners, and include collaborative problem-solving

2. Assessment
In addition to standardized testing, achievement should be measured based on your learners' personal goals.

3. Equity
Learners at all levels, from levels 1 to 6, should be instructed in all four content strands areas.

4. Life Skills
Instruction should include scenarios that mimic real mathematical problems that adults may encounter so that they may learn how to deal with them successfully in a safe environment, gaining confidence in their problem solving and decision-making skills.

5. Teaching
Teaching methods, materials, and activities should be varied so learners may be better able to cope with the wide variety of challenges that come their way. The use of manipulatives and realia should be used as well as the traditional textbooks or worksheets. Whole class and small group instruction should be mixed with individual or partnered work. Short assignments and long-term projects should be included as well.

6. Technology
Learners need to become comfortable with the use of calculators, computer programs, and other tech-

The Math Framework …

nological tools in the classroom so that they can transfer this experience to their personal everyday lives.

The Five Habits of Mind

Habits of mind include what we want our adult learners to exhibit in the classroom as well as in their personal lives so they may become more numerate. These include the following:

1. Curiosity
Being open to new ideas or different problem solving strategies.

2. Respect for Evidence
Understanding the value of data and when to use it as evidence.

3. Persistence
Knowing that most problems can be solved if you take another stab at it, try another approach, or take some extra time to think it through.

4. Ownership
Making math meaningful and purposeful.

5. Reflection
Taking time to think about and learn from each math experience.

The Four Content Strands

The four content strands include the math concepts that we teach. They include the following:

1. Number Sense
What numbers represent, understanding the concepts of arithmetic operations and computation, determining what method may be used to solve a problem, and estimating.

2. Patterns, Functions, and Algebra
The connections between math and the fine arts and the sciences. Relationships can be demonstrated using tables, charts, equations, and graphs.

3. Statistics and Probability
Data and values that may be expressed with words or with numbers. Data must be carefully analyzed and evaluated in order for an accurate conclusion to be drawn.

4. Geometry and Measurement
Spatial concepts that are used to describe the world around us.

Learning Standards
Learning standards refer to the things we want students to know.

Benchmarks

Benchmarks refer to detailed descriptions of of specific skills learners should be developing on their way to becoming more numerate. They are listed for each learning standard and differ depending on a student's proficiency level.

Proficiency Levels

These levels remain consistent throughout the four content strands. For example:
- Level 1: Beginning Adult Numeracy
- Level 2: Beginning ABE Mathematics
- Level 3: Intermediate ABE Mathematics
- Level 4: Pre-GED/ABE Mathematics
- Level 5: ASE/GED Mathematics
- Level 6: ASE/Bridge to College Mathematics

These proficiency levels correspond to National Reporting System (NRS) levels; they should not to be confused with class designations. For example, in a level 1 ABE class, or beginner class, there may be learners with skills ranging from proficiency level 1 to 3 (beginning adult numeracy to intermediate ABE mathematics). And, the individual learner's skills may be spread over a wide range of levels as well. For example, a learner may have little to no knowledge of statistics, which would place him at level 1 in the statistics and probability strand. That same learner, a carpenter who uses fractions on a daily basis and knows common equivalents, would be at level 4 in the number sense strand.

Benchmarks, detailed descriptions of specific skills learners should be developing, are listed for each learning standard and will differ depending on the proficiency level. The benchmarks are broken down further into enabling knowledge and skills, very concrete explanations of what the student should be able to demonstrate.

Please go to <www.doe.mass.edu /acls/frameworks/ > to get a complete copy of the Sample lessons, examples, and illustrations make the frameworks a user-friendly resource.

Shirley Lyons is a transitions to college teacher at Northern Essex Community College. She can be reached at <slyon@necc.mass.edu>

Fabulous Features of theMath Forum and other Delightful Web sites

Math Forum
<http://mathforum.org/>

This amazing, in-depth site brings you to so many useful, exciting, and fun features that you may never get to another math site once you get started!

The Math Forum describes itself as "a leading center for mathematics and mathematics education on the Internet" and operates under Drexel's School of Education. The forum's "online community includes teachers, students, researchers, parents, educators, and citizens at all levels who have an interest in math and math education."

Fabulous Features of the Math Forum

■ **Ask Dr. Math**
Ask Dr. Math is a question and answer service for math students and their teachers. A search able archive is available by level and topic, as well as summaries of Frequently Asked Questions (the Dr. Math FAQ).

■ **Math Tools**
The Forum's digital library supports the use and development of software for mathematics education. Offers real technology tools (graphing calculator, applets, etc) lesson plans, stories, activities, support materials, and a newsletter.

■ **Teacher2Teacher**
A resource for teachers and parents. Ask a question, discuss math education, look for answers. Searchable archive by topic.

■ **Problem of the Week (PoWs)**
Looking for creative ways to kick off the math-teaching week? This feature "provides creative, non-routine challenges for students in grades three through twelve."
The Math Forum Internet News provides a weekly newsletter describing useful math-related Internet sites. You can also review back issues of the newsletter here.
<http://forum.swarth more. edu/ electronic. newsletter>.

Lincs Science and Numeracy Special Collection
<http://literacynet.org/sciencelincs/ttinteractive.html>
Provides links to Internet sites useful for teaching and learning about science and numeracy. Don't miss it.

Figure This
<www.figurethis.org>
Figure This! Math Challenges for Families,offers online mathematical problems for middle-schools students and their families.

TV 411
<www.tv411.org/index.shtml>
Tons of math activities, including how to use a calculator, multiple percents, place value, polygons and perimeter, keeping up with exponential growth, and much more. You can also order a free "Think Math" DVD, a multimedia teaching tool.

EQUALS
<www.lawrencehallofscience.org/equals/>
Equals programs at the Lawrence Hall of Science, University of California at Berkeley, provide workshops and curriculum materials in mathematics and equity. Serves PreK-12 teachers, parents, families, and community members.

Ask Dr.Math
<www.mathforum.org>

Q. I would like a complete explanation of functions.

A. In general, a function is a set of rules for taking input and producing output. Most of the time when you talk about functions in math the input and output are numbers. If I've got a function called Fred, and I input the number 5, Fred might output 10. If I input the number 3, Fred might output 6. It just so happens that Fred is the "take a number and double it" function. You could write this as Fred(x) = 2x, which says that whatever the value of x is, the value of "Fred of x" will be twice it. You could also imagine functions that take more than one number as their input, like f(x,y) = x+y. That means that if you give the function numbers 8 and 5 as input, the function spits out the number 13 as output.

Adult Numeracy Network Urges National Math Panel: Include Adults in Your Agenda!

In mid-September, Mary Jane Schmitt, past president of the Adult Numeracy Network (ANN) presented a talk to the National Mathematics Advisory Panel.Her talk was called The Importance of Insuring Access to Quality Mathematics Education for Students At Risk of Leaving School and Adults and Young Adults Who Have Left the K-12 System. Below are excerpts from her presentation, reprinted with her permission.

We in the Adult Numeracy Network (ANN) are in the business of teaching K-12 mathematics content to students who didn't 'get it' when they were in the K-12 system.

We ask the panel to create an inclusive agenda that not only addresses the needs of every student currently in the K-12 system, but also extends somewhat beyond the K-12 system. The Executive Order sets forth a policy to "foster greater knowledge of and improved performance in mathematics among American students."

But what about the adolescents and young adults who have dropped out of the system and have yet to obtain a high school diploma? The members of your panel have been directed by the President to focus on the need to create a competitive future workforce. What about the adults in the current workforce who lack sufficient mathematics knowledge and skills to succeed? The panel is interested in parents having input to their children's education. What about the need of parents to develop their own mathematical skills as heads of family, citizens, and workers? The panel is interested in preparing students for college and careers. What about those who when enrolling in community colleges find themselves unprepared to take on college-level mathematics?

The numbers here are not insignificant, and must motivate the mathematics education community to take action.

■   There have been estimates of a 70 percent high school graduation rate, and that every nine seconds a student drops out of school in America. When they do so, their journey through K-12 mathematics education is cut short.

■   One in every seven high school diplomas awarded in the United States is a GED. Of those who fail to pass the GED, the mathematics test is the most frequently failed section.

■   Most of those who are going to be working 10 years from now are already working. Yet, results of large-scale surveys of the adult population indicate that a strikingly large proportion have inadequate skills for the mathematical demands of the twenty-first century. One recent survey found that numeracy proficiency of 58.6 percent of U.S. adults is below the minimum level for coping with today's skill demands. Another survey estimates that the quantitative literacy skills of 55percent of U.S. adults are at Basic or Below Basic levels. Moreover, in both surveys, the percentage at these lower levels in math was significantly higher than it was for reading.

■   Nearly half (42 percent) of students in community colleges are taking remedial courses. Community Colleges are quickly becoming the space where students who need to take catch-up courses must go. This includes both recent high school graduates and adults seeking retraining and re-education. Moreover, few who begin developmental math continue on to complete a degree. As one professor graphically stated on the front page of the *New York Times* on September 2, 2006, "It's the math that's killing us."

To omit this large group of adolescents and adults from the panel's agenda does a disservice to countless individuals, to our nation's families, communities and workplaces, and to the economic prosperity of the nation.

■   Individuals are impacted. A person's numeracy skill level may be even more predictive of economic success than literacy skill level. People lacking math knowledge and skills lag financially behind those with higher skills.

■   Our nation's economic health is impacted. One international com-
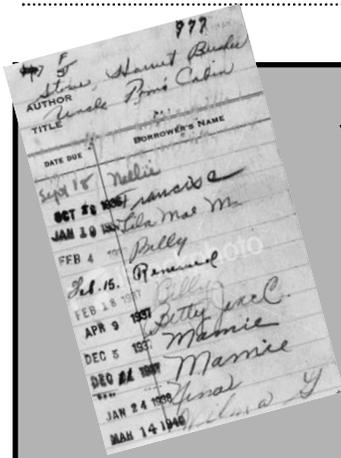
Visit the New SABES Library

Location: Adult Literacy Resource Institute, UMass Boston, Wheatley
4th floor, Room 167, 100 Morrissey Blvd., Boston, MA 02125

Telephone: 617-287-4074; 877-605-5400 toll free in Massachusetts

Web site: <sabesliteracylibrary@umb.edu>

■   The SABES Literacy Library is a statewide staff development resource for Massachusetts Adult Basic Education and ESOL practitioners and programs.

■   The library is located at the Adult Literacy Resource Institute/Greater Boston SABES. Resources include books, videos, DVDs, research, access to online databases, software, curriculum, and more.

■   Practitioners can visit or request materials through email or the phone and will be mailed. Email or call to discuss your general resource needs or assistance in locating a specific title.

■   Library materials will often be brought to statewide conferences, workshops or institutes and may be borrowed from these events.

■   Materials are loaned for four weeks. Please remember that our resources need to be available for other literacy practitioners and return materials when you are finished with them. Materials may be mailed back or brought to the local library for return through the state interlibrary loan system.

■   Email or talk to a librarian to
  ◆ arrange for a visit to the library;
  ◆ ask for recommendations for materials;
  ◆ ask for help with library services;
  ◆ give feedback about SABES library
     services;
  ◆ request a specific item to be sent, and
  ◆ register to use the library materials and
     services.
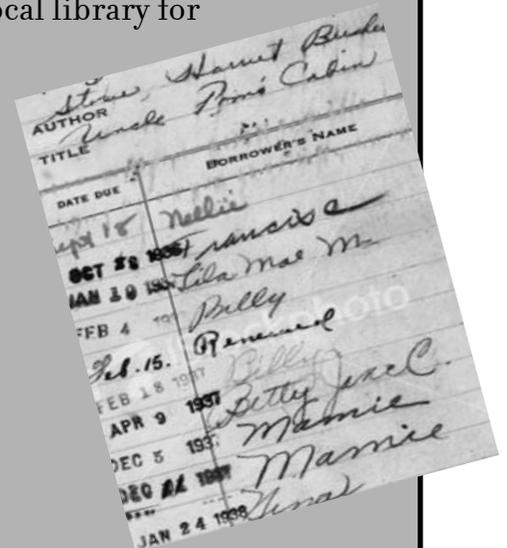
Check out the online catalogue at <www.sabes.org/library>.

Watch for updates on services in the coming months. Funded by the Massachusetts Department of Education/ACLS.

parative study suggests that increasing the quantitative, prose, and document literacy of the segment the population with the lowest skill levels has a greater positive effect on a nation's GDP than increasing the mathematics literacy of the segment with higher-level skills.

We trust that you conclude, as we do, that your agenda must include the mathematics education of not only those at risk of dropping out, but also those who drop back in, working adults in need of more math for workplace and career advancement, and adolescents and adults seeking higher education.

*Mary Jane Schmitt works at TERC in Cambridge and is a member of the Adult Numeracy Network Board .
She can be reached at <mary_jane_schmitt@terc.edu>.*

Check out the ANN Web site at <www.literacynet.org/ann/>.

Why Join National Council of Teachers of Mathematics (NCTM)? <www.nctm.org>

NCTM is the largest mathematics education organization, with 100,000 members and 250 affiliates throughout the United States and Canada. NTCM is on the cutting edge of math education, and its standards and principles inform a national math agenda. The NCTM Web site provides information about jobs, new products, publications, and links to useful material. When you becpme a member, you gain access to the following:

Principles and Standards: The NCTM Principles and Standards, posted online for members in complete and executive summary versions, provide the prevailing set of guidelines for mathematics teaching and learning. Can also be ordered by nonmembers.

Student Math Notes: This feature offers great teaching resources for = grades 5-10. Downloads are free to individual members of NCTM.

Professional Development: Offers events, resources, e-workshops, and other trainings.

Resources for Parents and Families: This feature offers help with homework questions and more.

1_1 $2 3_4 5 6$ $^7 8 1 0 1 ^1_1 2$

Math-Related Internet Discussion List
<http://mathforum.org/kb/forum.jspa?forumID=219>

ABE/GED/ESL, workplace, and literacy teachers, tutors, and adult learners are encouraged to take part in this discussion of educational issues around mathematical literacy. This list is maintained by the Adult Numeracy Network (ANN). Messages are archived and searchable, so you can go back through past dialogues to find information on a particular topic. If you join this list, you can pose questions, engage in online discussions, and offer your own ideas and resources to others. A quick review of this site shows quite a variety of topics: a crosspost on mathematical fiction, an announcement of free math software, a discussion among many members about the relationship between numeracy and literacy, a call for papers, an explanation about teaching fractions by looking forward to algebra, and more.

T2T: SABES Math Initiative Goes Intensive

By Patricia Donovan

Only a small percentage of adult education teachers have completed math teacher training. We know from research that intensive, longer-term professional development results in more effective change . So how should we respond to staff development planning for ABE math?

SABES Math Initiative

SABES has organized a math initiative for ABE teachers in Massachusetts. A group of ten practitioner leaders and five SABES representatives has been planning the initiative and offering workshops around the state. (Remember the Math Circus at Network ?) This year SABES has strengthened the math initiative through the Teacher to Teacher: Exploring Math program, nicknamed T2T.

Each SABES region is offering 16 hours of math training over a year's time to teachers of all stripes—from the math-phobic to the math lovers, ESOL, ABE, and GED alike. Each region designs the specifics of its training and decides whether to focus on number sense, algebra, data and statistics, or geometry and measurement, or on all four of these strands. However, all math groups focus on four components of math instruction and include teachers

- doing math;
- reading and applying math-related professional literature/research;
- examining student work for evidence of math understanding and misconceptions;
- connecting to the Massachusetts math and numeracy frameworks.

Structural differences appear in each region. For instance, the western region will use the Annenberg study model, one that uses a Web-based program to launch exploration of mathematical practices. Boston plans to organize a Japanese lesson study group. This group will collaborate on planning, implementing, and observing a lesson in action, then revising it. The Northeast, Southeast, and Central regions expect to run sessions based on the New York Math Exchange Group (MEG) model, where doing math and exchanging experiences and ideas on teaching math become the focus.

Program participants were recruited by SABES representatives in a variety of ways. Preference for participation was awarded to those programs with two or more interested teachers with the expectation of deeper, more sustainable change in math instructional practice emerging where teacher-partners share in professional development.

The Teacher to Teacher project is funded by World Education (home to the SABES Central Resource Center). Additional funding was made available by Verizon, a company that has continuously supported adult education projects.

Future issues of *Field Notes* will feature articles by some of the teachers engaged in these intensive staff development projects. If you have questions about the math initiative, contact Patricia Donovan at <pdonovan@worlded.org>.

SABES Region	*Teacher to Teacher* Practitioner Leaders	Anticipated Participating Programs	Start Dates
Boston	Linda Huntington Cambridge Adult Learning Center Dorrie Nord Julie's Family Learning Center	Bridge Over Troubled Waters Jamaica Plain ALP JVS Boston Mujeres Unidas Notre Dame CC SCALE	Nov. 14
Central	Cathy Coleman QCC ABE Program Ronnie Kell MWCC Devens Learning Center	Cedar Junction Grafton Job Corps Shriver Job Corps Mt. Wachusett Community College ABE	Oct. 18, 2006
Northeast	Barbara Goodridge Lowell Adult Learning Center Shirley Lyon NECC College Transitions	Haverhill Public Schools Even Start Lowell Adult Education Center Middlesex CHOC/ Billerica Middlesex Community College Adult Learning Center	December 1 Jan. 19 March 9 April 13 May 18
Southeast	Michele Bahr Marine Biological Laboratory Marilyn Moses Brockton Adult Learning Center	BCC ABE Brockton ALC UMD WEP Youth Build New Bedford PS	October 28
West	Michele Brown Read Write Now Jim Rathschmidt Franklin CHOC	Puerto Rican Cultural Center The Literacy Project/North Quabbin Adult Ed Center HALO Young Parents Program	November 17

Students Express…

Barbara's Experiences

The responses in my room where similar to those in Marilyn's, but this was a group who had tested well in math. There were additional themes that came up, especially that math is challenging but helpful for the future.Some students expressed themselves visually in clever ways.

When I solve a problem, a light bulb goes off in my head!

Mind
Applications
Thinks
Head

$ ☺ $

Add Money   Subtract Bills   Multiply Savings   Divide Payments

Math = Independence!!

Math

everyday

kids' homework

work

letters

algebra

Ugh

formulas

??   ??   ??
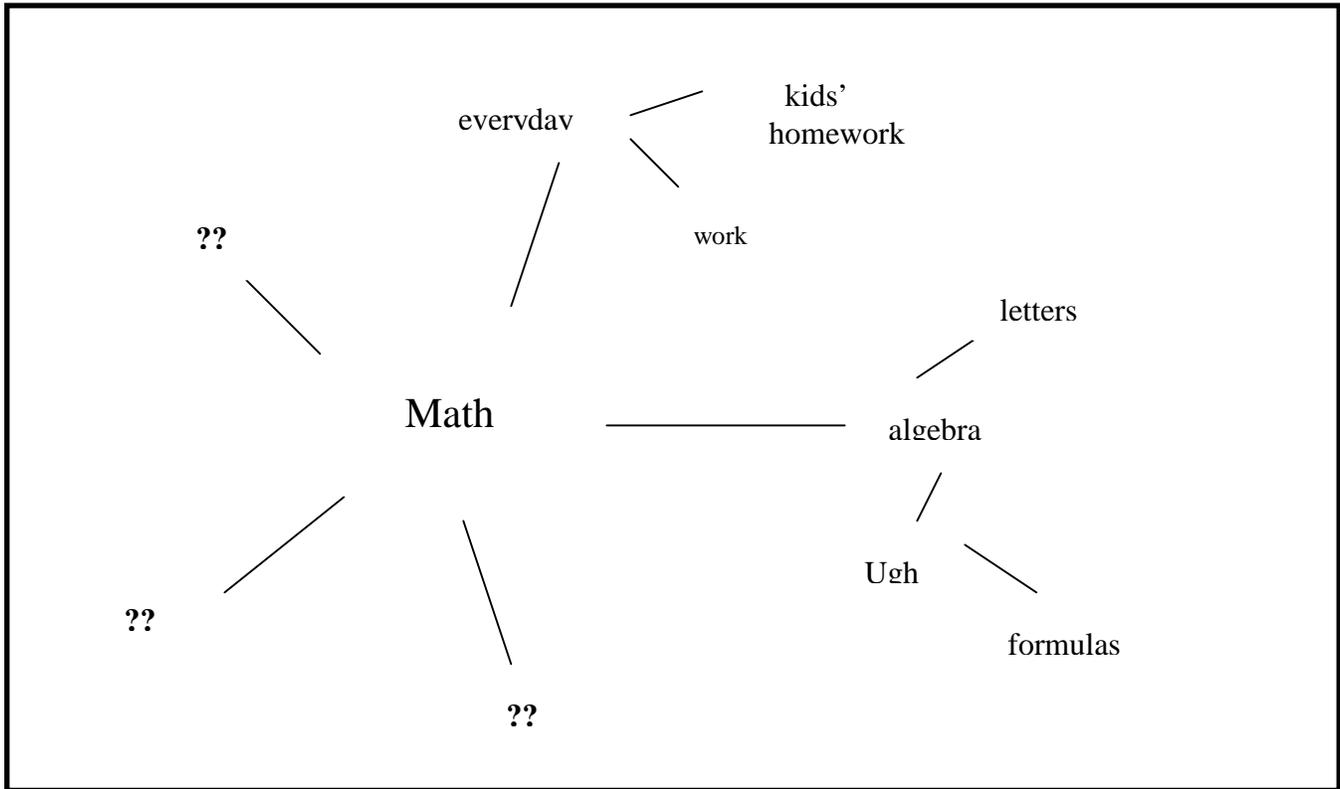
Application Idea

Use a mind map at the beginning and close of a math class cycle to see if there are any changes in students' peceptions, associations, and feelings about math.

Verizon Awards SABES Math Grant!

The SABES Math Initiative has received a boost recently from the Verizon Foundation, which awarded SABES Northeast, Southeast, and Boston regions $13,000 to support efforts focused on improving math instruction for adult education students in those regions.

The grant will augment funding provided by SABES and World Education to ABE and ESOL teachers involved in the Teacher to Teacher: Exploring Math program (T2T)) Projects developed during the course of T2T will be shared at local and national conferences. Thanks to the Verizon Foundation, funds for these projects will be available to selected teachers.

According to their Web site, "Since 2000, the Verizon Foundation has invested more than $400 million in programs, partnerships, and organizations in the United States and around the world. In 2005, the Foundation awarded more than 3,500 grants totaling $74.8 million to charitable and nonprofit agencies that serve the needs of diverse communities—from victims of domestic violence, to people with disabilities, as well as people who are economically and socially disadvantaged".

Hands-On Math

From the Web site:
"Hands On Math is a collection of resources from The Futures Channel, designed to help teachers engage student attention and bring about active mathematics learning. Hands-On Math supplies everything you need to deliver dozens of lessons that show students the fascinating real-world value of this subject."
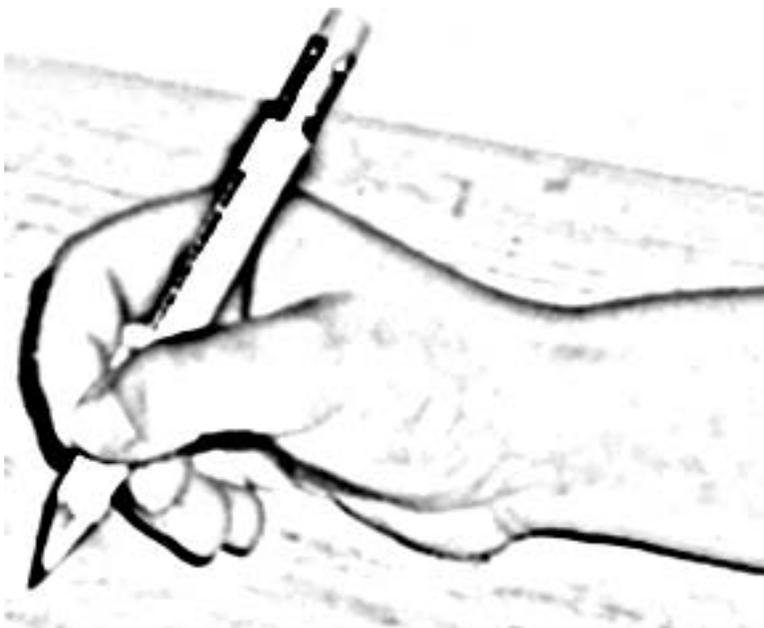
Verizon Literacy Campus

<www.verizonreads.net/08001.shtml>
From the Web site: "We created the Verizon Literacy Campus (VLC) to connect literacy organizations, volunteers, and people who want to learn more about supporting literacy and to provide online information to these audiences. The Literacy Campus was conceived and funded by Verizon, in partnership with ProLiteracy Worldwide and the National Center for Family Literacy. Verizon Literacy Campus' offerings include the following:

■ Free online courses for new and existing volunteers to help increase their knowledge and skills in support of literacy organizations in their communities

■ Downloadable resources, literacy-related Internet links and other documents

■ A "Literacy Organization Locator" tool that enables you to locate literacy providers in your community or across the country. Visitors can search by organization type, state, or ZIP code

Doh!
Using the Simpsons to Teach Math
\<simpsonsmath.com\>

*P*opular culture is a wonderful thing when it finds its way into a classroom. Iconic characters from our living room screens can add levity to otherwise ponderous academic tasks. In research-ing this issue of *Field Notes,* I came across a Web site, created by real smart people, who adapt *The Simpsons* television show to the teaching of math. Check it out! From the Web site:

"*The Simpsons* has established itself as an award-winning international pop culture phenomenon. It is the longest-running sitcom of all time and it is also one of the most literate television programs on the air, containing many ref-erences to subject matter and scholars from various academic fields, including mathematics. Since *The Simpsons* has been airing in prime-time for most of our students' lives, they likely are familiar with the program and its large cast of characters, including a resident scientist. The Simpsons also contains over a hundred instances of mathematics ranging from arithmetic to geometry to calculus, many designed to expose and poke fun at innumeracy. In fact, all Jean, Executive Producer and head writer, has a bachelor's degree in mathematics from Harvard University. Several episodes of *The Simpsons* contain significant mathematics that relates to material we normally cover in our classes. For these reasons, this program is an ideal source of fun ways to introduce important concepts to students, to reduce math anxiety, and to motivate students ..."

Check out \<simpsonsand math.com for jokes, excerpts from episodes, especially the ones on pi at \<www.mathsci.appstate.edu/~sjg/simpsonsmath/pi.html\>.

What's Skip Counting? What's An Icosahedron? Click Away for the Answers!

By Barbara Goodridge

What is skip counting?   What is an icosahedron? Where can one find excellent video clips showing math (and science) used in careers? How can I get easily to a practice GED test with official answer grids ? Go to the the SABES Web site \<www.SABES.org\> and click on "Math" for links that answer these questions and others like them. You will find the "General Resource Pages" page organ-ized by topic and by Framework strands. Your students can make good use of some of these sites as well.

Glossary of Math Terms

Abacus
Beads arranged on a frame used for counting and calculatin.

Absolute value
The distance of a number from zero on a number line.

Algebraic expression
An expression that includes at least one variable.

Algorithm
A way of calculating a step-by-step mathematical procedure. A method to find an answer. A formula.

Axis/Axes
Real or imaginary reference line (For example, graphs have horizontal and vertical axes).

Abundant number
A number that is smaller than the sum of its proper divisors.

Base numbers
The base number is the basis of each place value column in a number system.

Continuous data
Data that can have an infinite number of possibilities within a selected range

Discrete data
Discrete data can only have a finite or limited number of possible values.

Expanded notation
A way of writing numbers to show place value. For example: 567 in expanded notation is 500+60+7.

Figurate numbers
Numbers that can be represented in a geometrical shape including square triangle and pentagonal numbers

Googol
Numeral 1 followed by 100 zeros, or 10 raised to the power of 100

Hindu Arabic number system
Our decimal system has descended from this system. It is a clever system because it uses a base 210 system where only 10 symbols are needed to write any whole number, no matter how big, you can repeat symbols, and you can use zero as a place holder to fill in empty space.

Histogram
A bar graph representing frequency distribution.

Jump strategy
Jumping along an empty number line by tens and ones to work out a calculation.

Km/h
This refers to sped: kilometers per hour.

MAB blocks
Blocks that show base 20 number values.

Mean
Average number of different amounts. Relatees to equal distribution of a data set.

Median
A type of average—the middle value of an ordered set of values. OR a line that joins the vortex of a triangle to the midpoint of the other side.

Number sense
Understanding a lot about numbers and how they work and being good at solving mathematical problems.

Numeracy
In short, numerical literacy.

Numerate
Being able to solve mathematical problems using a variety of methods. The capacity for quantitative thought and expression.

Oblique
Lines at an angle to the horizon.

Pi
Ratio of the circumference of a circle to its diameter.

Place value
Determines the value of a digit in a number, based on the location of the digit.

Qualitative data
Descriptive data that can be categorized, such as food, clothing, etc.

Probability
The chance that a particular outcome will occur, measured as a ratio of the total of possible outcomes.

Quantitative data
Data that can be counted or measured.

Radius
Distance from the center of a circle to its circumference.

Many of these definitions were adapted from: <www.teachers.ash.org.au/jeather/maths/dictionary.html>

There is
GEOMETRY *in*
the *humming*
of the
s t r i n g s.

—Pythagoras

Rockin' Math Resources

Books Mainly for Teachers

Burns, M. (2000). *About teaching mathematics*, **2nd ed. Sausalito, CA: Math Solutions Publications.**
Marilyn Burns, guru of student-centered math instruction, offers great examples of student work, student-teacher interactions, and interesting problems. This great teacher resource offers plenty of hands-on activities and is especially useful for working with beginner math students.

Dewdney, A. K. (1993). *200% of nothing*. **New York: John Wiley & Sons, Inc.**
Do statistics lie? Read this book and see what you think. The examples in this book startle the reader and make statistics come alive. Even better, teachers can pick up this book and dip into it as time permit—a great gift to the busy teacher.

Flansburg, S. (1994). *Math magic.* **New York: HarperPerennial.**
Math Magic offers alternative methods of computation in a fun and engaging format.

Gal, I. (2000). *Adult numeracy development: theory, research, practice.* **Cresskill, NY: Hampton Press, Inc.**
Iddo Gal has performed a great service to ABE by compiling this series of articles by practitioners and researchers practicing around the world. He helps us examine what is known about how adults learn math and how to nurture that learning. This is a great basic resource for anyone who wants to improve classroom teaching.

Greenes, C., Schulman, L. & Spungin, R. (1989). *I hate mathematics book.* **Boston: Little Brown.**
The fun and interesting problems in this book will appeal to people who think they "hate" math.

Gustein, E. & B. Peterson. (2005). *Rethinking mathematics: Teaching social justice by the numbers.* **Milwaukee, WI: Rethinking Schools.**
<www.rethinkingschools.org/publication/math/>
"…more than 30 articles show how to weave social justice issues throughout the mathematics curriculum, as well as how to integrate math into other curricular areas…this book offers teaching ideas, lesson plans, and reflections by practitioners and mathematics educators. This is real world math—math that helps students analyze social problems as they gain essential academic skills."

Starmark, J., Thompson, V., & Cossey, R. (1986). *Family math*. **(Equals Series) Berkeley, CA: University of California Lawrence Hall of Science.**
Great activities for every age in an easy-to-use format.

Tobias, S. (1993). *Overcoming math anxiety.* **New York: W. W. Norton & Co.**
In this classic text, Tobias offers insight into math anxiety and includes tools to explore students' attitudes toward math. She helps us understand why it's so important to address affective, as well as cognitive needs in the classroom.

Math Journals and Publications

Mathematics Teacher
<www.nctm.org/publications/>
Offers activities, lesson ideas, teaching strategies, and problems through in-depth articles, departments, and features. If you belong to the National Association of Teachers of Mathematics (NCTM) you can download articles.

Online Journal for School Mathematics (ON-Math)
<www.nctm.org/publications/>
Provides a broad range of ideas for teaching and learning math at any level. Must sign in as an NCTM member to access articles.

The Math Practitioner
<www.literacynet.org/ann/practitioner.html>
A quarterly newsletter of the Adult Numeracy Network (ANN) with practical ideas for adult numeracy instruction and articles on staff development activities around the country.

Books for Students

TERC (2000) *EMPower*. Emeryville, CA: Key Curriculum Press.
<http://empower.terc.edu>
From the TERC Web site: "The series focuses on mathematical reasoning, communication, and problem solving with strategies and approaches designed to appeal to a broad spectrum of learning styles. Each unit includes activities with clear mathematical goals and contexts that are engaging and useful for adult learners. Student and teacher texts available.

Cohen, S. (2003) *Figure it out: Thinking like a math problem solver.* English and Spanish editions. North Billerica, MA: Curriculum Associates.
According to the publishers' description of this series: "Students learn to apply eight strategies in each book, including: draw a picture; use a pattern; work backward; make a table; act it out; use a model; guess and check; make a list. Each strategy lesson begins with a problem modeled and directed by the teacher, followed by thought-provoking questions that lead to solving the problem.

More Rockin' Good Resources

Professional Organizations

By joining one of these organizations—either locally or nationally—you become part of a wide dialogue about teaching math and you can stretch your repertoire of practical strategies for the classroom. Please see page 23 for information on the National Council of Teachers of Mathematics (NCTM).

The Adult Numeracy Network (ANN)
<www.literacynet.org/ann>

The Adult Numeracy Network (ANN), formerly the Adult Numeracy Practitioners Network, was formed by adult education practitioners in 1994. In April 1998, the ANN became an affiliate-at-large of the National Council of Teachers of Mathematics.

MathWest
<www.mathwest.org>
MATHWESTnews@yahoo.com

MathWest, an affiliated group of the National Council of Teachers of Mathematics (NCTM), is an organization of mathematics teachers in western Massachusetts. It was formed to share experiences, resources, and talents to develop professional growth.

The Mathematics Exchange Group (MEG)
<nycmeg@yahoo.com>

MEG provides ongoing professional development opportunities for ABE math teachers. For the last several years has the group has been exploring Japanese Lesson Study as a process for improving mathematics instruction. MEG founders are available for on-site or regional workshops.Contact Denise Degan, Charlie Brover, or Solange Farina at the email address above.

Sources for Manipulatives and Games
Classroom Direct
<www.classroomdirect.com >

Classroom Direct is a great one-stop resource for math teachers. From this site, you can order manipulatives such as cusiniare rods, pattern blocks, and the like. In addition, you can find place value stack sets, number puzzle boards, visual counters, geoboards, play money, and games. Flash cards and drill cards are also available here, along with drawing instruments, workbooks, graphing supplies, and more.

Games
Sudoku

"The aim of this popular Japanese logic puzzle is to enter a numerical digit from 1 through 9 in each cell of a 9x9 grid made up of 3x3 subgrids (called "regions"), starting with various digits given in some cells (the "givens"). Each row, column, and region must contain only one instance of each numeral."
(Wikipedia)

Equate

A math board game, Equate is played like Scrabble. Instead of letters, tiles are imprinted with integers (positive and negative), integer exponents, fractions, the four basic operations, and equal symbols. It is a multi-level game and can be made more difficult with an advanced tile set

Special Projects and Initiatives

The Massachusetts ABE Math Initiative
See page 24 for more information about the Massachusetts ABE Math Initiative.

SABES is looking for good examples of intake and placement assessments that programs have found or developed themselves. We would like to share some of these in upcoming staff development offeringings. Please contact Carey Reid at <creid@worlded.org> if you have something that might be useful for others. These intakes and placements need not be limited to math; we would like them across all areas of ABE.

Mark Your Calendar

Check the SABES Web site, <www.sabes.org> for local and regional activities. This list was prepared by Lou Wollrab.

December 13, 2006
Massachusetts Department of Education, Adult and Community Learning Services (ACLS), Workforce Development Conference
Chasing the American Dream: Helping ABE/ESOL Students Get Ahead
Location: Marlboro, MA **Note New Location**!
Contact: ACLS, 781-338-3850, Web site: <www.doemass.org/acls/mailings/2006/0512/workdev_news.html>

March 8-10, 2007
Women Expanding / Literacy Education Action Resource Network (WE LEARN), 4th Annual (Net)Working Conference:
What Can We Learn from Women-Focused Programs?
Location: Boston, MA
Contact: WE LEARN, 401-383-4374
Web site: <www.litwomen.org/conference.html>

March 14, 2007
Commonwealth Workforce Coalition
Sharing Skills, Building Connections
Location: Worcester, MA, DCU Center
Contact: Rachel Ennis <rennis@cedac.org>
Web site: <http://cwc.cedac.org>

March 21-24, 2007
Teachers of English to Speakers of Other Languages (TESOL), 41st Annual Convention and Exhibit
Location: Seattle, WA
Contact: TESOL, 703-836-0774.
Web site: <www.tesol.org/s_tesol/>

March 25-28, 2007
Commission on Adult Basic Education (COABE)
2007 Annual Conference: Life, Liberty and the Pursuit of Learning
Location: Philadelphia, PA
Contact: COABE, 315-422-912.
Web site: <www.coabe2007.org/joomla/>

April 9-13, 2007
American Educational Research Association (AERA)
2007 Annual Convention and Exhibition: The World of Educational Quality
Location: Chicago, IL
Contact: AERA, 202-223-9485
Web site: <www.aera.net/annualmeeting/?id=282>

June 5-9, 2007
Adult Education Research Conference (AERC) / Canadian Association for the Study of Adult Education (CASAE), Joint Annual Conference
Location: Halifax, Nova Scotia
Contact: <info@adulterc.com>
Web site: <www.adulterc.org/Conference.htm>
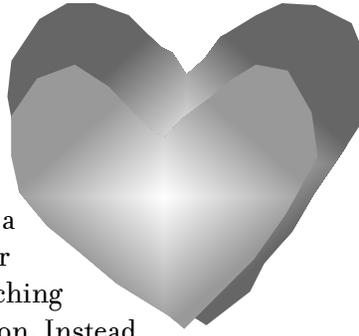
Googol

NUMERAL 1
followed by

100

zeros,

OR ten
RAISED

to the power of

100

Teaching From the Heart

The summer issue of *Field Notes* offers a chance for teachers to write about their work in a personal way. The topic "teaching from the heart" is open to interpretation. Instead of writing about outcomes, standards, or performance accountability, share your most heartening classroom stories, your heartbreaks and heart-healing tales. Write about a book you've used that has "heart" in the title; submit a lesson plan on Valentine's Day or a lesson on cardiac care. Explore idioms relating to the heart for an ESOL class. Brainstorm with colleagues and come up with some other ideas. The deadline is April 1, so there's plenty of time. This issue, with your creative input, will be lighthearted and heart healthy. Remind us why we got into this work, and refresh yourself in the process. For submission guidelines, go to <www.sabes.org> and click on *Field Notes.* Questions? Email Lenore Balliro, editor, at <lballiro@worlded.org>.

Upcoming Issues of *Field Notes*

Spring 2007
ABE Student Leadership
Submit by: December 15

Summer 2007
Teaching from the Heart
Submit by: April 1

Ideas? Want to reserve space for an article?
Email Lenore at
<lballiro@worlded.org>.

Volume 16
Number 1

FIELD NOTES

*by and for the Massachusetts
Adult Education Community*

*funded by the Massachusetts
Department of Education*

44 Farnsworth Street
Boston, MA 02210

Return Service Requested

WORLD EDUCATION

SABES

System for Adult Basic Education Support