Texas Mathematics Teacher

Volume LIII Issue 1 Spring 2006

Codes and Cards
in the Classroom

page 6

Check the Back Cover
for your membership card
and expiration date

2006 Election Ballot included *see page 33*

Interested in Algebra?
see page 10

http://www.tctmonline.net/

Texas Council of Teachers of Mathematics
2005-06 Mission and Goals Statements

MISSION

To promote mathematics education in Texas

GOALS

Administration

- Investigate online membership registration through CAMT and/or the TCTM website

Publications

- Survey membership to identify what they want in the Texas Mathematics Teacher (TMT)
- Review and redesign the TMT journal and the TCTM website
- Improve the review protocol, establish criteria for reviewers
- Provide tips for new teachers in the TMT and on the website

Service

- Increase the donations toward Mathematics Specialist College Scholarships
- Staff CAMT with volunteers as necessary
- Advertise affiliated group conferences on the TCTM website, in the TMT and at CAMT

Communication

- Maintain an e-mail list of members for timely announcements
- Communicate with affiliated groups in a timely manner

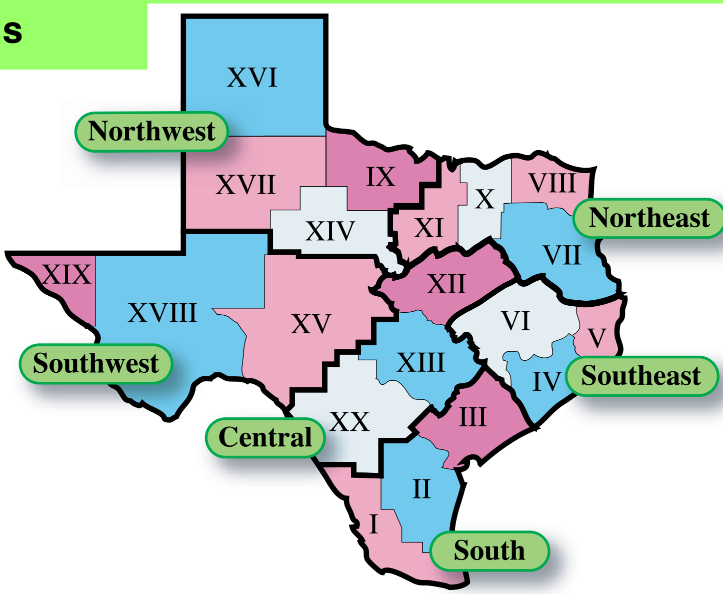
Membership

- Encourage affiliated groups to include TCTM registration on their membership forms

Public Relations

- Sponsor and staff the TCTM booth at CAMT
- Follow NCTM Advocacy Toolkit (2004) for increased voice of TCTM membership on issues relevant to our mission

TCTM Regions



TCTM Past-Presidents

1970-1972	James E. Carson	1982-1984	Betty Travis	1994-1996	Diane McGowan
1972-1974	Shirley Ray	1984-1986	Ralph Cain	1996-1998	Basia Hall
1974-1976	W. A. Ashworth, Jr.	1986-1988	Maggie Dement	1998-2000	Pam Alexander
1976-1978	Shirley Cousins	1988-1990	Otto Bielss	2000-2002	Kathy Mittag
1978-1980	Anita Priest	1990-1992	Karen Hall	2002-2006	Cynthia Schneider
1980-1982	Patsy Johnson	1992-1994	Susan Thomas		

Texas Mathematics Teacher

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Volume LIII Issue 1 **Spring 2006**

Articles

Features

Departments

TCTM Applications

Editor:
Cynthia L. Schneider
234 Preston Hollow
New Braunfels, TX 78132
cschneider@satx.rr.com

Director of Publication:
Mary Alice Hatchett
20172 W Lake Pkwy
Georgetown, TX 78628-9512
mahat@earthlink.net

Layout and Graphic Designer
Geoffrey Potter
<state-monkey@austin.rr.com>

Texas Mathematics Teacher (ISSN# 0277-030X), the official journal of the Texas Council of Teachers of Mathematics, is published in the fall and spring. Editorial correspondence should be mailed or e-mailed to the editor.

Call For Articles

The ***Texas Mathematics Teacher*** seeks articles on issues of interest to mathematics educators, especially K-12 classroom teachers in Texas. All readers are encouraged to contribute articles and opinions for any section of the journal.

Manuscripts, including tables and figures, should be typed in Microsoft Word and submitted electronically as an e-mail attachment to the editor with a copy to the director. No author identification should appear on or in the manuscript. A cover letter containing author's name, address, affiliations, phone, e-mail address, and the article's intended audience should be included. After refereeing, authors will be notified of a publication decision.

Teachers are encouraged to submit articles for ***Voices From the Classroom,*** including inspirational stories, exemplary lessons, or management tools. If submitting a lesson, it should include identification of the appropriate grade level and any prerequisites.

Items for ***Lone Star News*** include, but are not limited to, NCTM affiliated group announcements, advertisements of upcoming professional meetings, and member updates.

Businesses interested in placing an **advertisement** for mathematics materials should contact Mary Alice Hatchett.

Deadline for submissions: Fall, July 1 Spring, January 1

Letter from the President

Dear TCTM Members,

This is my last letter to you as president. As with most final acts, it is bittersweet. I took on the task of leading this organization with very definite goals in mind. I feel I have accomplished many of those goals and moved us closer to many others. In my four years as president we have increased our membership substantially, moved to more email communication and become aware of our role as an advocate for mathematics teachers with legislators and other government officials. We have increased the number and amount of scholarships and CAMTerships. I hope these trends continue.

With CAMT Board changes in the registration policies for 2005, TCTM membership is now at more than 3,500 mathematics educators across Texas. The registration process for CAMT 2006 will support our membership even more. All paid participants at CAMT 2006 will be given a complimentary membership in TCTM. The dues will be donated by CAMT to TCTM. Paid participants may opt to decline the free membership if they wish. With this change we may become one of the largest NCTM affiliates in the country. The added membership will increase our status as we reach out to the State Board of Education and the Texas Legislature with our opinions on policies related to mathematics education. Since speakers are given a complimentary registration at CAMT, they will need to pay for their TCTM membership. However, we do provide a reduced membership rate of $10.00 when submitting through CAMT. I hope all speakers take advantage of this opportunity.

As described in the Fall 2005 journal, delivered late in February, you will see an important change to the CAMTership award and eligibility rules, implemented by the TCTM board in January. We will now be awarding eight $500.00 CAMTerships. To be eligible to apply, you need to be a classroom teacher with five or fewer years of teaching experience in Texas (previous winners are not eligible). You must apply by May 31, 2006. Winners will be determined by random drawing and will be required to work two hours as a volunteer at CAMT. Additional information is on the application.

Our future holds many interesting and challenging events. Next year, we plan to provide our publication in a web-based format as well as print. You will be given the option to decide if you wish to continue to receive the print version or not. The textbook adoption process is underway and I hope we can support you in reviewing the materials with additional features in the *Texas Mathematics Teacher* in 2006-07. Don't forget about the 2006 CAMT in Houston this year! CAMT will be held in San Antonio in 2007, as always, in the summer. Also in 2007, NCTM will hold a regional conference in Houston at the end of November; so you will have two great opportunities for professional development and networking in one year. I hope you plan to attend at least one, if not more, of these events.

Finally, the mathematics teachers of Texas awe me. I have had the opportunity to meet and see in action many wonderful teachers. No one has an easy job. There are many reasons we chose to go into teaching, but usually there is one big reason we stay. It's for the kids. No matter how good (or bad) they are, we know we're helping them set and achieve their goals. There is no better job than that. I hope you enjoy every minute you can, persevere when times are tough and express your love to every student who makes the day worthwhile.

I want to close my last letter with sincere thanks for letting me serve as your president. I will always be proud of the honor you have given me to act in this leadership role. I know the organization will be in the best possible hands with Jo Ann Wheeler taking over the presidency at the end of CAMT. Please join me in welcoming her to the position and wishing her a great tenure.

Meanwhile, if you have questions or concerns you would like to share with me, please do not hesitate to contact me now or in the future.

Sincerely,

Cynthia L. Schneider
TCTM President 2004-2006

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Lone Star News

Affiliate Groups

These are local affiliated groups in Texas. If you are actively involved with them, please send future meeting and conference information to Cynthia Schneider at *<cschneider@satx.rr.com>* so we may publicize your events. Contact information for each group is available on the NCTM website,

http://www.nctm.org

Contact information for regional directors is located on the inside back cover.

SOUTHWEST REGION: *Service Centers 15, 18, 19*

Rebecca Ontiveros, Regional Director

Greater El Paso CTM

Annual fall conference; regular meetings throughout the year. Contact: Bob Kimball *<kimball2rc@gmail.com>*.

SOUTHEAST REGION: *Service Centers 4, 5, 6*

Paul Gray, Regional Director

Fort Bend CTM

Holds a short meeting in August, a fall mini-conference, a spring mini-conference and an end-of-year banquet to serve the districts of Alief, Fort Bend, Katy, and Stafford. Contact: Jan Moore, *<Jan.Moore@fortbend.k12.tx.us>* or Susan Cinque, *<olsoncinque@alltel.net>*.

Houston CTM

The Houston CTM serves teachers in Houston ISD. Each year, HCTM sponsors a mini-conference with exhibits and speakers as well as an annual spring banquet. Houston CTM also sponsors the Michelle Rohr and Madolyn Reed Scholarships for students in mathematics education. Contact: Linda Watkins, *<lswatkins@academicplanet.com>*.

1960 Area CTM

Holds two meetings and one competition a year to serve the districts of Aldine, Klein, Katy, Humble, Tomball, Spring, and Cypress-Fairbanks. Provides scholarships for students in mathematics education and awards for local mathematics education leaders. Contact: Sheila Cunningham, *<scunningham@kleinisd.net>*.

NORTHWEST REGION: *Service Centers 9, 14, 16, 17*

Nita Keesee, Regional Director

Big Country CTM & Science

Will hold their annual conference in January 2007. Contact: Leslie Koske, *<lkoske@esc14.net>* or 325-675-8661.

Texas South Plains CTM

Thirteenth Annual Panhandle Area Mathematics and Science Conference, September 30, 2006, Canyon, TX. Contact: Gilberto Antunez, *<gantunez@mail.wtamu.edu>*, or see *http://www.wtamu.edu/academic/ess/edu/*

NORTHEAST REGION: *Service Centers 7, 8, 10, 11*

Jacqueline Weilmuenster, Regional Director

East Texas CTM

Red River CTM

STEAM (Successfully Training Educators As Mathematicians) is held every four years at the campuses of Texas A&M University-Texarkana and Texarkana College, Contact: Debra Walsh, *<dwalsh@redwater.esc8.net>* or Susie Howdeshell, *<showdeshell@pgisd.net>* or see *http://www.tamut.edu/~rrcmath/*

Greater Dallas CTM

Holds two mathematics contests (W. K. McNabb Mathematics Contests) for students in grades 7 - 12 - one in the fall (early Nov.) and one in the spring (early April). A banquet in May is held for the winners. Contact: Tom Butts, *<tbutts@utdallas.edu>* .

SOUTH TEXAS REGION: *Service Centers 1, 2, 3*

Barba Patton, Regional Director

You are invited to join a listserv which will be for the purpose of promoting math education. The listserv will be a means to communicating your concerns about math education, share teaching ideas, etc. This listserv is managed by Dr. Barba Patton, Assistant Professor of Education at the University of Houston-Victoria. To join, send an email to imailsrv@listserv.uhv.edu Leave the subject line blank and put in the message subscribe Math at MathED-L your full name (example subscribe Math at MathED-L Barba Patton). Barba's email is *<pattonb@uhv.edu.>*

CTM @ Texas A&M University at Corpus Christi (Student Affiliate)

CTM @ Texas A&M University at Kingsville (Student Affiliate)

Rio Grande Valley CTM

The 41st annual conference, Saturday November 18, 2006, at the University of Texas - Pan American, Edinburg, Texas, from 8:00 to 4:00 p.m. Contact: Frank Rivera, *<f.rivera@ljisd.esc1.net>* or see *http://www.rgvctm.org*

CENTRAL TEXAS REGION: *Service Centers 12, 13, 20*

Patricia Rossman and Scott Fay , Co-Regional Directors

Austin Area CTM

Holds a fall conference in October and spring meeting. Contact: Carol Lindell, *<clindell@taylor.isd.tenet.edu>* .

Alamo District CTM

Normally holds a fall and spring conference. Contact: Kathy Mittag, *<kmittag@utsa.edu>*, or see *http://www.adctm.net*

Central Texas CTM

Central Texas CTM has received final approval for affiliation with NCTM. CTCTM will receive their charter from Cathy Seeley, President of NCTM (and a Texan!) at the delegate assembly in St. Louis in April at the Annual Meeting. Congratulations! It is wonderful to have the affiliates in Texas growing again.

CTCTM holds a fall meeting and a spring mini-conference, in Waco at the Region 12 Service Center. Contact: Tommy Bryan *<Tommy_Bryan@baylor.edu>* or see *http://www.baylor.edu/soe/ctctm*

NON-AFFILIATED CONFERENCES

STATEWIDE

Texas Association of Supervisor's of Mathematics (TASM) Fall Meeting September 18-19, 2006 in Austin. For membership and registration information, please see

http://www.tasmonline.net/

Membership is required to register for this meeting.

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Codes and Cards in the Classroom

According to the NCTM Principles and Standards for School Mathematics, students should be able to recognize and apply mathematics in contexts outside of mathematics. Likewise the TEKS state that a student is expected to identify and apply mathematics to everyday experiences inside and outside of school at every grade. Also, the following activities are applicable to a variety of TEKS in the number and operation or algebraic reasoning strands starting at Grade 3, up to the Mathematical Models with Applications course in high school.

Introducing mathematical concepts using these "outside contexts" can be a useful motivational tool in delivery. One of the most common misconceptions we hear in our lower-level mathematics classes is that "much of math is not applicable in everyday life." As teachers of this subject we know that this can't be further from the truth. This misconception may be partly due to the over-emphasis of a skills-based curriculum introduced several decades ago. This over-emphasis clearly manifests itself in a typical algebra class when we get to the dreaded "word problems." Although we do not want to get into a discussion about the pros and cons of a skills-based curriculum, we propose the early development of our students' lateral thinking skills ("thinking outside the box"). In this article we shall present some classroom activities designed to show students the efficacy of mathematics.

Codes

Everyone is fascinated with the making and breaking of codes. In today's society codes are used almost everywhere, from communication to commerce. The first two activities deal with Universal Product Codes (UPC) and credit card numbers.

Activity 1

Universal Product Codes are designed to be read by an optic scanner. They typically have two parts: the bar code and the code printed below for easy access. To avoid an error in scanning the item, UPC's have an error-detecting code.

7 35854 00304 3

The first digit in the code (7) is called the Symbol code.
The next group of five digits (35854) is the Company code.
The next group of five digits (00304) is the Product code.
The last digit (3) is the check digit.

Consider the first eleven digits of the code. (We do not use the check digit in the calculation.) Position is very important in the UPC code. The digit in the first position is 7. The digit in the sixth position is 4. Each of the digits has a position number. Multiply all the digits with odd position numbers by 7, and all the digits with even position numbers by 9. Now calculate the sum of the resulting products.

7	3	5	8	5	4	0	0	3	0	4	
7	9	7	9	7	9	7	9	7	9	7	
49 +	27 +	35 +	72 +	35 +	36 +	0 +	0 +	21 +	0 +	28	= 303

Divide this result (303) by 10 and record the remainder. In this case the remainder is 3, which is our check digit.

An alternative way of using the check digit would be to subtract the check digit from your sum and verify that the resulting number is divisible by 10.

1. The following is a UPC code taken from a deck of playing cards. The check digit has been blacked out. Determine the appropriate check digit, using the same method previously described.

0 73854 00808 [redacted]

2. Check the UPC codes of items found in the classroom or at home. Verify that the check digit is correct.
3. All books published have an ISBN number. These

numbers are used to identify publishers, subject and various other information. The check digit scheme employed by the ISBN number is slightly different from the UPC. Search the web to find the scheme employed by the ISBN system. How do they differ from UPC codes?

Further Investigations:

- Does this error-detecting code always detect errors where two consecutive numbers are transposed?

Consider the following UPC number, 26134273894. If we calculate the check digit for this number we get 9.

2	6	1	3	4	2	7	3	8	9	4
7	9	7	9	7	9	7	9	7	9	7

14 + 54 + 7 + 27 + 28 + 18 + 49 + 27 + 56 + 81 +28 = 389

Now suppose that when this number was scanned by a bar-code scanner, the "6" and the "1" were transposed. So the reader actually scans the number 21634273894. Now calculate the check digit for this number.

2	1	6	3	4	2	7	3	8	9	4
7	9	7	9	7	9	7	9	7	9	7

14 + 9 + 42 + 27 + 28 + 18 + 49 + 27 + 56 + 81 + 28 = 379

Note that the check digit is the same. In other words this error-detecting code did not pick up the transposition error. There are four other pairs of numbers that can be transposed without changing the check digit. Can you find them?

- Can the 7 and 9, be replaced with another pair of numbers?

In the UPC codes we multiply the digit of the number by either a "7" or a "9" depending on the position of the digit. We found that we could transpose two digits and have the check digit remain the same. Choose two different multipliers and see how many pairs of numbers can be transposed without changing the check digit.

Activity 2.

Credit card companies use a similar method of error detecting codes. Not all companies use the same scheme; Discover, Visa and MasterCard use the following method. Most credit cards have a 16-digit number. For Discover cards the first four digits are always 6011; this is known as the prefix. Visa uses a one-digit prefix; all Visa card numbers start with 4. Consider Mr. Underhill's Discover card number. (This is for all you "Fletch" fans.)

6011-4321-5651-3201

We use a similar scheme as we did in the UPC codes, except this time we will multiply by 2 and 1 instead of 7 and 9.

6	0	1	1	4	3	2	1	5	6	5	1	3	2	0	1
2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
12	0	2	1	8	3	4	1	10	6	10	1	6	2	0	1

In the last row we have 3 results that are 2-digit numbers. Replace each two-digit number with the sum of their digits. For example, 12 is replaced by 1 + 2 = 3. Then calculate the sum of these numbers.

6	0	1	1	4	3	2	1	5	6	5	1	3	2	0	1
2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
12	0	2	1	8	3	4	1	10	6	10	1	6	2	0	1

3 + 0 + 2 + 1 + 8 + 3 + 4 + 1 + 1 + 6 + 1 + 1 + 6 + 2 + 0 + 1 = 40

The result you get must be a multiple of 10. In other words the check digit is always 0.

1. Suppose you have a credit card number 6011-7289-2356-221_. What would the last number have to be?
2. Is 6011-3578-9864-2259 a valid credit card number?
3. How do think credit card and mail order companies use this process when receiving orders over the phone? Why is there a need for error-detecting codes?

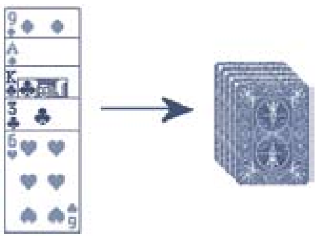
Cards

Card tricks are another source of mathematical investigation. Most card tricks that are not the sleight-of-hand variety can be easily explained with the help of mathematics. Surprisingly, the mathematics is usually extremely elementary. The following example is one such trick.

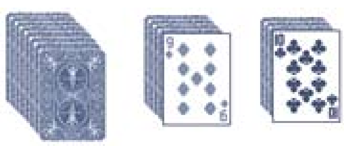
Activity 3.

Here is an interesting card trick. You will need an ordinary deck of playing cards (52 cards). Each card will have the face value shown on the card: the Aces will have a value of one, the Jacks will have the value of eleven, Queens have the value of 12, and the Kings have a value of 13. Shuffle the deck of cards.

Turn the top card face up on the table. Note the face value of the card. Start counting from this number and add cards face up to that stack until the count reaches 13. Once you reach 13, turn the entire pile face down. Note that the only face card value that you are concerned with is the first card you turned face up. The rest of the cards should be thought of as placeholders.



Repeat this process until you cannot complete the count. For example, if you had 4 cards left in your hand and the card you turned over was the 4 of spades, you would not have enough cards to get to 13. Have a member of the class point to three of the stacks. Collect all the stacks of cards that were not pointed out by the class member and place them back in your hand. Have another member of the class pick two of the three stacks and turn over the top card of each stack.



Note the face values of the two cards that were turned up and add these two numbers. Remove that number of cards from your hand. Now remove ten additional cards from your hand. Count the number of cards left in your hand; this will be the face value of the top card in the stack that was not chosen.

1. Suppose the top card in one of your stacks was a 7 of hearts. How many cards would be in your stack?
2. What if your top card was the Jack of clubs? How many cards would be in that stack?
3. Can you find a general rule for the number of cards in a stack if you know the value of the top card?
4. Can you explain how this trick works? The removal of ten cards at the end of the trick may be a hint as to how the trick works.

Further Investigations:

- Suppose we changed our count to 14 instead of 13. With the count changed to 14 answer questions 1 through 3 above. In the first example we removed ten cards. How many cards will we have to remove now?
- Can 13 be replaced with other values? If so, what would need to change to make the trick work? Clearly there is a "workable" range of values that we could choose to replace the number 13 in the trick. For example, if we chose the count number to be 2, then the audience would think we were just memorizing the cards. If we choose the count number to be too high, say 30, then we would run out of cards before we got three piles. Give a "workable" range of numbers that can be used to replace 13, be sure to justify you choice.

Selected Solutions:

Activity 1

1. The check digit is 9.

Activity 2

1. The last number should be 9.
2. It is a valid number.

Activity 3

1. 7
2. 3
3. Fourteen minus the face-value of the card

■

Linda Fosnaugh, Ph.D. • <linda.fosnaugh@mwsu.edu>
Associate Professor • Department of Mathematics, Midwestern State University, Texas

Patrick Mitchell, Ph.D. • <patrick.mitchell@mwsu.edu>
Professor and Department Chair • Department of Mathematics, Midwestern State University, Texas

Dear Readers: If the card game really interests you, please write up an explanation of why it works (see question 4) and send it in. We will share your explanations in a future journal. - Editor

CAMT 2006 Volunteers

Dear Members of TCTM,

Volunteer to be a VOLUNTEER!

We believe that there is an opportunity for everyone to find their niche in helping CAMT to be a success for everyone involved – here's how you can join in on the efforts (we would love to have over 250 volunteers ready to go!). We are looking for fellow mathematics educators to assist us with supporting participants in areas such as the following: Registration, Exhibits, Speaker Check-In, or Transportation. Come work "behind the scenes." We need you! Please e-mail, telephone or fax your name and contact information (be sure to include contact information for the summer) to Paul Gray, along with which of the following dates you are available to volunteer, Wednesday July 19, Thursday July 20, Friday July 21, or Saturday July 22. Specify if morning or afternoon is best and which area you prefer. Paul will respond via e-mail or home phone with a specific scheduled time and location.

Thank you for making every CAMT a wonderful experience!

Volunteer Information

Name:	Last	First	Middle
Address:	Number and street		Apt. number
	City	State	Zip Code
Contact:	( ) Home Phone	( ) Cell Phone	Email Address
Affiliation:	District or Professional Affiliation		ESC

Please submit your form to Paul Gray,

by mail: **Paul Gray,**
Region 4 Education Service Center
7145 W. Tidwell
Houston, TX 77092

by fax: **(512) 232-1855**
ATTN: Paul Gray

by email: **< pgray@esc4.net >**

TCTM Leader Spotlight

Each year since 1995, TCTM has accepted nominations for two awards for leaders in our professional community. The TCTM Leadership Award is presented to a TCTM member who is nominated by a TCTM affiliate. This person is honored for his/her contributions to the improvement of mathematics education at the local and state level by designing innovative staff development and/or promoting their local mathematics council. The second award, the E. Glenadine Gibb Achievement Award, is presented to someone nominated by a TCTM member for his/her contribution to the improvement of mathematics education at the state and/or national level. The following individuals have been honored and we wish to acknowledge their former and ongoing contributions this year in the leader spotlight. If you wish to nominate someone this year, please see the forms on pages 23 and 25.

Our prior awardees are

Year	Leadership(local/state)	Gibb (state/national)
1995	Mary Alice Hatchett	Iris Carl
1996	Betty Forte	Cathy Seeley
1997	Diane McGowan	Pam Chandler
1998	----	----
1999	Linda Shaub	Eva Gates
2000	Lloy Lizcano	Bill Hopkins
2001	Susan Hull	Pam Alexander
2002	Janie Schielack	Judy Kelley
2003	Bonnie McNemar	Dinah Chancellor
2004	Dixie Ross	Jacqueline Weilmuenster
2005	Barbara "Basia" Hall	Barrie Madison

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Why Use a Function Approach When Teaching Algebra?

What is a Function Approach?

In defining what a function approach is, sometimes we have to define what it is not. Teaching function notation early is not teaching from a function approach! Nor is it teaching from a function approach when you just move the chapter of functions to the first or second topic of the year. To teach from a function approach means using functions, function representations, and function behaviors to enhance the teaching of algebraic concepts/skills such as adding and subtracting polynomials, factoring, equation solving, systems of equations, modeling, solving inequalities, laws of exponents, properties of inequalities, definitions, etc. This requires that you start with a "function implementation module" that begins with numeric representations of functions and leads to students learning to move freely through representations. This is followed by an analysis of the geometric behaviors of functions integrated with studying parameter-behavior connections. After this, one is then ready to start teaching more traditional algebra, but not with a traditional pedagogy. This is teaching from a function approach! A graphing calculator is required for all students at all times – both in the implementation module and throughout the algebra course.

The Implementation Module

Start by using data pairs of real-world relationships (no traditional symbol manipulation needed). The relationships may be of a wide variety. That is, there is no need to segregate by function type. Rather, we integrate a variety of relationships such as linear, quadratic, exponential, absolute value, etc. simultaneously – just as students might encounter them in their lives. The mathematics is simple: classify relationships by shape, and whether they seem to be increasing and/or decreasing in nature.

This first step primes the students for later study of functions. The data relationships and contexts help make associations to assist recall; and students strengthen their innate abilities of pattern recognition. *Teach students to move freely from numeric to graphic forms and make the connections between the two.* This is easily accomplished by making the data sets available to the students through calculator programs that can be distributed to student devices via the GraphLink™ cable or through TI Navigator™. When the programs are executed, the data is transferred to the list editor making it available to be viewed in numeric and graphic forms (and later in symbolic form). The question of whether students think the relationship is increasing or decreasing can be answered by looking at the numeric representations. Keep in mind that the data sets all come from a real-world context, this makes answering the question rather simple. Students need to make the association between increasing (or decreasing) numbers in the range with a rising (or falling) graph. Names of the graphs (shapes) of data relationship may reflect student inexperience with mathematics as they will use names like *V* or *J* instead of absolute value and exponential.

This step primes the students for a more intensive study of functions. The data relationships and contexts help make associations to assist recall. Further, they get the attention of the students. The use of technology helps with attention too. Students start making mathematical connections between representations.

Example 1

The population of earth (shown below in billions) is increasing as confirmed by the numeric representation (or the graph), and the shape of the graph. The students might call the shape a *J*; the instructor can introduce the term exponential when appropriate.

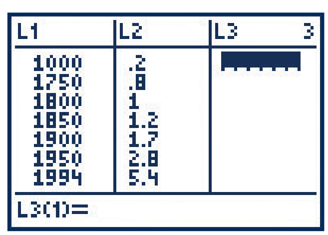

Figure 1

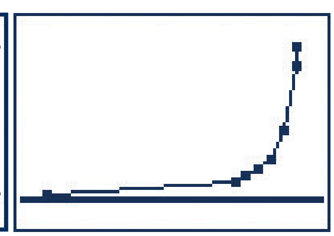

Figure 2

Teach students to move from numeric or literal forms to symbolic forms. This is not accomplished by students learning English-mathematics conversions. Rather, we use pattern recognition and the list editor on a graphing calculator to reach the goal. Pattern recognition is an innate function of the human brain, while English-mathematics conversions are language specific. Below is one simple example. This process can be used for a variety of functions such as linear, quadratic, and rational. In every case, we use pattern recognition and guided discovery to create a model. We do not use English-mathematics conversions (or regression).

Example 2

Suppose we start with 500 small candies marked with a letter on one side. We toss them on the table. How many do we expect to have the letter facing up? Students say about 250. You say, "How did you get that?" See the edit line in Figure 3 for the student answer.

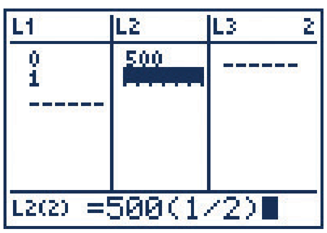

Figure 3

We eat the candies with the letter facing up, and toss the remaining on the table. We now have about 250 candies on the table. How many do we expect to have the letter facing up? Students say 125. You say, "How did you get that?" Students say 250($\frac{1}{2}$). You say, "And where did the 250 come from?" See the edit line in Figure 4 for the student answer.

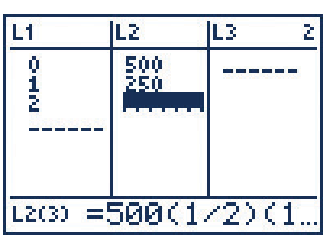

Figure 4

(Note: There are now 2 factors of $\frac{1}{2}$.)

The candies with the letter facing up are eaten and we toss the remaining on the table. We now have about 125 candies on the table. How many do we expect to have the letter facing up? Students say about 63. You say, "How did you get that?" Students say 125($\frac{1}{2}$). You say, "But where did the 125 come from?" Students say 250($\frac{1}{2}$)($\frac{1}{2}$). You say, "But where did the 250 come from?" See the edit line in Figure 5 for the student answer.

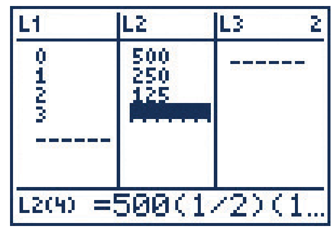

Figure 5

(Note: There are now 3 factors of $\frac{1}{2}$.)

Based on appropriate questions and discussions, at this point most of the class will recognize the exponentially decreasing pattern and you are ready for the introduction of symbols – see Figures 6 and 7 below.

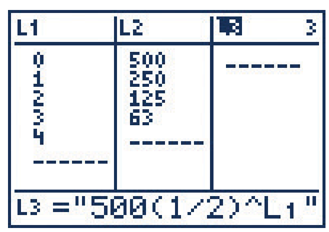

Figure 6

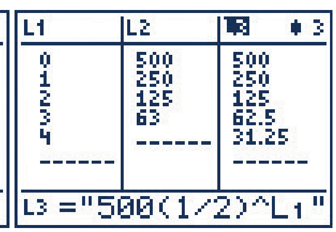

Figure 7

In L1 of Figure 8, you can enter new values to see the power of abstract mathematical symbols.

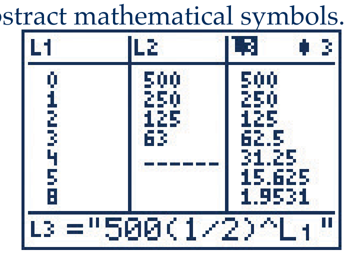

Figure 8

We now need to look at the graphical representation (see Figure 9) and use the Y= editor to introduce standard x notation.

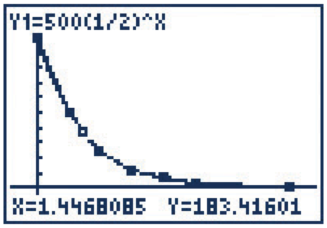

Figure 9

Teach the connections to real world situations to make associations that help memory and make algebra seem "reasonable." For example, using real-world contexts, students find that the mathematical concepts of increasing and decreasing are simple ideas. They need not wait for calculus to understand the basic concepts – maybe the formal definitions, but not the concepts. Further, students have a basic understanding of function representation. There is no need to formalize concepts now. This is just an introduction to functions so that algebraic concepts can be taught using functions at a later time – including a formal definition of a function and function notation.

Students now realize that mathematical symbols like $y = -500x + 3000$ and $s = -16t^2 + 15t + 6$ have a real-world meaning. They know that the symbols have a real-world connection, and how the symbols are connected to the numerical and graphical representations. At this time, students have not made sense of symbols such as $\frac{2x^3y^4}{x^{-8}y^2}$ or $5\sqrt{32x^5y^{17}z^3}$.

Teach the geometric behaviors of basic functions (increasing/decreasing, max/min, rate of change, zeros, initial condition, when positive/negative, domain, and range). Why? If we are going to use function concepts to teach algebra, students must know something about geometric behaviors. For example, suppose your students know nothing about functions but you want them to use a graphing calculator to solve the equation $2x^2 + 41x = 115$. What do they do? Simple, they graph the function $y = 2x^2 + 41x - 115$ in the 10×10 (or decimal) window, find the zero of the function to be $\frac{5}{2}$, and call it the root of the equation and then quit. This is not enough.

How can you use rate of change and initial condition of the linear function to teach addition of polynomials unless students know what the rate of change and initial condition are? You can use the distributive property to teach addition and subtraction of polynomials, but will it be with understanding? What will be the underlying mathematical connection? What will be the associative cues students can use to recall it next year? How have you used the innate visualization brain processing of mathematics to your advantage? Do you capitalize on the innate and learned number sense? So, typically we use the distributive property and abstract symbols *after* we use function behaviors to discover how we add and subtract polynomials.

How will students learn to use the behaviors of rate of change, increasing, decreasing, maximum and minimum, etc. to find mathematical models of data relationships without knowing anything about these behaviors? Well, you could use the low-level cognitive skill of rote memorization. Okay, not really. The point being is that you are teaching black box mathematics when students are not taught function behaviors before functions are used to teach and to do algebra. Function behaviors can be taught using contextual situations to help students understand.

Teach parameter-behavior connections. In the natural progression of teaching from a function approach, parameter-behavior questions start to come to mind. I wonder why some lines are steeper than others? Why do some parabolas open up and others down? Are the rates of change of the branches of the graph of an absolute value function related? Why is the vertex where it is? If your students are not asking these questions, shouldn't you?

The answer to these questions is found by studying parameter-behavior connections. How do you teach parameter-behavior connections? Well, one excellent way is to use guided-discovery activities. Another is to find embedded guided-discovery exercises in homework. Example 3 below is a guided discovery graphing calculator activity that is typically assigned to student groups.

Example 3

Exploration

Class ________ Name __________________

For each of the following functions, find the maximum or minimum, and specify the range.

	Maximum / Minimum	Range
1. $3\lvert x+2\rvert-5$	_________/_________	__________
2. $5\lvert x-3\rvert+7$	_________/_________	__________
3. $2\lvert x+4\rvert+3$	_________/_________	__________
4. $-2\lvert x-3\rvert+6$	_________/_________	__________
5. $-5\lvert x+1\rvert+4$	_________/_________	__________
6. $-2.6\lvert x-5\rvert-7$	_________/_________	__________

7. Given the absolute value function of the form $d\lvert x+e\rvert+f$, where d, e, and f are real numbers and $d \neq 0$, answer the following questions:
   a. What is the maximum or minimum value of the function?
   b. What is the first (or last) number in the range of the function?
   c. What number, d, e, or f, helps you decide if there is a maximum or a minimum?

Example 4 is a guided-discovery exercise that is embedded within other practice homework exercises. A graphing calculator is used on homework exercises too!

Example 4

Find the zero for each function in Exercises 15 - 17. Secondly, find the domain of each function.

15. $3\sqrt{x+4},\ 2\sqrt{x+2},\ -3\sqrt{x+1},$

$-\frac{1}{2}\sqrt{x-1},\ \frac{3}{8}\sqrt{x-3},\ 15\sqrt{x-6}$

This exercise combines practice as well as discovery and pattern recognition. By the end of the exercise, you have to figure that most students are able to find the zero and domain of the last few functions without the aid of a graphing calculator. We appeal to the brain function of processing abstract mathematics through the visual system. We associate the zeros with the x-axis and functions behaviors.

The enriched teaching / learning environment consists of the pencil and paper group activity, individual homework, a graphing calculator, a TI StudyCard™ stack (not shown), and lecture. We most certainly capitalize on the mind's ability to recognize patterns. At the same time, the proper use of technology attracts, and keeps, the attention of students.

Teaching Algebra

When finished with the implementation module, you can use functions, function representations, and function behaviors in the teaching of more traditional topics. Below are examples requiring the graphing calculator.

Example 5

Teaching Factoring through Activities

Exploration 1

Class ________ Name __________________

1. What is the zero of the function $f(x)=2(x-3)$
2. What is the zero of the function $g(x)=2x-6$?
3. How are functions f and g related?
4. What is the zero of the function $f(x)=-4(x-3)$?
5. What is the zero of the function $g(x)=-4x+12$?
6. How are functions f and g related?
7. What are the zeros of the function $f(x)=(x+1)(x-3)$?
8. What are the zeros of the function $g(x)=x^2-2x-3$?
9. How are functions f and g related?
10. What are the zeros of the function $f(x)=(x-2)(x+2)$?
11. What are the zeros of the function $g(x)=x^2-4$?
12. How are functions f and g related?
13. If the zeros of $f(x)$ are –1 and 3, create one possible $f(x)$.
14. If the zeros of $f(x)$ are –4 and –2, create one possible $f(x)$.
15. If the zero of $f(x)$ is 5, create one possible $f(x)$.
16. If the zeros of $f(x)$ are –4, 2, and 1, create one possible $f(x)$.
17. If d and e are the integer zeros of a quadratic function $f(x)$, create one possible $f(x)$.

Exploration 2

Class ________ Name __________________

1. What are the zeros of the function $f(x)=(2x-1)(x+3)$? Express them as reduced fractions.
2. What are the zeros of the function $g(x)=2x^2+5x-3$? Express them as reduced fractions.
3. How are functions *f* and *g* related?
4. What are the zeros of the function $f(x)=(3x-1)(2x+5)$? Express them as reduced fractions.
5. What are the zeros of the function $g(x)=6x^2+13x-5$? Express them as reduced fractions.
6. How are functions *f* and *g* related?
7. What are the zeros of the function $f(x)=(2x-3)(x+2)$? Express them as reduced fractions.
8. What are the zeros of the function $g(x)=2x^2+x-6$? Express them as reduced fractions.
9. How are functions *f* and *g* related?
10. What are the zeros of the function $f(x)=(3x-2)(2x+3)$? Express them as reduced fractions.
11. What are the zeros of the function $g(x)=6x^2+5x-6$? Express them as reduced fractions.
12. How are functions *f* and *g* related?
13. If $2/3$ and 3 are the zeros of a quadratic function $f(x)$, create one possible $f(x)$ containing integer parameters.
14. If $2/3$ and –3 are the zeros of a quadratic function $f(x)$, create one possible $f(x)$ containing integer parameters.
15. If $2/3$ and $-1/4$ are the zeros of a quadratic function $f(x)$, create one possible $f(x)$ containing integer parameters.
16. If $\frac{a}{b}$ and $\frac{d}{e}$ are the zeros of a quadratic function $f(x)$, create one possible $f(x)$ containing integer parameters.
17. Describe in your own words any connection you see between the zeros of a function and the symbolic form of the function.

Exploration 3

Class ________ Name __________________

In the first two explorations, you learned about the connection between function parameters and the related zeros of the function. Below is a quick review and then a continuation of the exploration.

1. Find the zeros of the function $y = (2x + 1)(x - 3)$.
2. Find the zeros of the function $y = 2x^2 - 5x - 3$.
3. Why are the zeros the same for $y = (2x + 1)(x - 3)$ and $y = 2x^2 - 5x - 3$?
4. Find *any* polynomial whose zeros are –5 and 5.
5. Find *any* polynomial with integer parameters whose zeros are $-\frac{4}{5}$ and 3.
6. Based on what you learned in the first two explorations, write the function $y = x^2 + x - 2$ another way using the zero-parameter connection.
7. Based on what you learned in the first two explorations, write the function $y = x^2 - 4$ another way using the zero-parameter connection.
8. The function $y = 2x^2 - 5x - 3$ can be symbolized another way. Write it using other symbols with integer parameters.
9. Why do you think the function $y = x^2 + 4$ cannot be written in different symbolic form with integer parameters?
10. Why do you think the function $y = x^2 + 2x + 4$ cannot be written in different symbolic form with integer parameters?
11. When you re-write a function like $y = x^2 + 3x - 28$ as $y = (x + 7)(x - 4)$, we say you are re-writing in factored form. Or we say you are factoring. For each of the following functions, re-write them in factored form. That is, factor them.
    a. $3x^2 - x - 2$
    b. $x^2 - 9$
    c. $20x^2 + 33x - 36$

More on Teaching Algebra: Teaching the Less Than Property

A traditional option (when not using a function approach) is to state the property and then use it in several examples. For instance the less than property for absolute value is:

If $|x| \le a$ for some positive number a, then $-a \le x \le a$.

But the problem is what is it associated with, other than absolute values? What are the associative cues for recalling this property? We cannot count on practice for long-term memory retention nor understanding. Where is the connection with number sense? That is, how have we capitalized on the brain's primary number sense, and learned number sense from grade school? What is the enriched environment in the teaching process? How did we help the brain use its visual processing abilities of the abstract mathematics? What was used to procure the attention of the student?

Thinking from a function approach, we know that students have seen all representations of absolute value functions from the implementation module. Given $y = d|x+e| + f$, they know what behaviors the d, e, and f parameters control. They have traced on the graph to make connections between representations and involved their learned number sense. They have associated absolute values with various real-world contexts. Students have made parameter-behavior associations with the more common function $y = d(x+e)^2 + f$. Technology and the various contexts used in the original work with absolute value data relationships have gotten their attention.

Example 6
Teaching the "Less Than Property" for Absolute Values, A Classroom Activity

In teaching from a function approach we start with the graph of the function $y = |x|$ and the graph of a constant function y = some positive number, for example $y = 2$. See Figure 10.

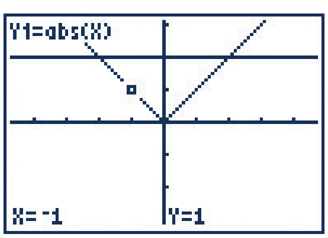

Figure 10

What do we discover about $|x|$ as we trace back and forth between $x = -2$ and $x = 2$? It is that it is always less than or equal to the positive number 2. Is this pattern true for the positive number 3 or 1.7 or 19?

Hmmm, it seems that if $|x| \le a$ then $-a \le x \le a$. Do we also learn something about x when $|x| > a$? Now is the time for formalizing the property with abstract symbols, followed by "thinking required" practice.

Observation

When *teaching* algebra from a function approach, yes, I grab the graphing calculator first. Used in teaching algebra from a *function approach*, the calculator facilitates the kind of teaching that facilitates student understanding and long-term memory of algebra.

Seven Reasons for Using a Function Approach

Here are some issues to consider when making decisions about teaching algebra using a function approach versus the traditional equation-solving approach.

The research shows that:

- We remember algebra longer and have better memory by using associations – made through function permeating the content. That is, students are more likely to remember the mathematics taught because we capitalize on associations made through using a function approach.
- Learning is made simpler, faster, and more understandable by using pattern building as a teaching tool. In a function approach, almost all of the pencil and paper activities, e-teaching activities, and class discussions use pattern building to reach a generalization about a concept or skill.
- Students cannot learn if they are not paying attention. The graphing calculator is used to draw attention to the mathematics through its basic functionalities *including* various applications software.
- Without visualizations, students do not understand or remember the mathematics as well. In the function approach visualizations are used *first* before any symbolic development. This greatly increases the likelihood that students will remember the mathematical concept being taught.
- Considerable brain processing takes place in the

subconscious side of the brain, including a learning module. To make this processing possible for our purposes, the brain must be primed. The function implementation module and early learning activities prime the brain for all the algebra that follows.

- The enriched teaching/learning environment promotes *correct* memory of math content. The wide variety of teaching activities facilitated by the function approach provides the enriched environment.
- Contextual situations (represented as functions) provide meaning to the algebra learned. Algebra taught without meaning creates memories without meaning that are quickly forgotten.

Author's Note:
The fully referenced paper from which this article was extracted can be found at

<http://www.math.ohio-state.edu/~elaughba/>

and 48 TI StudyCard activities designed for the function approach are also on this page. The four activities in this article can be downloaded from the same page.

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Ed Laughbaum • <elaughba@math.ohio-state.edu>
Associate Director • The Ohio State University

About this Publication

Since 1971, the Texas Council of Teachers of Mathematics (TCTM) has produced the journal *Texas Mathematics Teacher* for our members. Our mission is to promote mathematics education in Texas. In the journal we accomplish this by publishing peer-reviewed articles by leading authors, state updates from the Texas Education Agency, and local news from around the state. TCTM is committed to improving mathematics instruction at all levels. We place an emphasis on classroom activities that are aligned to the Texas Essential Knowledge and Skills and the NCTM *Principles and Standards for School Mathematics.*

The *Texas Mathematics Teacher* seeks articles on issues of interest to mathematics educators, especially K-12 classroom teachers in Texas. All readers are encouraged to contribute articles and opinions for any section of the journal. Teachers are encouraged to submit articles for Voices From the Classroom, including inspirational stories, exemplary lessons, or management tools. More specific guidelines for submissions may be found on page 3.

In 2004-05, our publication took on a new look with a four-color cover and one-color interior. Original artwork on the cover is another appealing change for our readers. We publish the journal twice each school year, in the fall and spring semesters. Next year, we plan to provide our publication in a web-based format as well as print. You will be given the option to decide if you wish to continue to receive the print version or not. Our current website archives the more recent journals in PDF format, please see

<www.tctmonline.net>

if you wish to view prior issues.

Our current publications committee consists of Cynthia Schneider, Mary Alice Hatchett, Geoffrey Potter, Larry Lesser and James Epperson. Larry and James serve as expert advisors; Cynthia is the editor. Mary Alice does many jobs, including requesting articles, serving as an elementary expert, and communicating with authors. Geoff is the layout and graphic designer; he manages to fit all the text into the limited number of pages we have to work with. The TCTM Board wishes to thank them for their leadership in improving the *Texas Mathematics Teacher*.

Our reviewers for 2005-06 have been Barbara Holland, Trisha Peterson, Paula Haney, Sherri Jones, Patty Copeland, Sheila Cunningham, Rita Tellez, Lisa Brown, Cathy Banks, Linda Gams, Ward Roberts, Jacqueline Weilmuenster, Edith Hays, Shirl Chapman, Kristi Gette, Maryann McDaniel, Barbara Long, Mary Swinton, Pam Summers, Pat Miller, Jane Ries Cushman, Ted Hull, Bonnie McNemar, and Tim Pope. We wish to thank all of these members for contributing time and expertise to making this publication a useful and informative journal.

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All advertising is subject to the approval of the publisher. The journal staff shall be responsible for ascertaining the acceptability of advertisements. All advertisements should be sent "copy-ready" by the closing dates of September 1 for the fall issue and January 15 for the spring issue. Position preference, such as right-hand pages or first half of issue will be honored on a first-come basis. All advertisements must be pre-paid by the closing date with a check made payable to TCTM, and mailed to our current treasurer, Kathy Hale. Rates for the *Texas Mathematics Teacher* per issue are: full page $500.00, half page $300.00, quarter page $200.00.

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Advertising that elicits significant reader complaints will not be rerun until the complaints have been investigated by the journal staff and the advertiser.

TEA Talks

Hot News

For additional information, refer to the websites listed

- Even though the SBOE has released Proclamation 2004 (secondary math textbooks), the funding for any proclamation is a decision made by the legislature. We will not know the status of funding for Proclamation 2004 until the 2007 legislative session. Also, Proclamation 2005 (elementary math textbooks) was approved at the November 2005 SBOE meeting.
- The secondary math TEKS were approved in February 2005, thereby allowing an optional early implementation date of fall 2005. Implementation is scheduled for fall 2006.
- The SBOE approved the adoption of the elementary mathematics TEKS with an implementation schedule of fall 2006. For elementary mathematics, schools should have started this school year teaching the original mathematics TEKS; therefore, classroom instruction for this school year should continue to reflect the original elementary mathematics TEKS.
- Since we have revised/refined our mathematics TEKS, TEA has identified monies to create TEKS professional development modules to assist teachers in the implementation of the revised math TEKS. Two sets of professional development training modules are currently being developed.

  Teaching the Math TEKS through Technology (TMT3) has been developed by the Education Service Center, Region 4, in Houston, and Texas A&M-Commerce. This training will focus on the following four areas: Middle School, Algebra I, Geometry, and Algebra II.

  The purpose of this professional development is to equip teachers to be effective and judicious users of technology as they teach to the depth and complexity outlined by the TEKS for mathematics. Each session is activity-based so as to encourage professional discourse about the decisions surrounding the use of technology to strengthen student learning about mathematics.

  Another set of professional development modules have been developed by Dr. Pam Littleton at Tarleton State University. These modules will assist teachers in implementing the revised math TEKS and are categorized by grade bands: K-2, 3-5, 6-8, and 9-12.
- TEA will release the TAKS tests for the 2005-2006 school year and produce item analysis reports.
- As more information becomes available, I will send it out via the math listserv. I encourage you to join the math listserv at

  <www.tea.state.tx.us/list>

■

Norma Torres-Martinez •
<norma.torres-martinez@tea.state.tx.us>
Director of Mathematics • Texas Education Agency

Teachers participating in the Austin Area CTM's Fall 2005 Confrence.
From left to right: Linda Shaub, Cindi Carroll, Robb Wilson, Scott Fay, and Carol Lindell.

TCTM E-mail Communications

Timely announcements are sent to our membership using e-mail.

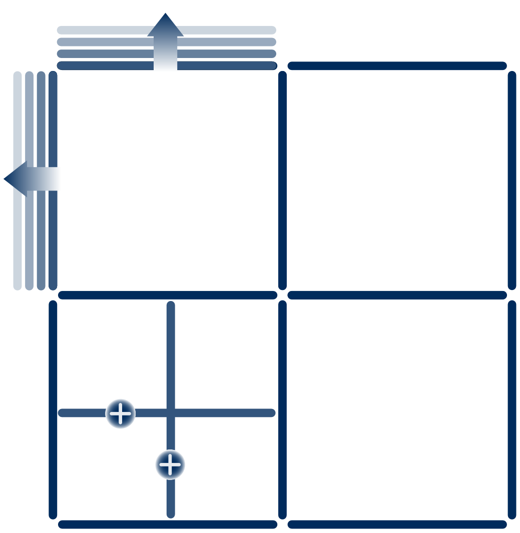
If you have an e-mail address, please be sure it is on file and up-to-date with TCTM. If you do not have an e-mail address, please let us know by indicating this on your membership application. We will attempt to contact you via postcard if there is a crucial issue at hand. TCTM members that have e-mail and have not received e-mail messages from the president, Cynthia Schneider, in the last six months, should contact her immediately at *<cschneider@satx.rr.com>* or by phone at 512-475-9713. Also note, if your server is not accepting our messages due to security, we would like to work with you on this issue. ■

Puzzle Corner

Sticks #6 Answer

Arrange 12 craft sticks to form the original figure. Rearrange two sticks to form a figure that has seven congruent squares.

Shown is a diagram of a solution.

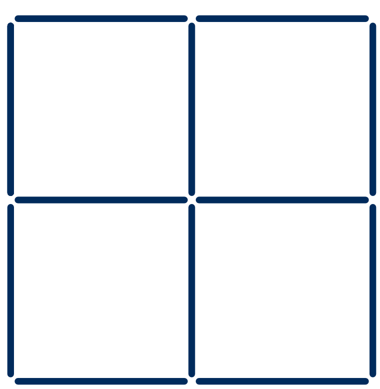


Sticks #7 Puzzle

We are interested in how your students responded to this problem and how they explained or justified their reasoning. Please e-mail copies of your students' work, include your name, grade level, campus name and district name to Mary Alice Hatchett, Director of Publications, *Texas Mathematics Teacher*. Selected submissions will be acknowledged and published in subsequent issues.

Please prepare a sketch of your solution

Arrange 12 craft sticks to form the following figure.



Remove two sticks to make two similar squares.

Teacher Input Into Classroom Visits:
Customized Classroom Visit Form

Pressure is on for school change. There are demands being placed upon administrators and teachers to improve schools and increase student achievement in mathematics. It is time for teachers to make demands in return. To be taken seriously, however, these demands must be thoughtful, specific, and designed to impact classroom instruction. The demands must be intended to unite administrators and teachers rather than to further divide them.

One area of common interest that must be managed is classroom visits to monitor instruction. Research has pressured administrators to enter classrooms, but much miscommunication and misunderstanding exists about what administrators should actually be doing before, during, and after the visits. Teachers need to step up and demand actions from administrators that will truly enhance and improve classroom instruction. Teachers want and need accurate, meaningful feedback about behaviors and actions in the classroom. Teachers and administrators both want students to be successful, so classroom visits must not be adversarial, but rather seen as partnerships.

Visiting classrooms to manage program or strategy implementation is different than conducting formal teacher evaluations. Teachers and administrators must clearly recognize the difference between classroom observations (evaluative) and classroom visits (supportive). Classroom *observations* are part of the formal teacher evaluation process. Observations gather data about specific teachers. They may consist of state- or district-required observations that last 45 minutes or more, or classroom observations of shorter duration that last 15 minutes or more. In classroom observations, positive or negative documentation is placed in the teacher's file. Classroom observations are designed to rate and evaluate individual teachers. Classroom observations, however, are not sufficient in helping teachers to change instructional practices.

Teachers and administrators must also use classroom visits. Classroom *visits* are methods instructional leaders use to gather information about the types and degree of curriculum and instruction occurring in the classrooms, with the purpose of rating the school. These methods are non-teacher evaluative. The purpose is to seek trends and patterns, with all visit data intended to be cumulative rather than individualized. The information is only valuable in totaled form. Since the results are non-evaluative for staff, teachers, central office staff, principals, and supervisors may conduct classroom visits. Classroom visits should not exceed 15 minutes in length, and are usually from three to seven minutes in length. By using short time intervals and targeted strategies, visits are less disruptive and less threatening.

Implementing an effective mathematics curriculum that aligns with state standards and utilizes research-based instructional methods is certainly a way to improve student achievement. Accurate implementation, however, requires monitoring and feedback over time. Supportive monitoring rather than evaluative monitoring is needed. Supportive monitoring and feedback come from data collected from numerous, short classroom visits that can be used for instructional dialogue. The dialogue topics consist of mathematics content, methods, teacher actions, student behaviors, and the impact on student learning.

Teachers must engage in this dialogue since they are the mathematics professionals. The intent is to gauge one's use of effective instructional strategies and to ensure mathematics content to improve student learning. This can be accomplished by having teachers join in on classroom visits and share their thoughts with fellow teammates.

With multiple visits conducted over time by designated faculty and staff, clarity and precision are needed to collect the data from the visit. Monitoring program implementation is also critical. It makes sense that the classroom visit forms must be customized to the school district or building and useable in short visits. Generic checklists may be helpful, but they can't target the specific expectations of school leaders or meet the needs of classroom teachers. These forms may actually interfere with effective classroom instruction by being too vague or comprehensive. Teachers may not understand the terms on the form or may be trying to incorporate every item for every lesson. Clearly, linking the items on the form to the elements of the adopted program and topics from teacher training seems to be extremely reasonable, appropriate, and useful.

To have this data and feedback be meaningful and useful, teachers must be part of the instrument design and collection process. NCSM, in the project *Road Map to Instructional Leadership: Reaching Equity in Mathematics by Increasing Student Achievement*, recommends the creation of a "Customized Classroom Visit Form" that specifically lists the recommended strategies from the adopted materials, district curriculum documents, and professional development topics. Teachers and administrators must work together to create the form. In this way, it becomes very clear what teachers are expected to do and which data administrators (as well as teachers) are to collect. In creating the form, teachers and administrators must place the strategies in priority order. With this priority list, teachers and administrators can agree upon a manageable number of strategies to implement at one time. This priority listing will support the visits having such a short duration.

For example, assume that one of the strategies the adopted mathematics program recommends is for students to work in collaborative groups. Teachers and administrators then must decide which teacher actions and student behaviors would be occurring if collaborative groups were properly functioning. Obviously, seating arrangements would be in evidence and reflected by grouping students by two, three, or four. Manipulatives would probably be present. Students would be talking and sharing ideas and strategies. Information the students were collecting would be recorded. These, and other pertinent elements, would be listed on the form.

The completed "Classroom Visit" forms are summarized by grade level clusters, subject, or departments, not individuals. The goal is to have the entire mathematics department implement effective, designated strategies on a regular basis. Ensuing conversations are about what strategies are being used with what frequency and with what results. In this non-threatening, collaborative environment, teachers and administrators can freely discuss the elements related to student achievement without fear of the forms resurfacing in a folder that evaluates individual teacher performance. As a result, the team assumes the responsibility for student learning and their practices, thus engaging and empowering staff.

Unfortunately, as with most well-intentioned innovations, classroom visits are undermined by a lack of time, commitment, and fidelity to the intent and process. It is up to all of us to make them work the way they were intended — as collaborative efforts to increase student achievement in mathematics.

■

Ted H. Hull, Ed.D. • <thhull@mail.utexas.edu>
Project Director • National Council of Supervisors of Mathematics

TCTM Mathematics Specialist Scholarship

Amount: $1500 **Deadline: May 31, 2006**

Eligibility: Any student attending a Texas college or university – public or private – and who plans on student teaching during the 2006-07 school year in order to pursue teacher certification at the elementary, middle or secondary level with a specialization or teaching field in mathematics is eligible to apply. A GPA of 3.0 overall and 3.25 in all courses that apply to the degree (or certification) is required.

Applicant Information

Name:	Last	First	Middle
Address:	Number and Street		Apt. number
	City	State	Zip Code
Contact:	( ) Home Phone	( ) Cell Phone	Email Address
Personal:	Social Security Number		Birth Date

College Information

What college or university do you plan to attend? If you are awarded this scholarship, TCTM's treasurer will send a check directly to the business office of the college. We need the college's complete address.

Name:	College or University		
Address:	Number and Street		
	City	State	Zip Code

You must submit three (3) copies of each of the following documents:

1. Completed application form.
2. College transcript. One must be an official copy.
3. Two letters of recommendation:
   - One from either a mathematics or mathematics education professor you have taken coursework from and is not related to you.
   - One from a K-12 classroom teacher of mathematics you have worked with recently or that was a former teacher of yours and is not related to you.
   - It is required that at least one of these recommendations come from a current member of TCTM, it is preferred that both recommendations come from current members of TCTM.
4. An essay of 1,500 words or more that describes your philosophy of teaching mathematics and how you will implement this philosophy with your future students. Specific examples of how you will teach a mathematics concept are required to illustrate your teaching philosophy. Or you may write an essay that explains a specific mathematics topic or concept, for example, a paper on proportionality.

Please submit all materials in one envelope to:

by mail: **Cynthia Schneider**
234 Preston Hollow
New Braunfels, TX 78132

by fax: **(512) 232-1855**
ATTN: Cynthia Schneider

TCTM Leadership Award Application

Deadline: May 31, 2006

Eligibility: The TCTM Leadership Award is presented to a TCTM member who is nominated by a TCTM Affiliated Group. This person is to be honored for his/her contributions to the improvement of mathematics education at the local and state level. He/she has designed innovative staff development and has promoted the local TCTM Affiliated mathematics council.

Information about the **TCTM member** nominating a candidate

Name: Last | First | Middle

Address: Number and street | Apt. number

City | State | Zip Code

Contact: ( ) Home Phone | ( ) Cell Phone | Email Address

Affiliation: District or Professional Affiliation | ESC

Are you a member of TCTM? Y N

Are you a member of NCTM? Y N

Information about the **nominee**

Name: Last | First | Middle

Address: Number and street | Apt. number

City | State | Zip Code

Contact: ( ) Home Phone | ( ) Cell Phone | Email Address

Affiliation: District or Professional Affiliation | ESC

Is the nominee a member of TCTM? Y N

Is the nominee a member of NCTM? Y N

Is the nominee retired? Y N

Applications should include 3 pages:

- ☐ Completed application form
- ☐ One-page, one-sided, typed biographical sheet including:
  - Name of nominee
  - Professional activities
  - National offices or committees
  - State TCTM offices held
  - Local TCTM-Affiliated Group offices held
  - Staff Development
  - Honors/awards
- ☐ One-page, one-sided essay indicating why the nominee should be honored for his/her contribution to the improvement of mathematics education at the local/state level

Send the completed application, biographical sketch, and essay to

by mail: **Cynthia Schneider,**
234 Preston Hollow,
New Braunfels, TX 78132

by fax: **(512) 232-1855**
ATTN: Cynthia Schneider

by email:
<cschneider@satx.rr.com>

APPLICATION

Texas Council of Teachers of Mathematics Membership Form

Applicant Information

Name: Last | First | Middle

Address: Number and street | Apt. number

City | State | Zip Code

Contact: (   ) Home Phone | (   ) Cell Phone | Email Address

Affiliation: District or Professional Affiliation | ESC

Individual TCTM Membership — Cost : $13.00 per year

Membership includes 1 copy of the semiannual TMT journal.

Circle area(s) of interest: **K-2** | **3-5** | **6-8** | **9-12** | **College**

Circle one : New Member | Renewal | Change of Address

____ year(s) x $13.00 = $

TCTM Membership for Institutions — Cost : $40.00 per year

For schools, institutions, or affiliated groups. Membership includes 3 copies of the TMT journal.

Circle one : New Member | Renewal | Change of Address

____ year(s) x $40.00 = $

National Council of Teachers of Mathematics Membership

Circle one : New Member | Renewal | Change of Address

Full Individual membership includes a print subscription to the NCTM News Bulletin and one NCTM Journal. Select one journal below.		*Additional print journals may be selected to enhance your membership, and includes online access.*	
Teaching Children Mathematics	$76	Teaching Children Mathematics	$32
Mathematics Teaching in the Middle School	$76	Mathematics Teaching in the Middle School	$32
Mathematics Teacher	$76	Mathematics Teacher	$32
Journal for Research in Mathematics Education	$100	Journal for Research in Mathematics Education	$56

Membership Dues $ | Additional Journals $

Amount Due NCTM $

Scholarship Donations

TCTM awards scholarships to college students planning to pursue a career in mathematics teaching either as a mathematics specialist in elementary school or as a secondary school teacher with certification in mathematics. Your contributions in any amount are greatly appreciated. Please write a separate check for scholarship donations.

Scholarship Donations $

Make check(s) payable to TCTM and mail to:

TCTM Treasurer
2833 Broken Bough Trail
Abilene, TX 79606

TOTAL AMOUNT DUE $

TCTM E. Glenadine Gibb Achievement Award Application

Deadline: May 31, 2006

Eligibility: The E. Glenadine Gibb Achievement Award is presented to someone nominated by a TCTM member to be honored for his/her contribution to the improvement of mathematics education at the state and/or national level.

Information about the **TCTM member** nominating a candidate

Name: Last / First / Middle

Address: Number and street / Apt. number

City / State / Zip Code

Contact: ( ) Home Phone / ( ) Cell Phone / Email Address

Affiliation: District or Professional Affiliation / ESC

Are you a member of TCTM? Y N

Are you a member of NCTM? Y N

Information about the **nominee**

Name: Last / First / Middle

Address: Number and street / Apt. number

City / State / Zip Code

Contact: ( ) Home Phone / ( ) Cell Phone / Email Address

Affiliation: District or Professional Affiliation / ESC

Is the nominee a member of TCTM? Y N

Is the nominee a member of NCTM? Y N

Is the nominee retired? Y N

- ☐ Completed application form
- ☐ One-page, one-sided, typed biographical sheet including:
  - Name of nominee
  - Professional activities
  - National offices or committees
  - State TCTM offices held
  - Local TCTM-Affiliated Group offices held
  - Staff Development
  - Honors/awards
- ☐ One-page, one-sided essay indicating why the nominee should be honored for his/her contribution to the improvement of mathematics education at the state/national level

Please submit the completed application, biographical sketch, and essay

by mail: **Cynthia Schneider, 234 Preston Hollow, New Braunfels, TX 78132**

by fax: **(512) 232-1855 ATTN: Cynthia Schneider**

by email: ***<cschneider@satx.rr.com>***

Match Aversion Probability

Probability is an increasingly important topic in mathematics education. To teach probability effectively and meaningfully, interesting examples are needed. Consequently, probability teachers are always on the lookout for examples that they can use in their classes. We shall describe what we feel is an interesting probabilistic situation.

This type of problem supports the eighth grade Texas Essential Knowledge and Skills (TEKS) 8.11: "The student applies concepts of theoretical and experimental probability to make predictions. The student is expected to: (a) find the probabilities of dependent and independent events; (b) use theoretical probabilities and experimental results to make predictions and decisions; and (c) select and use different models to simulate an event."

The Problem

Suppose that a cash drawer at a bank contains 72 commemorative quarters, including twelve for each of the six states of Arkansas, Kansas, Louisiana, Mississippi, Missouri, and Texas. These coins are randomly mixed in the drawer.

A student, Emily, brings a set of smaller coins, totaling $1.50 in value, to the bank to be exchanged for six quarters. If these six quarters are randomly selected from the cash drawer, what is the probability that she will receive exactly one coin for each of the six states? In other words, what is the probability that quarter matches are averted?

Have the students predict the probability before they begin working on the problem. Have students model this situation with coins or objects that represent coins.

The Solution

An explanation of the solution follows:

1. Select the first quarter. Any selection is possible for this first coin.
2. Select the second quarter. There are 71 quarters remaining, but 11 of them are from the same state as the first quarter selected. Therefore, the probability that the second quarter is for a different state than the first quarter is $\frac{60}{71}$.
3. Select the third quarter. There are 70 quarters available for selection, but 22 of these represent states already used. Consequently, the probability of selecting a quarter representing a state different from the first two is $\frac{48}{70}$.
4. Select the fourth quarter. There are 69 quarters remaining in the drawer, but only 36 of them are from states different from those of the first three quarters. The probability of securing a quarter from a state not previously represented is $\frac{36}{69}$.
5. Select the fifth quarter. The probability of avoiding the states previously selected is $\frac{24}{68}$.
6. Select the sixth quarter. The probability of avoiding the states previously selected is $\frac{12}{67}$.

The probability that the six selected quarters represent six different states is: $1 \cdot \frac{60}{71} \cdot \frac{48}{70} \cdot \frac{36}{69} \cdot \frac{24}{68} \cdot \frac{12}{67} = 0.019$.
The probability that at least one state will be "duplicated" is $1 - 0.019 = 0.981$.

Common Errors

A common student error in addressing this problem is to assume that the six states must be represented in a fixed order, such as alphabetical. If this errant approach is used, the probability of selecting six distinct states appears to be: $\frac{12}{72} \cdot \frac{12}{71} \cdot \frac{12}{70} \cdot \frac{12}{69} \cdot \frac{12}{68} \cdot \frac{12}{67}$.

Another common error is to misinterpret the problem as requiring that a specific coin is to be selected from each of the six states, seemingly yielding a probability of: $\frac{1}{12} \cdot \frac{1}{12} \cdot \frac{1}{12} \cdot \frac{1}{12} \cdot \frac{1}{12} \cdot \frac{1}{12}$.

How should a teacher counter these and other possible errors in approaching this problem? One suggestion would be to solve a simpler problem; what if there were only 36 coins and three states? Teachers and students are encouraged to generalize this process for other match aversion situations. ■

David R. Duncan, Ph.D. • <David.Duncan@uni.edu>
Professor of Mathematics, University of Northern Iowa

Bonnie H. Litwiller, Ed.D.• <litwille@math.uni.edu>
Professor of Mathematics, University of Northern Iowa

FEATURE

TCTM Recognition Breakfast at CAMT 2006

Saturday, July 22, 2006, 7:00 a.m. - 8:30 a.m.
Hyatt Regency Downtown Hotel

Award recipients and board members will be recognized at the breakfast, along with a door prize drawing. Admittance to the breakfast is for TCTM members only and is not included with membership or CAMT registration. We regret that children or other guests cannot be accommodated. You must register and pay your breakfast fee in advance through TCTM. The registration form and payment instructions for the breakfast are below. Admittance at the breakfast is limited by the room size and catering contract which must be finalized before the conference, so please register by the deadline of June 1, 2006. Your e-ticket for the breakfast will be e-mailed to you no later than June 30.

Member Information

Name:	Last	First	Middle
Address:	Number and street		Apt. number
	City		Zip Code
Phone :	Home Phone	Cell Phone	Email address
Affiliation:	District or Professional Affiliation		ESC

☐ Enclosed please find my $15.00 check, payable to TCTM, for the breakfast.

Please mail your check and form to **Cynthia Schneider, 234 Preston Hollow, New Braunfels, TX 78132**

FEATURE

Recommended Readings and Resources

The Code Book: The Evolution of Secrecy from Mary, Queen of Scots to Quantum Cryptography by Simon Singh

The Code Book: The Evolution of Secrecy from Mary, Queen of Scots to Quantum Cryptography by Simon Singh 1999
ISBN 0-385-49531-5

This is a fascinating description of how to keep what we write a secret – with lots of mathematics involved. Starting with a few examples in ancient history, such as letter counting, the author quickly advances in time to cipher machines and finally to quantum cryptography. This book provides a way to interweave language, history and mathematics in a unique setting. Each example of a code is followed up with the breaking of the code. Some of these are great stories to share with our students about problem solving. There is probability, algebra and number theory – but not all at once. The author builds his story from completely accessible mathematics to very sophisticated theories. And best of all, in the end, I felt very safe in using my credit card online!

■

TCTM CAMTership Application

Deadline: May 31, 2006

Eligibility: Eight $500 CAMTerships will be awarded to teachers with five or fewer years teaching experience in Texas.Previous winners are not eligible. Winners will be determined by random drawing of names and will be notified by telephone or email after June 1, 2006. Winners will be asked to volunteer for two hours at CAMT and will be TCTM's guest at our breakfast Saturday morning, where the checks will be presented. Good luck!

Name:	Last	First	Middle
Address:	Number and street		Apt. number
	City	State	Zip Code
Contact:	( ) Home Phone	( ) Cell Phone	Email Address
Workplace:	District and Campus		ESC

Are you a member of TCTM?	Y / N	Have you attended CAMT before?	Y / N
How long have you been teaching in Texas?		What grade(s) are you currently teaching?	

Send your completed application to:

by mail: **Cynthia Schneider, 234 Preston Hollow, New Braunfels, TX 78132**

by fax: **(512) 232-1855 ATTN: Cynthia Schneider**

by email: *<cschneider@satx.rr.com>*

CAMT 2006

Navigating Mathematical Understanding Through Research July 20 – 22, 2006

Dear Members of TCTM,

We know that this year's Conference for the Advancement of Mathematics Teaching (CAMT) is going to be an outstanding experience for everyone who attends. We hope that you will mark July 20-22, 2006 on your calendar and make plans to join us. You won't want to miss it!

CAMT begins with a two-day pre-conference on July 18-19, 2006. The focus of the pre-conference will be Making Mathematics Accessible for ALL Students, developed by the Region 4 Education Service Center. The pre-conference sessions will emphasize instructional strategies that best meet the needs of English language learners and students with special needs.

This year's conference theme, Navigating Mathematical Understanding Through Research, will encourage each one of us to strengthen our instructional strategies based on the best practices revealed through research in mathematics education. We have a program filled with more than 60 international and national leaders in mathematics education, as well as over 625 outstanding teacher leaders from districts all over the state of Texas.

Please consider registering for the ticketed session on Friday, July 21. This session, Leading Texas Schools to Success in Teaching Underachieving Students of Poverty, by William Parrett and Robert Parr will also include lunch.

Remember, this year registration is available online. Please follow the links from our CAMT website at

<www.tenet.edu/camt>.

On behalf of the CAMT program committee, I look forward to seeing you in Houston.

Janet D. Vela
CAMT 2006 Program Chair
Region 4 Education Service Center
7145 West Tidwell
Houston, TX 77092
Work 713-744-8177
jvela@esc4.net

■

Errata

Texas Mathematics Teacher, Volume LII, Issue 2, Fall 2005

The Voices from the Classroom: Fraction ID activity printed on page 28 in the Fall 2005 *Texas Mathematics Teacher* is from the "Professional Development in the Texas Assessment Program for TAAS Mathematics" for grades 6-8, originally published in October 1994 and was authored in both places by Mary Alice Hatchett, now an independent K-12 Math Consultant.

■

2005 Scholarship Donors

The TCTM Board wishes to thank the following contributors for their very generous donations to the TCTM scholarship fund.

Major Contributors

Pearson Education - Prentice Hall • Harcourt Achieve • Agile Mind

Recognized Contributors

Key Curriculum Press

■

TCTM Candidates

for Vice-President Secondary

Scott Fay

Scott Fay is currently an eighth-grade pre-Algebra and Algebra I teacher in Corsicana ISD. Scott graduated from Texas A&M University at Commerce and has been teaching for six years. Scott has always believed that any student can learn math, but the teacher's role is crucial in this process. Scott has been a member of the Texas Council of Teachers of Mathematics for six years and has served for the last two years as the co-Central Regional Director. He supports the goals of TCTM and strives to represent this organization by participating, supporting and speaking at local affiliate conferences. As VP-Secondary, he plans on keeping informed of issues related to 6-12 mathematics education and advising the board on policies and procedures to assist his colleagues.

Amy Gaskins

Dr. Amy Gaskin has 30 years in math education, teaching in 4 states: Texas, Oklahoma, Nevada, & Missouri. She has taught for 19 years in public schools; this experience included assignments for middle school, Algebra I, Geometry, Algebra II, Precalculus, and Calculus. Amy has also taught mathematics and math education methods at the university level for seven years. Her experiences lead her to work as a math specialist K-12 at Region XIII in Austin, Texas. She is a TEXTEAMS Trainer, Agile Mind Trainer, and Mathematics Education Consultant. Dr. Gaskins holds a B.S. from Texas Tech University in math education, a M.S. in math education from East Central University in Oklahoma and an Ed.D. in Curriculum & Instruction with a mathematics specialization from the University of Nevada, Las Vegas.

Sheryl Roehl

Sheryl Roehl has a B.S. degree in Mathematics and a M.S. in Education. She taught high school math, science and computer programming for twelve years and taught mathematics at the junior college level for 3 years. While teaching in Victoria, she was selected as a Danforth Leadership Fellow. She then served as the math/science, TAAS and curriculum specialist for Region III Education Service Center in Victoria for nine years. She joined the staff of the South Texas Rural Systemic Initiative in April of 2002 as the Assistant Project Director. In her new position, she is currently working with 30 rural school districts in South Texas to improve student performance in math and science. Sheryl served as co-chair of the CAMT exhibits for two years and also served as the Government Relations Representative for the Texas Association of Supervisors of Mathematics (TASM). Sheryl has served as the South Regional Director for TCTM for six years. Sheryl is currently a doctoral graduate candidate (ABD) at Texas A & M University-Corpus Christi and is also an adjunct mathematics professor at TAMUCC.

TCTM Candidates

for Secretary

Abigayle Barton

Dr. Abigayle Barton is currently a Mathematics Specialist for the Alliance for the Improvement for Mathematics Skills PreK-16, a MSP grant funded by the National Science Foundation. The AIMS project serves nine local school districts, Del Mar College, and Texas A&M University-Kingsville. The overarching goal of the AIMS project is to prepare all students for college level mathematics courses by graduation from high school through vertical alignment, professional development, challenging curriculum, the use of information technology, and research on strategies and interventions. Abigayle also teaches a Master's Level Early Childhood Mathematics Methods course at Texas A&M University-Kingsville. Prior to working for AIMS, Abigayle taught third grade and PreK-5 special education in Corpus Christi, Texas and taught second grade and was a second grade mathematics specialist in Slaton, Texas.

Bonnie McNemar

Bonnie McNemar has over 30 years experience in secondary mathematics education. She taught both middle school and high school and served as secondary mathematics coordinator. Since 1989 her focus has been on designing, delivering and managing profesisonal development for teachers of mathematics. For three years, she served as the director of the Teachers Teaching with Technology program. In 2002-2003, she was on the Math Team at the Charles A. Dana Center. She served as the coordinator of the Online Mathematics Initiative at the Distance Education Center, University of Texas at Austin during 2003-2004. Currently she is working as an independent consultant to school districts across Texas.

for Northeast Regional Director

vote only if you live in Service Center Region 7, 8, 10, or 11

Shirl Chapman

Shirl Chapman has been the Middle School Mathematics Specialist for Region Seven Educational Service Center for nine years. Her responsibilities include coordinating, developing and implementing staff development for middle school mathematics teachers. She also teaches an Elementary Education course to pre-service teachers at East Texas Baptist University. Shirl is the author of a state training designed for special education teachers, "Math, TAKS and SDAA II, Closing the Gap". She is a TEXTEAMS leader and has served on the advisory committee for many of the Dana Center projects. She is currently serving on the advisory committee for MTA (Math TEKS Awareness), and MTR (Math TEKS Refinement). Shirl holds a bachelor's degree in elementary education from East Texas State University. She attained her master's degree in elementary education, mid management certification in administration and superintendent certification all from Stephen F. Austin State University. She taught for 13 years at Marshall Junior High. During that time she was voted Teacher of the Year in 1995 and 1997 and Teacher of the Week in 1995 and 1996.

Colleen Clower

Colleen Clower has been in education for 26 years, 22 of those were in the classroom. She spent three years as a math specialist on an elementary campus. In June 2005, she was hired as the elementary math coordinator for Denton ISD. After completing a B.A. from the University of North Texas, she continued to grow by participating in national, state and local professional development. Her M.S. in Mathematics from Texas Woman's University provided further development of a constructivist view of mathematics instruction and gave her tools to support principals, teachers and students. In the position of NE Regional Director she promises to bring to the office her experience in communicating and collaborating with a variety of entities to enhance instruction of mathematics.

TCTM Candidates

for Northwest Regional Director

vote only if you live in Service Center Region 9, 14, 16, or 17

Nita Keesee

Nita Keesee currently serves as the Instructional Specialist for Clack Middle School in Abilene ISD. Her duties include curriculum, staff development, technology integration and TAKS coordination. She has fourteen years experience in teaching high school mathematics and five years in curriculum. She has a B.S. and holds a master's in secondary education. She is past president for the Abilene Association of Texas Professional Educators and past Regional Director. Nita strives to remain current in all aspects of her vocation such as the Dana Center Leadership Workshops and the TEXTEAMS Math Institutes. She has participated in the TEA TAKS Item Reviews for 10th grade math and 8th grade science. A member of her local educators' organization, the Big Country Council of Teachers of Math and Science, since its beginning, Nita wishes to continue supporting the work of TCTM as the Northwest Regional Director.

Pam Summers

Pam Summers has 31 years of experience in mathematics education. She has been a mathematics supervisor in Lubbock ISD for 15 years. She is passionate about mathematics education and considers it a privilege to represent the teachers in her area. She promises to work hard to do a good job.

for Central Regional Director

vote only if you live in Service Center Region 12, 13, or 20

David Hughes

David Hughes serves as a senior program coordinator for mathematics at The Charles A. Dana Center. In his position, he works with mathematics teachers and leaders in The Partnership for High Achievement, a program dedicated to student success through meaningful change in district structures and practice. Prior to joining the Dana Center, David worked as a prekindergarten to fifth grade campus mathematics facilitator and as an elementary teacher. Additionally, he has taught mathematics methods at The University of Texas at Austin and has extensive experience leading professional development for elementary mathematics teachers. He holds a B.S. in Education from The University of Texas at Austin and a M.Ed. in Elementary Education from Southwest Texas State University.

William C. Luke

William C. Luke graduated with a B.S. from the University of Maryland. Before becoming a teacher, he was in the United States Army for 22 years, attaining the rank of Sergeant First Class E-7. His military career included assignments in Germany, Saudi Arabia, Iraq, and many places in the United States. He has worked as a substitute teacher and a 5th grade instructional aide. He taught 6th grade math for six years. He is presently attending Tarleton State University to earn his master's degree in Mathematics. He is also working as an Instructor for Central Texas College in their Academic Learning Center. He has presented math and science workshops from the local school level to National Council of Teachers of Mathematics Conference. He believes that his mission as an educator is to provide an environment without fear and where his students believe that they will learn. He is a member of CTCTM, TCTM, and NCTM.

Pat Rossman

Pat Rossman would like to serve two more years as a Central Regional Director for TCTM. It is important to remain vigilant of the mathematics educational issues in Texas as we serve children with the best standards, curriculum, instructional practices, and professional educators. Pat works for the Austin Independent School District as a Math Specialist for Middle Schools and serves 18 campuses. Her current focus is facilitating change via professional development and campus support with struggling campuses as they educate children to reach and surpass standards. Immediately prior to this position, she worked for five years as a Secondary Mathematics Specialist aligning written, taught, and assessed curriculum. This school year is Pat's 29th year in education having taught mostly middle school mathematics in both Texas and Illinois. She is a co-author of the book published by the University of Texas' Charles A. Dana Center called Middle School Assessments Proportional Reasoning. Pat is the first of five National Board Certified Teachers in Early Adolescence Mathematics in Texas. Her goal is to increase participation by Central Regional teachers in TCTM.

TCTM Ballot

Circle your choices below. Write-in candidate names are acceptable. Copy and mail your ballot to Angela Murski at the address below. The voting deadline is June 1, 2006.

for Vice-President Secondary

☐ Scott Fay ☐ Amy Gaskins ☐ Sheryl Roehl

☐ ____________________
write in candidates

for Secretary

☐ Abigayle Barton ☐ Bonnie McNemar ☐ ____________________
write in candidates

for Northeast Regional Director

vote only if you live in Service Center Region 7, 8, 10, or 11

☐ Shirl Chapman ☐ Colleen Clower ☐ ____________________
write in candidates

for Northwest Regional Director

vote only if you live in Service Center Region 9, 14, 16, or 17

☐ Nita Keesee ☐ Pam Summers ☐ ____________________
write in candidates

for Central Regional Director

vote only if you live in Service Center Region 12, 13, or 20

☐ David Hughes ☐ William C. Luke ☐ Pat Rossman

☐ ____________________
write in candidates

Mail in your ballot

Angela Murski
TCTM Vice-President Elementary
20305 Hunters Point Dr.
Georgetown, TX 78628

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TCTM Vice-President Elementary
20305 Hunters Point Dr.
Georgetown, TX 78628

Texas Council of Teachers of Mathematics
Executive Board 2005 - 2006

Elected Offices (Voting Members)

President (2006)
Cynthia L. Schneider
234 Preston Hollow
New Braunfels, TX 78132
cschneider@satx.rr.com

VP-Elementary (2007)
Angela Murski
1401 W. Pecan St.
Pflugerville, TX 78660
Angela.Murski@pflugervil-leisd.net

VP-Secondary (2006)
Linda Shaub
1111 Highland Hills
Marble Falls, TX 78654
lshaub@mail.utexas.edu

President-Elect (2006)
Jo Ann Wheeler
7145 West Tidwell
Houston, TX 77092
jwheeler@esc4.net

Secretary (2006)
Bonnie McNemar
3101 Indian Mound Rd
Georgetown, TX 78628
bmcnemar@aol.com

Treasurer (2007)
Kathy Hale
2833 Broken Bough Trail
Abilene, TX 79606
khale@esc14.net

NW Regional Director (2006)
Nita Keesee
4234 CR 355
Abilene, TX 79601
nita.keesee@abileneisd.org

NE Regional Director (2006)
Jacqueline Weilmuenster
3547 Mercury
Grapevine, TX 76051
jacqueline.weilmuenster@gcisd.net

Co-Central Regional Director (2006)
Scott Fay
Collins Middle School
1500 Dobbins Road
Corsicana, TX 75110
sfay@cisd.org

Co-Central Regional Director (2006)
Pat Rossman
7801 Shoal Creek Blvd #227
Austin, TX 78757
prossman@austinisd.org

SW Regional Director (2007)
Rebecca Ontiveros
6611 Boeing Dr.
El Paso, TX 79925
rontiveros@esc19.net

South Regional Director (2007)
Barba Patton
498 Springwood
Victoria, TX 77905
pattonb@uhv.edu

SE Regional Director (2007)
Paul Gray
7145 West Tidwell
Houston, TX 77092
pgray@esc4.net

Appointed Offices

NCTM Rep [2006]
David McReynolds
12506 Mill Ct.
Houston, TX 77070
dmcreynolds@esc4.net

Government Relations Rep [2006]
Garland Linkenhoger
501 East Uphall Ave.
McAllen, TX 78503
garland_linkenhoger@yahoo.com

CAMT Board Rep [2006]
Nancy Trapp
RR 2 Box 312
Raymondville, TX 78580
nancy.trapp@lyfordcisd.net

Journal Editor [2006]
Cynthia L. Schneider
234 Preston Hollow
New Braunfels, TX 78132
cschneider@satx.rr.com

Director of Publications [2006]
Mary Alice Hatchett
20172 W. Lake Pkwy
Georgetown, TX 78628-9512
mahat@earthlink.net

Parliamentarian [2006]
Susan Larson
148 PR 7050
Gause, TX 77857
slarsonrsi@aol.com

Liaisons

NCTM ASC Representative for the Southern 2 Region
Ann Indingaro
160 South Hollywood Dr.
Memphis, TN 38112
indingarom@ten-nash.ten.k12.tn.us

TEA Consultant
Norma Torres-Martinez
1701 N. Congress Ave.
Austin, TX 78701
Norma.Torres-Martinez@tea.state.tx.us

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Cynthia L. Schneider, Ph.D.
President

234 Preston Hollow
New Braunfels, TX 78132

Texas Mathematics Teacher
234 Preston Hollow
New Braunfels, TX 78132