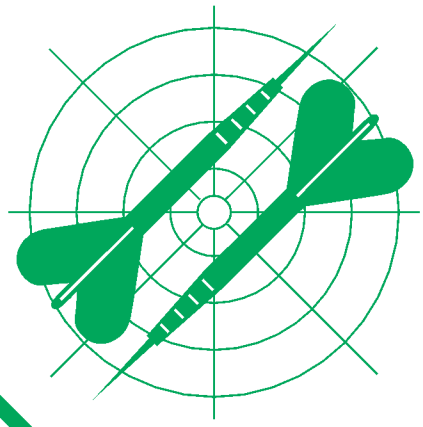
GEORGIA COUNCIL of TEACHERS of MATHEMATICS
GCTM

REFLECTIONS

Vol. LI No. 6 Fall 2006



Probability and the New GPS

REFLECTIONS

Vol. LI No. 6 Fall 2006

ABOUT YOUR MAILING LABEL:

Please notice 2 important parts of the mailing label on the back of the journal: Above your name you will find your membership number and expiration date. In an effort to conserve costs, we will not be issuing membership cards, but will include this information on your mailing label on each issue of the journal. If you should ever need verification of your membership in GCTM for professional reasons, please contact Susan Craig, Membership Director, whose contact information is on page 28.

Ruminations on Being a Mathematics Teacher

by Dottie Whitlow
GCTM President

Have you ever reflected on your career as a math teacher? How did you become a math teacher? How would you describe yourself as a math teacher? How would your students describe you? Would their description fit with your vision of yourself as a math teacher? Think back to the events or decisions that led you to become a math teacher. Why did you become a math teacher? Did you always love math and want to be a math teacher? Did you find it while you were on some other path? Did it find you? What is your measure of success in being a mathematics teacher?

"*If a child is to keep alive his inborn sense of wonder, he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement and mystery of the world we live in.*" —*Rachel Carson* Maybe you became a math teacher because like Rachel Carson, you wanted to share the discovery and wonder that the world holds with young people. We all know the reward of seeing the joy of a student who has realized or learned something for the first time and takes pride in understanding it.

"Don't limit your child to your own learning, for he was born for another time." —*Rabbinical saying* Maybe you became a math teacher because you realize that children reach into the future. As we get older, they will become our doctors, writers, decision-makers, insurance adjusters, scientists, and even our care-givers.

"Some of us are ground crew—holding lines, building fires, dreaming dreams, letting go, watching the upward flight. Others of us are bound for the sky and the far edges of things." —*Robert Fulghum* Maybe you became a math teacher because you want to inspire young people to dream great dreams for great things.

Regardless of your motivations and rewards, this can be tough work. Sometimes we have to wonder if we can get it all done: weave the dreams, make the progress, inspire the greatness, teach math to all. It helps to have a clear knowledge and focus on where we and our students are going. It is easier to do the work and walk the path when we know where we are going today, tomorrow and during our time together.

We do need to have a plan. There are many wonderful, worthwhile tasks and things to see, do and visit as we plan our time with our students. Hopefully you can plan, and you don't suffer from the same troubles as *E.B. White* who says, *"If the world were merely seductive, that would be easy. If it were merely challenging, that would be no problem. But I arise on the morning torn between a desire to improve or save the world and a desire to enjoy or savor the world. This makes it hard to plan the day."*

In your planning, I urge you to be deliberate, selective and focused about what you and your students do. Remember that mathematics in the world is interconnected and integrated; it doesn't come in compartments, so neither should our teaching and learning. Try to figure out where your students are at the start of your time together; meet them there and begin the journey. Clearly communicate expectations to yourself and your students. That's how we will know where we are

CONT. ON NEXT PAGE

GCTM NEWS

CONT. FROM PAGE 1

going and whether we have arrived.

Do you want students to learn? Of course you do. I suggest you start asking them to talk and to think. Let them make mistakes and fix them, both on paper and in their thinking. Let them go home as tired as you do because they have been active learners each day. Sometimes we want to help so much, we help them right out of the learning by doing all the thinking and answering for them. *"The surest way to make it hard for children is to make it easy for them." —Eleanor Roosevelt*

Do you want students to enjoy math? Of course you do. We can build confidence and good attitudes by posing problems and asking questions in ways that help students express what they know and allow all students to participate in the mathematical dialogue at some level. Asking good, thoughtful questions, like "why" and "how do you know" is the number one strategy for raising student achievement. TIMSS helps us know that we are not so good at asking good questions. *"It is better to know some of the questions than all of the answers." —James Thurber*

We also build confidence in our students by becoming learners right along with our students rather than conveying that everything has already been learned and discovered, and it is their turn to memorize it. We can learn with our students and learn with our colleagues. This is important and sometimes it can be scary. But we must embrace it.

"To grow, a lobster must shed its old shell numerous times. Each shedding renders the creature totally defenseless until the new shell forms…when risk becomes frightening, think of the lobster, vulnerability is the price of growth." —Richard Armstrong

Talking and learning with our peers is wonderful professional development. It also isn't always easy. We may disagree. That's okay, but we should try to understand each other's thinking. *"When we all think alike, no one is thinking." —Walter Lippman*

Remember that Michelangelo was 81 years old when he is reported to have said, *"Still, I am learning."*

I hope that you can reflect on your career and continually renew yourself. You are the most important resource you bring to any learning situation. I hope you will ask yourself each day,

What messages did I send today?
Did I teach with excitement and passion?
Did I communicate through word or deed that I love teaching? That I love math? That I love kids? That I expect great and wonderful things?

I am proud of all of you, the mathematics teachers of Georgia! We can continually renew ourselves, our teaching, our vision, our expectations, our students. Try to remember,

Love and skill together can create a miracle.

Dottie Whitlow

MISSION

The Mission of the Georgia Council of Teachers of Mathematics is to:

1. Promote a high quality mathematics education for all students
2. Encourage an active interest in mathematics and in mathematics education
3. Promote and reward excellence in the teaching of mathematics in Georgia

GCTM NEWS

Did You Know?

by Becky King
Executive Director

The first Georgia Mathematics Conference was a one-day meeting on Saturday, Feb. 15, 1958. The program for the day consisted of an opening general session followed by two sessions each for elementary and secondary teachers. During the night of Feb. 14, Georgia had a near record snowfall. One hundred and forty people had made reservations for lunch, but no money had been collected and the GCTM treasury had only $18.75! Despite the bad weather, 110 teachers attended that day. Since that successful beginning, money has been collected with advance registrations. What a long and wonderful history we have, and how thankful we are to those who have paved the way before us.

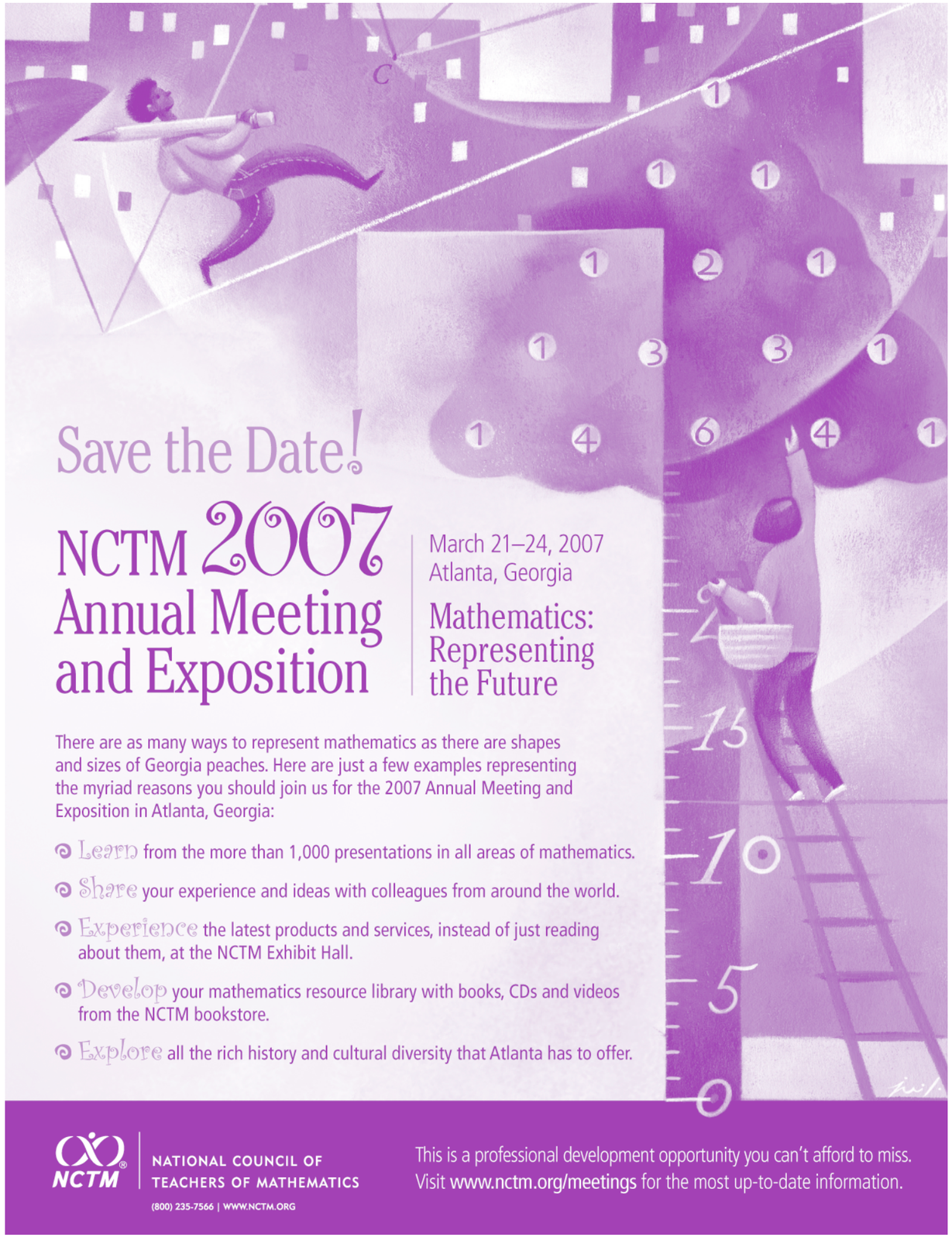
Earning a PLU Credit Requires Three Steps:

Step 1 is done **before** the conference. The PLU **Prior Approval Form** for 2006 is now on the GCTM Web site. Visit www.gctm.org to download the form. Fill it out and get the required signatures **before** you attend the conference. (Do not include this form with your pre-registration.)

Step 2 is done **at** the conference. Bring the prior approval form to the PLU desk in the registration area at the conference and receive a form to be filled out as you attend workshops.

Step 3 is done **after** the conference. This is an on-the-job assessment completed in your school system. The purpose of this element is to put to use what you have learned. You will receive the proper form for this at the conference.

If you have questions about earning PLU credit at the conference, contact Becky King via email at bwking@comcast.net.



Be a Volunteer at *NCTM Atlanta 2007*

We need many volunteers for the **2007 NCTM Annual Meeting and Exposition in Atlanta** next March.

If you are interested, please take a few minutes to visit the online volunteer form at www.gctm.org/volunteer. Select the volunteer option that interests you and enter the days and times you are willing to serve. Starting in the fall, we will begin to assign volunteers to their responsibilities and you will receive more information. We would like volunteers to commit to serving for a 4 hour shift.

All volunteers will receive a special t-shirt and may register for the NCTM Annual Meeting and Exposition at the member rate. All college students who volunteer a minimum of 4 hours may attend any sessions on the same day they volunteer and they are not required to register. We do ask, however, that they never take the place of a registered paying attendee.

Thank you again for volunteering and we hope to see you in Atlanta next March. Please do not hesitate to contact one of us if you have any questions.

LAC Volunteer Committee Co-Chairs

Nathan Borchelt (nathanborchelt@clayton.edu)
Linda Nash (lindanash@clayton.edu)
Bryson Payne (bpayne@ngcsu.edu)

There is also a great opportunity to showcase Georgia's students to thousands of teachers both nationally and internationally. During the 2007 Annual Conference in Atlanta, there will be an exhibit that displays exemplary student work. Your help is needed in collecting student work from all grade bands (P – 16), as well as superb work of teacher candidates. Your assistance will help to highlight the excellent work Georgia students are producing. Some of the work may also provide examples for the Georgia Department of Education's website in alignment with the Georgia Performance Standards.

If you are interested, please see the "Student Exhibit Application" and the "Student Work Permission Form" on our Web site www.gctm.org.

NCTM ATLANTA

GCTM NEWS

Each One Bring One

by Susan Craig
Membership Director

Soon it will be time to begin a new school year—new students, new curricula, new challenges and new opportunities! I am glad that GCTM is a part of these new beginnings for you.

From the membership report you can easily see that GCTM continues to grow. GCTM is its members. As a member I hope you take seriously your important role as a member recruiter and membership retention agent.

Right this very moment, won't you please call a colleague who has never been a GCTM member and one who may be a lapsed member, and invite them to join us! It will help get their new year off to a great start!

What reasons can you give them for being a member of GCTM? Try these:

- GCTM sponsors a superior conference, The Georgia Mathematics Conference, annually attended by over 2000 mathematics teachers from across the state with nationally recognized speakers;
- Members receive this excellent journal, *REFLECTIONS*, which gets even better with each new issue;
- GCTM offers awards and grants for teachers who are GCTM members;
- GCTM will be hosting the NCTM Annual Meeting and Exposition in Atlanta in March 2007. Many local volunteers will be needed to make this the finest conference possible for teachers of mathematics from around the world;
- Every teacher of mathematics should be a member of his or her professional organization.

GCTM is the perfect choice ...and that's just the beginning of the list.

Please use the membership form in this issue to bring us one new member and Happy New School Year!

MEMBERSHIP REPORT—JULY 2006

	NW	NE	MetroW	MetroE	CW	CE	SW	SE	Out of State	Lost	Totals
2006	165	151	144	221	218	131	169	238	7	0	1444
2007	16	6	11	22	14	17	9	12	0	0	107
2008	0	0	1	0	0	0	2	0	0	0	3
Life	26	44	79	41	70	61	38	64	14	36	473
Student	87	93	102	33	36	162	5	25	0	0	543
Total	294	294	337	317	338	371	223	339	21		2534

GCTM's 2006 Academy

by Peggy Pool

The third annual GCTM Academy was held at Thomson Middle School in Centerville, Georgia June 14-16. Teachers were enlightened with their choice of three workshops. Makoto Yoshida was the instructor for the elementary workshop for teachers of grades 3-5. Debbie Poss and Don Slater were the instructors for the middle school workshop for teachers of grade 8. Brad Findell was the instructor for the high school session. Comments from the participants indicate that the Academy was a great success.

"The 2006 GCTM Academy was excellent! The content and instruction techniques used will be very helpful in my classroom. The collaboration among the participants was also very insightful and useful."
—Jane Tippins, Comer Elementary School, Madison County

"Dr. Yoshida was a fascinating instructor. His experience with both the Japanese and American education systems is unique. His approach to common mathematical concepts provided the elementary participants a fresh perspective. We were on the edge of our seats (and brains) for the entire 2 ½ days."
—Mary Matthew, Carver Elementary, Bryan County (Richmond Hill)

"This year's GCTM Academy has been an exhilarating experience! I have been very skeptical about the 'New' GPS but these three days of actually taking part in activities and tasks that we will use to work with our students has been an eye opener. I have always tried to make math interesting for the students but I feel the new GPS is going to enhance their interest and mastery even more. Thanks GCTM."
—Linda Rogers, Marion Middle School

*"Wow! What a great summer workshop! It has provided me with a large number of activities to take back and **actually be able to use** in my classroom. There was never a dull moment! I can't wait until next year's institute!"*
—Gayla Braziel, Sumter County Middle School

"The problem sets explored in this Academy showed me what is expected of our students with the roll out of the new standards. I look forward to next year's Academy, not to mention the October Conference. I feel better about how this state is moving forward. I CAN DO THIS!!"
—Amanda Avery, Cass High School, Bartow County (Cartersville)

"The summer academy was great. It caused me to reflect on my own pedagogy and I realized the things that I need to be mindful of in teaching. I also left with many ideas and activities that I can use with my students."
—Alphonese Wilson,Westover High School, Dougherty County (Albany)

Special recognition goes to Dan Funsch who fathered the idea of GCTM holding an Academy three years ago.

A big thank you goes out to Cathy Franklin for her energy and willingness to help in every possible capacity to assure that this year's Academy went smoothly.

We are grateful to the Thomson Middle school staff for being so very hospitable.

Also, the generosity of our sponsors ETA and Texas Instruments is appreciated and the participants enjoyed some incredible door prizes.

GCTM NEWS

Georgia Mathematics Conference at Rock Eagle, October 19 – 21

Come to the greatest state Mathematics Conference in the United States! We have exhibits by publishers and vendors, workshops by teachers from Georgia and elsewhere, nationally known speakers, exciting activities in the afternoons and evenings, and many opportunities to network with other educators. Other evening events will be the annual meeting of GCTM, installation of new officers, presentation of awards, and opportunities to win fantastic door prizes.

EVENING KEYNOTE SPEAKERS

Thursday evening:
Randy Charles
Friday evening:
Steve Leinwand

Steve Leinwand is a Principal Research Scientist at AIR and is currently working on a range of projects involving K-12 mathematics, including Ohio K-8 diagnostic and achievement tests, a comparative analysis of Singapore Mathematics for the Department of Education as well as other projects

He served a 3-year term on the NCTM Board of Directors, during which time he helped review Principles and Standards for School Mathematics.

Steve is also a senior author of Scott Foresman Addison Wesley's K-8 mathematics program. He has written numerous articles and his new book, *Sensible Mathematics: A Guide for School Leaders* is published by Heinemann. Steve is a frequent speaker at state, regional and national conferences.

OTHER MAJOR SPEAKERS

Thursday:
***Phil Daro, Gail Englert, *Lou Matthews, David Fricke, Marilyn Stratchen**
Friday:
Silvia Llmas-Flores, Ann Lawrence, *Doug Clements, *Asa Hilliard, Chris Franklin
* Biography included.

Asa Hilliard

Dr. Asa G. Hilliard, III is the Fuller E. Callaway Professor of Urban Education at Georgia State University, with joint appointments in the Department of Educational Policy Studies and the Department of Educational Psychology/Special Education

He has written more than two hundred research reports, articles and books on testing, ancient African History, teaching strategies, African culture, and child growth and development.

Phil Daro

Phil Daro currently works on advancing the design and use of leadership tools for improving mathematics instruction at every level of the educational system. He also directs the development of a middle school mathematics program inspired by the Japanese curriculum, and consults with states and school districts on their accountability systems and mathematics programs.

As a former mathematics teacher, he directed large scale teacher professional development programs for the University of California including the California Mathematics Project and the American Mathematics Project.

Doug Clements

Doug Clements is recipient of the Chancellor's Award for Excellence in Scholarship and Creative Activities, State University of New York, 2006 and UB's "Sustained Achievement" award. He has published over 100 refereed research studies, 8 books, 50 chapters, and 200 additional publications in the areas of mathematics education, educational technology, and early childhood education.

Clements' work has been funded by a string of grants from the U.S. Department of Education's Institute of Educational Sciences (IES) and the National Science Foundation (NSF). Most recently, Clements and his colleague, Julie Sarama in cooperation with Prof. Jaekyung Lee, are working on a project called *Scaling Up TRIAD: Teaching Early Mathematics for Understanding with Trajectories and Technologies.* This is a large-scale study of integrated early childhood mathematics curriculum and professional development innovations.

Lou Matthews

Dr. Lou Edward Matthews is a professor of middle/secondary mathematics education in the School of Education at the University of South Carolina Upstate in Spartanburg, South Carolina. He has been involved in mathematics education in the United States and Bermuda for the past 15 years where he has taught at the middle, high school, and college levels.

Dr. Matthews has directed several innovative mathematics education programs and initiatives, which primarily focus on the empowerment of teachers and students of mathematics. He was elected in as the 2004-2006 Southeast Regional Representative for the Benjamin Banneker Association, Inc., a national affiliate of the National Council of Teachers of Mathematics.

GCTM NEWS

GCTM Math Tournament News

Middle School Tournament

The 6th Annual GCTM Middle School Tournament was held at Thomson Middle School on April 22. Congratulations to the top six teams:

1st—Evans Middle School
2nd—First Presbyterian Day School
3rd—Fayette Middle School
4th—Trinity Elementary School
5th—Palmer Middle School
6th—Greater Atlanta Christian School

High School Tournament

The 2006 GCTM State Math Tournament was held at Mercer University on April 29 to determine the best math team in the state.

Thirty-three teams of four mathletes, as well as about a dozen individuals, participated in this tournament, which consisted of 3 parts. The written test contained 50 questions, 45 of which were multiple-choice. The questions covered the entire high school math curriculum, including calculus and statistics, and although calculators were needed for the written part of the test, not all questions were calculator active. After the written test, each person worked ten individual ciphering questions, which had to be completed in less than 2 minutes without technology. Then students paired up for the pair ciphering round, where each pair received 4 questions on which they could collaborate before submitting answers.

Top Individual Awards:

1—Andy Davenport, Westminster
2—Phillip Mote, Lassiter
3—William Drobny, Parkview
4—Wes Brown, Greater Atlanta Christian
5—Stephen Froehlich, Chamblee Charter
6—Sam Brotherton, Rockdale Magnet
7—Livia Zarnescu, Pope
8—Linda Liu, Parkview
9—Harrison Brown, Centennial
10—Jonathan Wysolovski, Rockdale Magnet

Top Teams:

1—Lassiter
2—Chamblee Charter
3—Pope
4—Rockdale Magnet
5—Centennial

Sample Questions from the 2006 GCTM State Tournament include:

Pair Ciphering:

The measures of the interior angles of a convex polygon form an arithmetic sequence. The smallest angle is 120° and the common difference is 5°. How many sides does this polygon have?

Individual Ciphering:

Let $\prec X \succ$ represent the smallest integer n such that 2n > x. Compute: $\dfrac{\prec 17 \succ + \prec 10 \succ}{\prec 19 \succ}$

Written Test:

1. The sides of a triangle are x, y, and $\sqrt{x^2 + xy + y^2}$. Find the measure of the largest angle in this triangle.
   A) 60° B) 100° C) 120° D) 150° E) none of these

2. An urn contains N black marbles and N white marbles. Three marbles are drawn from the urn randomly and without replacement. That is the value of N if the probability is 1/12 that all three chosen marbles are black?
   A) 4 B) 5 C) 6 D) 7 E) 8

Georgia ARML Team Goes to Penn State

Consider the following problem:
If tan(11x) = tan (34°) , and tan(19x) = tan(21°), compute tan(5x).

I've just finished reading the 7th email about a proposed solution to this problem and this one involved the possibility (or impossibility) of complex values of x. You're probably wondering what group of intellectuals cares so much about a problem like this. Well, this is the usual electronic communication that takes place among members of the Georgia **American Regions Math League** (ARML) team.

Each year after the state tournament, a dedicated group of math team coaches determines the 33 best mathletes in the state. The top 15 students are chosen to be the "A" team and the rest are usually underclassmen, chosen for their ability to help the team for several years. After practicing every Sunday afternoon in May, this group travels to Penn State University for the annual ARML contest. The actual contest is held simultaneously at three different sites and involves over 100 teams from all over the U.S. and Canada.

The ARML competition consists of 4 parts: the team round, power question, individual questions, and the relays. In the team round, all 15 members of a team are handed 10 questions to answer in 20 minutes. Students may collaborate and use calculators to determine the solution to these problems, but in order to score high, they must learn to work as a team and to use each other's strengths. In the power round, the team is given a battery of questions on an unusual topic. Most of the power round questions consist of writing proofs, and the team gets an hour to complete this part. After this, all the students go to an auditorium to answer 8 individual questions. The questions are handed out two at a time and students have 10 minutes to answer each pair. After lunch, mathletes line up for the 3-person relays.

The Georgia ARML team has placed in the top 15 in the nation every year for the last 15 years, placing first once and third twice. Last year they placed 11th with a strong returning team.

At this year's competition, the Georgia ARML team finished 8th (the B team finished 19th) out of 120 teams from all over the U.S., Canada, the Philippines, and Taiwan. Five Georgia students were in the run-off for a place among the top ten students in the nation.

ARML TEAM MEMBERS:
Brotherton, Sam (Rockdale Magnet)
Brown, Harrison (Centennial)
Brown, Wes (Greater Atlanta Christian)
Cheng, Dale (Chattahoochee)
Clark, Michael (Lassiter)
Davenport, Andy (Westminster)
Dong, Jimmy (Northview)
Dorminy, Billy (Sola Fida)
Doss, Mark (Columbus)
Drobny, William (Parkview)
Edwards, Miles (Lassiter)
Fang, Joe (North Gwinnett)
Ferreira, Eddy (Roswell)
Froelich, Stefan (Chamblee Charter)
Getzendanner, Andy (Westminster)
Hipsman, Nathan (Lassiter)
Huang, Peter (Lakeside)
Johnson, Fred (Paideia)
Karnick, Santhosh (Wheeler)
Kim, Nayoon (Rockdale Magnet)
Lai, Ruby (Athens Academy)
Lanchester, Amy (Rockdale Magnet)
Lee, Sean (Centennial)
Liu, Linda (Parkview)
Mote, Phillip (Lassiter)
Narayan, Karthik (Northview)
Ou, Jordan (Chamblee Charter)
Pham, Jeremy (Advanced Academy of West Georgia)
Sawyer, Ethan (Chamblee Charter)
Solntsev, Stefan (Pope)
Wang, Carol (Chamblee Charter)
Ware, Brayden (Mount de Sales)
Wysolovski, Jonathan (Rockdale Magnet)

COACHES:
Bross, Jack (Paideia)
Fulton, Tom (Walton)
Garner, Chuck (Rockdale Magnet)
Hedrick, Ben (Alpharetta)
Koppelman, Charles (Kennesaw State University)
Marcus, Adam (Georgia Tech)
Poss, Debbie (Lassiter)
Sigur, Steve (Paideia)
Slater, Don (Lassiter)

Teacher Tips: Trators and Gators

by Robb Sinn
North Georgia College & State University

Trators and **Gators** are the key to successful classroom management. I learned my skills on the job in a racially diverse, urban high school teaching at-risk students. I watched and learned from master-level teachers as they demonstrated a simple distillation of their Zen-like disciplinary skill.

Identify all **Trators** and **Gators**.

The brightly plumed **Trator** is easily viewable in his natural environment. You'll know a perpe**trator** within ten minutes of meeting him (males of the species are more prevalent than females). Your Day 1 Task? Identify and learn the names of all suspected **Trators.** They act out loudly and proudly, disrupting class with jokes, antics, and sometimes belligerence. Immediately ladle out copious quantities of consequences. "Nailing the **Trators**" allows you about a week of relative tranquility. Do not become complacent! Use this time to develop better seating charts; to learn the names, backgrounds, and abilities of your students; and to ingrain needed procedures into your classes so they can utilize technology without destroying it, navigate station activities, collaborate well in groups, and accomplish learning tasks during all types of instructional time.

And use this time to search for **Gators. Gators** have evolved a camouflage skin a chameleon would envy, and catching a glimpse of one in the wild is quite difficult. Diligent detective work will help you spot an instigator**. Gators** start trouble quietly, then sit back and watch. They feed on mayhem, and they manipulate the **Trators** like maestros directing a symphony. Their Machiavellian machinations cause classroom conflagrations, but an actual rules-violation from a **Gator** is quite rare. They are saboteurs who ignite trouble and attempt to escape undetected.Therein lies the **Gator** vulnerability. They hate "getting caught." Any consequence, even being called down in class, is abhorrent. When dispensing consequences, include any known **Gator** in the area as an accessory to nearby disruptions. Dole out consequences for "having started it all." When you can detect and deter the clandestine operations of **Gators**, you will be well on your way to mastering effective classroom management. The fires of **Trators** burn much less brightly when deprived of **Gator**-fuel.

DISCIPLINE TIPS FOR TRATORS

1. ***Warnings and Increments.***
   Go slow, use warnings early (try one *before* class), and cover several incidents with one disciplinary measure.
2. ***One-on-One.***
   Trators are often clowns. Chat with Trators in the hallway or after class without the audience.
3. ***Positive Reinforcement.***
   Trators respond to praise. Labeled lifelong troublemakers, they have rarely heard teachers say nice things about them

DISCIPLINE TIPS FOR GATORS

1. ***Warning Signs.***
   Five people laugh uproariously, but the nearby Trator is "paying attention." Yeah, right. Call down Trator first, then the others.
2. ***Public Discipline.***
   Gators' status depends upon secrecy. Add a longwinded speech to consequences.
3. ***Inquest.***
   Trators know to deny all wrongdoing, but get Gators talking. They spill trade secrets trying to convince you they are angels.

A Mathematician of Note: Ibn al-Haitham

by Keith Luoma
Augusta State University

This issue's "noteworthy" mathematician was born in 965 in the Persian city of Basra—now a part of modern-day Iraq. His full name is Abu-Ali al-Hassan ibn al-Haitham, which can be deciphered as "al-Hassan, the father of Ali, the son of al-Haitham." He is generally known in the scientific literature as ibn al-Haitham (sometimes spelled "al-Haytham), or by his Latinized name, "Alhazen."

As a boy, ibn al-Haitham was especially interested in theology, but in time he became disillusioned by the differences he found between the various religious sects. He decided to devote his life to the pursuit of truth as revealed in mathematics and science.

Ibn al-Haitham lived in an age when the Muslim world was at the forefront of exact knowledge, and he had access to Arabic translations of the greatest classical scholars.

As his knowledge and fame grew, it came to the attention of the current caliph of Egypt, al-Hakim, that ibn al-Haitham had proposed the building of a dam to control the Nile River. Al-Hakim invited ibn al-Haitham to Egypt to engineer and manage the project. However, once there, ibn al-Haitham saw that the project was hopeless, given the primitive engineering methods available to him.

Although al-Hakim was a patron of the arts and sciences, he was also a ruthless man, famous for handing out the death penalty for minor infractions. Afraid for his life, ibn al-Haitham faked insanity, and was put under house arrest until the death of the caliph.

Afterwards, he lived a modest lifestyle, supported partially by selling copies of and commentaries on the Greek classics. He died sometime around 1039 in Cairo, Egypt.

Ibn al-Haitham wrote approximately 200 works on subjects spanning mathematics, optics, astronomy, medicine, philosophy, and theology. After his death, he was accused of heretical beliefs, and many of his treatises were burned. Fortunately, some copies were apparently hidden away, and as a result, many of his most famous texts are still in existence.

Although his work was later studied by such luminaries as Galileo, Kepler, and Fermat, ibn al-Haitham is most famous for a geometrical problem in optics—what is now called the Alhazen Problem. Simply stated, imagine a circular mirror, and a point-like object. Where would an observer have to be situated so as to view the object in the mirror? Whereas Ibn al-Haitham solved the problem using conic sections, 18th century mathematicians such as Isaac Barrow would approach it with the newly-invented analytic geometry.

Ibn al-Haitham used mathematics to solve physical problems (he is honored as the "father of optics"), but he was also interested in pure mathematics.

He wrote at least 25 works on mathematics—including a commentary on Euclid—and was one of many scholars who attempted a proof of the parallel postulate.

Ibn al-Haitham joined the elite group of mathematicians honored on paper money in October of 2003, when the infamous Iraqi notes picturing Saddam Hussein were replaced by a new set of currency.

Of the six new denominations that were released, only two bore portraits—the Babylonian lawmaker Hammurabi on the 25,000 dinar note, and ibn al-Haitham on the 10,000 dinar note. At the time of this writing the ibn al-Haitham design is still in circulation.

Differentiation Instruction in a Nutshell

by Terrie L. Kielborn, Ph.D.

Wilson 'Snowflake' Bentley took over 6,000 photographs of individual flakes between the early 1880s and he found no two were alike. Just as snowflakes are different, the ways in which our students learn, think, and create are different too. If we are to develop our students' potential, we must provide them with rich learning experiences that magnify their individual strengths and talents. Tomlinson (1999) tells us that a student's potential is affected by the match between what they learn and how they learn. This is the focus of differentiation instruction.

A differentiated classroom provides a "variety of avenues to content, process, products" for all students (Tomlinson, 2006). It is where teachers provide specific ways for each individual to learn as deeply and as quickly as possible. According to Tomlinson (1999), it is providing multiple options for taking in information, making sense of ideas, and expressing what is learned. One student's road map for learning is totally different from someone else's (Tomlinson, 1999). What are the characteristics of a differentiated classroom? According to Tomlinson (2001), a differentiated classroom should include:

- Teacher sensitivity to the varying needs of learners
- On-going assessment
- Multiple learning options
- Variable pacing
- Respectful tasks for all learners
- Use of flexible grouping
- Teacher use of a variety of instructional strategies
- Varied modes of assessment
- Grading based on student growth or opportunity to demonstrate knowledge.

Three things to consider when differentiating: 1) readiness 2) interests and 3) learning profile.

Readiness Strategies include providing assignments for different levels, reteaching students having difficulty, demonstrating ideas or skills, providing organizers, providing key vocabulary, using more concrete examples, and using manipulatives.

Interest Strategies include providing interest stations that expand on topic, using examples and illustrations based on student interests, and using student questions to guide explanations.

Learning Profile Strategies include presenting in visual, auditory and kinesthetic modes, using applications, examples and illustrations from a wide range of intelligences, teaching with whole-to-part and part-to-whole approaches, and using wait time to allow for reflection (Tomlinson, p.7).

In addition, differentiation instruction should address four areas: content, process, product and learning environment.

Content consists of ideas, concepts, descriptive information, facts, rules, and principles that are presented to the learner. Content can be differentiated through depth, complexity, novelty, and acceleration. Examples of differentiating content include: learning contracts, technology, small group, and interest-based mini-lessons.

Process is the presentation of content, including the learning activities for students, the questions that are asked, as well as the teaching methods and thinking skills that are used. Examples of differentiating process or activities include student choice, learning contract, cubing (see example of cubed activity), tiered curriculum, and learning stations.

Products are the outcomes of instruction that consolidate learning and communicate ideas. Examples of differentiating products include independent study, tiered products (see fraction tic-tac-toe), and student choice.

The learning environment is the way the classroom looks and/or feels, including the interactions that occur, the roles and relationships between and among students and teachers, the expectations for growth and success, and the sense of mutual respect, fairness, and safety present in the classroom. Examples of differentiating learning environment include class meetings, response journals, and established protocols.

Now that an overview of differentiation has been discussed, there are a few things to keep in mind that differentiation is NOT. Differentiation instruction is NOT individualized instruction, chaotic, or providing modifications (Tomlinson, 2001). Keeping in mind the four components mentioned above, a specific topic could be introduced to the whole group, several small groups, or individually. It may require that we manage and monitor several activities at once. Finally, if a student is in one group for reading or spelling, s/he may be in an entirely different group for mathematics. Grouping should be flexible utilizing ongoing assessment to provide direction for regrouping throughout the year.

Many teachers feel that this emphasis on differentiation instruction is another "thing" to implement for an already full and stressful agenda. The key is to begin at a pace that is challenging yet overwhelming. If we try to create 30 assignments for 30 students we will become frustrated and exhausted. Changing habits or patterns of teaching is difficult and stressful (Tomlinson, 2006). Just as teachers have their own special strengths, preferences and weaknesses, so do their students. The goal is for all students to obtain mastery over specific content (VanSciver, 2005). In order to accomplish this teachers need training and support in learning to differentiate instruction, assistance in establishing appropriate goals and timelines, support specialists, time for learning and planning, diversified materials, and supportive policies (Tomlinson, 2006).

To conclude, here is a list (certainly not inclusive) of helpful hints to keep in mind when planning differentiated lessons.

- Determine the learning style preference of students (noisy v. quiet space, lighted v. dark, oral v. visual channel, one spot v. flexibility to move around)
- Remember that students may or may not share the same learning preference as the teacher
- Have students determine their own preferences (learning style inventory or multiple intelligent test)
- Allow students to create their own ways to explore or express their ideas
- Think like a student
- Include student interests in curriculum ideas and materials
- Focus on essential skills and information
- Match the complexity of a task to a student's skill and level of understanding

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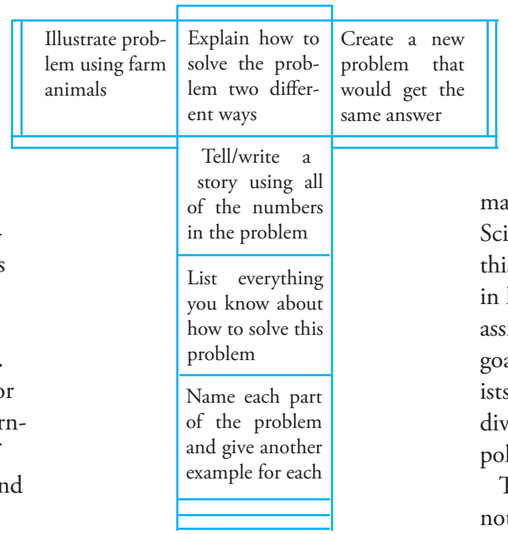
F$_r$a^{c}t$_i$o^n Think-Tac-Toe

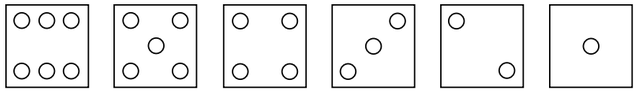
Using a newspaper, cut out examples for three different types of fractions (proper, improper, decimal or percent).	Using a Pizza Hut supreme pizza, list each ingredient and the fraction it represents.	Develop a fraction worksheet that shows two answers that are the same, two answers that show a reciprocal, the answer that is the smallest & the answer that is the largest.
Create a game that uses all four operations of fractions, reinforces names of the parts of a fraction, and shows the relationship to decimals.	Choose your favorite fraction. Make up 5 real-world problems that use that fraction.	Make a list of 15 words that you think of when you hear the word, "fraction." Now, use all of these words in a story. Underline each word.
Find a recipe that you like for 6 people. Rewrite the recipe for 4 people. Make the recipe and bring to school for a taste test.	If the answer to a problem is __, create 4 different word problems using at least two different operations and one problem that does not use fourths.	Find a picture from a coloring book. Write problems using fractions in each white space to later color. Using a possible 4-6 colors, make a key matching the colors to the answers.



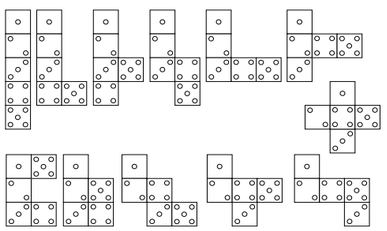
(A cube activity for solving word problems.)

Luckless Dice

by Adriaan Lockhurst



Dice are not just for board games; they make great building blocks for several mathematical puzzles. One of the best-known mathematical puzzles is the PENTOMINO, so called because each of the flat pieces used are made of FIVE squares.



THE PENTOMINO PIECES

Because there are 12 possible shapes (all other shapes are just reflections or rotations of these shapes) of 5 squares (or cubes) each they can be used to make;

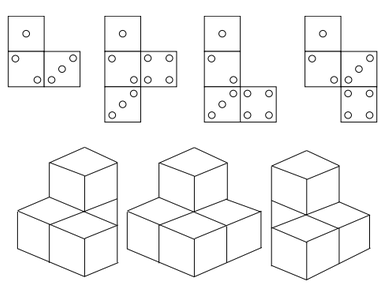
- A rectangle of size 6 by 10
- A rectangle of size 5 by 12
- A rectangle of size 4 by 15
- A rectangle of size 3 by 20[1]

If you use dice (or other cubes) to build a set of Pentomino pieces there is another interesting shape you can make; a 3 by 4 by 5 block (Pythagoras would enjoy THAT shape; can you see why?)[2].

Possible classroom activities;

- Using five sizeable squares or blocks have your students try to find all possible shapes in which all squares / blocks are connected by at least one side
- Order those shapes and eliminate reflections and rotations to produce a chart of Pentomino pieces (see above for an example)
- Have students make several Pentomino sets (arts and crafts project)
- Have (groups of) students find at least one solution for each of the possible rectangles that can be made with a full set of Pentomino pieces

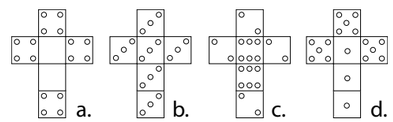
The famous mathematician Piet Hein designed another puzzle, the SOMA CUBE, with seven pieces (four flat shapes and three three-dimensional shapes) built of cubes as follows;



THE SOMA PIECES

These pieces can be used to make a 3 by 3 by 3 cube. Discarding the 3 piece block, the remaining pieces can be used to make a cube with a hole straight through it.

A final thing to do with dice that does NOT involve luck is to make a set of four special dice with the patterns of dots like this;



THE UNFAIR DICE

A normal die has 21 spots of course; here a. has 16 spots, b. has 18, c. has 20 and d. has 18 again. You would think that die c. would win when used against any of the other three in a simple gambling game. Here is a game you would need these special dice for:

- Tell the student s/he will get a point for every throw in which her / his die wins and will lose a point for every throw in which the point value of the throw loses (note that there are no draws in this game)
- Tell the student that both of you will start with ten points and the game ends whenever one of you are out of points
- Let a student pick one of the dice first, allowing the student to study them

It is HIGHLY unlikely that the student will win; if you pick the correct die (the next in line, or a OR if the student picks d) you will win two out of every three throws!

The student will most likely choose

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High School Student Writes Amazing Proof

by Debbie Poss

"It bugged me." That was the answer I got last year when I asked Lassiter High School junior Matt Johnson why he spent over a month writing a 12-page explanation and proof of how to take the square root of any complex number. He continued, "When we studied DeMoivre's Theorem in Analysis, I thought that if there is a quick way to square any complex number, there must be a quick way to take its root. And this problem just bugged me until I solved it. I thought it might come in handy at some math tournament, but I really doubted that it would."

And this is the reason that Matt worked on and off, whenever he had time or a new inspiration, on the problem.

Perhaps he was born with a math gene. His mother, Jody Johnson, teaches math at Mt. Pisgah Christian School and, according to Matt, she works math problems to calm down after a stressful day, and she doodles math formulas.

He first showed her his proof, and she returned it to him for editing. In fact, I received at least 3 "final versions" of this proof until he was satisfied that it was clear and complete.

"At first I thought there were four separate cases until I realized that a more general solution could solve all those problems," Matt admits. "I kept revising the proof until all possible holes were filled."

So what sort of student would take on this project for nothing more than curiosity? Matt Johnson is a brilliant, but well-rounded student. He just graduated with a 4.4 average, 9th in his class after scoring a perfect math score on the PSAT, SAT and SAT II.

Due to his high scores on the American Math contest, he qualified for the AIME (American Invitational Math Exam) 3 of the 4 years in high school, and attended the Governors Honors Program in mathematics. He played trumpet in the band and was the treasurer of 4 clubs.

(He laughs as he says this, jokingly, that his mathematical ability is translated to others as the ability to be a good treasurer.)

In his spare time he and his friends like to watch "really bad movies." An Eagle Scout, too, he starts school at Georgia Tech this fall.

Personally, I hope he finds other problems that "bug him" in college. The millennium problems are still out there, and Matt Johnson is just the sort of person with the curiosity, ability and determination to solve one or two of them. If you would like to view Matt's proof, please go to the GCTM Web site at www.gctm.org.

Check Out These Web sites Often:

www.gctm.org
www.nctm.org

Spreadsheet Power: Math in Action

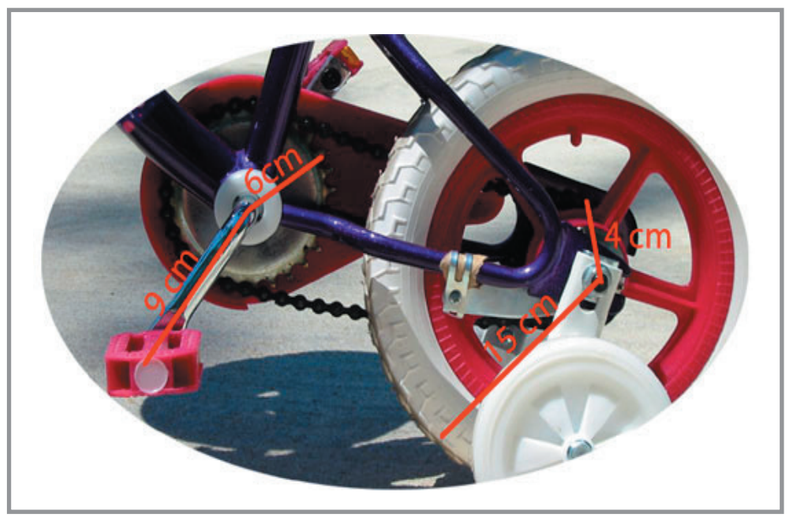
by Mary Kay Bacallao

Teaching mathematical problem solving just got easier with the use of spreadsheets. Students can use real world numbers to answer questions that would not have been possible before. Teachers can empower students to get answers to complex math problems without tedious calculations. In the end, the student will better understand the math that they have been using in their computations for years.

So what do these problems look like? Will my students care about the answers they get? Let's begin problem solving with bicycles. If your students ride their bikes to school, you can ask them to bring the bicycles into your classroom and use them to solve mechanical advantage problems.

Ask them who they think has the fastest bike. Chances are they will have a variety of reasons why they think one bike may be faster than any of the others.

Next ask them if they think that the question can be answered by using math.



What measurements should be taken?

Does the length of the pedal or the radius of the wheels have anything to do with how fast or far the bicycle will go?

Why is riding a bicycle faster and more efficient than walking or running?

This activity is designed to help the see the mathematical connection to the concept of mechanical advantage that they learned in science class. This concept can be illustrated in a simple fashion by looking at a "big wheel." Have students calculate the distance pedaled (circumference of the circle made by the pedal rotation) in one rotation of the pedal and compare that with the corresponding distance traveled (circumference of the big wheel) in a spreadsheet.

If the formula for mechanical advantage (Mechanical Advantage = Distance Traveled/Distance Pedaled) is used, the students will be able to find the mechanical advantage of the big wheel.

Once the students understand this illustration, they can begin to think about the measurements they need to calculate the mechanical advantage of each bicycle. Since the bicycle has a pedal that is separated from the wheel by a chain, there are other factors to consider. All of these factors can be entered into a spreadsheet. The students can create an algebraic equation that will find the mechanical advantage of any bicycle when standard measurements are taken and entered into the spreadsheet.

This spreadsheet example is given in the illustration on the following page.

The students can compare the mechanical advantage of the bicycles and other factors such as rider size, height, and riding conditions to determine the best bicycle to buy.

Students will then be able to use this information when shopping for bicycles or determining if a race is fair. As a challenge, students can also look at how bicycles with multiple speeds can adjust mechanical advantages to fit riding conditions.

With the power of spreadsheets, students can see number relationships and use real world data more efficiently. Instead of solving contrived problems with perfect whole numbers, they will be able to solve real problems with meaning and understanding.

The excel template shown below is available by request. Please email bacallao_mk@mercer.edu.

WHY SHOULD I RIDE A BIKE?

Calculating the Mechanical Advantage of a Bicycle

Length of Pedal	Radius of Pedal Gear	Radius of Wheel Gear	Radius of Tire Wheel	Distance Pedaled	Distance Traveled	Mechanical Advantage
9	6	4	15	56.54866776	141.3716894	2.5
15	9	4	23	94.24777961	325.1548396	3.45
12	7	4	25	75.39822369	274.8893572	3.645833333
18	8	3	32	113.0973355	536.1651462	4.740740741

Length of Pedal	Radius of Pedal Gear	Radius of Wheel Gear	Radius of Tire Wheel	Distance Pedaled	Distance Traveled	Mechanical Advantage
Input Value	Input Value	Input Value	Input Value	=A6*2*PI()	=B6*2(PI()/(C6*2*PI()))*D6*2*PI()	=G6/E6
Input Value	Input Value	Input Value	Input Value	=A7*2*PI()	=B7*2(PI()/(C7*2*PI()))*D7*2*PI()	=G7/E7
Input Value	Input Value	Input Value	Input Value	=A8*2*PI()	=B8*2(PI()/(C8*2*PI()))*D8*2*PI()	=G8/E8
Input Value	Input Value	Input Value	Input Value	=A9*2*PI()	=B9*2(PI()/(C9*2*PI()))*D9*2*PI()	=G9/E9

PI() indicates that Excel calculates PI correct to 15 decimal places. The teacher should stress that 3.14 is only an approximation for PI and that if you're using a value for accuracy, you need more than two decimal places.

Hamburgers and Probablility: Appetizing Combinations

by Delores Anderson

I can remember back in the 1970s when a popular fast-food chain came out with a jingle advertising its claim that it could make hamburgers in 256 different ways using these eight toppings: cheese, ketchup, lettuce, mayonnaise, mustard, onion, pickles, and tomato. When I teach probability, I ask my students if they think this claim is true, and, if so, how to verify it. One approach to verifying this claim is to use the GPS Process Skills for problem-solving strategies - Solve a Simpler Problem and Make a List - using the abbreviations C = Cheese, K = Ketchup, L = Lettuce, MA = Mayonnaise, MU = Mustard, O = Onion, P = Pickles, and T = Tomato.

The customer has two choices for each topping on his hamburger: with or without it.

Using only the one topping Ketchup, then there will be two hamburgers possible: with K or without K.

Using only the two toppings Ketchup and Mustard, then there will be four hamburgers possible with these toppings:K; MU; K and MU; and without K and MU.

Using only the three toppings Ketchup, Mustard, and Onion, then there will be eight hamburgers possible with these toppings: K; MU; O; K and MU; K and O; MU and O; K, MU, and O; and without K, MU, and O.

The students can draw the following table showing the number of ways it is possible to make hamburgers from the lists for 1, 2, and 3 toppings.

# of Toppings	# of Hamburgers
1	$2 = 2^1$
2	$4 = 2^2$
3	$8 = 2^3$

Using the problem-solving strategy Look for a Pattern, the students can continue the table without having to make lists for 4, 5, 6, 7, and 8 toppings.

4	$16 = 2^4$
5	$32 = 2^5$
6	$64 = 2^6$
7	$128 = 2^7$
8	$256 = 2^8$

The students' conclusion is that a hamburger can be made in 256 different ways from eight toppings and that the advertising claim is true by the Multiplication Principle of Counting.

Another question related to this problem is to find the number of combinations possible using the eight toppings.

Order does not matter in combinations; a rearrangement of the same toppings will be the same combination.

The formula for combinations is

$$_nC_r = \frac{n!}{r!(n-r)!}$$

which represents the number of combinations of n things taken r at a time. By definition 0! = 1.

In this case, n equals 8, which is the number of toppings, and r equals the number of toppings used together at a time from 0 to 8.

# of Toppings	# of Combinations
0	$1 = {}_8C_0$
1	$8 = {}_8C_1$
2	$28 = {}_8C_2$
3	$56 = {}_8C_3$
4	$70 = {}_8C_4$
5	$56 = {}_8C_5$
6	$28 = {}_8C_6$
7	$8 = {}_8C_7$
8	$+\ 1 = {}_8C_8$
	256

	Sum
1	2^0
1 1	2^1
1 2 1	2^2
1 3 3 1	2^3
1 4 6 4 1	2^4
1 5 10 10 5 1	2^5
1 6 15 20 15 6 1	2^6
1 7 21 35 35 21 7 1	2^7
1 8 28 56 70 56 28 8 1	2^8

Students can find many interesting properties in the triangle.

For example, the rows are palindromes, which read the same forwards and backwards.

The sum of the two terms above is the term below.

The sum of the last row of numbers listed in the triangle above yields 1 + 8 + 28 + 56 + 70 + 56 + 28 + 8 + 1 = 2^8 = 256, which is the number of possible combinations for eight toppings.

In general, the sum of all of the terms in the row of Pascal's Triangle beginning 1,n, . . . is equal to 2^n. The sum of the terms in each row is a power of two.

Each row of Pascal's Triangle can be rewritten in terms of combinations.

$$
\begin{array}{c}
{}_0C_0 \\
{}_1C_0\ {}_1C_1 \\
{}_2C_0\ {}_2C_1\ {}_2C_2 \\
{}_3C_0\ {}_3C_1\ {}_3C_2\ {}_3C_3 \\
{}_4C_0\ {}_4C_1\ {}_4C_2\ {}_4C_3\ {}_4C_4 \\
{}_5C_0\ {}_5C_1\ {}_5C_2\ {}_5C_3\ {}_5C_4\ {}_5C_5 \\
{}_6C_0\ {}_6C_1\ {}_6C_2\ {}_6C_3\ {}_6C_4\ {}_6C_5\ {}_6C_6 \\
{}_7C_0\ {}_7C_1\ {}_7C_2\ {}_7C_3\ {}_7C_4\ {}_7C_5\ {}_7C_6\ {}_7C_7 \\
{}_8C_0\ {}_8C_1\ {}_8C_2\ {}_8C_3\ {}_8C_4\ {}_8C_5\ {}_8C_6\ {}_8C_7\ {}_8C_8
\end{array}
$$

Simplifying each of the combinations in the triangle above results in Pascal's Triangle.

My students are always interested in seeing the lists that I made of the 256 possible combinations to illustrate the problem and to enhance their understanding of the results of their computations.

For a copy of these lists, please visit the GCTM Web site at www.gctm.org.

"ON-MATH"

This NCTM electronic journal is free to everyone until June 2007.
It is a collection of interactive articles that are available for classroom use.

http://my.nctm.org/eresources/journal_home.asp?journal_id=6

OBJECTIVES

The Objectives of the Georgia Council of Teachers of Mathematics are

to encourage an active interest in mathematics and

to act as an advocate for the improvement of mathematics education at all levels.

Georgia Performance Standards in Mathematicsc

by Peggy Pool

THE GPS FRAMEWORK: Have you seen it? The Seventh Grade Framework has now joined the Sixth Grade Framework on the Web at **www.georgiastandards.org** with plans in progress to have frameworks for K-5, grade 8, Math 1, and Math 2 on the Web in the fall. These mathematics frameworks help to define the depth and rigor expected of all Georgia students. Prior to exploring these frameworks, plan to read the introduction which clarifies their purpose, explains their organization, and summarizes the principles inherent in a standards based classroom.

There are four major components to the GPS: **1) the standards and elements, 2) tasks, 3) student work, and 4) teacher commentary.** At the moment, both the sixth and seventh grade frameworks are composed of excellent tasks. However, there is still a great need for more student work. Should you be willing to submit student work, please contact Desha Williams at dwilliams@gsu.edu or Peggy Pool at ppool@gctm.org. Not only may these be used within the frameworks, but GCTM will also be showcasing samples of student work at Rock Eagle in October.

Thank you to all of the committee members and others who have helped and will help to improve each unit. Collaborating and working together, we are not only improving student achievement in mathematics; we are improving the lives of our students along with the future of our state, our country, and the world.

UNDERSTANDING THE GEORGIA PERFORMANCE STANDARDS IN MATHEMATICS

As our sixth grade teachers will attest, the Georgia Performance Standards in Mathematics are here! Kindergarten, first grade, second grade, third grade and seventh grade will also be experiencing them with full implementation during this coming school year. They have been posted on the web for a while now. Teachers across Georgia have read them and understand that there are many changes in the content that they will be responsible for teaching in their classrooms

The curriculum has changed, especially in grades 7-12. However, that is only a small piece of the changes that are being made in the classrooms across our state as we implement our GPS. Other areas that are experiencing change in the classroom are summarized below.

1—High expectations are the same for every student. No longer will some students be excused from learning because of there personal characteristics, backgrounds or physical challenges.

2—Students will see that mathematics is important because each new idea links to other ideas and is not a series of isolated bits and pieces. Instruction will build on "big ideas" in meaningful ways.

3—Teachers will encourage students to think, question and solve problems. Students should be motivated to try different ideas, strategies, representations and solutions and discuss these with their peers. Learning will take place because of the experiences that the teachers provide within the classroom.

4—Although computation is important, students will be required to go beyond computation to think and reason mathematically. They will learn mathematics with essential understandings that will make it possible for them to solve new problems and learn new ideas that they will face in the future.

5—Assessment is no longer of learning, but for learning! Teachers must continually gather information about student growth and understanding, use a variety of assessment techniques and have a good idea of how their students may be thinking about the mathematics being developed. This means that assessment must be ongoing and include effective feedback.

6—Technology should not be used as a crutch, but as a tool to enhance learning. Through the use of calculators and computers; students may be able to explore new ideas, work with a broader range of problems, and bypass less important procedures when developing more advanced concepts.

This means that no longer will the teacher be doing all of the work within the classroom. Instead, students will be engaged in meaningful tasks with the teacher as a facilitator. They will take pride in their mathematical thinking power and enjoy learning mathematics within the classroom setting. Wow! Isn't this why we became teachers? What an exciting time to be in education!

Quotes from Sixth Grade Teachers Across Georgia after the First Year of GPS Implementation

"I saw students become better problem solvers as they were able to use various strategies. I believe my students learned a lot because the standards are higher."
—Rita Pickens, Banks County

"Teachers are more focused in the planning process, generating better lessons. Teachers are 'confessing' that the students are more attentive in class."
—Roslyn Wells, Richmond County

"Students have taken ownership in their learning. They have learned to think about the 'whys.' The GPS have brought a higher level of active engagement into our classrooms."
—Naomi Strickland, Bartow County

"Teachers in Sumter County and across the state are beginning to 'think outside of the box' and use ordinary, everyday items and events to teach extraordinary lessons in mathematics. Once the teachers make the connections, students tend to enjoy mathematics and overcome their fear of the subject."
—Gayla Braziel, Sumter County

"Students are much more enthusiastic about math. Students are much more capable of applying math skills to situations and solving multi-step problems."
—Debra Maxwell, Lumpkin County

"Teachers are sharing within a grade and vertically much more, resulting in a collaboration of resources and knowledge which we haven't ever seen before."
—Karen McGuire, Union County

"Mathematics GPS makes sense on so many levels! No longer passive learners, they are being trained by GPS to expect the struggle that is a part of meaningful learning. We are working to support logical/mathematical empowerment and agility!"
—Lianna Nix, Jasper County

"My students did more communicating with one another and learned to be less dependent upon the teacher. The students didn't realize when we were doing a performance task, they just thought we were having fun."
—Jessica Bramlett, Trion City

" When they learn the why and really understand, it opens their eyes to a new world that some have never experienced before."
—Pam Quinn, Chickamauga City Schools

Differentiation Instruction in a Nutshell

CONT. FROM PG. 15

—Make sure students have adequate structure, challenge and clarity of purpose and expectations for assignments (Tomlinson, 2001).

Push me! See how far I got
Work me 'til I drop. Then pick me up.
Open a door, and then make me run to it before it closes.
Teach me so that I might learn,
Then let me enter the tunnel of experience alone.
And when, near the end,
I turn to see you beginning another's journey,
I shall smile.

(Kathleen as cited in Tomlinson, 2001, p. 97).

References

Manning, J. (1997). Snowflakes. Owashtanong Islands Audubon Society. Retrieved online on May 15, 2006 from http://www.macatawa.org/~oias/snowflak.htm

Tomlinson, C.A. (1999). *The differentiated classroom: Responding to the needs of all learners*. Alexandria, VA: ASCD.

Tomlinson, C.A. (2001). *How to differentiate instruction in mixed-ability classrooms*. (2nd Ed). Alexandria, VA: ASCD.

Tomlinson, C.A. (2003). *Differentiation in practice, Grades 5-9*. Alexandria, VA: ASCD.

Tomlinson, C.A. (2006). Meeting the needs of gifted learners in the regular classroom: Vision or delusion? Retrieved online from National Association for Gifted Children, March 21, 2006.

VanSciver, J.H. (2005). Motherhood, apple pie, and differentiated instruction. *Phi Delta Kappan*, 534 – 535.

Luckless Dice

CONT. FROM PG. 65

die c and lose. The next student to play will—having seen what happened—probably NOT choose die c (but still lose obviously). As the old (appended) saying goes, "all is fair in love, war, and education."

[1] The 3 by 20 rectangle has just TWO possible solutions, not counting rotations and reflections.

[2] This is because 3, 4, 5 is known as a Pythagorean triplet, a (the smallest in fact in this case) solution in "natural numbers" of famous formula $a^2 = b^2 + c^2$.

NEW EDITORIAL BOARD FOR *REFLECTIONS*

Cheryl Hughes—Cheryl is the mathematics department chair at Landmark Christian School in Fairburn, where she teaches Geometry and Honors Geometry. She has been the editor of *REFLECTIONS* since 2000.

Harriet Briscoe—Harriet lives in Gainesville and teaches Honors Geometry and AP Calculus at Chestatee High School. She will retire in December of this year.

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Terrie Kilborn—Terrie is the Curriculum Specialist for Ithica Elementary School in Carroll County. Her experience covers 1st-6th grades, as well as 8th grade and college. She also teaches a variety of courses for the University of West Georgia.


Cheryl Hughes


Harriet Briscoe


Greg Chamblee


Terrie Kilborn

Al's Web Sites

www2.ups.edu/community/tofu/lev1f/jourframe.htm
JOURNALING is a site that provides teaching strategies for incorporating writing into the mathematics classroom. It includes many writing prompts, advice on writing journals, and lesson plans that focus on getting students to understand what is expected of them in their mathematics writing.

http://intermath.coe.uga.edu
INTERMATH is a professional development effort designed to support teachers in becoming better mathematics educators. It focuses on building teachers' mathematical content knowledge through mathematical investigations that are supported by technology.

www.kidsolr.com/math/index.html
KIDS ONLINE RESOURCE's Math link has very nice interactive multimedia math resources for a broad spectrum of age and content areas… from shapes to TI-83 calculator tutorial. There is also a nice selection of lesson plans and a number of links to other valuable math resources.

www.educationallearninggames.com
EDUCATIONLEARNINGGAMES.COM is an online catalog of math resources that focuses on games that support the learning of math concepts.

http://public.doe.k12.ga.us/ci_testing.aspx?PageReq=CITESTING_EOCT&SubPageReq=CONTENTDESC
This is where you'll find the content descriptors for End of Course Tests and released test items from previous EOCTs.

www.setgame.com/set/puzzle_frame.htm
This site hosts a daily interactive set game puzzle. The game consists of cards that have four attributes…color, number, shape, and fill. The object of the game is to find a set of three cards that, for each attribute, all three cards are different or all three cards are the same. There are six sets to be found in each daily puzzle.

http://ccte.jhu.edu/techacademy/web/2000/heal/siteslist.html
Really Cool Math Websites! Cool Algebra Sites! Cool Geometry Sites! Even Cool Discrete Math, Trigonometry and Calculus Sites! Cool Math Puzzles and Cool Math Brain Teasers Sites! Cool Math Web Quest Sites! Cool Math Humor! Cool Elementary, Middle School, and High School Math Teacher Resources!

NEXT ISSUE

Deadline: Oct. 1

Topics: Teaching with Technology
Methods of Assessment

MathFest: The Largest Math Extravaganza on Earth for Elementary Students

by Dr. Rob Boykins

MathFest is an extended math initiative that motivates students, parents, and teachers to raise the both standards and expectations in mathematics, and it is having a positive impact on elementary school students who participate in the event. There have been definite improvements in math achievement since this program began at E.W. Oliver Elementary School in Riverdale, Georgia In its fifth year, this event is the creation of Dr. Ron K. Boykins, principal of Oliver Elementary. His philosophy is that "we can make kids competitive by making them compete. To change our attitudes on math, we need to start when our kids are young."

The competition this past March was held at Clayton State University and attracted about 800 students in Kindergarten through 6th grade. MathFest has provided the motivation, rigor, and comprehensive push that many students need to accomplish more in math.

MathFest provides both a motivation for students to learn and practice mathematics and opportunity for them to compete. This program not only increases student achievement by pushing students to become more competitive, it also encourages them to focus on math skills which will enable them to be more competitive in this nation's highly technological society.

MathFest provides the rigor, community resources, training, motivation, collaboration, and comprehensive development necessary to improve mathematics education nationally.

COMPONENTS:

1. Practice Sessions are held in individual schools for 2-3 months. These consist of practice problems for each grade level that are formatted like those in the CRCT. Students who answer at least 75% of the problems correctly are invited to an incentive activity. Those activities motivate the students to do their best during the practice session.

2. Testing Sessions are conducted at each grade level. The tests are formatted similarly, and at least 25% of the problems are one grade level above the testing level. Students receive this testing over a 3-week period. These tests are used to determine which students will to move to a competitive session.

3. Competition day is attended by the students with the highest composite total from each grade level during the testing sessions. On MathFest Competition Day, students from each grade level are positioned in the testing area for assessment.

   Students show their answers to the problems by writing their responses on individual dry erase boards. All students are given the same amount of time to complete the problems. There is no score reward for speed. They are encouraged to check their work if they finish early. Calculators are not used in the competition.

4. Also on Competition Day there are:

   a. Math Instruction—Each school brings creative lessons to motivate and educate students about the value of math

   b. Fun-Day Activities—Each school sets up a math activity table where students solve problems and win small prizes in a real world type of math setting.

   c. Mock Math and Science Job Fair—Students visit displays and participate in mock interviews for math-related jobs.

MathFest 2007 will be held in Atlanta on March 24. It is anticipated that there will be 10,000 elementary students attending this spectacular event. Mathematics educators from all over the world will be gathering in Atlanta at that time for the annual meeting of the National Council of Teachers of Mathematics, and they will be invited to witness this exciting competition, the largest math extravaganza on earth for elementary students.

Math Teachers Know Best

by Flavia Gordon-Gunter

When President Bush first signed No Child Left Behind, every educator's attention turned to reading and research-based programs. Math, unfortunately, was put on the sidelines. Now, four years later, the nation is shifting its attention to mathematics education and finding new ways to engage students in this subject that too few of our students have had to opportunity to learn well.

I don't know when the fear of math first began, but Americans typically shy away from mathematics. Teachers must be leaders in showing students that math is real, math is important, math can be fun, and competence in the subject can be attained by all students.

When I was an elementary teacher at Morningside Elementary in Atlanta Public Schools, math was a favorite subject of mine. In 2004, I had a wonderful opportunity to truly take a leadership role in the future of elementary mathematics education when I was asked to participate in the National Advisory Panel for SRA/McGraw-Hill as it developed its new Pre-K-6 math program called *Real Math*, which was just launched in January 2005.

Being a part of the *SRA Real Math* National Advisory was a one-of-a-kind experience. On top of getting to travel to exciting cities such as Cleveland and Dallas, it was an opportunity to meet other math teachers and be part of a panel. This experience was great for collaborating, building networks and friendships, and sharing expertise.

It was very satisfying to have my voice heard by SRA. Too often, teachers are ignored, but SRA really listened and respected us. In the end, I think the teacher feedback about *Real Math* has helped create a great new tool for math teachers. My former school, Morningside Elementary School, is currently field-testing *SRA Real Math* in all grades. As the district mentor teacher, I visit the schools using *Real Math* and see the results of my efforts in action. I'm impressed with the level of math these students are doing!

In addition to listening to feedback from real teachers, SRA videotaped me and other classroom teachers modeling *Real Math* lessons for the Professional Development Video that will be shown to teachers that are new to the program. It was a day filled with engaging math activities. One of the lessons they taped had students construct a guardrail for a playground. The kids loved it and could relate the math they were learning to real-life situations.

While I think that teachers in the math classroom have the clearest picture of what is needed to improve mathematics education, the bottom line is that the so-called math fear is everyone's problem. Teacher, parents, administrators, and even publishers must work together to find solutions in making math instruction stronger and more relevant to students.

No one can do it alone, and I encourage you, my fellow math instructors, to seek out opportunities for partnerships and learning opportunities such as the ones SRA/McGraw-Hill provided me.

SUGGESTIONS FOR *REFLECTIONS*

Take an online survey to help us make *REFLECTIONS* more applicable to your needs. Go to www.gctm.org and follow the link to the survey.

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GCTM Student Membership (Pre-Service Teachers) FREE _____ (Faculty Advisor Signature)

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Applicant's Signature (required) _____

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APPLICATION

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Get Out Your Calendars, Day Planners, and PDAs

GCTM Annual Conference at Rock Eagle

October 19 - 21, 2006

NCTM Annual Conference in Atlanta

March 21 - 24, 2007

REFLECTIONS

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