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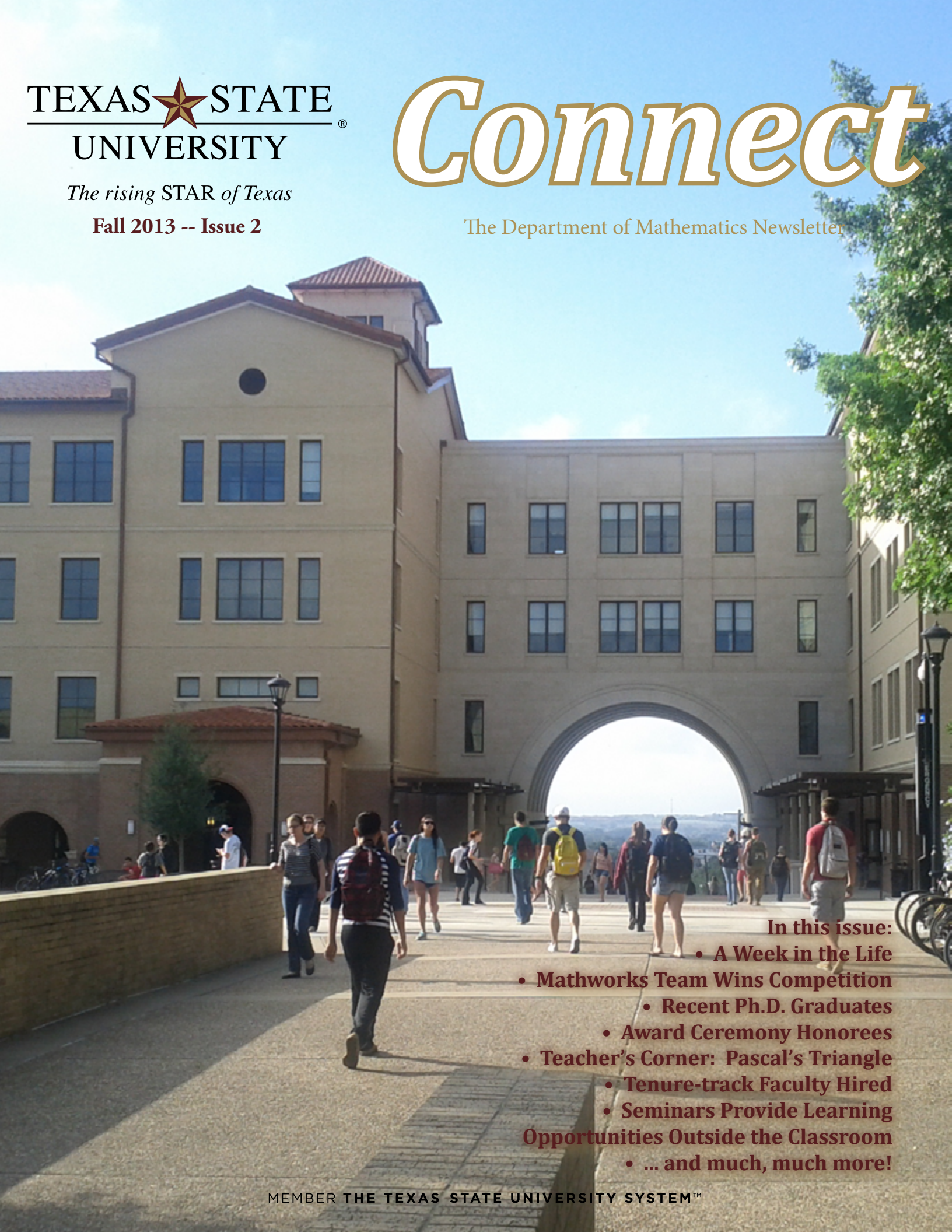
The rising STAR *of Texas*

Fall 2013 -- Issue 2

Connect

The Department of Mathematics Newsletter



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- **... and much, much more!**

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The Official Newsletter of the Department of Mathematics Texas State University - San Marcos

Nathaniel Dean, Chair
Susan Morey, Assistant Chair
Douglas Ray, Editor in Chief

Contributors:
Jayme Blascke, University News Service

Cover:
The new Undergraduate Academic Center opened in 2012 and provides support for the Personalized Academic & Career Exploration (PACE) center.

Photo: Blaise Pascal (public domain)
http://en.wikipedia.org/wiki/Blaise_Pascal

TEXAS STATE UNIVERSITY

The rising STAR *of Texas*

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Letter from the Chair

Dear Alumni,

Now in my third year as Chair of the Mathematics, I'd like to give you an update of the happenings in and around the Math Department. First, I'd like to thank Joyce Fischer, Suji Singh, John Spellmann, and Dick Stein for their many years of service to the department and wish them many happy years in retirement. In recent years, the Math Department has experienced unprecedented growth. Of the 35,600 students enrolled at Texas State in Fall 2013, 11,700 of them are taking a math course. With these recent retirements and student body growth, we have hired four new tenure-track faculty. You can meet them on page 4 of this newsletter.

Our Ph.D. program in Math Education continues to gain ground, having graduated seven students this last year. Many congratulations go to these students.

Students in the Mathematics Department continue to achieve at high levels. During our spring Awards program, we honored 115 math majors from both undergraduate and graduate levels for their accomplishments over the past year. New scholarship opportunities to support students, faculty, and alumni are being made available (see below).

Finally, we would love to hear about your successes. You can ***Connect*** to us through the Alumni Connections (see page 9).

Best wishes,
Nathaniel Dean

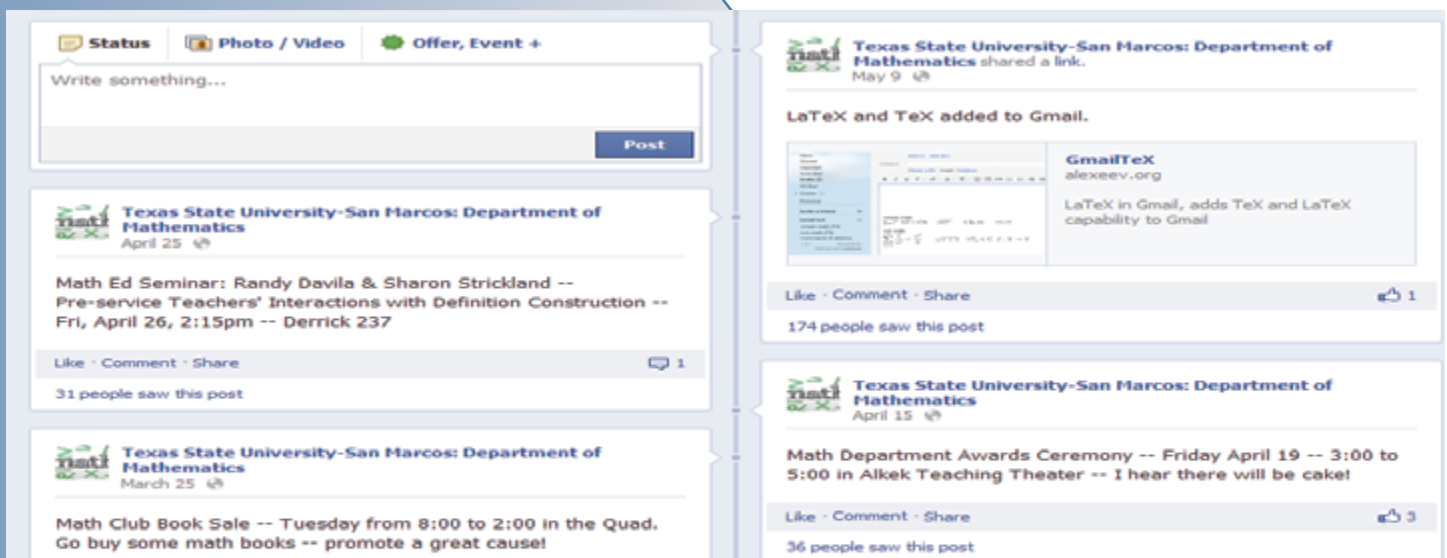
Awards are available for outstanding students, outstanding teachers of mathematics, and faculty who have made outstanding contributions to the department and/or the profession of mathematics. In particular, teaching alumni are encouraged to apply for an award to promote the study, research, training, and teaching of mathematics. To apply for a Wayment Award, visit the Math Department website:

http://www.txstate.edu/math

Connect with the Math Department on Facebook!

Search for **Texas State University San Marcos - Department of Mathematics**

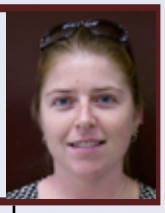
Find us on Facebook



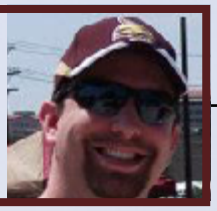
Where are they now?

Congratulations to our newest Ph.D.s! These recent graduates span the country and make Texas State proud.

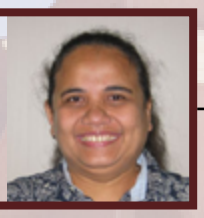
Dr. Lindsey Gerber
Utah Valley Univ.
Orem, Ut

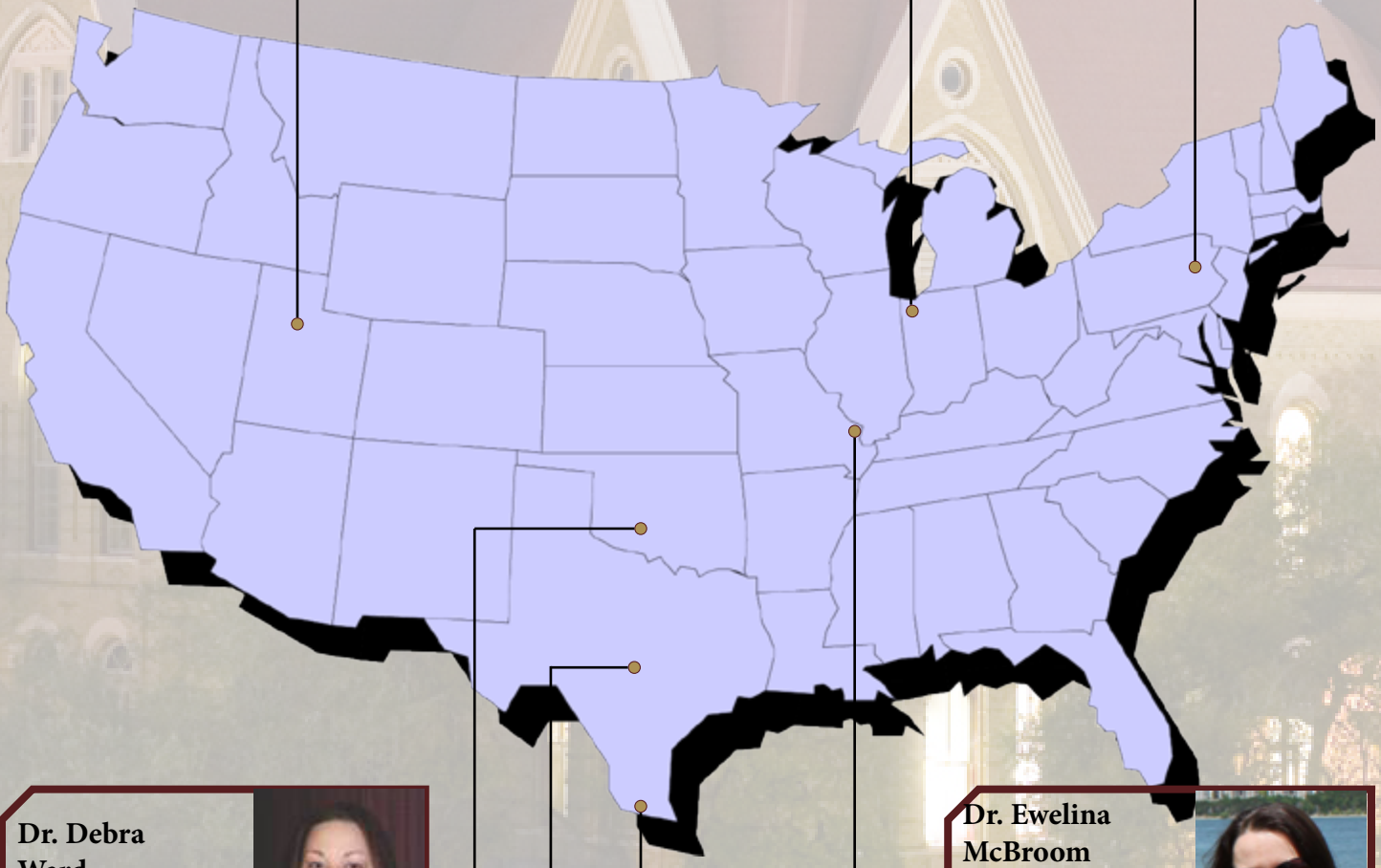


Dr. Joshua Goodson
Kutztown Univ.
Kutztown, Pa

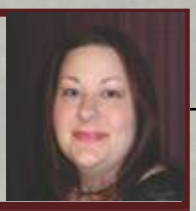


Dr. Rini Oktavia
Valparaiso Univ.
Valparaiso, In

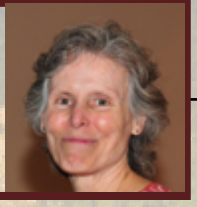




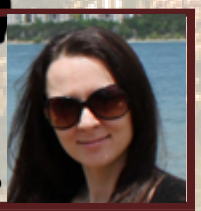
Dr. Debra Ward
Cameron Univ.
Lawton, Ok



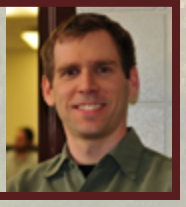
Dr. Aimee Tennant
Huston-Tillotson Univ.
Austin, Tx



Dr. Ewelina McBroom
Southeast Missouri State Univ.
Cape Girardeau, Mo



Dr. Aaron Wilson
Univ of Texas-Pan American
Edinburg, Tx



Math Department adds four new tenure-track faculty

The Math Department is experiencing growth all around. The Fall 2013 semester saw a record number of students taking mathematics classes on campus: 11,700. With recent retirements and the increased number of students, the Math Department was able to hire four new tenure-track faculty members and promote one of our Senior Lecturers, Hiroko Warshauer, to a tenure-track position this fall.

Jennifer Czocher

Jennifer earned her Ph.D. from The Ohio State University in Mathematics Education. She is originally from Cleveland, Ohio. Her research will focus on building models of STEM students' mathematical thinking. Jennifer has set several goals, including building models of how students interpret and think about mathematical ideas and incorporate these into curriculum and instruction; grow partnerships with local high schools, community colleges, and universities with the aim of encouraging persistence of Texas students in the STEM disciplines through success in mathematics; contribute to strengthening the doctoral program in mathematics education. In addition, Jennifer enjoys cooking, dancing, and learning French.

Shuying Sun

Shuying was originally from China. She was born in Harbin, which is a very cold "ice city" in the northeast of China. There are a lot of beautiful ice-sculptures in the winter in Harbin. She has liked math since she was a teenager. With this interest in math, she got her bachelor's and master's degrees in Hebei Normal University (a university for teachers), and then she went to Canada and received her Ph.D. in statistics from the University of Toronto. Shuying's research interest is statistical genetics and bioinformatics. Her research goal is to address challenging genetics and bioinformatics questions using mathematical and statistical theory, methods and tools. Her teaching goal is to care for and inspire students to learn and to grow together with them. Along her journey, Shuying has received help from many mentors and friends. Therefore, in return, she would like to give help and support to other students. As for personal hobbies, she loves walking, jogging, and chatting with family and friends. In addition to these hobbies, Shuying always loves to pet cats and dogs and play with them.

Young Ju Lee

Young Ju is from South Korea and has a wife and two kids. He earned his Ph.D. from Penn State in Mathematics. Before joining Texas State, he worked at both UCLA and Rutgers. His research is in Applied Mathematics, particularly in the area of Computational Fluids Dynamics and Materials Science. He has been a plenary speaker at several international conferences and has been awarded three consecutive NSF awards as a sole principal investigator since 2006. These grants will support Young Ju's work until 2016. His goal at Texas State is to integrate these research areas into the education of the next generation of scientists in Mathematics and Engineering. For down time, Young Ju can often be found swimming at the recreation center on campus. Further, he enjoys tennis and table tennis, exercising, and listening to music.

Yong Yang

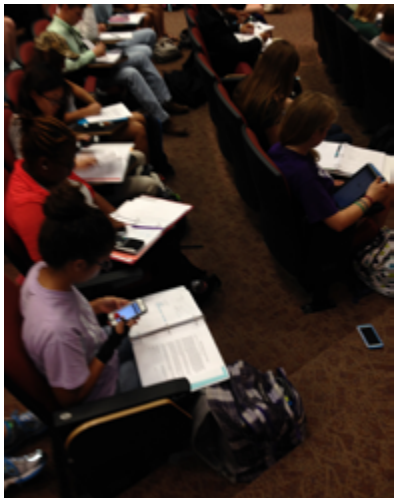
Yong grew up in Shanghai, China and received a Ph.D. from the University of Florida in 2009. He is interested in group theory and combinatorics. He plans on collaborating with other faculty members in the math department and is hoping to advise both undergraduate and graduate student research projects. In his spare time, Yong likes to play basketball and watch birds.

Instructor Finds Unique Use for Cell Phones and Tablets in Class

Shawn Peterson opens his college algebra class with a quiz where students answer with their cell phone, laptop, or tablet. The question above asked students to find the inverse of a linear function.

Many instructors find it annoying when students use their cell phones or tablets in class. However, instructor Shawn Peterson has found an interesting way to engage students while they use their cell phones or tablets in class. While teaching the large lecture college algebra class, Mr. Peterson opens and closes each class with a quiz. With over 300 students, it would be impossible to pass out papers and collect them in an orderly fashion. Instead, he uses a system called Top Hat.

The Top Hat system allows Mr. Peterson to store questions in a database. Then, when ready, he opens the question up for answering. The question appears on the screen (see photo). Students work the problem while in the classroom and submit their answers through their cell phone, tablet, or other personal electronic device. For smart phones and tablets, Top Hat has developed an app that students can download and use during class. For students who do not have a smart phone or tablet, their answers can be submitted via text message. This system replaces the need for students to purchase a "clicker" or other device, which can be two or three times the cost of using Top Hat. Students report they enjoy using the system. Instructors who have used this system enjoy it as well since results of questions are reported in real time. At the touch of a button, the classroom results appear on screen which allows the instructor to gauge student comprehension on the topic in question. In addition to multiple choice questions, other question types can be asked, including polling, sorting, matching, and word-answer questions, among others.



Students Khiana, Mackenzie, Lynn, Gabriela, Claire, and Erin are pictured working on the Top Hat quiz question and submitting it on a variety of devices.

For more information on Top Hat, visit ***www.tophat.com***

News in Brief From Around Campus and Beyond

August 2013: Congratulations to Jian Shen for winning the Presidential Award for Excellence in Scholarly/Creative Activities. Dr. Shen received this award in part for his acquisition of grants from NSF, THECB, NNSF (China), and NSERC (Canada). In addition, he has published over 70 papers in refereed journals and conference proceedings. Dr. Shen is also active with Mathworks as a mentor. In 2009, his Siemens competition team took first place at nationals.

April 2013: The Math Club in conjunction with Pi Mu Epsilon held a book sale to raise funds. In the photo, Daniel Campos, then president of the Math Club, prepares books donated by faculty and students for sale.

January 2013: 48th Mersenne Prime was confirmed as the largest known prime to date. The number, 2 raised to 57,885,161 power minus 1, contains 17,425,170 digits. The discovery was made by Dr. Curtis Cooper, University of Central Missouri.

January 2013: John Karlin passed away at age 94. He worked as a "math psychologist" at Bell Labs. One of his greatest accomplishments was the arrangement of the keypad on the touch-tone telephone. His arrangement was tested for user comfort and accuracy. Many of our cell phones today still use this arrangement. Also, he encouraged all-number dialing.

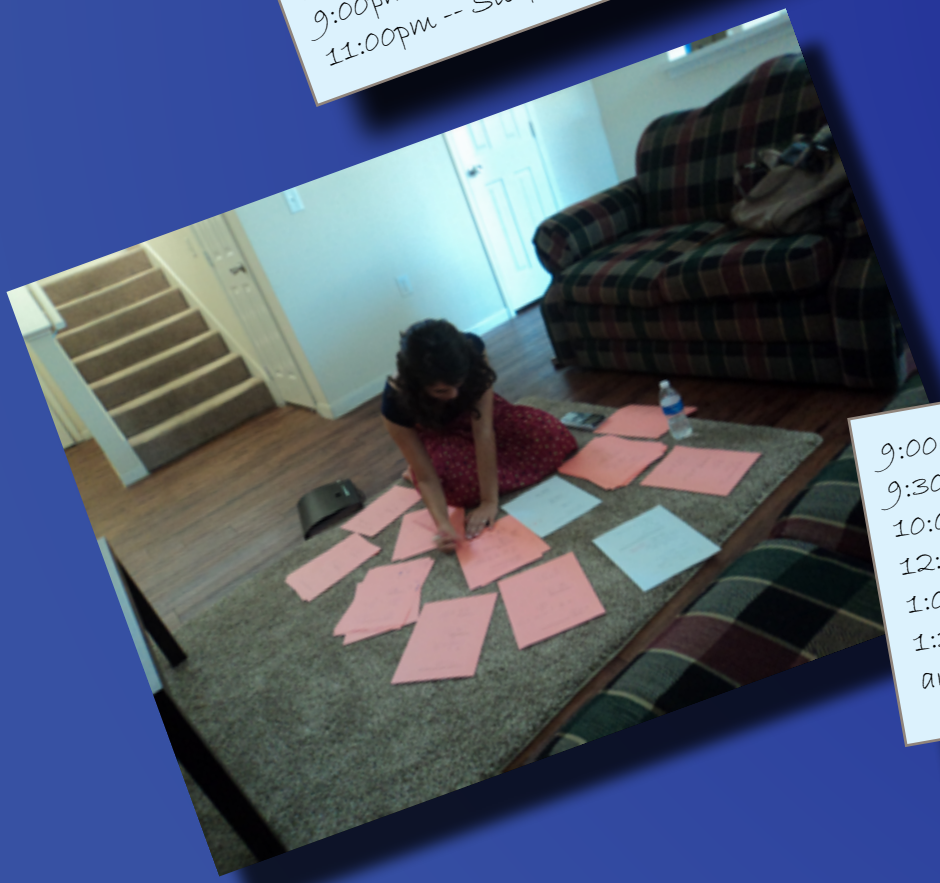
A Week in the Life: Student Profile

Meagan Benavides

Meagan is a junior majoring in Mathematics with a Business minor. In addition to her studies, she also works for the Math Department in various capacities, including Undergraduate Teaching Assistant and classroom helper. After first gaining some experience in the business world, she would like to return and teach high school algebra. Here is a sample of her busy schedule during the Fall 2013 semester.

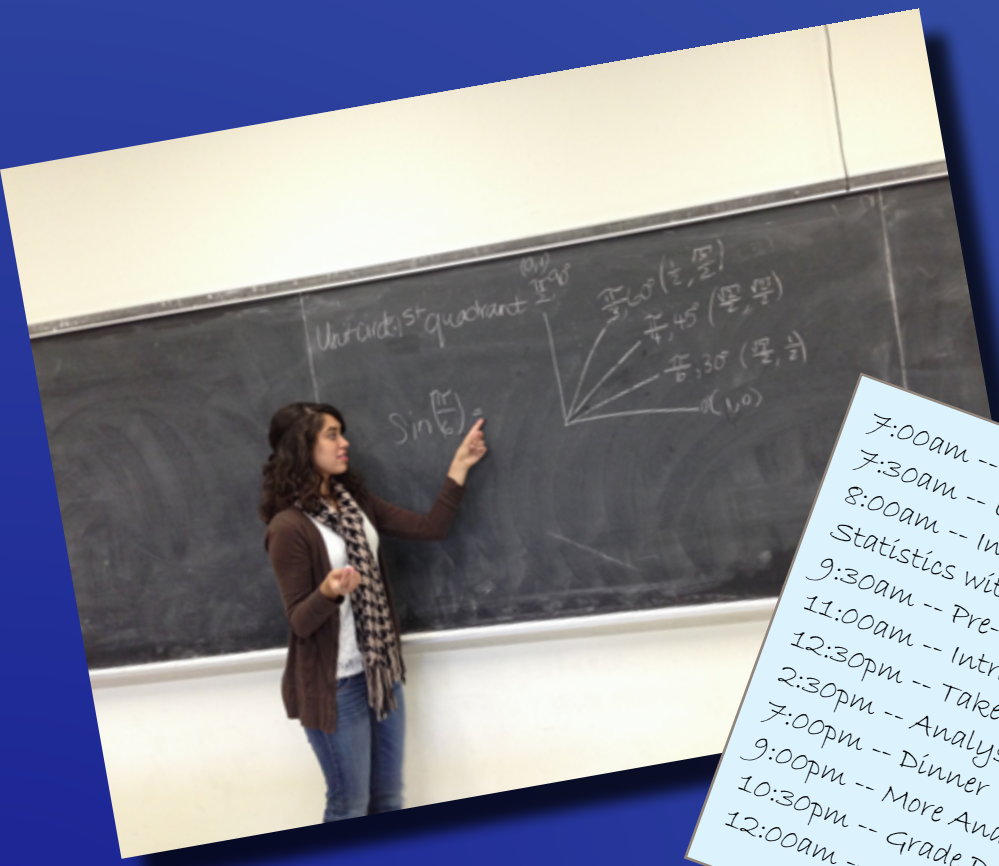
Monday and Wednesday

7:00am -- Wake up
7:30am -- Leave for school
8:00am -- Beginning Jogging
9:00am -- Breakfast
9:27am -- Catch bus to campus
10:00am -- Analysis I with McCabe
11:00am -- Business Law
12:30pm -- American Literature
2:00pm -- Lunch in LBJ Student Center
2:30pm -- Office Hours (Modern Geometry)
4:35pm -- Meet with instructor for Pre-calculus
5:00pm -- Class helper for College Algebra
6:30pm -- Take bus home
7:00pm -- Dinner
9:00pm -- Homework with roommate
11:00pm -- Sleep



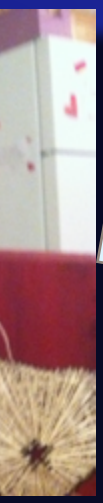
Friday

9:00am -- Wake up
9:30am -- Leave for school
10:00am -- Analysis I
12:00pm -- Talk Math 2 Me seminar
1:00pm -- Take bus home / lunch
1:30pm -- Weekend activities (visit family and friends; art projects)



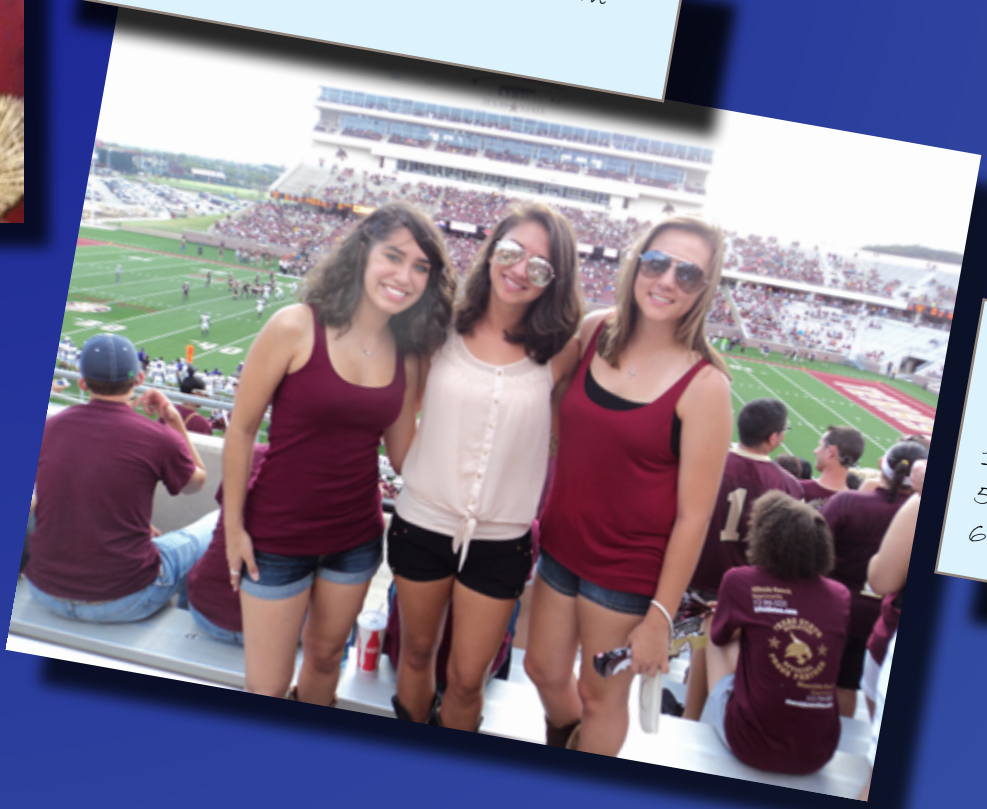
Tuesday and Thursday

7:00am -- Wake up
7:30am -- Leave for school
8:00am -- Intro. to Probability and Statistics with Dr. Sun
9:30am -- Pre-calculus lab (TA)
11:00am -- Intro. to Marketing
12:30pm -- Take bus home / lunch
2:30pm -- Analysis homework
7:00pm -- Dinner
9:00pm -- More Analysis homework
10:30pm -- Grade Pre-calculus homework
12:00am -- Sleep



Saturday

1:00pm -- Tailgating at Bobcat Stadium
6:00pm -- Kick-off



Sunday

9:00am -- Breakfast
10:30am -- Church
12:00pm -- Lunch
1:00pm -- Homework
5:00pm -- Dinner
6:00pm -- More Homework

Math Department Award Winners -- Spring 2013

Undergraduate Recognition for Academic Achievement

This award is presented to undergraduate mathematics majors who have completed at least 30 hours of college level course work at Texas State and have a Texas State grade point average of at least 3.00 but less than 3.25.

Josephine A. Aguilar
William G. Blackman
Kylon S. Brune
Tara N. Dattel
Alexandra C. Ewing
Joshua L. Fails
Sara N. Fincher
Jessica R. Garcia
Jacob S. Glasby
Adrian A. Gonzalez
Ana G. Guerrero
Ashley M. Hartgrove
Kelsey M. Mayfield
Jill N. Meyer
Demeraya L. Moore
Dennis T. Porter
Gareth D. Pritchard
Danielle N. Schievelbein
Andrew Suarez
Rachel G. Thompson
Eric N. Vignaud
Matthew R. Wallace
Timothy C. Whisenant
Sion A. Williams
Charlotte P. Wrockloff
Justin L. Yonker

Undergraduate Recognition for Academic Distinction

This award is presented to undergraduate mathematics majors who have completed at least 30 hours of college level course work at Texas State and have a Texas State grade point average of at least 3.25 but less than 3.6.

Rebecca L. Breeding
Sarah A. Bullock
Jorge E. Canada
Caleb T. Coats
Edward E. Cruz-Medrano
Dustin W. Dillman
Michael G. Elizondo
Mary M. Foegelle
Colin J. Hamilton
Jerry R. Hook
Justin A. Jacobs
Sarah E. Johnston
Kristen L. Keller
Joshua S. Kelly
Mikayla C. Maloney
Michael W. Matthews
Colin D. Michalik
Robert E. Monroe
Monica Moss
James R. Naughton
Juan O. Rivera
Kyrie M. Rojo
Taylor N. Shimek
Phillip J. Street
Courtney R. Stuart
Matthew A. Whipple
Timothy Z. Young
Andrea Zermeno

Undergraduate Recognition for Academic Excellence

This award is presented to undergraduate mathematics majors who have completed at least 30 hours of college level course work at Texas State and have a Texas State grade point average of at least 3.6.

Christopher J. Baker
Kyle E. Bell
Meagan R. Benavides
Gregory C. Beuhler
Aubrey N. Borges
Derek A. Bush
Daniel L. Campos
Bryce A. Cashell
Adam A. Chalupa
Zachary W. Coleman
Priscilla R. Collard
Ashley M. Craft
David E. Curry
Julian Davalos
Hayden R. Dooley
Kyle R. Gates
Ryan W. Gates
Derek J. Hammons
Michael D. Hicks
Benjamin B. Hoffman
Georgiana A. Kritikos
Kaitlin B. Kunetz
Sara A. Medlin
Rachel L. Menking
Jacob D. Mescher
Labeeb I. Mohammed
William R. Moody
Courtney N. Murach
Minh-Anh N. Nguyen
Stuart J. Olsen
Tiana M. Owens
Zachary T. Pingel
Mark A. Proctor
Tyler L. Purcell
Leah R. Ramirez
Jack E. Rhoades
Ellen B. Robinson
Martin T. Schmidt
Casey A. Stovall
Maria E. Tomasso
Francis B. Toto
Alexander J. Wright
Megan N. Zamora

Graduate Recognition for Academic Excellence

This award is presented to graduate mathematics majors at the Master's level who have completed at least 15 hours of 5000+ level mathematics courses at Texas State and have a Texas State grade point average of at least 3.75.

Natalie G. Black
Lacy S. Gellasch
Anthony W. Harrison
Rebecca A. Hofer
Pedro J. Merced
Charles Reich
Randolf H. Reiss
Zhaochen Song
Brittany A. Webre

Graduate Recognition for Academic Excellence

This award is presented to graduate mathematics majors at the Ph.D. level who have completed at least 36 hours of 7000 level mathematics courses at Texas State and have a Texas State grade point average of at least 3.75.

Sarah E. Hanusch
Robert. W. Jaster
Abby G. Mask
Carlos Mejía Colindres
Namakshi Namakshi
Rini Oktavia
Alana A. Rosenwasser
Michelle Schrauth
Debra D. Ward
Aaron T. Wilson

Robert and Brita Northcutt Scholarship

Leah R. Ramirez

R.H. Bing Award

Christopher J. Baker Zachary T. Pingel

Graduate Student Award for Outstanding Achievement

Anthony W. Harrison Robert W. Jaster

Give back -- Support Mathematics Education

Contributions to our scholarship funds are always welcome. As the university and Math Department grow, more and more students rely on your generous gifts to support their education. Please consider giving support to our majors in one of these scholarship funds.

Established Scholarship Funds

_____ Department of Mathematics Discretionary Fund

_____ Robert and Brita Northcutt Scholarship – awarded to Texas State student majoring in mathematics with Texas State GPA of at least 3.0 on at least 30 hours of coursework at Texas State.

_____ Lynn H. Tulloch Math Scholarship – awarded to full time Texas State student majoring in mathematics and pursuing teacher certification. Preference should be given to athletes. The student should have a Texas State GPA of at least 3.0 on at least 30 hours of coursework at Texas State.

_____ Don and Helen Cude Award – awarded to undergraduate mathematics major pursuing teacher certification who has the highest GPA among senior level students who have completed at least seven upper level mathematics courses.

_____ R. H. Bing Award – awarded to undergraduate mathematics major not pursuing teacher certification who have completed at least seven upper level mathematics courses.

_____ Wayment Award Fund

_____ Mathworks Fund

To contribute, mark the scholarship fund to donate to and complete the form below:

Name: _____

Address: _____

City: _____ State: _____ ZIP: _____

Country: _____ Phone: _____

Email: _____

Signature: _____

Check Number: _____ Amount: _____

Please return to

Donor Services
JCK 480
601 University Drive
San Marcos, Texas 78666

Alumni Connections

http://www.math.txstate.edu/resources/alumni-connections.html

We'd like to hear from you -- our treasured alumni! We've made it easy for you to reconnect with Texas State University and the Math Department. Go to the website below to register your information. You'll be able to stay connected with the happenings here in San Marcos.

Mathworks Team Sweeps International Math Contest

By Jayme Blascke, University News Service

A team of four middle school students representing the Mathworks center at Texas State University and the city of San Marcos has won the 2013 Primary Math World Contest (PMWC), held in Hong Kong, July 13-19.

The PMWC is hosted by Po Leung Kuk, a regional charitable foundation. This is the first Texas team to win the competition outright--the 2008 team tied for first place. In addition, the four students achieved first place in the team portion of the contest, as well as receiving the Po Leung Kuk Cup for being the top non-Asian team. Mathworks teams have now won the Po Leung Kuk Cup 8 times.

The team was accompanied by Nate Dean, chair of the mathematics department at Texas State, and Monica Martin, a math teacher at Miller Middle School in San Marcos. This is the 11th time a Mathworks has competed in the PWMC, facing more than 40 teams from across the world, with representation from countries including Taiwan, China, South Africa, Indonesia and Bulgaria.

The team members were Alex Liu (13, The Village School, Houston); Vinjai Vale (homeschool, Dallas); Shreya Thipireddy (13, Harmony School of Excellence, Houston); Linda Yu (13, St. John's School, Houston). Liu and Vale accomplished perfect scores on the individual portion of the contest.

The four students' journey to Hong Kong started in October of 2012, when they were among more than 500 students across the state of Texas who participated in the Mathworks Math Contest (MMC). As top scorers, the four were invited to participate in the Mathworks residential Junior Summer Math Camp (JSMC) in early June with 36 other middle school students. The team prepared for the PWMC during their time in the Math Camp, devoting two weeks to doing in-depth mathematics on the Texas State campus. Under the tutelage of professors and camp counselors, including Jian Shen of the university's math department, the four students gained experience in creative problem solving and teamwork.

The JSMC is directed by Max Warshauer, Regents Professor of Mathematics at Texas State and director of the Mathworks center.

About Mathworks

Mathworks is a center for mathematics education at Texas State University with core programs of Summer Math Camps, Teacher Training, and Curriculum Development. The Mathworks Junior Summer Math Camp and Honors Summer Math Camp are nationally recognized as two of the premier summer programs in the country. For more information about Mathworks, see *www.txstate.edu/mathworks.*

Seminars Provide Insights to Variety of Mathematics

Each semester, the department runs three seminars covering many different aspects of mathematics. Here is a sample of the seminars from this past year:

Discrete Math:
"Two Combinatorial Problems, Only One Solution: A Tale in Two Parts" by Dr. Jeremy Alm, Illinois College

"Eigenvalue conditions for some properties of simple graphs" by Dr. Xiaofeng Gu

Math Education:
"Bayes Theorem, Bayesian Statistics and Predicting the Election Result" by Dr. Alex White

"Adult Student Learning Behaviors in a Roadblock Mathematics Course" by Dr. Aimee Tennant

Talk Math 2 Me:
"The Tower of Hanoi" by Amanda Walker

"A Brief Introduction to the Postage Stamp Problem" by Joni Schneider

Teacher's Corner: Pascal's Triangle

Want to know how many different 2-person committees can be formed from a group of 5 coworkers? Looking for an easy way to expand $(x + y)^4$? Pascal's Triangle is the tool for you.

Although named for Blaise Pascal, this pattern was known as early as the 10th century. Today we use Pascal's triangle as an aid to solve many problems. The triangle is also full of many patterns. Here are a few of the properties of Pascal's Triangle.

- The triangle is built with 1's along the outside diagonals.
- Each number in the triangle is the sum of the two numbers above it.
- Each number in the triangle is a combination C(n, r), where n is the row number (starting from 0) and r is the number going across (starting from 0).
- The sum of the numbers across each row is a power of 2.
- If you alternately add and subtract the numbers going across a row, the result is 0.
- Pascal's Triangle is symmetric down the middle.

Since each number in the triangle is a combination, we can answer our first question. Suppose Anna, Beth, Charlie, David, and Eleanor all work together. The boss wants to know how many different committees can be formed with pairs of these coworkers. You can laboriously count out all of the groups; however, Pascal's Triangle makes the answer obvious. The number of ways to form pairs of coworkers from a group of 5 is given in the triangle as the third number of Row 5 (remember to start counting with 0). Thus, 10 groups can be formed.

What about expanding $(x+y)^4$? With Pascal's Triangle, it's simple. First recall that the sum of the exponents of x and y in each term will add up to 4. This gives the following terms: x^4, x^3y, x^2y^2, xy^3, y^4 (notice that each the exponents in each term add up to 4; when the variable is not given, the exponent is 0). Be sure to keep these terms in order, where the exponent on the x's decrease from left to right all the while the exponent on the y's increase. Next, use the numbers from Pascal's Triangle as the coefficients of these terms. This gives $(x + y)^4 = 1x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + 1y^4$. It's just that easy.

Blaise Pascal (1623-1662) -- French mathematician and philosopher. Published *Traite du triangle arithmetique* in 1653 for describing binomial coefficients. (Public domain)

Lessons and Projects:

Elementary School -- Create a poster of Pascal's Triangle and have students discover patterns. Have students extend the triangle several rows.

Middle School -- Have students work out $(x+y)^n$ for several small values of n or have students research the expansion using an online computer program (WolframAlpha, for examle). Discover patterns between consecutive expansions.

High School -- Apply the ideas of Pascal's Triangle to probability. For example, "A coin is flipped 6 times. What is the probability of getting exactly 4 Heads?"

High School/College -- Extend the idea of Pascal's Triangle to Pascal's Pyramid, which gives the coefficients of $(x + y + z)^n$. Have students build models of the pyramid and discover patterns within.

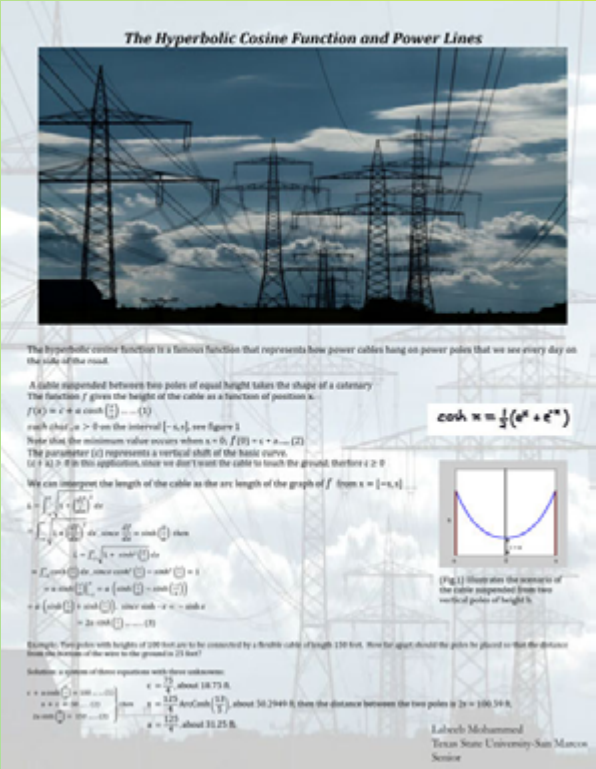
Have other ideas for a lesson with Pascal's Triangle. Share them with us. Email me at dray@txstate.edu.

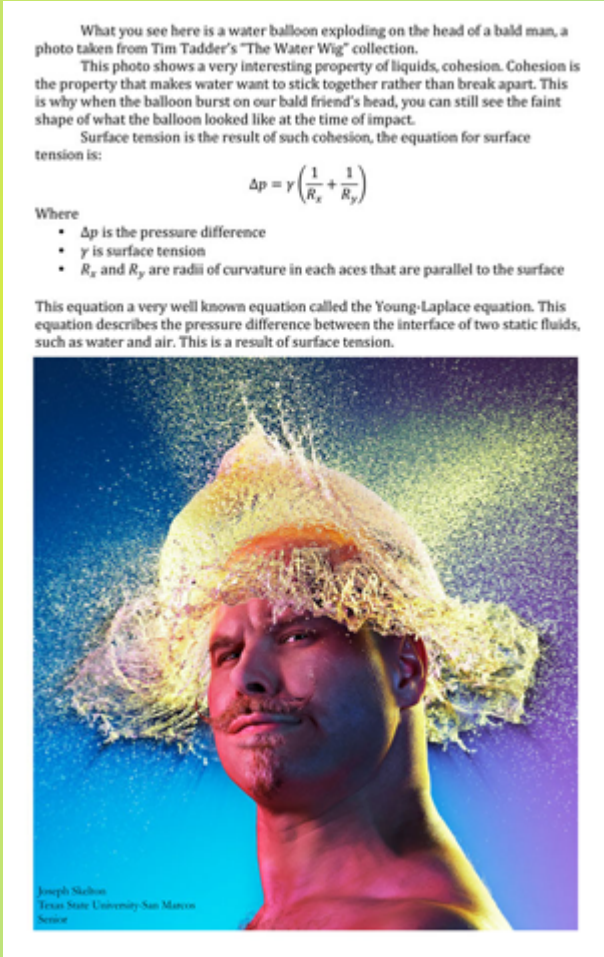
Row 0								1							
Row 1							1		1						
Row 2						1		2		1					
Row 3					1		3		3		1				
Row 4				1		4		6		4		1			
Row 5			1		5		10		10		5		1		
Row 6		1		6		15		20		15		6		1	
Row 7	1		7		21		35		35		21		7		1

Pascal's Triangle *with the row numbers starting at Row 0.*

Math in the Picture Contest Winners

Posters created by Labeeb Mohammed and Joseph Skelton were announced as winners of this year's Math in the Picture contest. The contest is run for undergraduates, graduates, and pre-college.





What you see here is a water balloon exploding on the head of a bald man, a photo taken from Tim Tadder's "The Water Wig" collection.

This photo shows a very interesting property of liquids, cohesion. Cohesion is the property that makes water want to stick together rather than break apart. This is why when the balloon burst on our bald friend's head, you can still see the faint shape of what the balloon looked like at the time of impact.

Surface tension is the result of such cohesion, the equation for surface tension is:

$$\Delta p = \gamma\left(\frac{1}{R_x} + \frac{1}{R_y}\right)$$

Where

- Δp is the pressure difference
- γ is surface tension
- R_x and R_y are radii of curvature in each aces that are parallel to the surface

This equation a very well known equation called the Young-Laplace equation. This equation describes the pressure difference between the interface of two static fluids, such as water and air. This is a result of surface tension.

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