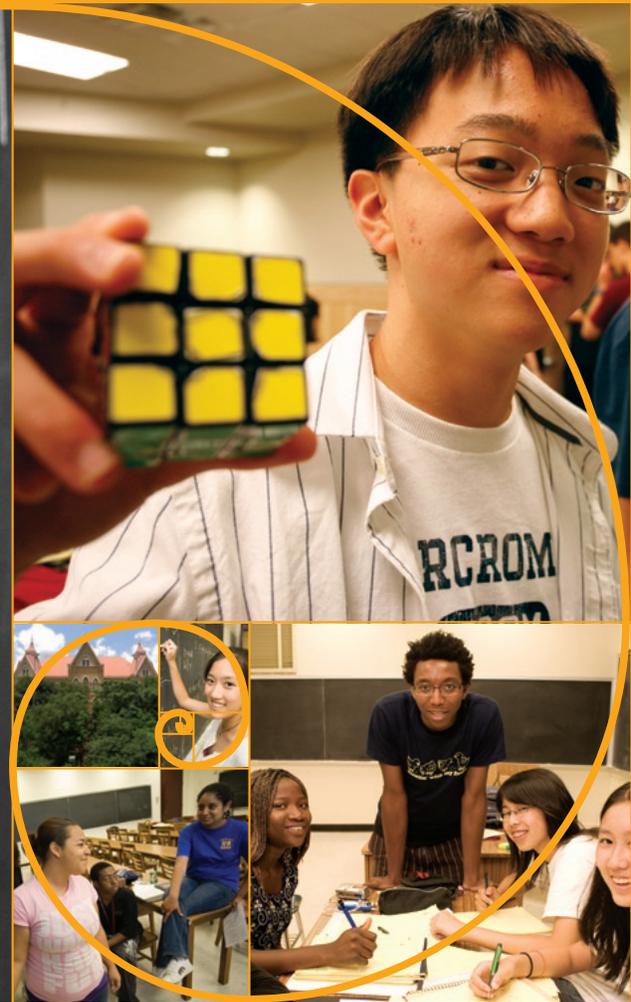
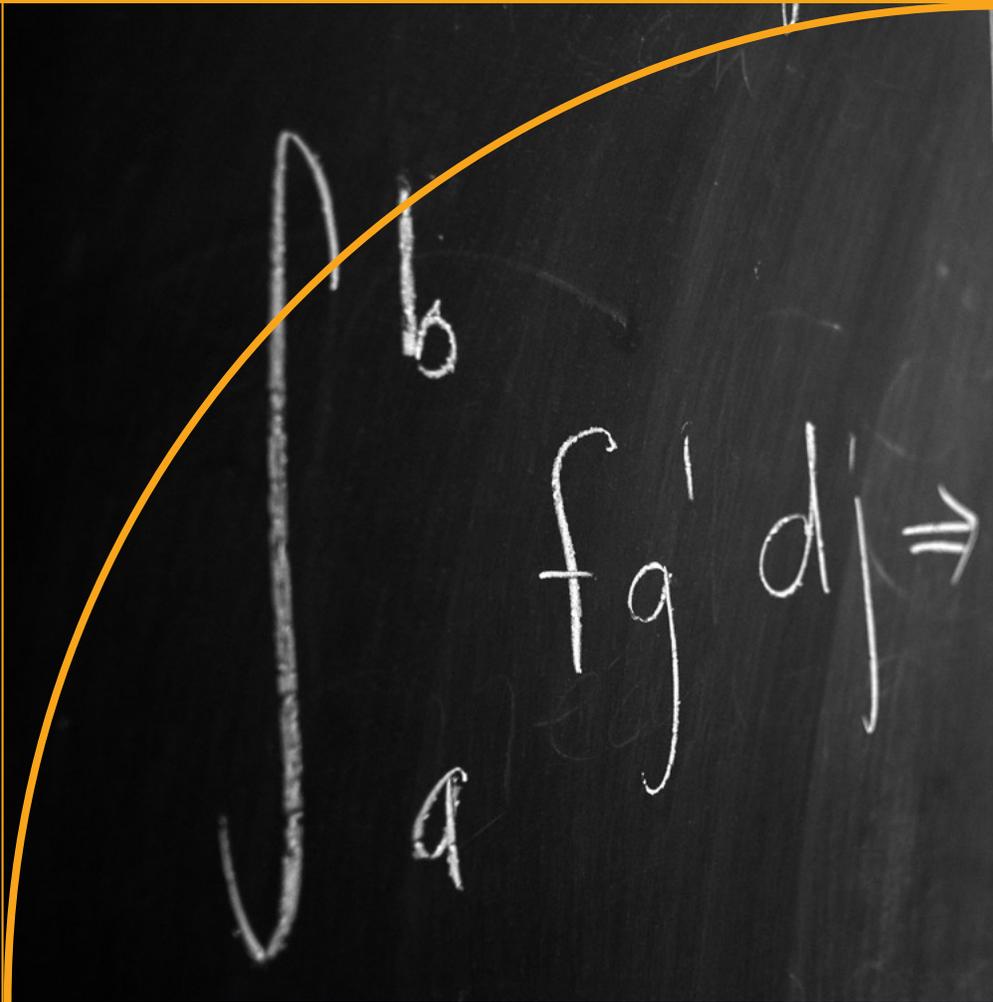


# Mathworks

TEXAS MATHWORKS AT TEXAS STATE UNIVERSITY

## 2010 ANNUAL REPORT



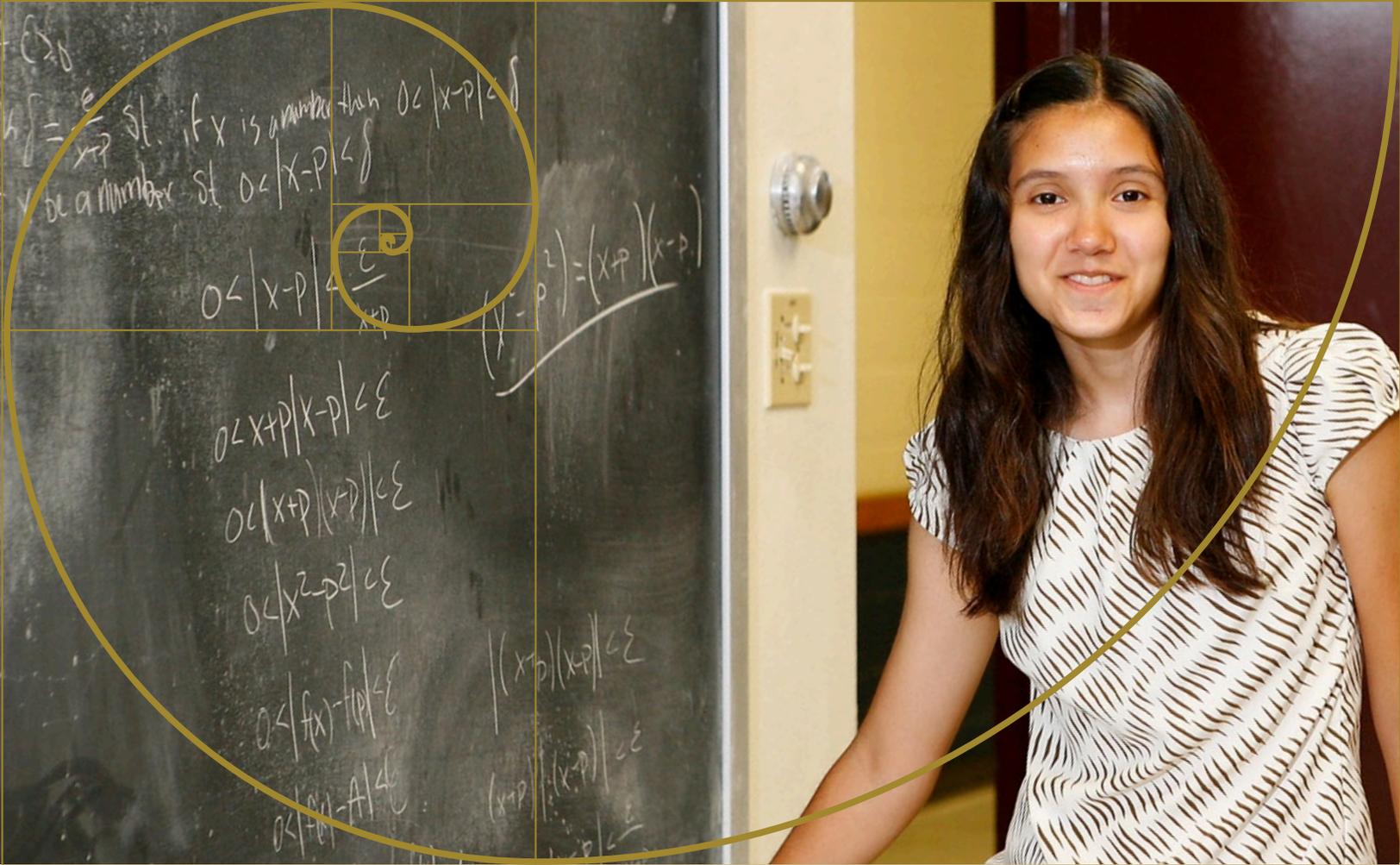
**MISSION** To develop model programs and self-sustaining learning communities that engage students from all backgrounds in doing mathematics at a high level.

**VISION** To be a nationally recognized leader for innovative and research-based model programs that significantly improve mathematics education.

**CORE PROGRAMS** Texas Mathworks is a center for innovation in mathematics education at Texas State University.

The three pillars of Mathworks are:

- *Summer programs for K-12 students*
- *Teacher training*
- *Curriculum Research and Development*



Mathworks raises the level of mathematical abilities of all students, and nurtures the creativities of our future leaders. We inspire students to think deeply about problems, and prepare them with a solid foundation in math for careers in science and technology. Our program participants develop the intellectual maturity and perseverance to make an impact on and give back to society.

Mathworks core programs include summer math camps, teacher training, and curriculum development. Our flagship Honors Summer Math Camp is a “national treasure” - attracting talented students from across the U.S., and a model program for what is possible when individuals of different backgrounds are brought together. The Junior Summer Math Camp continues to inspire new generations of middle school students to be engaged and excited about mathematics. Camp participants carry that enthusiasm for math into the school year and beyond.

The math camps are important laboratories for our teacher training and curriculum development programs. Activities, pedagogy, and research ideas from the camps drive the work that we do to impact mathematics education during the school year. Teacher trainees observe camps in action, attend professional development classes, and are prepared to use the Mathworks curriculum. This school year, we are expanding our curriculum pilots to directly impact over 4,000 middle school students.

*“I had always seen mathematics as something that either you knew or you didn't. Now I know that patience is the key to discovering beautiful things. I also learned that taking on new challenges and welcoming opportunities is the key to new discoveries.”*

*- 2010 Honors Summer Math Camp student*

# HONORS SUMMER MATH CAMP

The 21st annual Honors Summer Math Camp (HSMC) was held on the Texas State University – San Marcos campus from June 20 to July 31, 2010. The program included 32 first year students, 18 second year students, 9 junior counselors, and 15 counselors. Students hailed from ten different states and three foreign countries.

These 59 students spent six weeks on the Texas State University – San Marcos campus, doing math for more than 30 hours a week. HSMC students also had the opportunity to meet leaders from industry and academia, attend weekend field trips, and participate in a service project.

- **Dates of program:** June 20 – July 31, 2010
- **Number of students that applied:** 167 (36% increase from 2009)
- **Number of participants:** 59
- **Number of participants receiving scholarships:** 29  
(49% of all participants)
- **Average scholarship amount:** \$2,251  
(83% of the maximum HSMC tuition cost)

## HSMC ACHIEVEMENTS

- In 2010, the American Mathematical Society Epsilon Fund recognized the HSMC for the ninth time as one of the top six or so summer math programs in the nation.
- 80% of HSMC students go on to major in math, science, or engineering in college.
- Student research projects from the HSMC have resulted in 94 semifinalists in the Siemens Competition in Math, Science, and Technology. This includes 43 regional finalists and 11 national finalists.



*“Math Camp has affected me in so many ways, not only teaching me math in ways I hadn’t thought possible, but by teaching me about loving learning and challenges, opening me up to opportunities, letting me know just how fun math can be, and inspiring me to reach out and take those opportunities for myself.”*

- 2010 HSMC Student

Data alone cannot describe the unique, exciting atmosphere of our program. We are interested in developing each of our participants, not only in mathematics, but also as clear thinkers who will be our future leaders. The following student comments, taken from the evaluations of our 2010 students describe the profound difference the program is making in students' lives.

*"Back at home not everyone enjoys doing mathematics or working hard, but here at HSMC you meet people with similar interests. It was nice to see that there are people who really want to succeed just like me. The expectations they have at camp are great and this has pushed me to succeed."*

- Madai, 11th grader from El Paso, TX

*"At school, we are encouraged to speed-learn curriculum and see knowledge as just knowledge, nothing else. Here at HSMC we learned that taking your time to solve a problem is a good thing, and that in the end, what's most important is how deeply you understand a concept and how much you enjoy this knowledge, rather than how quickly you can grasp the idea."*

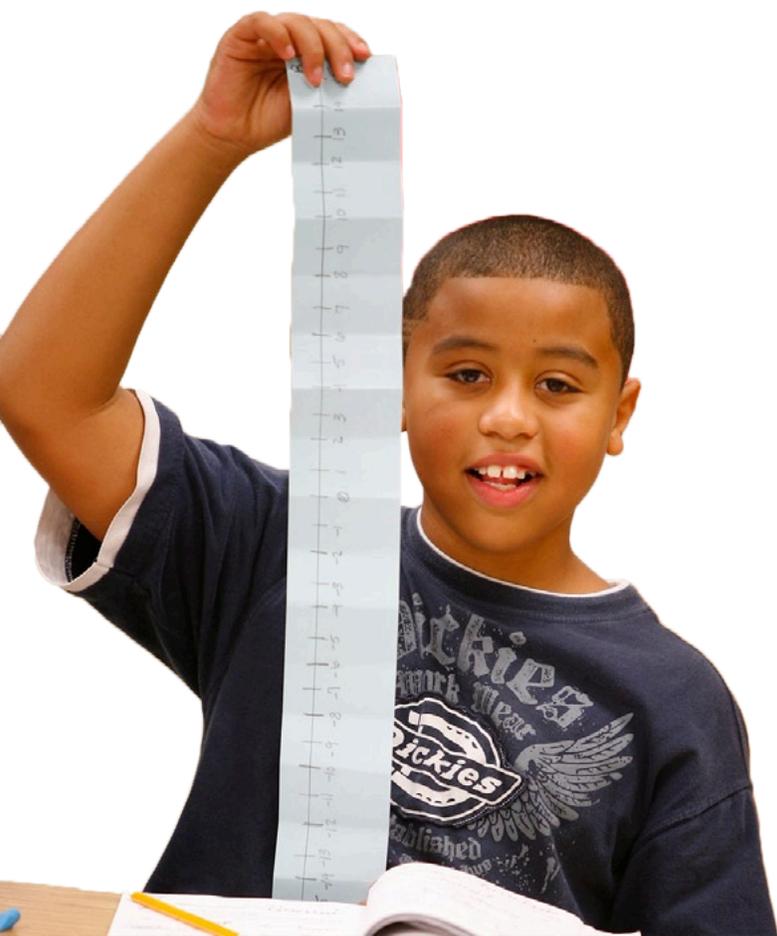
- Lilly, 10th grader from Sugar Land, TX

*"My school focuses so much on helping students pass, it leaves little time for teachers to show students advancements in their subjects. This camp was different than any other camp or activity I have ever done. This challenged me to go beyond what I thought I was capable of. Everyone is amazing, and it's great that we all work together on something we are passionate about."*

- Leah, 12th grader from McAllen, TX

*"HSMC has offered to me so much within six weeks that I feel all my years of high school are not capable of matching it. I come from a small border town that is considered to be economically disadvantaged. Education is not a priority for most of the people, so our educational system is slow, to say the least. I plan on becoming the first member of my family to attend college."*

- Angel, 12th grader from Fabens, TX



# JUNIOR SUMMER MATH CAMP COMMUTER PROGRAM

The 15th annual Junior Summer Math Camp (JSMC) was held in San Marcos from June 7 to June 18, 2010. The program included 188 students from the 4th through 8th grades. Thanks to the U.S. Department of Education, the Kodosky Foundation, and Time Warner Cable, Mathworks was able to award 143 full scholarships and 15 partial scholarships. Over 70% of participants are from San Marcos or nearby towns, where the median income level is \$32,200, and over 68% of students qualify for free or reduced lunch. Because of generous scholarship support, these students were able to attend the JSMC and build a foundation for higher-level mathematics.

## MEASURABLE IMPACT

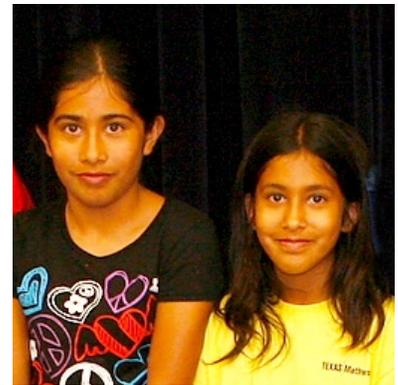
The Orleans-Hanna Algebra Prognosis Test is given as a pre- and post-assessment each summer. Mathworks JSMC participants have achieved statistically significant ( $p < 0.001$ ) gains each year that the Prognosis has been given. The data repeatedly shows that participants are better prepared for pre-algebra and algebraic concepts.

## JSMC ACROSS THE STATE

Master teachers who were trained in San Marcos conducted their own two-week math camp in three other Texas cities. The success of these additional camps shows the potential for the model to be replicated across the state.

### Students Registered

McAllen:	212
New Braunfels:	125
Midland:	62



*"I'm excited that my girls can get a good foundation in math. I want to thank you for the scholarships and look forward to sending the girls to Math Camp next year."*

*- Renee, parent of 5th grader and 3rd grader*

The JSMC is an important part of the central Texas community, impacting students and parents alike. The comments below emphasize the value of an enriching summer program that challenges and nurtures students during their middle school years.

*"I didn't like math before, but now I really do!"*

- Belen, 5th grader

*"We got to see math in different ways. In this camp we got to just focus on math and see different ways to do math problems. I loved this math camp and want to attend again!"*

- Savannah, 6th grader

*"Here they make math fun by doing projects and physical activities that involve math."*

- Emily, 7th grader

*"I learned many things in math that I never knew about. I would recommend this camp to anyone."*

- Jose, 7th grader

*"This program is very different from all the others because it is fun, interesting, and challenging. This was one of the best times I've had!"*

- Eric, 8th grader

*"I like how my daughter comes home every day of the camp and shares the games she plays as she learns math skills. I like the fact that this math camp is empowering my daughter with excellent math skills."*

- Carlos, parent of 7th grader

*"Seeing my son thrive socially and academically and his being able to communicate and desiring to share with me math discoveries learned is amazing, wonderful, and a true blessing."*

- Diana, parent of 4th grader



# JUNIOR SUMMER MATH CAMP RESIDENTIAL PROGRAM

The 15th annual Residential Junior Summer Math Camp (JSMC) was held on the Texas State University – San Marcos campus from June 7 to June 18, 2010. The program included 32 students, 8 counselors, and 2 visiting international students. The Residential JSMC recruits talented 6th-8th grade students, giving them the opportunity to work in small groups, guided by undergraduate counselors, and taught by university professors.

For students to grow, we need to engage them when they are young, provide them with creative experiences during critical middle school years, and continue to build on that support. Comments from 2010 participants show how the JSMC is helping to shape students' perspectives of mathematics and strengthening their problem-solving skills.

*"This camp has been an unique experience in my life that I will never forget. It allows for infinitely many more times creativity than school does. I learned things I had never dreamed of before."*

- Susan, from Kingwood, TX

*"Before this camp I had minimal experience with Algebra. Now I have a huge advantage because I have the tools to look at problems from a different perspective. Now I have a love for math and a key to knowing more math than I have ever dreamed of."*

- Emily, from Lewisville, TX

*"In school it can get boring because you can predict what you are going to learn or what the questions are about. At Math Camp you are learning something very different every day. This Math Camp makes you learn things so that you are able to go at any type of problem that may come your way."*

- Brandon, from Houston, TX

*"Math Camp has really helped me by showing me that math is more than just formulas and that it can be fun too."*

- Brenda, from Austin, TX

## CONNECT A MILLION MINDS

A new grant from Time Warner Cable's Connect a Million Minds (CaMM) initiative sponsored five Residential JSMC scholarships. The CaMM grant also helped to support printing of camp t-shirts for both the commuter and residential programs. A group of commuter JSMC students had the opportunity to visit Time Warner Cable's Austin offices on a special field trip.



# JUNIOR SUMMER MATH CAMP

## PMWC TEAM

### PRIMARY MATH WORLD CONTEST TEAM

Each summer Mathworks sends a team of four students to compete in the international Primary Math World Contest (PMWC) in Hong Kong. In eight years of attendance, the Mathworks team has won the Po Leung Kuk Cup (awarded to the top non-Asian team) six times, and also tied for first overall in 2008. More than 40 teams from across the world compete in the PMWC each year.

### 2010 MATHWORKS PMWC TEAM

(L to R) Vincent Liu, Michael Ma, Victor Zhou, Alex Whatley, team chaperone Melissa Freese, team leader Hiroko Warshauer



### VISITING STUDENTS

The Residential JSMC had the honor this year of hosting two visiting students from Indonesia. Alyssa Mustika and Agasha Ratam were accompanied by the Indonesian national math team coach, Ridwan Saputra. The JSMC students had a wonderful time with the guests, and shared their common interest of mathematics.

### VISITING STUDENTS WITH MATHWORKS PMWC TEAM

(L to R) Alssya, Vincent, Michael, Alex, Victor, Agasha



# CURRICULUM PROJECT

## THE CHALLENGE

Research shows that “students who complete Algebra II are more than twice as likely to graduate from college compared to students with less mathematical preparation” [1]. However, for many students, just passing Algebra I is a major hurdle. Only 41% of Texas high school graduates are ready for Algebra, and among Texas teens, only 50% have passing mastery (score of 70% or better) of math [2]. The long-term achievement gap among students of differing ethnic and socioeconomic groups can be significantly reduced or even eliminated if students increase their success in algebra and higher-level mathematics.

## A SOLUTION: MATH EXPLORATIONS

Mathworks’ innovative school-year curriculum integrates learning from the laboratory of summer math camps with objectives that cover the Texas Essential Knowledge and Skills (TEKS) through Algebra I. Young students are engaged in using algebraic ideas, and these ideas are built upon throughout their middle school years. Math Explorations weaves algebra and algebraic ideas with hands-on, inquiry-based explorations for students working independently and in groups. The curriculum is presented in carefully developed textbooks and supporting materials that are used in a growing number

of pilot locations throughout Texas. Teachers are trained during the summers to implement the curriculum during the following school year. For the 2010-2011 school year, 33 teachers will be piloting the curriculum with over 4,000 students. Pilot results are being rigorously tested, evaluated, and prepared for broader adoption.

## 2009-2010 SCHOOL YEAR PILOTS

This past school year, the Mathworks curriculum was piloted in four different school districts, directly impacting over 1,300 middle school students. Each pilot class achieved statistically significant gains on the Orleans-Hanna Algebra Prognosis Test. The series of three textbooks was piloted at eight different schools across the four school districts: Midland (4), McAllen (3), Austin (1), and San Marcos (1).

The 7th grade students using the Mathworks curriculum achieved an average post-test score that was higher than the national normed score for 8th grade students. The Mathworks curriculum carefully lays down a foundation for algebraic concepts, engaging students in fundamental mathematical ideas at a deep level. Young students become much better prepared for algebra and higher-level math courses.

## 2009-2010 MATHWORKS CURRICULUM PILOTS ORLEANS-HANNA ALGEBRA PROGNOSIS PRE- AND POST- TESTS

School District	Grade	# of Teachers	# of Students	Pre-Test Mean	Post-Test Mean
Midland	7	8	409	26.4	34.7
McAllen	6	3	323	12.5	26.5
	7	3	239	26.5	35.2
	8	2	49	45.7	47.6
Austin	6	3	242	30.3	43.9
San Marcos	7	1	31	31.3	38.3
	8	1	27	40.1	42.8
<b>TOTALS</b>		<b>20</b>	<b>1,320</b>		

\* 7th grade national normed score: 29.1

\* 8th grade national normed score: 31.3

# TEACHER TRAINING

## PRE-SERVICE TEACHING FELLOWS

The “Teaching Fellows” program recruits talented undergraduates into mathematics, and places these students into middle school classrooms for an early teaching experience. This hands-on program provides a unique introduction to mentoring for prospective teachers. More than 250 undergraduates have participated as Fellows over the past five years.

## SUMMER PROFESSIONAL DEVELOPMENT

Over the past decade, more than 650 Texas K-12 teachers have participated in summer training with Mathworks. Teachers observe summer math camps in action and attend graduate classes covering content and pedagogy. After training, teachers are prepared to use the Mathworks curriculum, ready to instill mathematics skills and confidence in their students. In the summer of 2010, 42 teachers participated in Mathworks teacher training, learning how to conduct their own summer math camps as well as implement the Mathworks curriculum during the school year.

During the school year, Mathworks faculty work with teachers through Math Inquiry Groups, forming a learning community that continually develops better ways to teach mathematics.

Testimonials from Mathworks teacher training participants show the importance of developing in educators a mindset that prepares them to teach mathematics to students of all backgrounds and provided a challenging learning environment:

*“I feel excited about going back home and taking what I learned and applying it. I have gained a new perspective. Before I had never thought it possible to teach algebra to such young kids, but I am now a believer. I look forward to coming back next summer.”*

*“The curriculum is quality mathematics for all, not watered down, designed to meet the needs of all students.”*

*“This program provides strong support and places high expectations for each student in a variety of situations which allows the students to engage in high level thinking and learning activities.”*

# RESEARCH & PUBLICATIONS

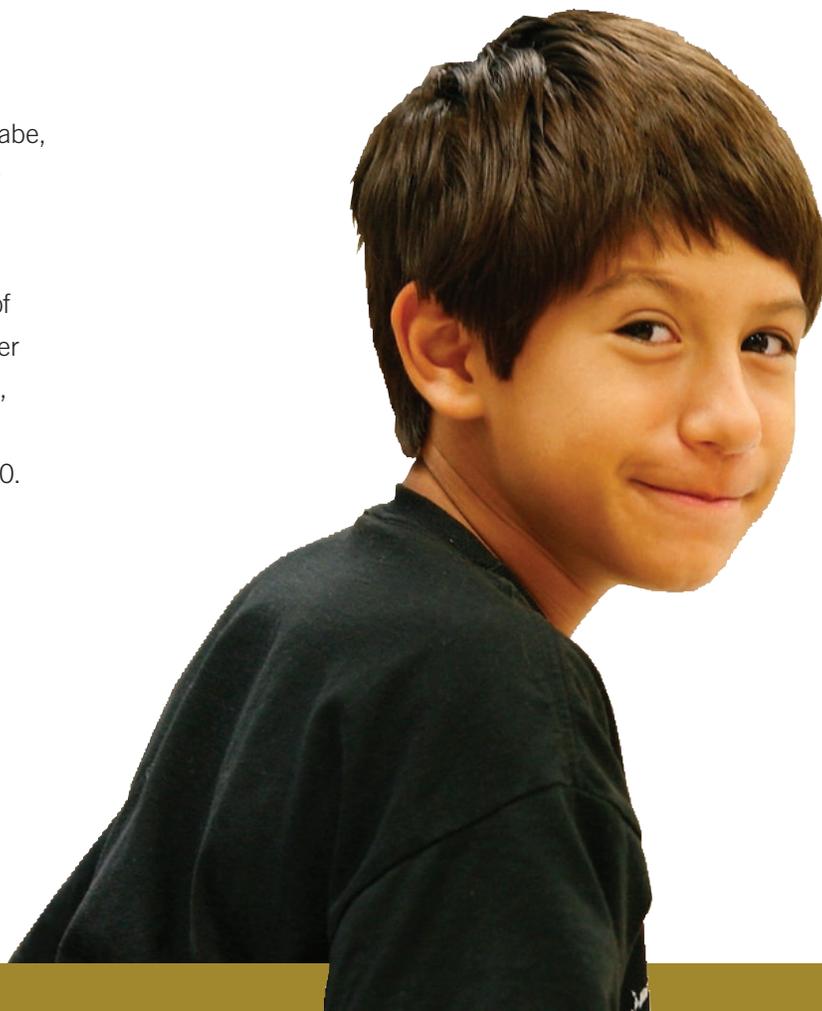
## FACULTY WORK

Mathworks faculty members are active in research and formalizing mathematical pedagogy, disseminating their work in publications and conferences. Below are recent works from this past school year.

- “Equity,” from *The Peak in the Middle: Developing Mathematically Gifted Students in the Middle Grades*. Max Warshauer, Terence McCabe, Alejandra Sorto, Sharon Strickland, Hiroko Warshauer, and Alex White. Edited by Mark Saul, Susan Assouline, and Linda Jensen Sheffield, 2010, NCTM
- “Understanding the Value of a Question: An Analysis of a Lesson.” Alejandra Sorto, Max Warshauer, and Terence McCabe. *Journal of Mathematical Sciences and Mathematics Education*, 4(1): 50 - 60, 2009.
- “Algebra on the Number Line.” Terrence McCabe, Alejandra Sorto, and Alex White. *Mathematics Teacher*, December 1, 2010 (in press).
- “Cultivating mathematical interest and talent of precollege students: Outreach through summer math camps and academies.” Invited panelist, Max Warshauer. American Math Society Joint Meeting, MAA Panel Discussion, January 2010.

## STUDENT RESEARCH

In the past nine years, 33 research papers authored by HSMC students have been recognized by the Siemens Competition in Math, Science, & Technology. The Siemens Competition is one of the premier high school research competitions in the nation, receiving over 2,000 entries each year. In 2009, the HSMC team of Sean Karson, Kevin Chen, and Dan Liu won first place overall in the competition, receiving a \$100,000 college scholarship. Their paper, “Relating Missing and Decycling Edges in Directed Graphs,” mentored by Dr. Jian Shen, has applications in network efficiencies.



# GRANT SPONSORS

Mathworks received over \$568,000 in grants and donations in 2009-2010, supporting our core programs and sustaining innovations in mathematics education while raising the level of math achievement for young students. Major grant funders are detailed below.

## HONORS SUMMER MATH CAMP

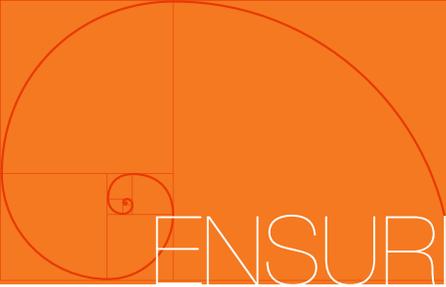
- American Mathematical Society Epsilon Fund: \$15,000 Supported student scholarships and operational funding
- KDK-Harman Foundation: \$10,000 Supported student scholarships for underserved minorities
- Mathematical Association of America – Tensor Grant: \$6,000 Supported student scholarships encouraging increased female participation in mathematics
- Siemens Foundation: \$30,000 Supported student scholarships and operational funding

## JUNIOR SUMMER MATH CAMP

- Kodosky Foundation: \$10,000 Supported the McAllen Junior Summer Math Camp
- H-E-B Tournament of Champions: \$10,000 Supported the McAllen Junior Summer Math Camp
- Time Warner Cable: \$5,500 Supported the residential and commuter Junior Summer Math Camps in San Marcos

## CURRICULUM DEVELOPMENT

- 3-M: \$5,950 To support a video podcast project, promoting peer-to-peer learning of mathematical concepts
- Kodosky Foundation: \$10,000 Supported curriculum development and curriculum pilots
- Sid W. Richardson Foundation: \$50,000 Supported the curriculum development and curriculum pilots
- Meadows Foundation: \$50,000 Supported curriculum development and summer teacher professional development
- U.S. Department of Education
  - o Curriculum Pilot Project with McAllen ISD: \$79,000
  - o Curriculum Pilot Project with Midland ISD: \$40,200
  - o Curriculum Pilot Project with San Marcos CISD: \$156,940



# ENSURING THE FUTURE

Mathworks programs spark students' imaginations, and expand their visions for what they can become. We continue our work to ensure that all students have the opportunity and ability to set new levels of achievement in mathematics. The words below from this year's participants and mentors represent a growing and dynamic group of thoughtful and prepared leaders who will be at the forefront of our society.

*"Coming into this camp, I hadn't even taken Algebra I, but I was able to learn so much. Now I'm about to go into Pre-Calculus. I'm ranked first in my class. Math is one of my favorite subjects and I am considering becoming an engineer. This camp is just phenomenal. I have gained a lot of confidence in myself because of this camp. I've learned so much more than I could have ever learned in a high school classroom. I learned to interact with others, work in groups effectively, and how to be a strong individual."*

*"I only hope to give back as much to camp as it has given to me. My campers taught me so much more than they could ever know – which is surprising, considering I was the counselor. This camp may be based on math, but it is so much more: it is learning from and teaching one another, sharing ideas, working together, and inspiring each other."*

*"I come from a very small town, with few people, and a really poor education system. The schools are dilapidated, and gangs as well as bullies are common. As the years passed, I became inquisitive and interested in academic subjects. By the time I reached middle school, I was called names, bullied and told off consistently. Attending math camp was an experience like no other. I was able to learn at a pace and a level which challenged me to my limits, and beyond in fact. Finally, after all my years of wondering why things shown to me in school worked, I was able to find answers. The wonderful community, and opportunities to learn are unlike anything I can obtain anywhere else."*

# ADMINISTRATORS

## **FACULTY**

Dr. Max Warshauer  
Dr. Terence McCabe  
Dr. Don Hazlewood  
Ms. Hiroko Warshauer  
Dr. Alejandra Sorto  
Dr. Alexander White  
Dr. Nathaniel Dean  
Dr. Jian Shen  
Dr. Weizhen Gu  
Dr. Carol Hazlewood  
Dr. Eugene Curtin  
Dr. Qiang Zhao  
Dr. Sharon Strickland

## **STAFF**

Max Warshauer, Director  
Terence McCabe, Associate Director  
Andrew Hsiao, Program Specialist  
Valerie Creveling, Accountant  
Patricia Amende, Administrative Assistant

## **ADVISORY BOARD**

Max Warshauer  
Herb Carter  
Howard Falkenberg  
Jeff Kodosky  
Robert Rutishauser  
Jim Smith

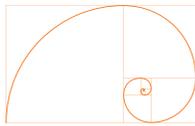
# SPONSORS & DONORS *SEPTEMBER 2009–AUGUST 2010*

3-M  
AMS Epsilon Fund  
H-E-B Tournament of Champions  
KDK-Harman Foundation  
Kodosky Foundation  
MAA – Tensor  
Meadows Foundation  
Mollusca Fund  
Sid W. Richardson Foundation  
Siemens Foundation  
Time Warner Cable  
U.S. Department of Education  
Bruce Lockhart  
Chris Hillar

Darrell Piersol  
Ernest Butler  
Harry Lucas  
Helen Zhang  
Jenny Chen  
Lisa Lefkowitz  
Wenyaw Chan & Alice Chuang  
Sharon Xie

Thanks to the generosity of these foundations, corporations, and individuals, Mathworks is making an impact on mathematics education. Your support is vital to our work.

Thank you!



# Mathworks

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