ELECTON RESULTS

The Nominations Committee thanks the MCTM membership for submitting election ballots! We thank all the candidates for their leadership and expertise in mathematics education and we congratulate the following people who won the election for our Board of Directors.

- Vice President at Large: Lisa Conzemius, Detroit Lakes High School
- Vice President High School: Paula Bengtson, Rush City High School
- District 1 Director: Megan Oswald, Lincoln K-8 Choice School, Rochester
- District 4 Director: Karen Hyers, Tartan High School, Oakdale
- District 7 Director: Sherri Kruger, Badger School District

We look forward to working with these MCTM members, and thank all the candidates for their diligent work in mathematics education. The new officers will be installed and commence their terms of service at the close of the 2011 MCTM Spring Conference.

2011 MCTM SPRING MATHEMATICS CONFERENCE

Finding Mathematics in the Real World

The Minnesota Council of Teachers of Mathematics and Minnesota Mathematics Association of Two-Year Colleges are hosting the annual Minnesota Spring Mathematics Conference April 29-30, 2011 at the Duluth Entertainment Convention Center.

Conference Strands

Geometry, Representation, Standards, Assessment Principle, Technology Principle

Featured Speakers

Mike Shaughnessy, President, National Council of Teachers of Mathematics

Reasoning and Sense Making in Geometry: Representations Provide the Keys

Mike Shaughnessy is currently serving as the President of the National Council of Teachers of Mathematics, and is in the middle of his 4-year term. He has taught mathematics content courses and directed professional development experiences for mathematics teachers at all levels, K–12, community college, and university. He has authored or co-authored over 70 articles, books, and book chapters on issues in the teaching and learning in mathematics education. From 1996–2008 Shaughnessy was the Director of the Doctoral Program in Mathematics Education at Portland State University. Throughout his career his principal research interests in mathematics education have been in the teaching and learning of statistics and probability, and in the teaching and learning of geometry. Mike was on the faculty of the Mathematics Department at Oregon State University from 1976 to 1993, and subse-

(Continued on page 4)
MCTM Continues to Build a Foundation

Help the MCTM Foundation meet a $5,000 Challenge Grant. In an effort to attract new donors to the MCTM Foundation, the MCTM Board of Directors has issued a $5,000 challenge grant to the Foundation. To qualify for this challenge grant the Foundation must receive donations from at least 100 new donors by July 31, 2011. If you are a first-time donor to the Foundation you can help meet this goal with a donation of $10.00 or more. See how far we've come by viewing the grid at http://www.mctm.org/foundationgrant.php and visit our table at the Spring Conference.

Funding may support:
- Recruitment/retention assistance for math teachers, schools, and district.
- Acquisition of proper teaching tools and materials.
- Teachers to attend external learning opportunities.
- Peer networks within schools, districts, and statewide.
- A Math Mentor Network.
- Business and industry partnerships, to provide practical applications.

Goals of MCTM

To develop an active interest in the science of mathematics.
To help provide opportunities for the exchange of ideas and materials regarding instruction in mathematics.
To further the study of problems relating to the teaching of mathematics at the elementary, secondary, and college levels.
To work for the improvement of mathematics instruction at the elementary, secondary, and college levels in Minnesota.
To work for the improvement of employment and service of members of the Council and members of the profession in general.

2010-2011 MCTM Board of Directors

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The **MCA-III Item Samplers** are available to help prepare students for taking the MCA-III. In this article we will give some general information about the samplers.

**Sampler format**

Item Samplers are available in both paper and online format. The multiple choice items are the same in both formats. The numeric type-in and gridded response items are the same in grades 5-8. The Technology Enhanced (TE) items are only included in the online format.

**Functionality**

The Item Sampler provides the student the look and feel of the test. The items and tools function as they will on the MCA-III. One function new to online tests is audio for all students.

The samplers do have some limitations in scoring the student responses. It is feasible to have immediate scoring of multiple choice items in the samplers but including scoring of all possible student responses to a TE item is beyond the capacity of the sample test delivery system. The teacher guide for each grade includes one correct answer for each TE item. As teachers use the sample items for test preparation, we hope there is opportunity for discussions with students about acceptable answers and about giving complete answers when there are multiple correct answers for an item.

The graphing capability shown in the Item Sampler is consistent with the graphing capability of the operational assessment. When an item requires a line to be graphed by plotting points, the underlying technology graphs only the segment that connects the points. Although this is not the ideal display of the answer, by definition the segment is a part of a line but the line is not defined only by what is visible. If the segment graphed is accurate, the student has made the required graph.

Students are not able to save their responses in the online item sampler and continue their work at a later time. The MCA-III does allow students to exit the test and resume testing at a later time.

**Calculators**

A calculator is provided as a tool in the item samplers. Samplers in grades 3 – 6 have a four function calculator samplers in grades 7 & 8 have a scientific calculator. The calculators can also be accessed on the Pearson Perspective website: [Educator Home](#) > [Learning Resources > Tools](#)

Students taking the on-line test must use the calculator provided in the test. On-line items provide a calculator when students are allowed to use it on a problem. When students are required to solve a problem without a calculator, there is no calculator provided with the item.

**Sampler items**

All items in the samplers are aligned to the Minnesota K-12 Academic Standards in Mathematics (2007) and the MCA-III draft test specifications. The teacher guides for the samplers provide information about the alignment of each item. The items in the sampler allow students to experience the full range of difficulty of the benchmarks. The challenging items are intended to be used as teaching tools to help students become more comfortable with questions of a higher level. The MCA-III's follow psychometric guidelines that ensure the full range of difficulty of the standards is assessed on each test form.

**Materials allowed during testing**

A printed formula sheet may be provided for students to use during the online math test. The paper test book includes the formula sheet in the front

(Continued on page 4)
During the online math test, students may be provided scratch paper and plain grid paper. The paper test book includes grid paper at the back.

**MCA-III Test items**

During the spring 2011 online grades 3-8 Mathematics MCA, students will be primarily answering questions that count for the reported score, and a limited number of questions that are for future test development and scaling purposes. All questions that contribute to a student’s score will be aligned to the student’s grade level MN Academic Standards. In order to permit us to construct an across-grade or vertical scale, some students may be asked to respond to a few questions aligned to out of grade level MN Academic Standards. This procedure is widely used and accepted for creating a vertical scale (Kolen, M. J. & R. L. Brennan. Test equating, scaling, and linking. New York: Springer, 2004. chapter 9). Any out of grade level question will be no more than two grade levels above or below a student’s grade. Students will be able to utilize their grade level content knowledge to work the questions. The validity of our vertical scale will be enhanced when students do their best on all questions they encounter during the administration.

Please feel free to contact us with questions about assessment.

Rosemary Heinitz  Rosemary.heinitz@state.mn.us
Margarita Alvarez  Margarita.alvarez@state.mn.us

Karim Logue, Founder and CEO of Mathalicious

*From Hip-Hop to the iPad: Making Math Real*

Karim Logue is the founder and CEO of Mathalicious (http://www.mathalicious.com). Previously, he taught eighth grade math in Greene County, VA and New York City, and was later a middle school math coach in Alexandria, VA. Today, Karim spends most of his time scouring the cosmos for interesting questions, and translating them into math lessons. These explore everything from whether people with small feet pay more for shoes, to whether video games consoles have followed Moore's Law (and what this means for the future of humanity). When not working on curriculum, Karim is an avid photographer and vagabond; he has shot in over forty countries, and has lived in seven. Karim holds a bachelor's degree in economics from Stanford University, and a master's degree in secondary math education from the University of Virginia.

More conference information will be posted and on-line registration is available at the MCTM web site. [www.mctm.org](http://www.mctm.org) Advance registration deadline is April 22.

"What does this mean? When will I use this?"

If you’re a math teacher, you’ve probably heard these questions before. We’re here to help you answer them.

At Mathalicious, we believe that math isn’t something to learn, but a tool to learn about other things. Our mission is to help transform the way math is taught by providing you with the best, most meaningful and most relevant math content available. Our lessons are aligned to traditional state standards but, unlike most content, emphasize conceptual understanding through engaging real-world applications.

What does this mean for you and your students?

It means you can use linear equations to pick the right cell phone plan, and percents to get healthier. It means you can use proportions to compare the iPhone and the iPad, and explore whether the Olympics are fair. Our approach means that you as a teacher can foster real conversations, real learning about topics that students really care about.
The following resolutions came forth from the 2010 Delegate Assembly. The resolutions were initially brought before the MCTM Board of Directors on May 1, 2010 and subsequently assigned to committees as appropriate for consideration and action.

Resolution #1
Be it resolved that MCTM request MAA (Mathematical Association of America) participation in Spring Conference.
Action taken:
- Assigned to Professional Partnerships Committee. (5/1/10)
- MAA membership will be encouraged to apply to speak at Spring Conference and/or have a strand in the program. (9/11/10)
- A MAA strand is being considered for the Spring Conference. (12/4/10)
- A MAA connection did not prove feasible for this year; will be considered for future. (2/4/11)

Resolution #2
Be it resolved that MCTM investigate approaches to improve communication to and among the membership.
Action taken:
- Assigned to Membership Committee. (5/1/10)
- E-Webinars will be explored as a networking tool. Membership expiration notices will be helpful. (9/11/10)

Resolution #3
Be it resolved that MCTM provide session abstracts online prior to conferences.
Action taken:
- Assigned to Spring Conference Committee. (5/1/10)
- Session abstracts will be available online for the Fall Conference. The Spring Conference Committee will report at a subsequent meeting. (9/11/10)

Resolution #4
Be it resolved that MCTM provide at the spring conference a place and time for teachers to socially connect. For example, designate tables at lunch or at the president’s reception for people who wish to connect (by subject area, grade band, etc.)
Action taken:
- Assigned to Spring Conference Committee. (5/1/10)
- There are plans to incorporate into the Spring Conference. (12/4/10)

Resolution #5
Be it resolved that MCTM investigate a financial incentive to attend both fall and spring conferences to encourage attendance and increase membership.
Action taken:
- Assigned to Membership Committee. (5/1/10)
- A $20 reduced rate coupon will be included in the Fall Conference program book to use for the Spring Conference. A $10 reduced rate coupon will be available to Spring Conference participants for use at the next Fall Conference. (9/11/10)

1) Suppose that you have a rope wrapped around the “equator” of a basketball. How much longer would you have to make the rope so that it is suspended 1 foot from the surface of the basketball at all points?

2) Now suppose you have the rope around the equator of the earth. (That’s about 25,000 miles long!) How much longer would you have to make the rope so that it is 1 foot off the ground all the way around the equator?

Surprised at the answer? Quite amazing!
Teaching mathematics for understanding requires teachers to develop deep understanding of the content beyond what is required for their grade level. We will examine important, grade-band specific mathematical ideas and understandings in number and algebra. We will study topics that are challenging to teach, difficult for students to learn and crucial for the development of mathematical proficiency as students continue their study of mathematics. We will look at lesson planning, instruction, interactions with students and assessment within each topic. Join leaders from across the state as we discuss the role of specific content knowledge in improving student achievement in mathematics.

Participants will have the opportunity to focus on one of the following challenging areas:

- Number sense (for young learners)
- Rational numbers (for intermediate level learners)
- Ratio, proportion and proportional reasoning (for middle school learners)
- Functions (for high school learners)

We will also have a session for administrators and curriculum coordinators to talk about professional development across the specified areas.

Who should attend?

- Administrators
- School board members
- District curriculum leaders
- Teacher leaders
- Teacher educators
- Teams from districts or schools

Why should you attend?

- To explore the big ideas and essential understandings in an important area of mathematics.
- To make connections with other mathematical ideas within the topic and other mathematical ideas students will encounter in the classroom.
- To consider the challenges that students often encounter in developing understanding related to the topic by analyzing the development of student thinking and how to assess for understanding.
- To create an opportunity for a school or district teams to explore how to more effectively reach students within challenging areas of mathematics.

Keynote speaker: Mike Shaughnessy, President, NCTM

Breakout sessions by grade band (PK-2, 3-5, 6-8, 9-12) will be led by pairs of math educators and classroom teachers.

Registration Information: See the MCTM website for further registration information. Individual and team registrations are available. Registration includes one copy of your grade-band level book from NCTM’s Essential Understanding series or Teaching and Learning Mathematics: Translating Research for School Administrators, along with continental breakfast and lunch.
Geometric Solids

This tool allows you to learn about various geometric solids and their properties. You can manipulate, rotate, and color each shape to explore the number of faces, edges, and vertices, and you can also use this tool to investigate the following question: For any polyhedron, what is the relationship between the number of faces, vertices, and edges?

Shape Tool

This tool allows you to create any geometric shape imaginable. Squares, triangles, rhombi, trapezoids and hexagons can be created, colored, enlarged, shrunk, rotated, reflected, sliced, and glued together. What design can you create?

Tessellation Creator

What shapes tessellate? If shapes can be combined to make patterns that repeat and cover the plane, then they tessellate. What patterns can you find? Which of the shapes tessellate by themselves? Can you cover the plane with just triangles? just squares? just pentagons?

Try to find a way to make a tessellation with just squares and octagons. Which other combinations of shapes tessellate? Is there a way to tell if shapes with tessellate by looking at the properties of those shapes? How?
A seemingly clandestine meeting takes place each year that helps shape the course of mathematics education in Minnesota. Those in attendance make plans and devise tasks that will directly affect you—and you may not even be aware that the meeting is taking place. Does that cause you to shout, “What’s going on here? I demand to know what is happening. I want to hear everything that is being said at that meeting. In fact, I want to be at that meeting!” Well I certainly hope so.

The meeting in question is the MCTM Annual Delegate Assembly held the Friday evening of the MCTM Spring Conference in Duluth. And the tasks that shape your future originate from the resolutions submitted by MCTM members. The MCTM Board of Directors wants you, as an MCTM member, to be aware of the process, so that you have an opportunity to shape your own future.

The process is straightforward and logical, just what you would expect from an organization of mathematics teachers. Minnesota has been divided into eight districts, closely aligned with the federal congressional districts. Each district has a district director elected by the MCTM members from that district. To find your district director you can look on the MCTM website or search this issue of Mathbits.

Your district director is interested in hearing from you about your concerns and ideas; email communication often works best. Your district director will compile all the ideas and concerns you submit and bring them to Duluth. Then after the Friday luncheon there are eight District Meetings led by the eight district directors. You are encouraged to attend and contribute to your district meeting. Since there are no other sessions scheduled during the district meetings, it should be easy for you to be able to attend.

During the district meetings members will propose resolutions to be presented to the board of directors. Each year there are questions regarding what type and how many resolutions should be submitted. Here are some suggested guidelines.

- A resolution should be about something that we are actually able to accomplish. We all would like to see world peace, but MCTM can do little to bring it about. So well meaning resolutions that are outside of the scope of MCTM sound nice but will never get accomplished.

- A resolution should not deal with lobbying. MCTM is a 501c3 organization. This means we are tax exempt, but it also means we have to be careful not to spend more than a small fraction of our time and resources lobbying the government. Consequently, a resolution that involves a good deal of lobbying cannot be taken on by the board of directors.

- A resolution has to be handled by volunteers. Your district directors and all other elected board members get no compensation for their efforts. They are on the board because they care about students and want them to have quality mathematics instruction. They would like to do much to help you, but they have to work on the resolutions after they have marked homework, planned their lessons, and dealt with all of the issues teachers deal with every day. That doesn’t give them much time. So please make sure your resolution is important enough to have your colleagues use their spare time to work on it.

With those guidelines in mind, the districts, led by their district directors during the district meetings, craft resolutions and submit them to the delegate assembly held Friday night, right after the dinner buffet. The Delegate Assembly is the official business meeting of MCTM. Each district is allocated a specific number of delegates based upon the number of MCTM members in that district. Your district director is responsible to find delegates to represent the district. This is not as easy a task as you might think. So if you are interested in serving
as a delegate, let your director know. Delegates are expected to attend the assembly. They will discuss and vote on the resolutions. MCTM members who are not delegates are welcome to attend the assembly proceedings, but are not allowed to vote on a resolution or submit a resolution from the floor (that is what the district meetings held in the afternoon are for).

The assembly is conducted as follows. The executive director, Tom Muchlinski, and the financial secretary, Craig Rypkema, present short reports on the state of the organization. Then the resolutions are introduced, debated, and voted upon. During this process some resolutions that do not meet the guidelines do not pass. Those resolutions that do pass are submitted to the board of directors. The board discusses the resolutions, determines whether each can be accomplished and is within the scope and mission of the organization and then votes on acceptance of the individual resolutions. Those resolutions that are accepted are then assigned to the appropriate committee to start working on them. During the school year MCTM members are giving a status report on the resolutions through Mathbits and the MCTM website.

The board of directors truly wants to serve all of its members and hopes this article has answered some questions, sparked some interest, and will encourage you to be part of the process.

Need a pentagonal pyramid that's six inches tall? Or a number line that goes from -18 to 32 by 5's? Or a set of pattern blocks where all shapes have one-inch sides? You can create all those things and more with the Dynamic Paper tool. Place the images you want, then export it as a PDF activity sheet for your students or as a JPEG image for use in other applications such as your interactive whiteboard.

**Dynamic Paper** allows you to create the following:
- Nets – two-dimensional outlines of three-dimensional shapes, including regular polyhedra, prisms, pyramids, cylinders and cones
- Graph Paper – coordinate graphs, polar coordinates, logarithmic graph paper
- Number Lines – including positive and negative coordinates
- Number Grids – hundreds boards and the like
- Tessellations – tiling patterns involving triangles, quadrilaterals, and hexagons
- Shapes – pattern blocks, attribute blocks, and color tiles
- Spinners – up to 16 sectors, with adjustable sizes

All images are can be customized in size, position on paper, addition of color, cloned for multiple copies, and more. All these examples were created in just a few minutes total.
CONNECT Session at the Spring Conference

Preservice teachers and those in their first several years of teaching are invited to attend the CONNECT Session the evening before the MCTM Spring Conference in Duluth. It will be held from 7:00-9:00 PM on Thursday, April 28 at the DECC. This event is sponsored by the CONNECT Committee and the MinnMATYC Mentoring program and has grown in size and popularity since its inception in 2003.

The session provides an orientation designed to maximize attendees’ conference experience during the next two days. Conference sessions that will be of particular interest to new teachers will be highlighted. It is also an opportunity for attendees to network with other teachers having similar interests and to meet some of the leaders in mathematics education.

In addition to meeting new people, preparing for the conference, and gathering new teaching ideas, participants will be eligible for door prizes and can come away with free learning materials from the famous “Book Giveaway.”

There is no charge for this event, that’s right – free food courtesy of MCTM! Reservations are not required but are greatly appreciated, especially if several people from a school or college are coming. If you know you will be attending, simply contact Betty Johnston at elizabeth.johnston@comcast.net  Thanks! And see you in April!

Mentoring

MCTM’s virtual mentoring program, facilitated by Ann Sweeney of St. Catherine University provides a bi-weekly email message to beginning teachers that includes teaching suggestions, problem ideas, useful websites and information about upcoming events. The Council also offers one-on-one mentoring with an experienced teacher to those who request it. In addition, we offer our Matt Mentor advice column found elsewhere in this issue of Mathbits as well as previous Matt Mentor columns archived at www.mctm.org

College Contacts

The CONNECT Committee has established a network of over 120 college and university faculty who receive information about how their students can benefit from MCTM. Each campus exhibits an MCTM poster that is updated every six weeks and describes upcoming MCTM activities. Ryota Matsuura from St. Olaf coordinates this effort so if you are a faculty member who works with preservice teachers and would like to be included in these mailings, contact him at matsuura@stolaf.edu

The possibilities are endless with Dynamic Paper! Only two more clicks would color the tessellations.
Dear Matt Mentor:

I am having trouble covering all the necessary topics in algebra II and still including the content of the state mathematics standards. Do you have any advice?

Rushed Algebra II Teacher

Dear Rushed:

It seems that algebra II teachers have been feeling this rush for a long time. This is a perfect time to ask your question, since we are at a transition period in algebra expectations and curriculum. Here are some of the differences from the past.

1. What needs to be taught is that content which is specified in the state standards, those dated 2007-2008. (They were developed in 2007, and placed in rule, making them official, in 2008.) Therefore, for algebra II, the content of the course is not just what is in any textbook, and not what “we’ve always done”. It must focus on the content of the standards for algebra at the high school level, adding content as needed to meet standards, and omitting content not included in state standards.

2. Students arrive at high school, starting this year, having had the opportunity to learn the algebra of lines, and those additional ideas in the 8th grade standards related to the algebra of lines. If their 8th grade teachers have followed #1 above, students should have a good grasp of these topics, since their teachers were able to focus on the specified standards rather than having to try to teach all the content often found in an algebra I textbook.

3. Teachers at all grades must adopt a new mindset that is different from past practice. The Minnesota standards are non-repetitive, that is, each grade lays out a shorter list of big ideas for that grade, giving teachers enough time to plan more extended instruction, and students more time to grasp the concepts. This also requires that all teachers must gradually wean themselves from re-teaching numerous topics from previous years’ standards. In the case of algebra II, about half of the course in the past was a repetition of algebra I.

4. This change puts responsibility on everyone in the system. Teachers will need to work to ensure that students can learn the content for the course. Students will also need to accept responsibility for learning concepts well the first time, with effective instruction. As we make the transition to a non-repetitive system in mathematics, we must make provisions to support students who do not fully understand the content of previous courses, while still not stealing time needed for new instruction. When students need to brush up, expect them to do some of this outside of class. Possible ideas for intervention include mini-diagnostic tests that check for mastery of critical ideas, brief, focused, and “just-in-time” review in class, self-help with review materials out of class, tutoring help, or technology-based review sessions.

The standards at high school are specified by level rather than grade, and can be configured in anyway a district decides. Some districts are spreading the algebra portion of the standards, together with the data analysis and probability, over 3 years for many of their students, with the first year occurring in grade 8, the second in grade 9, and the third in grade 11, with 10th grade devoted to geometry and measurement.

This still leaves grade 12 for a variety of possible courses. These might be a math applications course to pull together previous content and prepare for future work, or the study of additional statistics in an AP Statistics course, or a pre-calculus level course of advanced work not covered in the standards, such as circle trigonometry, matrices and vectors, polynomial functions, and other advanced topics. Some students in schools may be ready for any courses at an earlier grade, and may choose to study AP Calculus or other advanced content.

(Continued on page 12)
So, to sum up, here are some suggestions for making algebra II less crowded and more effective:

- Minimize re-teaching what students are expected to already know, such as the algebra of lines (see the 8th grade standards for specifics).
- Omit topics not included in Minnesota standards for grades 9-11.
- Do not simply follow the textbook.
- Develop strategies for supporting students who do not have a solid understanding of previous learning.
- Collaborate with other teachers in your school or nearby schools to develop a scope and sequence for algebra and other strands based on state standards, and help each other find good resources for such instruction.

Good luck, and happy algebra teaching! Matt Mentor!

"Unraveling Complex Systems" will be the theme for Mathematics Awareness Month, April 2011, as per a joint announcement from the American Mathematical Society, the American Statistical Association, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics. Mathematics Awareness Month is sponsored by the Joint Policy Board for Mathematics (JPBM).

How do epidemics spread, birds flock, and stock markets operate? Many of these answers fall within the realm of mathematics.

From natural entities such as living cells, insect colonies and whole ecosystems to man-made inventions like power grids, transportation networks and the World Wide Web, we see complex systems everywhere. Deciphering the mathematics behind such systems can unravel well-structured networks and discernible patterns in natural and artificial structures. That is the idea behind Mathematics Awareness Month, April 2011.

Understanding these complex systems can not only help us manage and improve the reliability of such critical infrastructures of everyday life, but can also allow us to interpret, enhance and better interact with natural systems. Mathematical models can delineate interactions among components of these systems, analyze their spontaneous and emergent behaviors, and thus help prevent undesirable developments while enhancing desirable traits during their adaptation and evolution.

In an effort to improve our understanding of such systems, the Joint Policy Board of Mathematics has chosen the theme, “Unraveling Complex Systems” to highlight the role of mathematics in the discipline. The 2011 Mathematics Awareness website will have articles and other resources to help explain the math behind such diverse systems as our dynamic response to HIV infections to production links that determine product trade between countries.

Articles and essays, as well as 8.5 x 11" copies of any of the four 2011 posters can be downloaded at www.mathaware.org.

About Math Awareness Month and JPBM: Mathematics Awareness Month, held each year in April, was created to increase public understanding of and appreciation for mathematics. It began in 1986, when President Reagan issued a proclamation establishing National Mathematics Awareness Week. Activities for Mathematics Awareness Month generally are organized on local, state and regional levels by college and university departments, institutional public information offices, student groups, and related associations and interest groups. The JPBM is a collaborative effort of the American Mathematical Society (AMS), the American Statistical Association (ASA), the Mathematical Association of America (MAA), and the Society for Industrial and Applied Mathematics (SIAM).
Transformations and Tessellations

I’m writing in response to the call in the last issue of Mathbits to share ideas to enhance learning geometry. I would like to share my experience with “[Making] learning geometry real and motivating via connections with students’ interests (art, music, skateboarding, etc)?”

The 2007 Minnesota Academic Standards at the 4th and 7th grade levels require that students be able to:

- **Use translations, reflections and rotations to establish congruency and understand symmetries.** (grade 4) and
- **Analyze the effect of change of scale, translations and reflections on the attributes of two-dimensional figures.** (grade 7).

Using materials from various sources such as the CMP2 unit *Kaleidoscopes, Hubcaps, and Mirrors*, the website www.tessellations.org, and materials provided by the University of Minnesota MathCep department, I teach a flex class to middle school students surrounding the topic of geometric transformations. For several weeks, my students learn about translation, reflection, and rotation by completing activities with manipulatives like Miras, angle rulers, and Cuisenaire Rods. Eventually they are able to perform multiple transformations on figures drawn on a coordinate plane.

After learning the “math” behind each transformation, students make a tessellation design piece from a cardboard square, triangle, or hexagon. Near the end of the unit, students will have five or six design pieces, each created by translating, rotating, or reflecting design motifs cut from the cardboard edges. They choose their favorite one to create a final project: an artistic tessellation. My students enjoy this activity regardless of their artistic talent. Once the design piece is replicated across the poster board, even my most linear students become very creative about seeing an object, person, or animal in their work and coloring the tessellation to illustrate their idea.

The website TESSELATIONS.org at www.tessellations.org has been a great resource for my students. Some of the topics they can research here are the history of tessellations, tessellations in nature, the father of tessellations - M.C. Escher, and methods for creating tessellations. Their favorite pages though, are the galleries where one can view stationary and animated tessellations created by professionals, as well as students like themselves. The webmaster, Seth Bareiss, welcomes contributions from schools and recently placed twelve of my students’ tessellations in the gallery titled School Galleries > Clearwater Middle. The kids were thrilled to go online and see their own work published for all to view! This has definitely been a motivating factor for them as well as for my current group of students who also hope to create tessellations creative enough to “make it to the website”.

Seth Bareiss also directed me to the World of Escher Contest site, www.worldofescher.com/contest. I checked it out and my goal is to get some of my students’ work entered. You can send in students’ tessellation art. Seth explained that the contest is free to enter, and mostly focused on students around the age of my middle grades students. Many contestants make the first cut, and their art is visible to be voted upon and commented upon by the public for 6 months. At the end of 6 months, the three best are put into a permanent "hall of fame" gallery, and the winners are offered inexpensive prizes from World Of Escher's gift shop. Winners are NOT chosen based on the beauty of their art so much as the weighing of their age against their achievement. Seth also stated that “Believe it or not, that's the most prominent and longest-lived tessellation contest I'm aware of.”

For more information about lessons and materials, contact Mary Jo Hughes at maryjohughes@waconia.k12.mn.us.
Applications are being accepted for the 2011 Toyota International Teacher Program to Costa Rica. The program will take place November 19 – December 3, 2011 and the deadline to apply is May 4, 2011. Full-time classroom teachers of all subjects and librarians, for grades 7 – 12, are invited to apply. Please visit the website at www.iie.org/toyota for additional information and application instructions.

The Toyota International Teacher Program is a fully-funded international professional development program for U.S. teachers. Funded by Toyota Motor Sales, U.S.A., Inc., and administered by the Institute of International Education, the program seeks to advance environmental stewardship and global connectedness in U.S. schools and communities. The Program to Costa Rica will explore environmental and cultural preservation, biodiversity, and sustainability through a variety of site visits, discussions, lectures, and hands-on activities. Program participants will have an opportunity to meet with local experts, visit schools and museums, and experience the rainforest first-hand.

The Toyota International Teacher Program values diversity and encourages educators of all backgrounds, subjects, and school types to apply for this unique professional development opportunity.

Colloquium on P-12 STEM Education Research August 15-16, 2011
A national forum for professionals researching and teaching P-12 STEM education
Continuing Education & Conference Center
University of Minnesota - Saint Paul campus

Join researchers, teachers, practitioners, legislators, and other STEM professionals from the state of Minnesota and around the nation for a unique interactive colloquium focusing on sharing problems and creating solutions for those involved with P-12 STEM Education. Hear different perspectives on how to integrate STEM, learn strategies to implement what works, find out about emerging research, and get clarity on how to meet common-core standards. Gain the knowledge to make a difference in theory and practice, and bridge the gap between teaching STEM in the 21st century using 20th century methodology. Active participation in the breakout sessions will provide a customized experience for each involved.

The colloquium features three “tracks” one may follow: research, research to practice, and workshops. Attendees are not restricted to any of the three tracks.

This event is sponsored by the STEM Education Center and the College of Education and Human Development (CEHD) at the University of Minnesota.

For more information: http://www.cehd.umn.edu/stem/

Make a plan and put it on your calendar—before you file this newsletter away—to share your ideas or experiences connected to the many facets of learning geometry!

One-half to two pages in a Word document is sufficient.
Graphics or pictures are great!
Please provide references for published materials that you’ve used or adapted.

Don’t let concerns about your writing not being polished enough make you hesitate—the editor and Mathbits committee members are glad to provide you with feedback.

Send your write-up electronically to Mathbits editor at tlgonske@nwc.edu by May 15.
Questions are also welcomed.

MCTM is a members’ organization. We want to spread the wealth of Minnesota teachers’ knowledge and experience.
2011 SPRING MATHEMATICS CONFERENCE

ADVANCE REGISTRATION FORM

REGISTER PRIOR TO APRIL 8, 2011 AND RECEIVE THE EARLY REGISTRATION DISCOUNT RATE

ADVANCE REGISTRATION CLOSES FRIDAY, APRIL 22, 2011 – AFTER THIS DATE YOU MAY REGISTER ON-SITE

Finding Mathematics in the Real World
• Geometry                 • Representation                  • Standards
• Assessment Principle             • Technology Principle

Duluth Entertainment Convention Center (DECC) – Duluth, MN
April 29 - 30, 2011

Register for the 2011 Spring Mathematics Conference by completing this form or online at www.mctm.org

You will receive an email confirmation of your registration. Please be sure to provide a current email address.

Name ________________________________________________________________
Address _______________________________________________________________
City _______________________ State _____ Zip Code __________
□ I am willing to be a presider

□ Teacher/Professor/Instructor □ Specialist/Coach/Supervisor □ Administrator □ Undergraduate Student □ Retired □ Other

LEVEL
□ Elementary □ Junior High/Middle □ High School □ District □ Post Secondary □ Other
UNDERGRADUATE STUDENTS ONLY – Please Indicate Your Level of Certification □ K – 8 □ 5 - 12

SPRING CONFERENCE REGISTRATION FEES
• Friday and Saturday registration fee includes two lunches and the Friday afternoon Presidents’ Reception
• Saturday only registration fee includes one lunch
• Non-member and lead speaker registration fees include a one year MCTM membership fee
• There is no Friday only registration

CANCELLATION POLICY
For refund requests received by Friday, April 22, 2011, MCTM will refund 50% your registration fee. After this date, no refunds will be given.

CONFERENCE REGISTRATION

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<th>Friday and Saturday</th>
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□ Vegetarian meals requested

MCTM DUES

□ New □ Renewal □ Do not need to renew

Regular Membership
□ 1 Year - $25.00 □ 2 Year - $40.00

Student/Retired Membership
□ 1 Year - $12.50 □ 2 Year - $20.00

Amount Due

Registration Fee
Dues
Fall Conference Discount (if applicable)
Foundation Contribution (optional)

TOTAL DUE

Method of Payment

□ Credit Card □ V □ MC □ D
Card Number ____________________________
Expiration Date _________________________
Signature ______________________________

□ Check payable to MCTM
□ PO Number ___________________________
(Purchase order must be attached)

Mail to: MCTM
PO Box 289
Wayzata, MN 55391
Phone: 612-210-8428
March 12, 2011 Winning Strategies Conference
April 13-16, 2011 NCTM Annual Meeting & Exposition, Indianapolis, IN
April 28-30, 2011 MCTM Spring Conference, Duluth, MN

The MCTM is an organization of professionals dedicated to promoting the teaching and learning of meaningful mathematics for all students by supporting educators in their efforts to improve mathematics education.

Mission Statement:

Mark Your Calendar

MCTM strives to provide membership with current information regarding mathematics education in the state of Minnesota. To accomplish this goal, we need an accurate, permanent address for each member. Is your correct address printed on the label of this issue of Mathbits? If not, contact Exec. Director Tom Muchlinski at 763-475-3168 or tmuchlinski@earthlink.net or visit the MCTM web site (www.mctm.org) membership page to make your change. Student MCTM members and members in transition are encouraged to provide a permanent address. Newsletters mailed to student members will not be forwarded. Thank you for helping us stay in touch! FYI: In an effort to be cost effective, MCTM sends newsletters at USPS bulk rate. As a result, delivery times may vary between postal districts.

MCTM’s Electronic Times is sent out by the Publicity Committee. Do we have your correct email address? Contact Tom Muchlinski with changes.

Do we have your correct address and email?

Check the mailing label for your membership renewal date. Renew online at www.mctm.org

Please submit items for publication in the next issue of Mathbits to tlgonske@nwc.edu by May 1, 2011. Email or call 651-631-5228 with any questions. - Teresa Gonske, Editor