



Mathbits

2011 MCTM Fall Conference

Friday, October 21 at Maple Grove Senior High School

Standards & Curriculum: Defining what students should understand and be able to do in their study of mathematics.

As part of the conference focus, the recently-written Minnesota Mathematics Frameworks document will be shared. Mike Lindstrom, director for the SciMathMN Frameworks Project is the keynote speaker. The conference features nearly 50 sessions. Registration opens at 7:30 with the welcome and keynote address at 8:00. Check the MCTM website for descriptions of the conference sessions.

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State Finalists for the 2011 Presidential Award for Excellence in Mathematics and Science Teaching Announced

Congratulations to the mathematics finalists for the 2011 Presidential Award for Excellence in Mathematics and Science Teaching!

Meredith Boucher, North Jr. High, Saint Cloud School District

Donna Forbes, Mahtomedi High School, Mahtomedi School District

Andrew Schwen, Roosevelt Middle School, Anoka-Hennepin School District

The three state finalists are chosen by a State Selection Committee. The Minnesota Council of Teachers of Mathematics honors each of the state finalists with a paid two-year membership in MCTM and a complimentary registration for the Minnesota Spring Mathematics Conference. One of the three state finalists will be selected by a National Selection Committee as The Presidential Award winner for Minnesota. The state Presidential Award winner is announced by the White House and will receive a \$10,000 cash award from the National Science Foundation as well as an invitation to Washington, DC for a week of recognition activities.

Please consider nominating an outstanding mathematics teacher in grades K-6 for the 2012 award. Visit www.paemst.org for more information.



Halloween math...

Q: What do you get when you take the circumference of your jack-o-lantern and divide it by its diameter?

A: Pumpkin π .

Important notice for all members

MCTM is transitioning to electronic communication

MCTM is transitioning to electronic communication with the membership. In order for you to receive information, MCTM needs to have your current email address on file. You may update your email address by sending a message to Tom Muchlinski at mctm@mctm.org

Please be sure that messages from the address mctm@mctm.org are not being blocked by your server or are being sent to your SPAM folder. If you do not receive any messages from MCTM over the course of the next few weeks, please email Tom Muchlinski at mctm@mctm.org

The MCTM Board of Directors election will be conducted electronically in December. Please be certain that MCTM has your current email address on file so that you may participate in the election. You may update your email address by sending a message to Tom Muchlinski at mctm@mctm.org. More information concerning the election will be emailed to the membership in November as well as posted on the MCTM website (www.mctm.org)

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.*

2011-2012 MCTM Board of Directors

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Happy Fall! This is always an exciting time of year and I hope you have had a great start to the school year. It is not too early to think about attending the Fall Conference on October 21 at Maple Grove Senior High School. Hopefully, you are also securing those staff development funds to present and attend the Spring Conference in Duluth, May 4-5, 2012.

Strategic Planning

Members of the MCTM Board and Executive Committee met this summer to begin work on a new strategic plan. Our strategic plan articulates specific goals and describes the action steps and resources need to accomplish them. It will guide us in our work and help us as we develop our budget in February.

We identified four areas of need:

- Effective Communication
- Equity
- Professional Development
- Mathematics District Leadership.

I will present the strategic plan to the Board and Executive Committee by the end of September. The plan is on our website for your information. Hopefully, you will be willing to help us as we work to accomplish our goals. We will report on our progress yearly during the Delegate Assembly at the Spring Conference. As we worked on the strategic plan, we appreciated the contributions from the delegates by way of the resolutions from last spring's Delegate Assembly. Thank you those who participated in strategic planning process this summer: Paula Bengtson, Karen Coblenz, Bill Eppright, Judy Hansen, Mary Jo Hughes, Seth Leavitt, Larry Luck, Tom Muchlinski, Sharon Stenglein, Cheryl Tucker, Patty Wallace, Kay Wohlhuter, Terry Wyberg, and Sue Wygant.

NCTM Affiliate Leaders Conference

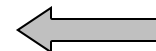
I had the pleasure of attending the NCTM Affiliate Leaders Conference in Denver in July along with Abe Schwartz, our NCTM Representative. The purpose of the Conference was to help affiliate organizations strengthen leadership, partnership, and membership through networking, accessing resources and developing leadership. We had a great time learning from the NCTM Affiliate representatives and leaders from other state Councils of Teachers of Mathematics!

MCTM District Leadership

The Minnesota Council of Teachers of Mathematics in partnership with MDE is seeking to identify K-12 mathematics leaders (Curriculum Coordinators, Instructional Specialists, Coaches, Building Leaders, etc.) across the state. This information will be used to provide communication, resources and support as well as to promote networking for K-12 mathematics leaders. Please use the survey link to register if you are a math leader or send the survey link (<<http://www.surveymonkey.com/s/TKY2NYY>>) to anyone in your school or district who can provide this information. Also, if you know of other K-12 mathematics leaders around the state, please send the link for the survey to them. Thank you!

President's Message

Michele Luke
MCTM President



Wanted:

Contact info for math
leaders across the
state

Compute this!

*A dozen a gross and a score,
Plus three times the square root of four,
Divided by seven
Plus five times eleven
Is nine squared and not a bit more.*

Attributed to Leigh Mercer (1893-1977). (Try to find the equation in Mathbits.)

Mathematics Specialist Report

Sue Wygant
MN Dept. of Education
susan.wygant@state.mn.us

**Must explore,
easily accessible
resources**

Where Do You Go To Get Information?

It's 11 p.m. and the text reads, "need calc help." The mother dutifully calls her son. It's a double integral...an electric flux problem. This is truly livin' the dream...! Doesn't everyone dream of solving an electric flux problem at 11 p.m., over the phone? Well, luckily, it was fairly straightforward, but that doesn't mean there weren't some critical communication snafus--It helps if you're actually working on the same problem...! Here's the problem:

$$\int \int_{-a}^a E_0 \left(1 + \frac{x^2}{a^2}\right) \cos \frac{\pi y}{2a} dx dy$$

"Have you checked it on Wolfram|Alpha?"

"Yes, you can throw anything in there and get an answer, but I need to be able to do it, not just get an answer." This was not a typical response when he was in high school, but how refreshing to hear it now! The mistake he had made? Dropped a negative sign... Welcome to another exciting school year! I hope you are off to a great start.

If you haven't visited Wolfram Alpha or possibly downloaded an app for your phone, it is worth checking out—google it and have fun exploring! Wolfram|Alpha introduces a fundamentally new way to get knowledge and answers—not by searching the web, but by doing dynamic computations based on a vast collection of built-in data, algorithms, and methods.

Isn't it incredible how easy it is to quickly obtain information? As a tribute to the release of the new Frameworks, this article is going to identify some websites that you might visit to help you with your individual questions and also those of your professional learning community. We will also ask you to submit your favorite sites to be included in future issues to be shared with other teachers.

As the access to information continues to improve, teachers and professional learning groups have much more information that can be used to help understand student thinking, guide changes in current practices. Check out the new Frameworks as well as the resources provided below.

Frameworks for Minnesota Mathematics and Science Standards

The Frameworks (www.scimathmn.org/stemtc) were introduced earlier in this issue. Take some time to visit the site, create a login and visit often. If you create a login, you are able to post and read comments to and from other users. Get connected, ask your questions, and share your knowledge!

Electronic Library for Minnesota

ELM is the Electronic Library for Minnesota (www.elm4you.org). It is a collection of research databases that contain millions of encyclopedia, magazine, journal, and newspaper articles; videos; audio files; primary sources; and more. This content comes from sources you know and trust, such as Encyclopedia Britannica, Time Magazine, the New York Times, and many more, but it also has articles from many professional journals in education.

I went to one of ELM's search engines for academic articles called the Academic Search Premier. I typed in "teaching fractions" and said I wanted only full-text articles (articles that can be downloaded) that have been published in peer-reviewed journals since 1990. This collection had 177 articles. Some of the first few titles are copied below.

- ♦ Mathematical Knowledge for Teaching Fraction Multiplication
- ♦ Children's Strategies for Division by Fractions in the Context of the Area of a Rectangle.
- ♦ Efficacy of Different Concrete Models for Teaching the Part-Whole Construct for Fractions.
- ♦ Student Achievement Effects of Technology-Supported Remediation of Understanding of Fractions.

(Continued from page 4)

- ♦ Key Developmental Understandings in Mathematics: A Direction for Investigating and Establishing Learning Goals.
- ♦ An Experiment in Teaching Ratio and Proportion

National Academies Press

Visit www.nap.edu and you will find more than 4,000 National Academies Press PDFs now available to download for free! Search this site for Adding It Up: Helping Children Learn Mathematics to learn about proficiency strands. Also, check out How Children Learn: Mathematics in the Classroom to find out what cognitive sciences research is saying about teaching and learning mathematics.

What's new at NCTM?

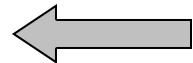
E-Seminars are free for NCTM members! Check out the titles below at www.nctm.org under the Professional Development tab.

- ♦ Assessment Considerations for RTI in Mathematics (General)
- ♦ Mathematics Teaching and Student Learning: What Does the Research Say?
- ♦ Using Multiple Representation in Algebra (Grades 6-12)
- ♦ Applying Response to Intervention (RTI) in Mathematics to Support ALL Learners (General)
- ♦ Developing Effective Instruction for Fractions, Ratios, and Proportional Thinking (Grades 4-8)
- ♦ Using Jokes and Humor Effectively in the Mathematics Classroom (General Interest)
- ♦ Why Don't My Students Have Number Sense? (Grades 6-8)
- ♦ Can Writing Be the Missing Link for Mathematical Understanding?
- ♦ Effective Mathematics Instruction: The Role of Mathematical Tasks (K-12)

Share your best sites!

Please visit <http://www.surveymonkey.com/s/C3YV9MF> to share your favorite websites with other MCTM members.

Wanted: Member Favorites



Introducing the Newly Released Mathematics and Science Frameworks

We are pleased to announce the release of a new online resource that was created with the assistance of over 170 Minnesota educators! The Frameworks are designed to help teachers translate Minnesota mathematics and science standards into classroom practices to impact student achievement. Explanations of the standards/benchmarks, classroom vignettes, sample assessment items, resources for administrators, PLCs, and families, as well as teachers, and more are provided for each standard. Examine how you and your school can use this resource for planning instruction, professional development, and curriculum alignment.

This effort was coordinated by SciMathMN under a grant from the Minnesota Department of Education to highlight practices that support the academic standards. Check out the Frameworks at www.scimathmn.org/stemtc. Please look under the Resources tab for upcoming Frameworks workshops being offered throughout the state.

Frameworks for the Minnesota Mathematics & Science Standards

CREATED BY SCIMATHMN AND THE MINNESOTA DEPARTMENT OF EDUCATION

WHAT ARE FRAMEWORKS?
Frameworks are resources developed to help teachers translate Minnesota state standards into classroom practice and assist in student achievement of those standards.

Search frameworks now ▶



Statewide Assessment Updates

Rosemary Heinitz

Math Content Specialist
MDE Research & Assessment
rosemary.heinitz@state.mn.us

As the new school year begins there are many updates to give you from the MDE Research and Assessment division. The final results for the 2011 Mathematics MCA-III, MCA-Modified, and Minnesota Test of Academic Skills (MTAS) are now available in districts.

The November GRAD retests will be the first assessments administered using Minnesota's new test vendor, American Institutes for Research (AIR).

The window for MCA-III Mathematics grades 3-8 online testing will open on February 6, 2012. The MCA-III online tests will be adaptive this year. This means that the students will get test questions based on how they answer previous questions. Students in districts taking the math test online will have three testing opportunities-how districts choose to use these opportunities is up to each district. The student's highest score will be the score of record.

Due to a new vendor, there will be changes in the online test delivery system. The Item Samplers will show those changes. The GRAD Item Samplers will be available in October and the MCA Item Samplers will be available in late January.

The implementation of Mathematics MCA-III grade 11 aligned to the 2007 standards continues to proceed on schedule.

Finally, we will be speaking at a few sessions at the fall conference on Friday, October 21, 2011. We hope to see you there!

MCTM CONNECT renews efforts to reach beginning teachers

The CONNECT Committee has received the names of all teachers licensed to teach math in grades 5-8 and 5-12 during the past year. This will enable us to contact these newly licensed teachers to make them aware of the benefits that MCTM and the CONNECT Committee has to offer. This connection, by email or U.S. mail, is made possible by the cooperation of **Sue Wygant** of the Minnesota Department of Education, **Tom Muchlinski**, MCTM Executive Director and several members of the CONNECT Committee. Members, If there are newly licensed math teachers in your building, please check in with them to be sure they received the mailing and reinforce the benefits of being CONNECTed to MCTM

Our contacts with preservice teachers continue this year as Campus Representative Coordinator, **Ryota Matsuura**, makes sure that each College and University campus has an MCTM poster that can be displayed where prospective teachers will see it. The posters will contain flyers regularly prepared by **Megan Oswald** with information about upcoming events.

The events CONNECT will be highlighting during this school year include the number of Fall Conference sessions designed for beginning teachers, the Winning Strategies Conference in March, the CONNECT Session preceding the MCTM Spring Conference, **Ann Sweeney's** virtual mentoring emails, live mentor opportunities and the Matt Mentor articles archived on the MCTM website.

Help get new teachers CONNECTed to MCTM!

The MCTM *Mathbits* Committee is seeking member volunteers who are interested in becoming part of an Editorial Panel. We would like the panel to consist of a member volunteer from each of the following areas of teaching experience: 1) elementary grades, 2) middle grades, 3) high school, 4) post-secondary mathematics, and 5) mathematics education. Each will serve as a coordinator to network and make connections with others in the designated area of teaching experience with the purpose of encouraging a range of member contributions for publication in *Mathbits*. The coordinator will obtain member-written contributions such as lesson and activity ideas, favorite resources, etc. and pass them on to the editor. If interested, you can start by contacting the MCTM vice-president for your grade level.

CONNECT

Committee to Orient
and Network New/
Novice Educators into a
Community of (math)
Teachers

$$\frac{12 + 144 + 20 + 3\sqrt{4}}{7} + (5 \times 11) = 9^2 + 0$$

Opportunity to
be involved

Dear Matt Mentor:

My materials have many word problems that require the students to read carefully in order to work them out. I find that students are very resistant to doing problems that require them to re-read or think hard and they come to me saying they don't understand what the problem is asking. Should I read the problems to them emphasizing the important words or sentences? Many of them just give up if they don't understand the problem right away. What can I do to make them more independent in figuring things out for themselves?

Worried teacher

Dear Worried:

Your question raises several different issues: students' willingness to think hard, their difficulties with reading comprehension, and the types of problems we ask them to solve. Let's look at each of those separately.

The most important thing you can do to help your students learn to think hard, and thus to learn mathematics, is not to take on the problem solving yourself. Often when students come to you (or any teacher) saying they don't understand, they are hoping that you will do the heavy lifting for them. We live in a culture where we expect faster and faster speeds in most tasks of life. We want our computers, internet connections, and phones to be ever faster, our food to be served quickly, lines to move rapidly. In teaching problem solving, we are attempting to value the opposite of fast: sticking to a task, often for a prolonged time. Matt once had a poster he loved on the door of his math classroom that said: *Patience, Persistence, Success*, with an appealing picture of a sailboat on it. In order to build these qualities in students we must help them experience success and build their confidence through scaffolding and providing timely supports.

Precise reading is one of the basic skills required in mathematics, and students need to learn to do the careful analysis required for understanding mathematical text, which is very different from reading fiction or most other types of reading. Exercises like those used for reading comprehension can be used to help your students improve these skills. New English-Language Arts standards include technical reading in all disciplines, including mathematics. Successful teachers often use a sequence of activities such as this during a lesson: Read the problem silently; read it aloud; explain it to a partner in your own words; ask a question about anything you don't understand; work on it independently for five minutes, and then join a group and begin to share what you know and what you don't know. This group work can continue for 20-25 minutes.

One frequently used strategy that is not associated with increased understanding is focusing on key words. As often as not, this can be misleading, and is not a useful approach. A strategy that is helpful is encouraging students to use visual representations for the problem, such as diagrams, arrows, graphs, or pictures. A strategy used in many successful mathematics programs is that of modeling word problems. For an excellent explanation of this, see the "Modeling Word Problems" part of the Minnesota Mathematics Framework developed by SciMathMN. The driving question for this part of the Best Practice section of the Framework is How can I help my students understand and use the important information in a word problem? It can be found at <http://scimathmn.org/stemtc/resources/mathematics-best-practices/modeling-word-problems>

Good problems are not the same as exercises, which provide practice, but not necessarily thinking. Often the "word problems" found in textbooks are actually exercises, a way to provide additional practice in a particular procedure. Though you may want your students to be able to solve these exercise-problems, it is probably not necessary to spend too much valuable time on them. A larger goal is to help them develop skill in solving non-routine prob-

**Ask
Matt Mentor!!**



**Patience, Persistence,
Success, ...**

**...build their
confidence through
scaffolding and
providing timely
supports.**



(Continued from page 7)

lems, ones that are not easily solved by performing a procedure currently being studied. An important role for you as a teacher is to select good problems. Terry Wyberg, immediate Past-President of MCTM, says that a primary characteristic of a good mathematics teacher is that s/he is a “good picker” of rich and interesting problems. The context of the problem can be a way to provide both motivation and understanding, remembering that the goal is learning mathematics. Realistic problems, using students’ experiences, can also help- students make sense of the situation, so they are not trying to read about something that is unfamiliar to them, or about which they do not care.

It is not clear from your question what grade level students you teach, and your question applies to students at all grades. There are special issues regarding word problems for algebra, since typically much algebraic work involves translating word problems into equations in order to solve them. It may help students to remind them to use any variable or term that helps them make sense of the problem, such as b for Barbie’s candy and k for Ken’s. Many students mistakenly believe that they must use Xs and Ys, reinforcing the belief that algebra is the intensive study of the last three letters of the alphabet. Translating a situation into an equation can also be explored by working backwards – translate an equation back into a situation with words. Remind students that any method that helps them reach a solution is acceptable. Some students are more comfortable using more informal methods to solve, others will use formal and abstract strategies easily. Both will work, and much enriching mathematics can be studied by encouraging students to compare and contrast different solution methods.

Have a Question for Matt?

Send your questions about teaching math topics to MattMentorMCTM@aol.com and watch for Matt’s response in the next issue of *Mathbits*.

So, to sum up:

- ♦ Don’t take the thinking away from your students; some struggle is necessary in order to learn
- ♦ Support persistence and build confidence
- ♦ Help them learn to read mathematics carefully
- ♦ Teach modeling techniques for approaching word problems
- ♦ Pick good problems
- ♦ Accept informal approaches

Happy solving!

Matt Mentor

Nominations for 2012 Presidential Award

Nominate an outstanding K-6 teacher for the 2012 Presidential Award for Excellence in Mathematics and Science Teaching

Nominations and applications for the 2012 Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) will be accepted beginning in the fall of 2011. The Presidential Awards for Excellence in Mathematics and Science Teaching are the Nation’s highest honors for teachers of mathematics and science. Teachers in grades K-6 with at least five years of teaching experience are eligible for the 2012 award. Teachers applying for the 2012 PAEMST award must be nominated and self-nominations are accepted.

Nominations can be submitted on-line through the PAEMST website at www.paemst.org. Contact Sue Wygant at susan.wygant@state.mn.us or 651-582-8581 if you have any questions. Applications must be postmarked by May 1, 2012, so an early nomination will provide the applicant with sufficient time to complete and submit a high quality application.

Please consider nominating an outstanding mathematics teacher in grades K-6 for this prestigious honor. The 2013 award will be open to teachers in grades 7–12.

Project MARS

The University of Minnesota, College of Education and Human Development (CEHD), is recruiting 100 seventh-grade Minnesota public school math teachers to participate in a research study, Project MARS (Mathematical Reasoning Strategies).

- In collaboration with Harvard University and the Institute of Education Sciences (IES), this study will investigate the effectiveness of schema- based instruction to improve proportional problem solving performance.
- Teachers are required to participate for two consecutive years (2012-2014). Project responsibilities include attending a two-day professional development workshop on the University of Minnesota Twin Cities campus and implementing a 6-week intervention.
- Teachers will be paid a generous stipend for attending the professional development workshop, for implementing our curriculum, and will be reimbursed for any long distance travel or substitute teacher related costs incurred during the study.

Project MARS
An opportunity
for 7th grade
teachers

You may also refer to the Project website at: www.cehd.umn.edu/EdPsych/MARS/

This study uses an instructional approach called schema-based instruction (SBI), and it incorporates four features: priming the mathematical structure of problems, visual representations, procedural flexibility, and metacognitive strategy knowledge. All instructional materials are provided along with professional development. Teacher stipends range from \$1700-\$2300. Teachers are being recruited this school year and the study will begin during the 2012-2013 school year. Please contact Susan Slater for further information.

Susan Slater, Project MARS Coordinator
 slat0013@umn.edu 612/626-8486

Math Day! $2 + 2 = \text{Zoo!}$

Now for two days!

$+ - \times \div = < + - \times \div = + - \times \div = > + - \times \div = < + - \times \div =$

Math Day at the Minnesota Zoo is a great way for students to experience real world application for the math they are learning in school. Students can think like zookeepers, exhibit designers, or aquarists and solve real life math problems essential to the daily operations at the Minnesota Zoo.

November 8 & 9, 2011

November 8 = geared towards elementary
 November 9 = geared towards secondary

\$3 per student + admission

For more information and to register, visit our website mnzoo.org or call 952.431.9218



Activities and resources for students and teachers

A project of the University of Cambridge in the UK, the **NRICH Project** aims to enrich the mathematical experiences of all learners. To support this aim, members of the NRICH team work in a wide range of capacities, including providing professional development for teachers wishing to embed rich mathematical tasks into everyday classroom practice.

On the website you can find **thousands of free mathematics enrichment materials** (problems, articles and games) for teachers and learners from ages 5 to 19. All the resources are designed to develop subject knowledge, problem-solving and mathematical thinking skills. The website is updated with new material on the first day of every month. Guidance on how to find the right resources can be found in the Help section of the site.

<http://nrich.maths.org/public/>

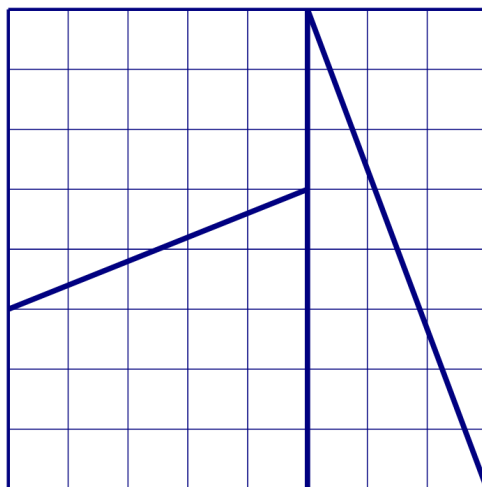
There are sections of the site for students, teachers, and parents. Students can submit solutions to the problems using the 'Submit a Solution' tab at the top of each problem. For teachers, there are Teachers' Notes accompanying each problem to offer guidance on possible ways of engaging learners in the activity or challenge. Students can also play a game, read a math related article, or try an activity. Elementary students can play a version of Mancala or the game of Achi from Ghana, read articles on the origin of the Morse code or the secrets of code breaking, learn about Pythagoras' discoveries, explore the mathematics of Celtic knots, and learn about the history of money. Content and activities are searchable by grade band, topic, or monthly themes and range from suiting the earliest learners through advanced secondary and post-secondary levels.

Problem solving for middle school

Try this!

A puzzling puzzle (a classic problem!)

- 1) Using 1-inch grid paper, draw an 8 by 8 square.
- 2) Color the unit squares in whatever way you find interesting.
- 3) Draw lines sectioning your square as shown.
- 4) Cut your square apart along the lines.
- 5) Rearrange your puzzle pieces to form a rectangle.
- 6) Compute the area of your rectangle. Compute the area of your original square.
- 7) Compare the computed area of your rectangle to the computed area of your square. What did you find?
- 8) Explain what happened with this puzzling puzzle!



Teachers:
Find more Fibonacci puzzles at
<http://www.maths.surrey.ac.uk/hosted-sites/R.Knott/Fibonacci/fibpuzzles2.html>

Financial Assistance Available For Professional Development

Do you need some financial assistance to participate in the 2012 MCTM Spring Conference? Are you a middle school mathematics teacher planning to increase your own understanding of mathematics through course work? The MCTM Foundation can help you. Conference Support Grants are available to both beginning and mid-career mathematics teachers. The Arnie Cutler Scholarship for Mathematics Course Work for Middle Grades Teachers can provide funds to grades 6 – 8 teachers for mathematics content course work. Updated application information and forms will be available at the MCTM Fall Conference and will also be on the MCTM website after October 21st. You can make a contribution to the Foundation on your Fall Conference registration form. Your contribution will help support these grants and new funding initiatives.

MCTM Foundation

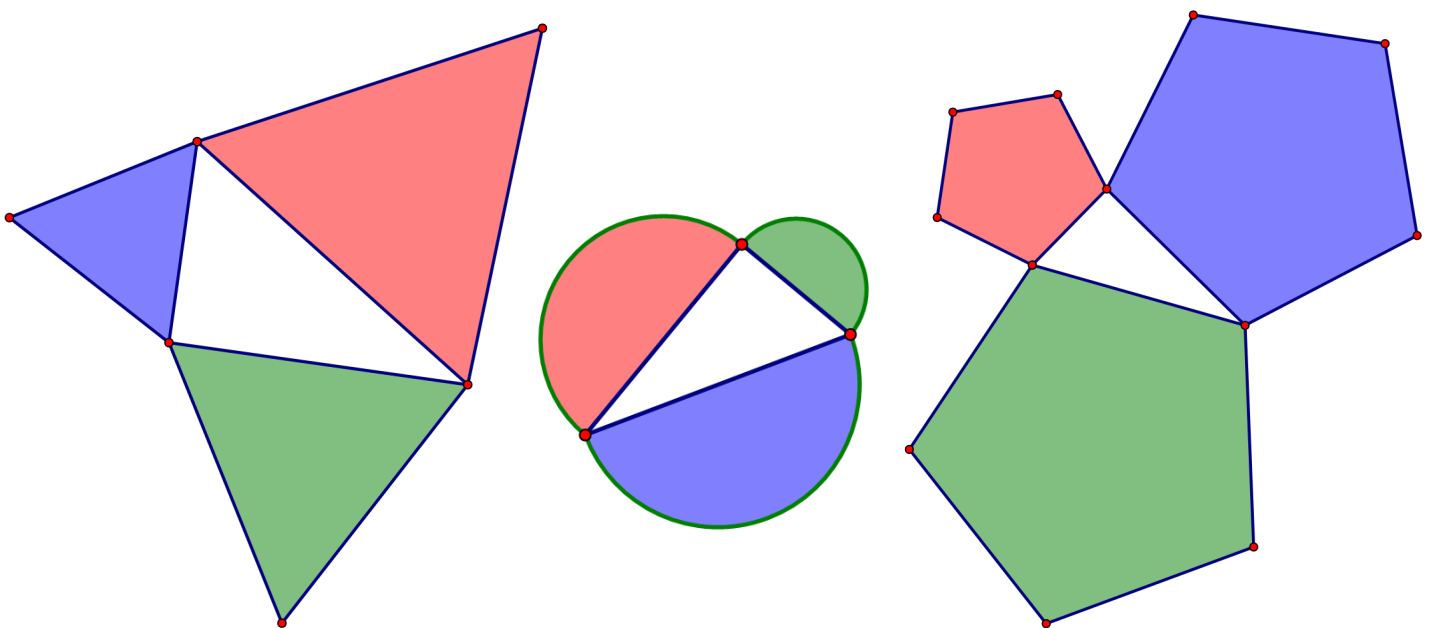
Ellen Delaney
Foundation Board Chair

Right triangles, constructions, and conjectures

- 1) Construct a right triangle. Construct an equilateral triangle on each side of the right triangle. Calculate the areas of the equilateral triangles. What do you observe? Make a conjecture.
- 2) Construct a second right triangle. Construct a circle (or semicircle) on each side of the triangle such that the side corresponds to the diameter. Calculate the areas of the circles (or semicircles). What do you observe? Make a conjecture.
- 3) Challenge: Construct a third right triangle. Draw a regular pentagon on each side of the triangle. You may want to determine the measure of an interior angle for an equilateral pentagon. Calculate the areas of the pentagons. What so you observe?
- 4) Extension: What additional cases might you try exploring? (An isosceles triangle, a rectangle, an equilateral hexagon,...?)
- 5) Make an overall conjecture regarding your findings.
- 6) Write a well-justified explanation of your findings or write an algebraic proof for several of your cases.
- 7) Were you surprised by the results of your explorations?
- 8) What mathematical skills did you need to apply in this investigation?

Problem solving for high school

Try this!



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Mission Statement:

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.

Mark Your Calendar

October 21, 2011	MCTM Fall Conference, Maple Grove High School
April 25-28, 2012	NCTM Annual Meeting & Expo, Philadelphia, PA
May 1, 2012	PAEMST Applications due
May 4-5, 2012	MCTM Spring Conference, Duluth, MN

Do we have your correct address and email?

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 612-210-8428 or mctm@mctm.org 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.

**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 November 1, 2011. Email or call 651-631-5228 with any questions. - Teresa Gonske, Editor
