



Mathbits

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Explore the Possibilities: Engage in Mathematics

2006 Minnesota Spring Mathematics Conference DECC, Duluth, MN · Friday, April 21 & Saturday, April 22, 2006

Explore these opportunities for engagement in mathematics at the spring conference

- Over 150 sessions for Pre-K through post secondary teachers
- Expanded number of elementary grade sessions
- Keynote speaker Eric Jolly, President of the Science Museum of Minnesota will talk about the opportunities and challenges facing mathematics teachers in Minnesota. *See below.*
- Network with other teachers during the Friday MCTM reception and hors d'ouvres buffet.
- Special sessions for new teachers
- Updates on current developments at the Department of Education
- Teacher Incentive Grant opportunities
- Be part of the future of MCTM by attending the annual Delegate Assembly. Contact your District Director to see how you can get involved.

Featured Keynote Speaker

Dr. Eric Jolly is president of the Science Museum of Minnesota. Prior to joining the Science Museum Dr. Jolly was senior scientist and vice president for Education Development Center in Newton, Mass. He is known for his contributions to mathematics and science education, frequently working with such groups as the American Association for the Advancement of Science, National Council for Teachers of Mathematics, and the National Science Teachers Association. Jolly serves on numerous national advisory boards, including the Mathematical Sciences Education Board of the National Academies of Science and the Committee on Opportunities in Science for the American Association for the Advancement of Science.



Upcoming Events:

Don't miss the annual
Spring Conference!

April 21-22

Pondering by the President

Karen Coblentz
MCTM President

Greetings from the Minnesota Council of Teachers of Mathematics!! I hope your school year is going well. I know mine is going very quickly. We are busy planning the Symposium and the Spring Math Conference in Duluth and we hope you can join us! It will be held April 20-22, 2006. We are excited to have Eric Jolly from the Minnesota Science Museum, and Craig Zablocki from Positively Humor, as our keynote speakers.

I want to remind you of the change in format this year regarding the Friday keynote speaker presentation. On Friday afternoon the sessions and workshops will conclude at the same time as always and then be followed immediately by Eric Jolly's keynote speaker presentation. After this presentation we will host the Presidents' Reception featuring a wide variety of hors d'oeuvres. The Delegate Assembly, which will include a sit down dinner for the delegates only, will occur after the reception. If you have questions regarding the conference events, please don't hesitate to email me or one of the conference chairs. Our conference committee, led by Denise Anderson, Jeannine Salzer, and JoAnn Luhtala, is working on the final details for the conference. Judy Stucki, our program chair, is working with her committee to finalize the program and we look forward to a great conference!

I would like to express my gratitude to Arnie and Jan Cutler. Arnie serves as our executive director for MCTM. He has been involved in our organization for many years and his leadership and wisdom are greatly appreciated. Arnie and Jan handle all the registrations and details for our conferences and meetings. We all owe a huge thank you to them for their hard work and dedication to our organization!

In this issue of Mathbits there are many items of interest. I hope you take a look and read through them carefully. If you ever have any information you would like shared, please contact one of us.

It is math time!

There are so many stories I could share from this past month about the wonderful group of students from Dassel Elementary. One in particular stands out, however, since it has to do with math. Two boys had left a classroom to go take some materials to the office for the teacher. One their way back, they were running down the hall. Another teacher stopped them and asked them why they were in such a hurry. They looked at her and said very emphatically, "It is math time!!" Wouldn't it be great if all our students had such a passion for mathematics!!!

Have a great rest of the year! Thanks for all you do!

Karen Coblentz
Karen.Coblentz@dc.k12.mn.us

Teaching to the Test

Excerpts from February
President's Message
Cathy Seeley
NCTM President

March's message is
"Technology is a Tool"
December's message was
"Do the Math in Your
Head"

Our tests are driving our teaching. This is the message from coast to coast as pressure mounts to produce results and meet the Adequate Yearly Progress requirements of the No Child Left Behind (NCLB) Act. Is this good or bad, and can a good mathematics program survive in this kind of environment?

The best preparation for any test is teaching a good mathematics program well to every student.

How can we balance teaching good mathematics and preparing for the state or provincial test? Are there effective test-preparation strategies that support student learning?

Read the balance of the February message and others at <http://www.nctm.org/news/president/>
Read the transcripts from February's online chat with Cathy Seeley about these and related questions at http://www.nctm.org/news/chat_archive.htm

A Mathematics Epidemic in the United States

Earlier this winter there was considerable attention given to the possibility of a bird flu pandemic. Causes, symptoms, treatments, and preventative measures were discussed and continue to be explored. While not trying to equate the two in any way, what would be the implications of a mathematics epidemic in the United States? In particular, what might be the symptoms and potential treatments?

Let us assume that this epidemic results in everyone becoming infected with proficiency in mathematics. What symptoms would they exhibit? If we look to the report 2002 report from the National Research Council titled “Helping Children Learn Mathematics”, we find there would be five symptoms (strands of mathematical proficiency), all interrelated. Since this report was discussed in detail in this column a couple of years ago, I will briefly summarize what those symptoms are.

1. Understanding mathematics – *comprehending mathematics concepts, operations, and relations—knowing what mathematical symbols, diagrams, and procedures mean.*
2. Computing fluently – *carrying out mathematical procedures flexibly, accurately, efficiently, and appropriately.*
3. Applying concepts to solve problems – *being able to formulate problems mathematically and to devise strategies for solving them using concepts and procedures appropriately.*
4. Reasoning logically – *using logic to explain and justify a solution to a problem or to extend from something known to something not yet known.*
5. Engaging with mathematics – *seeing mathematics as sensible, useful, and doable—if you work at it—and being willing to do the work.*

With this epidemic we want to have as many people as possible become infected. What treatments would cause this epidemic to spread? Most would agree that effective teaching would be the treatment that holds the most promise for meeting this goal. In a description of their joint project, “PRIME—PRompt Intervention in Mathematics Education”, the Ohio Resource Center for Mathematics, Science, and Reading and the Ohio Department of Education present a research-based list of the characteristics of effective teaching, a list that is consistent with research from across grade levels and over time. It includes:

MATHEMATICAL FOCUS	<ul style="list-style-type: none"> • Focus on important mathematical ideas; • Make the mathematical focus clear to the children;
FEATURES OF TASKS	<ul style="list-style-type: none"> • Structure purposeful tasks that enable different possibilities, strategies, and products to emerge; • Choose tasks that engage children and maintain their involvement;
MATERIALS, TOOLS, AND REPRESENTATIONS	<ul style="list-style-type: none"> • Use a range of materials, representations, and contexts for the same concept;
ADAPTATIONS, CONNECTIONS, AND LINKS	<ul style="list-style-type: none"> • Use teachable moments as they occur; • Make connections to mathematical ideas from previous lessons or experiences;

(Continued on page 4)

Mathematics Specialist Report

Tom Muchlinski

MDE Academic Standards & Professional Development

We want to have as many people as possible become infected with proficiency in mathematics.

ORGANIZATIONAL STYLE(S) AND TEACHING APPROACHES	<ul style="list-style-type: none"> Engage and focus students' mathematical thinking through an introductory, whole-group activity; Choose from a variety of individual and group structures and teachers roles within the major part of the lesson;
LEARNING COMMUNITY AND CLASSROOM INTERACTION	<ul style="list-style-type: none"> Use a range of question types to probe and challenge students' thinking and reasoning; Refrain from telling students everything; Encourage students to explain their mathematical thinking; Encourage students to listen to and evaluate others' mathematical thinking and ideas; Listen attentively to individual students; Build on students' mathematical ideas and strategies;
EXPECTATIONS	<ul style="list-style-type: none"> Have high but realistic mathematical expectations for all students; Promote and value effort, persistence, and concentration;
REFLECTION	<ul style="list-style-type: none"> Draw out important mathematical ideas during or toward the end of the lesson; After the lesson, reflect on students' responses and learning, lesson activities, and lesson content;
ASSESSMENT METHODS	<ul style="list-style-type: none"> Collect data by observation or listening to students; Use a variety of assessment methods; Modify planning as a result of assessment;
PERSONAL ATTRIBUTES OF THE TEACHER	<ul style="list-style-type: none"> Believe that mathematics learning can and should be enjoyable; Have confidence in their own knowledge of mathematics at the level they are teaching; Show pride and pleasure in individuals' success.

(Clark & Clark, 2004)

**...prompt
intervention is
necessary...
treatment after
failure does not
have a great track
record...**

For this epidemic of mathematical proficiency to spread, when a student exhibits a lack of one or more symptoms during treatment, prompt intervention is necessary, before the situation becomes critical and he or she fails. For a variety of reasons, we have created a mathematics teaching system that relies heavily on remediation, with courses designated as "remedial mathematics" at almost every level, particularly high school and postsecondary. This treatment after failure does not have a great track record for being effective in developing mathematical proficiency.

Prompt intervention is intervention that occurs before a student fails. It requires a careful identification of students whose gaps in understanding and/or skill doom them to eventual failure and then filling in those gaps before the students have trouble. To learn more about "PRIME—PRompt Intervention in Mathematics Education", go to http://www.ohiorc.org/orc_documents/orc/PRIME/PRIME_Math_Interv_Progs.pdf

Isaiah Benjamin, now almost 3 ½ years old spent sometime at his grandparents house over the holidays. On one of those days, he informed me that he was going downstairs to do some "work" and to check his email. After about 10 minutes it seemed like a good idea for me to check on him and when I did I found him at my desk "pasting some things". As I looked at his "work" I could see that he was representing a multiplication problem with an array. He had arranged \$.37 postage stamps into two rows with five stamps in each row thus verifying the fact that $2 \times 5 = \$3.70$. It also explains why we came up ten stamps short when we mailed out this year's Christmas cards.

Tom Muchlinski

The Assessment and Testing division of MDE has a new name! To better reflect our expanded mission of developing more and better ways to effectively use the results of the state assessments, we are now officially referred to as “Research and Assessment” division.

The Item Samplers are part of our expanded mission. The MCA-II Item Samplers were developed to familiarize students and teachers with the format of the MCA-IIs and the kinds of items that will appear on them. The student directions, segment layouts, and answer sheet each reflect the way the test will look in the spring, except that the Item Sampler is shorter than the actual test. The questions that appear in the Item Sampler have been through the complete item review and field testing process. Some of them are released items from previous tests and others are in the test item pool but have not yet been used on operational test forms. The distribution of items in the Item Sampler does not match the MCA-II Test Specifications. Every effort has been made to find a good example for each of the benchmarks.

Many Minnesota teachers used the Item Samplers to prepare for tests in 2005. The 2006 Item Samplers will have two noticeable differences:

1. The cover art is new. We hope you enjoy the new look.
2. The constructed response areas on the answer document in grades 4 – 8 and 11 will have grid lines.
 - The intent of the grid lines is to help students organize their work.
 - They may follow the lines to keep their writing aligned.
 - If a graph is needed in the response, students may draw directly on the grid and in any part of the grid.
 - Students may use the grid lines to help them draw more accurate shapes (or they may ignore the grid lines when drawing shapes).

Please contact the Research and Assessment division with your questions about statewide tests. Rosemary.heinitz@state.mn.us

The MCTM CONNECT Committee is planning to launch a new feature in the next issue of *Mathbits* entitled “ASK MATT MENTOR”. Matt is a very wise and experienced math teacher who is willing to give advice to beginning teachers about ideas for teaching some aspect of mathematics. Matt’s column, which will appear in each issue of *Mathbits*, will answer at least one submitted question. Readers will be invited to join the discussion by emailing their own responses, or disagreements, to Matt which will then be posted to the “ASK MATT MENTOR” page on the MCTM website.

While the intent is to assist beginning teachers, teachers at all levels of experience are encouraged to join in. The hope of the CONNECT Committee is that this feature will promote a lively discussion and sharing of teaching ideas. Matt’s focus will be on teaching mathematics rather than on classroom management.

Matt is eager to get started and is waiting for a few questions that need a response, so all readers are asked to send in questions. They can be your own, questions asked by beginning teachers, questions that get talked about in the lounge or at the lunch table or just a question about math to which you’d like to see Matt’s response.

Email your questions to: mattmentormctm@aol.com. In addition to the question, give your name, school name and grade or course. Then watch for a response in the next issue of *Mathbits*.

The Montana Council of Teachers of Mathematics invites you to read the latest issue of *The Montana Mathematics Enthusiast* at <http://www.montanamath.org/TMME>

What’s New in Statewide Assessment?

Rosemary Heinitz

Math Content Specialist
MDE Research & Assessment

Ask Matt Mentor!!

mattmentormctm@aol.com

MCTM CONNECT

MN Jr. High Math League 2000 Students Participate in Math Competitions

“Did Cindy bring the cookies?” “What does ‘sigma’ mean?” “When Mr. Math taught us how to find the volume of a cone in class today, I already knew it!” “Can I be on the Gold team this next meet?” “Has the website been updated yet (to learn State rankings)?” Such are the comments heard at the start of math team practice from Bemidji to Austin. All across Minnesota 2000 middle school students compete in the Minnesota Junior High School Math League. Teams from 133 schools are organized into 25 divisions to compete in five meets from early October to January.

At a meet, students compete as individuals in Events A and B, and then tackle a team event as a team of six mathletes. Schools can have more than one team and any number of alternates. There are six years of meets available on the website, so there is lots of practice material!

Each year I try to pick a theme or bit of knowledge to teach. One year I discovered most students could not read a moon rise and set table like the one Ken uses to plan his fishing, so that table kept reappearing until students learned to read it correctly.

The students enjoy learning material they don’t see in the normal math class, but is fully accessible to middle school students. They love getting together for practices and meets with other students that really enjoy math. And it is such an “upper” for the coaches to meet with eager, excited mathletes at the end of the day! The creative thinkers that can do multi-step problems and really understand the concepts can shine in math league, quite independent of their homework habits!

To learn more about the JHML, visit members.aol.com/mathleague.

(Marlys Henke founded the Minnesota Junior High School Mathematics league in 1986 and continues as its director. She recently retired from teaching at Central High School in St. Paul where, as coach of Central's High School Math League team, she took her team to the state tournament every year from 1990-2004.)

Early in August, I spent four days at Tech Corps, at the Carlson Center on the University of MN campus. An integral part of this experience was my visit to Ed Shellum, a systems operator, at Great River Energy. I would like to share parts of the report I wrote:

Office impressions: Ed had two computers on his desk ... one that was for his email, word processing, etc. The other was for all the displays of Great River Energy. Ed shared all the various windows that he can look at; it was a good example of the “multiple representations of data” concept that math folks are always talking about.

JOB: They were testing a new RTU when I was there. Each RTU (remote terminal unit) has several hundred things that have to be tested, individually. He showed me spreadsheets of information. I was excited to see the equation $y = mx + b$ on several of them.

We looked at lots of schematics and graphs for each station. He showed me how the MISO system, who oversee the entire Midwest, tells them how much power to generate. The power generated should equal the power sent out. If the GRE overshoots its allotted amount, it has to pay huge fines.

We talked a lot about the coal generators in central ND, the source of most of GRE megawatts (MW). It is cheapest to use the coal generators. The power is sent on DC lines from ND to MN. 5% of that power is lost during transmission. Coal generators are easy to start up, to maintain, and to generate power quickly. The other ND plant is a natural gas plant;

Featured Guest Column

By Marlys Henke
MN Jr High Math League

How I Spent a Week Last Summer

By Sue Westegaard

GRE trades this power with Xcel who services that part of ND. Natural gas plants take longer to start up and they don't generate power as quickly.

Another power generator that I was interested in was the trash one in Monticello. It took quite a while to get it on line and to be consistent in its generation. They now use 1000 to 1500 tons of garbage to generate 15 – 30 MW of power. The time of the year determines how much power they can generate; when the garbage contains damp plant matter, they do not generate as much power.

We also talked about wind turbines. A certain percentage of their energy must be from renewable resources. Ed had the person in charge of wind turbines call me; we talked for over an hour.

Ed also talked me about how he works with his five subordinates. He has two guys who write a lot of software to do whatever they need done. One guy writes the code and the other one does the queries. Logic is a huge need for their jobs.

Control Central: He gave me a tour of their control room. It looked a lot like the pictures we see of the NASA control room. They had about eight big screens at front of the room. One huge one monitors weather. Others show various spreadsheets and schematics. Three different guys were sitting at five or six computer monitors. One guy works with output and another works with problems. It reminded me of an air traffic controller job. An overseer sits at a desk and monitors the whole thing. He also writes the protocol for situations (i.e. if a line needs to be turned off or on, etc.) It is usually a 14 – 17 step process. Various people have access to certain screens and programs. By looking at the big screens, one can have a great overview of the weather, incoming power, outgoing power, etc.

Computer Room: Amazing amounts of equipment ...wires everywhere. Everything in and out of GRE has two different paths; in case something happens to one, the other one can take over. The same goes for servers. I would not even want to guess how much wire and cable was in that room. They build their own RTU. The technicians who worked there were Vo Tech graduates. They looked really young to me.

Summer 2006: BestPrep staff has already started planning for its 2006 Technology Integration Workshop. The Carlson School of Management will host the four-day staff development opportunity for teachers from July 31 - August 3, 2006.

Participants are asked to bring a previously taught lesson plan they would like to enrich with new technology. Teachers will learn integration techniques, attend breakout sessions on technology and workplace related topics, and go on a ½ day job shadow to experience technology and workplace skills in business.

New this year, teams of teachers are invited to attend. A team can consist of 2-5 teachers from the same school or school district. The fee for teams to participate is reduced to \$175 per person for two team members; 3 to 5 members per team is \$150; and the individual fee remains at \$200 per participant. A few scholarships may be available for schools without staff development funds; request information when applying.

For more information on the workshop visit <http://www.bestprep.org/TC/tcworkshop.htm> or contact Bonnie Vagasky at 612-337-5252 x227.

Professional
Development
Opportunity

MCTM Continues to Build a Foundation

Funding supports:

- * 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
 - * Math Mentor Network
-

MCTM Foundation

For information on the governing board and on making donations, see the www.mctm.org

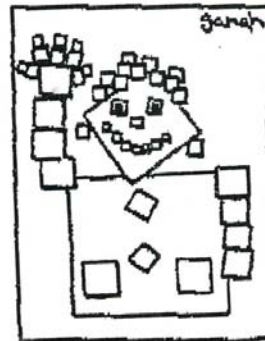
Mathbits

Geometry is always a fun unit to do and right now our school is doing that unit. I would like to share some ideas that we have been using.

Family Shape Portrait

Helps students to explore geometry by creating single-shaped portraits.

- 1) Give each student a sheet of drawing paper. Make plenty of crayons, markers, pencils, and rulers available.
- 2) Review the many different shapes introduced in the book. List these on the chalkboard along with a rendering of each.
- 3) Explain that students will be creating an unusual "family portrait." This portrait will include many members of the Shape Family.
- 4) Provide the materials and assign a shape to each student (or pair). Ask students to create a portrait of their Shape Family member using only that shape—for example, the square member of the family can be made of only squares (square nose, square eyes, square feet, and so on).
- 5) Encourage students to name their family member according to the shape—for example, Timmy Triangle and Helen Hexagon. Arrange the portraits on a bulletin board to create a Shape Family display.



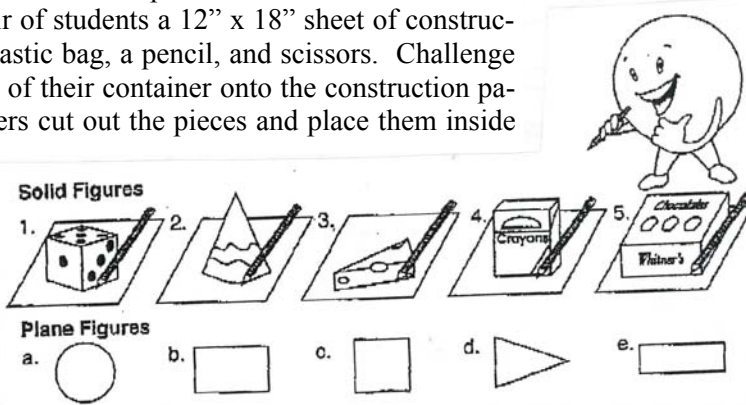
Focus on the Elementary Grades

Judy Hansen
First Grade Teacher
Brown Elementary
Pipestone, MN

Seeing Shapes From All Sides

To relate plane figures to solid figures. Students will identify the face shapes of solid figures and determine the types and number of faces on solid figures.

Obtain one empty, solid-figure-shapes container--such as a cereal box, an instant oatmeal carton, or a facial tissue box--for each pair of students. In addition to the container, give the pair of students a 12" x 18" sheet of construction paper, a resealable plastic bag, a pencil, and scissors. Challenge the pair to trace each face of their container onto the construction paper. Then have the partners cut out the pieces and place them inside the plastic bag. Place all of the containers and bags in a center. Invite students to remove the shapes from each bag, in turn, and decide which container they match.



References:

Meeting the Math Standards with Favorite Picture Books: Lessons, Activities, and Hands-on Reproducibles That Help You Teach Essential Math Skills and Concepts. Author: Bob Krech. Published by Scholastic (2002).

Math Skills Workout. Published by The Education Center, Inc.
(see www.theeducationcenter.com)

Additional activity resources:

Rolling The Net and Skeletons from *Navigating through Geometry in Pre-K—Grade 2.* Published by NCTM (2001).

Mentoring Another Mathematics Teacher

As I look back at my career, the most stimulating professional development has involved other Minnesota teachers. Whether it was attending the MCTM Annual Conferences, or working on a committee for the Minnesota Department of Education, or participating in a training or workshop, being surrounded by other Minnesota teachers has been exciting and worthwhile. When I return from any of these activities, I have a lot more energy and conviction to continue working hard at studying and implementing "What To Teach", "How To Teach", and "How to Assess". I find that I am more focused on making a difference in what is best for our students.

Another benefit of attending professional development activities is building a network of fellow Minnesota mathematics teachers. I enjoy going to each new opportunity because I know I'll see some friends and also meet some new people in addition to delving into some rich mathematics. I would like to thank the Minnesota State Mathematics Specialists, first Sharon Stenglein and now Tom Muchlinski for encouraging and supporting my continuing development.

I want to encourage you to find someone in your building, district, or state and ask them to attend a conference or training with you. This is an excellent way to get started building a nice relationship. A next step might be meeting (it doesn't have to be in a school building) to discuss how to teach a topic or how to use technology to improve understanding. When you show attention to another teacher (just like with your students), they will usually improve their attitude and their teaching. In the long run, your efforts will come back to enrich you because you are building a learning network of mathematics colleagues.

Don Karlgaard

P.S. My grandsons, Ben (2 years) & Eli (3 months), have caught more fish than Tom's!

Every pickle you eat brings you nearer to death. Amazingly, the "thinking man" has failed to grasp the terrifying significance of the term "in a pickle." Although leading horticulturists have long known that *Cucumis sativus* possesses an indehiscent pepo, the pickle industry continues to expand.

Pickles are associated with all the major diseases of the body. Eating them breeds war and communism. They can be related to most airline tragedies. Auto accidents are caused by pickles. There exists a positive relationship between crime waves and consumption of this fruit of the cucurbit family.

For example ...

- Nearly all sick people have eaten pickles. The effects are obviously cumulative.
- 99.9% of all people who die from cancer have eaten pickles.
- 99.8% of all soldiers have eaten pickles.
- 96.8% of all communist sympathizers have eaten pickles.
- 99.7% of the people involved in air and auto accidents ate pickles within 14 days preceding the accident.
- 93.1% of all juvenile delinquents come from homes where pickles are served frequently.

Evidence points to the long-term effects of pickle eating:

- Of all the people born in 1889 who later dined on pickles, there has been a 100% mortality.
- All pickle eaters born between 1909 and 1919 have wrinkled skin, have lost most of their teeth, have brittle bones and failing eyesight -- if the ills of eating pickles have not already caused their death.
- Even more convincing is the report of a noted team of medical specialists: rats force-fed with 20 pounds of pickles per day for 30 days developed bulging abdomens. Their appetites for wholesome food was destroyed.

In spite of all the evidence, pickle growers and packers continue to spread their evil. More than 120,000 acres of fertile U.S. soil are devoted to growing pickles.

Eat orchid petal soup. Practically no one has as many problems from eating orchid petal soup as they do with eating pickles.

Focus on the High School Level

Don Karlgaard
Mathematics Teacher
Brainerd High School
Brainerd, MN

Pickles will kill you...some logic

<http://www.pen.k12.va.us/Div/Winchester/jhhs/math/humor/mathhumr.html>

If These Walls Could Talk...

What do your middle school students do when they need some help with their math class-work? Do they talk with other students? Ask you for help? Look at the book? Stare at the walls?

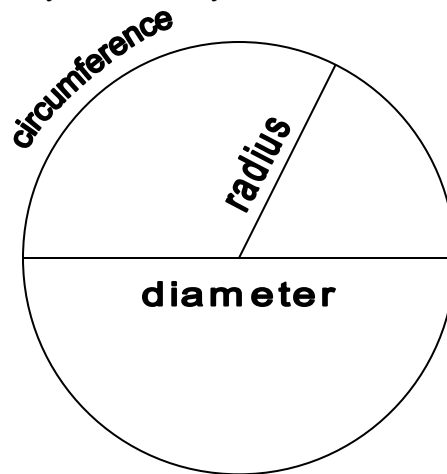
Those walls could be a big help to students if we gave some time and thought to using them in productive ways to provide a bridge for students from teacher support to independent work.

Focus on the Middle Grades

Anne Bartel
Minneapolis Public Schools

Karin taught a 6th grade unit in the fall on circles and how to compute circumference and area. Some students struggled to remember the circle terms necessary to conceptually understand the formulas. So with her class Karin drew a large circle on chart paper. Then she labeled a diameter with the word right above it in green. After some discussion with the class she labeled both a radius and the term written along it in red. Finally, she outlined the circumference of the circle in black and wrote the term also.

The chart paper was posted up high where everyone could see it. Karin and her students created movements to make for each vocabulary term and she quizzed them periodically. When she said the circle term, could they make the movement? When she made the movement, could they say the term? When she pointed to a circle, could they identify the part? When students hesitated on any of these, they could check the diagram for help.



In another lesson, the students used string and rulers to measure the circumference and diameter of various circular lids and containers. They created a table of the resulting measurements and then discussed the relationships they observed. The class came to the conclusion that circumference is a little more than three times the diameter (and conversely, that the diameter is about 1/3 of the circumference).

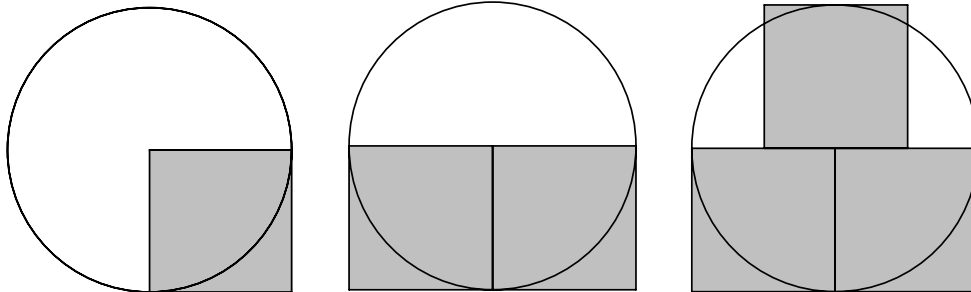
Karin had some student volunteers make a poster for the class. On it, two different lids were attached with the two strings for each stretched out, the circumference string taped and labeled above the diameter string but lined up on the edge. Once the class had identified pi as the quantity “a little more than 3”, they summarized the relationships on the bottom of the poster:

- To find the circumference, multiply the diameter by pi (or 3.14)
- To find the diameter, divide the circumference by pi (or 3.14)

Later in the unit, Karin’s students explored radius squares (squares that measured a circle’s radius on a side). They cut out radius squares for various-sized circles and cut and pasted to explore how many radius squares were needed to cover a circle. As students shared their

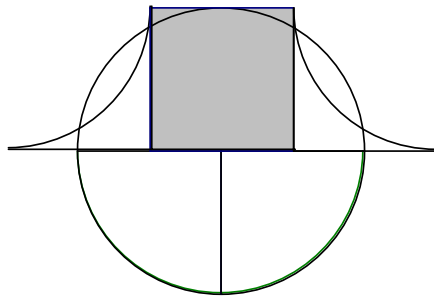
Remember Pi Day—
March 14

estimates, one student's work provided a particularly efficient way to visualize the relationship. Karin intentionally chose to use this student's work to help her summarize the formula, $A=\pi r^2$, for the area of a circle. With the student's permission, she enlarged the student's work and posted it with the words "REMINDER: it takes a little more than 3 radius squares to cover a circle."



*The square has a measure on each side equal to the radius of the circle.
It takes a little more than 3 of these radius squares to cover the circle.*

The student trimmed off the bottom of the squares along the circle's edge on the bottom, and rotated them to fit them in the corners above.



Underneath the diagrams, Karin wrote the formula for the area of the circle and these two questions:

1. How would you find the area of a circle if you knew its radius?
2. How would you find the area of a circle if you only knew its diameter?

As the unit progressed, Karin had students add circle terms and concepts to the word wall. Students who continued to struggle, especially her ELL students, worked with her after school to add pictures to these words so they would remember them better and feel more inclined to use the word wall when they needed the extra help.

Karin doesn't have any more time than the rest of us busy teachers, but she believes that her classroom walls should provide a learning resource for her students. Part of her planning in teaching a math unit involves thinking ahead about the concepts that will be particularly challenging for many of her students and what types of visual, auditory and kinesthetic resources might help support their learning. With some pre-planning, she can use student work, student volunteers or real-life materials to provide visual reminders of the important math in the unit. If her students "listen", Karin's classroom walls have a lot to say.

Some Pi History

Pi was known by the Egyptians, who calculated it to be approximately $(4/3)^4$ which equals 3.1604. The earliest known reference to pi occurs in a Middle Kingdom papyrus scroll, written around 1650 BC by a scribe named Ahmes. He began the scroll with the words: "The Entrance Into the Knowledge of All Existing Things" and remarked in passing that he composed the scroll "in likeness to writings made of old."

*Around 200 BC, Archimedes of Syracuse, a Greek mathematician, found that pi is somewhere about 3.14 (in fractions; Greeks did not have decimals). Archimedes wrote a book called *The Measurement of a Circle*. In the book he states that Pi is a number between $3 \frac{10}{71}$ and $3 \frac{1}{7}$. He figured this out by taking a polygon with 96 sides and inscribing a circle inside the polygon.*

New knowledge of Pi then bogged down until the 17th century. Pi was then called the Ludolphian number, after Ludolph van Ceulen, a German mathematician. The first person to use the Greek letter Pi for the number was William Jones, an English mathematician, who coined it in 1706.

<http://mathforum.org/drmath/>

Be sure to send your math and math teaching/learning questions to ASK MATT MENTOR at mattmentormctm@aol.com

2006 MCTM Spring Conference

Explore the Possibilities: Engage in Mathematics



- ⊕ The Teaching Principle ⊕ The Equity Principle
- ⊕ Numbers and Operations ⊕ Problem Solving
- ⊕ Communication ⊕ Connections

April 21 - 22, 2006
DECC • Duluth, MN

Jointly sponsored by:

MCTM • *Minnesota Council of Teachers of Mathematics*
MinnMATYC • *MN Mathematical Association of Two Year Colleges*



*For registration, further
conference information and
program updates access*
www.mctm.org

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call 1.800.438.5884
or access*
www.visitduluth.com

Still have questions? Contact one of the following:
Arnie Cutler, 612.626.8326, cutler@umn.edu
Denise Anderson, 763-753-7110, denise.anderson@stfrancis.k12.mn.us
Jeannine Salzer, jeannine_salzer@hopkins.k12.mn.us
JoAnn Luhtala, JoAnn.luhtala@duluth.k12.mn.us

2006 MCTM Spring Conference

Explore the Possibilities: Engage in Mathematics

Lodging

Part of the fun of the MCTM Spring Conference is deciding where to stay. There are several hotels within walking distance to DECC, each with its own special features. You can pick a hotel that is right on Lake Superior, or one that is a converted factory, or another that is in downtown Duluth. Information on hotels and recreational activities in Duluth is available at www.visitduluth.com. Special conference rates vary by hotel and have been negotiated with the following hotels until the blocks of rooms run out. Mention the MATH conference and confirm rates for conference dates and any extended stay (rates may change for extra days, suites, location of room, extra guests, etc.).

Please note: If you use a hotel chain's 800 number, you may not get the discounted rate. Your best option would be to use the direct numbers listed below.

	Comfort Suites 218.727.1378 Hampton Inn 218.720.3000; 800.HAMPTON Hawthorn Suites 218.727.4663	Holiday Inn 218.722.1202; 800.477.7089 Inn on Lake Superior 218.726.1111; 888.ON THE LAKE Radisson Harborview 218.727.8981
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Minnesota Council of Teachers of Mathematics
EIGHTH SYMPOSIUM ON MATHEMATICS EDUCATION
*“Principles and Standards for School Mathematics:
Resources for Translating Concepts to Action”*

Thursday, April 20, 2006

Duluth Entertainment and Convention Center – Duluth, MN

Join leaders from across the state to investigate new resources for teaching and learning mathematics. Explore strategies to implement the vision of the National Council of Teachers of Mathematics document, *Principles and Standards for School Mathematics*, particularly as it relates to teaching ALL students important concepts of measurement as well as examine why measurement is indispensable to the study of number, geometry, statistics and other branches of mathematics.

Who should attend?

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

Why should you attend?

- Learn how the NCTM *Navigations* resources can assist teachers in helping all students learn important measurement concepts.
- Examine how the NCTM *Principles and Standards* focus the curriculum and articulate measurement concepts across all grade levels, from early hands on work with standard and non-standard units through the use of powerful new technologies for sophisticated measurement.
- Explore teaching strategies for encouraging problem solving, reasoning, communicating, and modeling in specific grade level bands: PreK – 2, 3 – 5, 6 – 8, or 9 – 12.
- Examine how measurement concepts are integrated throughout the Minnesota Academic Standards in mathematics.
- Develop plans with your school or district team to implement resources and teaching strategies that support continued improvement over time.

For symposium registration information see the MCTM website www.mctm.org

Insert spring conference registration form on this page.

<p>A printer used 2592 instead of $(2^5)(9^5)$. As it turns out it was okay because $2592 = (2^5)(9^5)$. Another example of this is that $(11^2)(9\frac{1}{3}) = 1129\frac{1}{3}$. How many more examples can you come up with?</p>	<p>How many different ways can you receive \$20 from the bank using only \$1, \$5, \$10, or \$20 bills (or a combination of them)? What if you add in a \$2 bill?</p>
<p style="text-align: center;">4 1 4 1 1 1 4 3 1 1 4 1 2 2 1 1 4 1 1 2 2 2 1 1 4</p> <p>What are the next two lines in the pattern? How would you explain the pattern to someone else?</p>	<p>Draw chord AB (not a diameter) in a circle. Now draw diameters AC and BD. What kind of polygon will ABCD always be? Can you explain why?</p>

Problems adapted from: Brumbaugh, D., Brumbaugh, L., and Rock, D. *Scratch Your Brain*. Pacific Grove, CA: Critical Thinking Books and Software, 2001.

Problem Spot

Contributed by
Michelle Bacon
Willow Creek Middle
School,
Rochester

Objective: Clarify meaning of quartiles and median, introduce the box and whisker plot.

Previous lesson: Introduce Median, Quartiles, Minimum and Maximum of a data set

Preparation: Make up signs for *Q1, Q2, Q3, Q4, median, maximum, minimum*

Procedures: Ask students if everyone knows their shoe size. Tell them they will be lining up against the wall of the classroom according to their shoe sizes. Explain that there is a bit of a problem that needs to be worked out first; since there are two different sizing systems we need to standardize them. Some girls may have purchased shoes with boys sizes and can offer the insight that they need to subtract 1½ sizes to purchase in boys sizes. Decide which scale you will use (boys or girls sizes) and adjust accordingly.

- Have students line up. Indicate smaller sizes to the left and larger to the right. Tell them to form rows perpendicular to the wall for identical sizes.
- Ask how they could find the median of the class' shoe sizes (usually they will decide to count from both ends to the middle but any appropriate method is okay).
- Give the *median* sign to the middle person and also give the *maximum* and *minimum* signs to the largest and smallest shoe sizes respectively.
- Ask how they will find the middle of each half of the data. Have them find *Q1* and *Q3* and hand out the signs. Point out that they represent the end of the first and third quartiles. Ask who should get *Q2* and *Q4*. Give these signs to the median and maximum persons and point out the fact that they are not needed.
- Have everyone without a sign sit down and create a number line from the minimum to the maximum on the board or overhead.
- Have each person with a sign put a point above the number line for their position and write the name of their data point above it (*Q1, Q3, etc.*).
- Create a box and whisker plot with their points.
- Discuss the size of each quartile. Why are they not the same length?

Anticipate what to do if two or more people share a position. They can hold the sign together but both of them remain in a part of the data set. They may need to average their sizes for a quartile or median.

Statistics Learning Activity

Contributed by
Jon Arnold
St. Charles High School

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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

April 20-22 MCTM Spring Conference 2006, Duluth
October 20 MCTM Fall Conference, Lakeville

Do we have your correct address?

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 Arnie Cutler at 612-626-8326 or cutler@tc.umn.edu 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. Thank you for helping us stay in touch!

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

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 is working to ensure timely delivery of information. Please contact Teresa Gonske or Arnie Cutler with any concerns.

Please submit items for publication in *Mathbits* to tlgonske@nwc.edu. Email tlgonske@nwc.edu or call 651-631-5228 if you have questions. - Teresa Gonske, Editor

2006 MCTM Spring Mathematics Conference Registration Form

Explore the Possibilities: Engage in Mathematics

*Teaching Principle *Equity Principle *Connections
*Communication *Number and Operations *Problem Solving

DECC, Duluth, MN • Friday-Saturday, April 21-22, 2006

Name _____

Mailing Address _____

City _____ State _____ Zip _____

If you are a new member OR if any of the following has changed, fill in the information requested below.

Home phone (include area code) (_____) _____ Work Phone (_____) _____

Fax (_____) _____ E-mail _____

School District Name _____ School Building _____

Circle one: teacher supervisor student retired other _____

Circle one: elementary jr. high/middle high school post secondary other _____

Spring Conference Registration Fees

Regular Friday & Saturday registration fee includes 2 lunches and a Friday late afternoon hors d'oeuvre buffet.

Regular Saturday only registration fee includes 1 lunch.

NOTE: Registrations on-site or those postmarked or sent after April 1, 2006 will be charged a \$15 late fee.

	<u>Fri.&Sat.</u>	<u>Sat. only</u>	Special Meal Requests
MCTM Member	_____ \$140.00	_____ \$ 90.00	Meal Tickets for Speakers or Non-registered Guests: _____ tickets for Friday lunch @ \$16.50 = _____ _____ tickets for Friday buffet @ \$27.00 = _____ _____ tickets for Saturday lunch @ \$16.50 = _____
Non-member	_____ \$165.00	_____ \$ 115.00	
Student Member	_____ \$ 70.00	_____ \$ 45.00	
Student non-member	_____ \$ 82.50	_____ \$ 57.50	
Speaker	Registration fee waived – select and pay for meals using the table at the right		_____ vegetarian meals preferred

There is no Friday only registration.

MCTM Dues

Circle one: new renewal do not need to renew

Indicate membership category:

_____ One year regular \$25.00

_____ Two year regular \$40.00

_____ One year undergrad student \$12.50

_____ One year retired \$12.50

I do not wish to have directory info published

Individuals should make their own lodging arrangements

For information about lodging and events in Duluth call 1.800.438.5884 or visit www.visitduluth.com

MCTM Foundation Contributions are optional but welcome!

I am willing to be a president

Amount Due & Method of Payment: ___credit card ___check ___ p.o. # _____ (copy attached)

Conference Registration/Meal Fee _____

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Total Due _____

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Mail to: MCTM, P.O. Box 120418, New Brighton, MN 55112 or register online at www.mctm.org