



# MONTANA MATHEMATICS

A Publication of the Montana Council  
of Teachers  
of Mathematics

August, 2005

VOLUME 40

ISSUE 1

## Mathematics Vocabulary: The Why's and How's of Teaching It

Mathematics vocabulary is an important component in the classroom. Yet, so often, we present it as an isolated lesson in which students copy definitions and are asked to memorize them for a test or quiz. When students are unable to accomplish this, we become frustrated. Students often feel as if they are taking a foreign language when vocabulary is studied in this manner.

The language of mathematics plays 3 crucial roles in learning math. First of all, we teach through the medium of language. So in order for students to understand what we are teaching, they need to understand the words that we are using. Second, students build understanding as they process ideas through the vocabulary. Last, teachers often diagnose and assess students understanding based on the vocabulary they use. However, it is important for us to remember that math vocabulary and language is limited largely to the school setting.

There are several strategies that teachers can use to promote vocabulary development.

- Build the concept first and then attach the vocabulary to the established ideas. By doing this, students are better able to understand the vocabulary that is introduced, because there is meaning attached to it.
- Have students work orally in groups on problem solving tasks and have them "talk mathematics." Your role as a teacher is to help support the mathematical talk and to supply vocabulary if students are unable to express themselves.
- Provide kinesthetic, hands-on manipulatives for students.
- Group or individual projects culminating in class presentations enhance the use of mathematical vocabulary.

- Have students write about mathematics in journals. Some possible topics include:
  - I thought that a function was \_\_\_\_\_. Now I know that a function is \_\_\_\_\_.
  - Compare what similar means in everyday English with what it means in mathematics.
  - Complete the following analogy and explain your thinking: Prism is to pyramid as cylinder is to \_\_\_\_\_.
  - What is the difference between the square of the number and the square root of a number?

When using writing in math, it is important to provide writing samples of different quality levels so that students can see what makes up clear, valid communication is.

The use of correct mathematical vocabulary is extremely important and we need to hold students accountable to using the vocabulary. However, we need to be sure that we have provided students with appropriate strategies to learn and use the vocabulary.

Angel Greenley

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## President's Message

August '05

As I write this column (it is the first part of August) the temperature is in the 90's and I am having a hard time believing that school is a mere two weeks away. This begins my 37<sup>th</sup> year of teaching. As each year rolls around, the questions I get asked the most is, "When are you going to give it up"? My response is the same as most of us in education would answer, "Where else can you have so much fun, get so much accomplished, get so much satisfaction, and still get paid for what we love to do?" Now I admit, there are days...., but what a great profession! I consider myself very lucky to have been allowed to do what I do. My son, Mike, is considering education as a major in college this year. Many people ask why he would choose an occupation with such low compensation? Again, I have to say there have been some times that money was an issue, but I told Mike that I wouldn't trade any of my 36 years for any other job. I heard a commencement speaker once say, "Don't just get a job, get a passion". It has been a wonderful ride. I hope he sticks with it. He will make a great teacher.

Enough of my life. Your MCTM has been working for you over the summer. We held our regular Board meeting in June and stayed an extra two days for a Visions and Reality Conference. The purpose of this meeting was to assess where MCTM is now, and then have a vision for the future. Our goal was to improve an already great organization. We wanted to look at what was good and then to incorporate new ideas.

MCTM continues to strive to present quality professional mathematical development for the teachers of Montana. The Professional Development Academy was a huge success this year. There were 34 participants for the Number Sense workshop at the Montana Learning Center at Canyon Ferry. Presenters Angel Greenley and Nina Miller are top notch teachers. MCTM has decided that it would benefit our members to present this workshop again next year but in Billings. This will give the eastern Montana teachers a better chance of attending. The Montana Learning Center at Canyon Ferry will tentatively host a technology workshop next summer taught by Jacquie McDonald. Stay tuned for the times of these presentations. The MCTM Board of Directors has decided that to best serve our membership, two different workshops will be presented at different locations each year.

MCTM is interested in becoming a resource for the Office of Public Instruction. We are in touch with OPI regarding possible rewriting of the standards, school improvement issues, the state given CRT's, and any new information regarding "Highly Qualified" teacher language.

The MCTM math contest was discussed. We are always interested in seeking new ways to provide a quality test for the students of Montana. A new format was used this last year to help with the administration of the tests. We hope that all the teachers and participants were satisfied with the change. MCTM is always looking for writers for these tests. This year we had ten

writers at the MLC at the end of July to write the tests for this year. Please, if there is ever a concern; contact a member of the Board. The MCTM math contest is unique in that it is written by Montana teachers for Montana students. Each year the MCTM awards nearly \$5000 to top scoring seniors who take this test.

The MCTM newsletter has been enhanced and upgraded. As you can see by this issue, there are some new features. We hope we will always have a "feature" article for you and then possibly a follow-up on that featured topic in the issues to come. There will still be the good old standards like the "Jokes and Quotes" and "Ask Barney", plus we have added some ones that you won't want to miss. Remember, there are updates on math happenings in the state in every issue. The Dean Preble Award nomination form, the teacher scholarship application as well as Leadership Conference info is available in most of the newsletters.

Finally, remember that Tony Reihl, our innovative webmaster from Billings, has created a website for the math teachers of Montana. Go to [www.montanamath.org](http://www.montanamath.org) for all kinds of information of math events in the state.

Finally (again), I hope this year is a rewarding and fulfilling year for you and your students. I keep saying how lucky I am to be involved with all of the quality teachers of Montana. You all are an inspiration. Keep up the good work.

Jim Hamling, Pres.

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**The MCTM Board of Directors and membership would like to welcome the following wonderful people to serve for the board:**

**Angel Greenley, Director Region IV and Secretary  
Lisa Wood, Director Region IV and Membership  
Chair**

**Jennie Luebeck, Director Region III**

**And**

**Lisa Scott, President Elect**

**We would like to say thank you for all your hard  
work and time serving for the board to the follow-  
ing people:**

**Jean Howard, Past President**

**Peggy Lynn, Director Region III and Secretary**

**Anne Blotkamp, Director Region III**

**Lisa Scott, Director Region IV**

**And**

**Deb Wickum, Membership Chair**

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## Jokes & Quotes by charlie

What is purple and commutes?  
Abelian grapes!

What did the Roman mathematician grow in his garden ?  
IV!

What do you call a chicken crossing the road?  
Poultry in motion!

"We humans are born with what seems to be a truly unique ability to acquire a virtually endless range of new skills. Surely you owe it to yourself to use that precious gift to your advantage whenever possible."

The Math Instinct, Keith Devlin, p.264  
(a very good read for mathematics and science teachers at all levels)

If you have a joke or quote to share, please email them to  
deisher6@midrivers.com.

Deadline for November Newsletter is

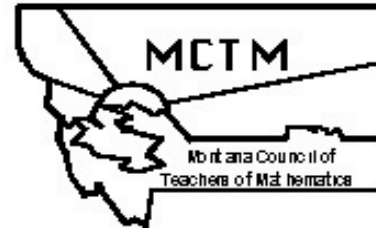
**November 10, 2005**

e-mail articles to  
kathje\_dalton@gfps.k12.mt.us

### MONTANA MATHEMATICS ENTHUSIAST

The Montana Mathematics Enthusiast [ISSN 1551-3440] will go international starting this October (that is, vol2,no2 onwards). The journal will start to feature articles from internationally known mathematicians and mathematics educators but continue to strive to include contributions from Montana teachers, university educators and all other math enthusiasts. MCTM members will also be interested in knowing that articles appearing in the journal are now reviewed on the Mathematics Didactics database (MathDi), which is an internationally known data base for mathematics education. MCTM members interested in contributing articles, book reviews or commentaries on previous articles to the journal are invited to send an e-mail of intent, so that future issues can be planned accordingly. Those interested in reviewing manuscripts are also encouraged to contact the editor. We thank you for your continued support and interest.  
Bharath Sriraman  
Editor

## Win a Trip to St. Louis, MO for the NCTM Convention!



### MCTM Membership Drive

MCTM is hosting a membership drive. Every member that recruits a new member will be entered twice into a drawing for a trip to the NCTM Conference in St. Louis, MO on April 26, 2006 through April 29, 2006. (See [www.nctm.org](http://www.nctm.org) for more details about the conference.) Anyone who renews their membership, has a ten-year membership or a life-time membership will be entered once.

The winner will receive paid registration at the NCTM member rate of \$195, four nights at a hotel at approximately \$170/night, an airline ticket estimated at \$500 and food expenses of \$25/day for four days. The total prize is not to exceed \$1500.

Members may copy a registration form for membership to MCTM and hand it out to their colleagues. New members need to write your name on the application and you will be entered into the drawing two times for each new member you recruit. The new member will be entered once for their new membership.

The winner of the trip to St. Louis, MO will be drawn at the Leadership Conference in Bozeman on January 14, 2006. The winner and an alternate winner will be selected at random. If the winner is unable to attend the conference, the alternate winner will attend in their place. The prize is not transferable.

Any questions about the contest may be sent to Lisa Scott, MCTM President Elect, at

## ASK BARNEY



Ask Barney

8/05

1. **Welcome back Barney. I have missed your column over the summer. Have you been up to anything good this summer?**

As a matter of fact I have. I have been taking some computer lessons, but it has been very difficult for a dog to learn a computer. For instance: 1) I can't help attacking the screen when it says "You've got mail", 2) It is hard to stick my head out of Windows 2000, 3) A saliva covered mouse pad is quite difficult to maneuver, 4) It is very tough to "mark" each website that everybody recommends and finally 5) After many hours of work, I seem to have developed carpal paw syndrome.

2. **I have a couple of questions for you.**

- a) **Why did the dog chase his tail?**

I know that one – he was trying to makes ends meet.

- b) **What happened when the dog went to the flea circus?**

He stole the show!

3. **I am a sixth grade teacher and I have a high anxiety problem about the upcoming CRT's that my students will take this spring. Is there anything I can do to help the students perform to the best of their abilities?**

I have been asked that very question several times. One of the best ideas I have is to read the "Progress Toward Standards" for your grade level. Each grade level has a separate publication. It gets very specific as to what the student should know at each grade level. There is a "Progress Towards Standards" written for each of the grade levels that the CRTs will test this year. Here are a couple of examples from the seventh grade ( I am paraphrasing a little) : 1) The students will use ordered pairs as coordinates of points in a four-quadrant plane. 2) The students, given formulas, will be able to find the volumes of prisms, cylinders,

cones, and pyramids. I have had several teachers tell me that this list helps immensely.

4. **I am looking forward to the fall conference October 19th and 20th in Missoula this year. I always get some great information. I forgot where the MCTM has booked rooms. Can you help me on this one?**

The MCTM has ten rooms reserved at the Holiday Inn Express Riverside for Wednesday and Thursday of the conference. The address is: 1021 East Broadway and their phone is 549-7600. The regular rate is over \$110, but their convention rate is \$89 plus a 7% tax. This is for 2 queen beds. MCTM also has twenty rooms at the Mountain Valley Inn. The motel is downtown on Broadway near St Patrick's hospital. The address is 420 W. Broadway, phone 1-800-249-9174. Their rooms are \$65 per night plus tax for up to four people. The reservations should be attn: Annie Puetz and mention my friend Cole Maxwell's name.

5. **I want to attend the MCTM Annual Meeting. Can anyone attend and where is it going to be held this year?**

Fantastic! It will be great to see you there. The meeting is open to all MCTM members. The meeting is always at noon on Thursday, but I don't know the room number. My advice would be to find that info in the convention book and make plans to attend. Also remember, there will be a free lunch for all paid up members of MCTM. New this year is that you will need a ticket for the lunch, so pick up a ticket at the MCTM booth. The meeting will last for two hours, and there will be some great stuff happening there. I might even show up to do some autographs (if anyone would ask, that is). The Board would love to see as many attend as possible. The last part is the regional meetings where you can meet with your regional rep to voice concerns, to give suggestions for MCTM and to meet with fellow MCTM members in your region.

6. **Any parting words?**

I have a couple. Did you know that it is possible to have a brain and not have a mind? A brain is inherited, but a mind is developed. I believe that we need to consider this when we deal with students. Keep watering, cultivating, and pruning and students will grow. The start of the school year is like spring planting for gardeners. Everything is fresh and there are new beginnings. Treat each student with respect for their

# Lesson Plans

Complete lesson plans are available at [www.montanamath.org](http://www.montanamath.org)

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## K-6

### High Number Draw

The objective of this lesson is two-fold. Students compare numbers and then practice finding the value of a digit and writing numbers in expanded form. It can be used in grades 3-6; but the worksheet must be adapted to the level you are using it at. All you need is a deck of cards, place mat and the worksheet. The size of the number can be varied according to the level of your students.

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## Middle School

Experimental and Theoretical Probability Using a Monte Carlo Simulation

Monty's Dilemma: Should You Stick or Switch?

Lesson from NCTM Illuminations Website

Submitted by Lisa Scott

[scottl@billings.k12.mt.us](mailto:scottl@billings.k12.mt.us)

Monty's Dilemma is a lesson designed to develop the theoretical probability, using a simulation, for the chance of winning what's behind door number 1, 2, or 3 on the game show "Let's Make a Deal". The students simulate the game show using an applet from Shodor Education Foundation's website, Shodor Interactive (<http://www.shodor.org/interactivate/index.html>).

The students use experimental probability and the Law of Large Numbers to make and test conjectures about the theoretical probabilities of winning if they stay with their original door choice or switch to a new door after seeing what is behind one door.

You can download the lesson plan and worksheets from the MCTM website at [www.montanamath.org](http://www.montanamath.org). You may also view the original NCTM Illuminations lesson plan at [http://illuminations.nctm.org/index\\_d.aspx?id=377](http://illuminations.nctm.org/index_d.aspx?id=377).

This is a fun way to learn about Monte Carlo simulations, experimental and theoretical probabilities, and the Law of Large Numbers.

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## High School

The high school activity for this newsletter is a sampling distribution activity for statistics. Each year I find it difficult to help my students understand the relationship between the mean and standard deviation of a population and the mean and standard deviation of a sampling distribution. Suppose that  $\bar{x}$  is the mean of a simple random sample of size  $n$  drawn from a large population with mean  $\mu$  and a standard deviation  $\sigma$ . Then the mean of the sampling distribution of  $\bar{x}$  is  $\mu_{\bar{x}} = \mu$  and its standard deviation is  $\sigma_{\bar{x}} = \sigma/n^{.5}$ . The distribution of samples of size  $n$  has a smaller spread than the original population. In fact, it is  $1/n^{.5}$  times smaller. The students seem to see the relationship better through the use of this activity. I use it at the beginning of the chapter on Sampling Distributions. The actual activity can be found on the MCTM website at <http://www.montanamath.org>.

The activity was adapted from the golden book that is provided with "The Practice of Statistics." The authors are Daniel S. Yates, David S. Moore, and Daren S. Starnes. You can contact the publisher at [www.whfreeman.com/statistics](http://www.whfreeman.com/statistics).

**Montana Mathematics Opportunities — Satinee Lightbourne**

Check out the MCTM web site at [www.montanamath.org](http://www.montanamath.org)

\*MEA/MFT Fall Conference. October 20-21, 2005 in Missoula, MT. Join other MCTM Members for our annual lunch meeting on Thursday. MCTM has blocked rooms at Mountain Valley Inn, 420 W. Broadway (just off Orange St.) and are \$65 per night for up to 4 people. The phone number is 728-4500. The rooms are held until Sept 1st. To get a group room and rate use the name Cole Maxwell.

\***Dean Preble Award.** Nominations are accepted year round! Nominate any MCTM member (board members excluded) who teaches K-college. Nomination procedure found on the MCTM web site. Click on Awards.

\***MCTM Teacher Scholarships.** Self-nomination form can be found on the MCTM web site. Click on Awards. These scholarships are offered year-round. Teachers can receive \$250 for help with any out of state conference or \$100 for any in state conference.

\***Presidential Awards.** Nominations for K - 6 teachers are currently being accepted. A teacher must be nominated in order to receive the application. Application deadline is May 1, 2006. Go the Awards page of the MCTM website or directly to [www.ehr.nsf.gov/pa/](http://www.ehr.nsf.gov/pa/).

\***Membership.** If your label is highlighted on this newsletter, your membership has expired or will expire at the end of September. Please send in your dues today!

**MCTM Membership Form**

\_\_\_\_\_ New Member \_\_\_\_\_ Renewal  
 \_\_\_\_\_ Elementary \_\_\_\_\_ MS \_\_\_\_\_ HS  
 \_\_\_\_\_ College \_\_\_\_\_ Other

Name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone Number: \_\_\_\_\_

Email: \_\_\_\_\_

Annual Dues (September- August)

\_\_\_\_\_ Regular (1 yr) \$15  
 \_\_\_\_\_ Regular (2 yrs) \$25  
 \_\_\_\_\_ Regular (10 yrs) \$100

\_\_\_\_\_ Life Time \$150

\_\_\_\_\_ Student \$8

\_\_\_\_\_ Retired Educator FREE

\_\_\_\_\_ MCTM & MSTA \$30

\_\_\_\_\_ Contribution to Scholarship

Fund \$5 to \$ 8

**Send Form with correct amount to:**

Lisa Wood, MCTM Membership Chair

1911 Belvedere Drive

Billings, MT 59102

[woodl@billings.k12.mt.us](mailto:woodl@billings.k12.mt.us)

## Greetings from the Montana Learning Center, MLC

The sun shines, the water glistens, and the people at MLC continue to smile. What a marvelous summer! It began in June with the MCTM board of directors meeting and conducting a Vision and Reality session to set short and long range goals. At the same time, a group of middle school teachers experienced the Society of Automotive Engineers World in Motion Program. They left eager to implement the interactive program into their classrooms.

In the later part of June, the mountain blue birds built a nest for everyone to view and the high school MCTM COMET participants arrived. Just imagine two weeks of 23 high school teachers from across the state doing relevant mathematics, reading their assignments while playing tennis, and having so much fun the lights never went out in the pink house. The MCTM COMET program provided an intense study of math content with a focus on reflective teaching as well as sailing, pontoon boat trips, canoeing, geo caching, and building a strong network of colleagues to continue their action plans throughout the school year.

July brought warmer weather, and a fabulous group of 34 elementary teachers who enjoyed the serenity of MLC while learning to build number sense with their K-6 students. The 20 middle school MCTM COMET participants found the cool classroom in the basement of the Green house their new home for doing relevant mathematics. They took part in all the same activities as the high school group and garnered a great deal of attention as they measured the speed of the cars traveling past MLC. They now lovingly refer to their time at MLC as "Geek Camp". During the time of MCTM COMET, a group of 4<sup>th</sup> – 6<sup>th</sup> graders stayed at MLC for the Young Naturalist Program. Gil and Marilyn returned to MLC to run a Lewis and Clark Elderhostel program where adults from across the nation have first-hand experiences studying Lewis and Clark's journey through Montana. A small group of MCTM members gathered to focus on writing problems for the MCTM Math Contest. They must have found their focus early because they were done a day ahead of schedule. Could that be because of the awesome atmosphere? The baby blue birds were in the patio eaves for all to appreciate during the month.

The final month of summer, August, started out even hotter with the 28 elementary MCTM COMET participants trying to find wall space to display all of the math they were doing and learning. Even the outside of the kitchen on the patio was adorned with displays representing the average elementary MCTM COMET participant., "I am going to my cabin now, time for sailing, I wonder if they can hear the laughter from the Tan house across the lake, number talk..." were a few of the pleasing phrases that filled the air. Camp Discovery, a day camp for 1<sup>st</sup> – 3<sup>rd</sup> graders, found the site a perfect place to examine water bugs and experience the science all around them. Everyone is now watching the baby blue birds and parents fly around the area, what a site. One more Lewis and Clark Elderhostel concluded the month with memories of the best spot in the west to learn, MLC.

### **Newest Program**

In April, MLC proudly jump started a new MCTM grant, Before It's Too Late, BITL. This program created regional workshops in Butte, Froid, Havre, Helena, Lodge Grass, for teachers and leaders of 6-12 mathematics to expand their content knowledge and pedagogy in order to teach all students the requisite mathematical skills needed to attend post-secondary education. A follow-up to plan the next phase for Before It's Too Late program also took place in August. The key BITL messages include: All Students Can Learn, Post-secondary Education Pays, and All Students Deserve to Dream. We must address student engagement in ongoing education and this exciting program can help!!

Check out what's happening at MLC [www.MontanaMath.org](http://www.MontanaMath.org) or [www.MontanaLearning.org](http://www.MontanaLearning.org)

Please contact me if you have any questions and/or programs you want scheduled at MLC  
Jean Howard [jkhoward@MontanaLearning.org](mailto:jkhoward@MontanaLearning.org)

**MCTM NEWSLETTER**  
**Great Falls Public Schools**  
 Great Falls High School  
 1900 2nd Ave. S  
 Great Falls, Montana 59401

Non-Profit Organization

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### MCTM Board of Directors 2005-2006

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**Editors: Mary Aspinwall, Kathje Dalton, Kurt Shepherd**

Montana Mathematics is a newsletter published for all members of the Montana Council of Teachers of Mathematics. The publication comes out 5 times/ year and is free to all members of the MCTM. Any information pertaining to MCTM can be sent to Kathje Dalton at Great Falls High School, 1900 2nd Ave S, Great Falls, Montana 59401. All entries will be reviewed.