



# MONTANA MATHEMATICS

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TEACHERS OF MATHEMATICS

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## Implementing the Algebra Standard – A Workshop Designed for You!

Picture this – a student diligently working on his Math. He looks up at the teacher who is bending over his desk. He innocently says, “But yesterday you told me  $x = 3!$ ”

Want your students to avoid the confusion often associated with algebraic thinking? Do YOU want to have a better grasp of the content in the Algebraic and Functional Thinking standard? We have a workshop for you!

MCTM is sponsoring a series of workshops focusing on algebraic thinking. This summer we will repeat the Elementary workshop designed for teachers in grades kindergarten through sixth grade and also offer a middle school workshop. A workshop designed for high school teachers will be offered next summer.

This summer’s Elementary workshop will be July 19-22 and will be presented by Angel Zickefoose. Angel is a Math Coach for Billings Public Schools. She is a K-8 Math Coach for Billings Public Schools and has provided several trainings for teachers around the state. The workshop will be hands-on, with ideas that you can implement in your classroom next fall! The main components of algebraic thinking will be addressed: 1) describing, extending analyzing and creating a wide variety of patterns; 2) describing and representing relationships with tables, graphs and rules; 3) analyzing functional relationships to explain how a change in one quantity results in change in another and 4) using patterns and functions to represent and solve problems. This workshop will be held at MSU Billings in the College of Education building – Room 330.

The Middle school workshop is designed for teachers in grades 5 through 9. It will take place July 12 – 15 at the Montana Learning Center. Mary Buck, a former Helena middle school teacher and principal as well as experienced national mathematics consultant, will bring her expertise to facilitate this workshop. The NCTM Algebra

standards as well as the new Montana State Standards will be the foundation for activities that participants will experience. A variety of algebra tasks will be used to investigate the following topics: student struggle, making mathematics explicit, cognitive demand of problems, effective questioning, and lesson planning. A Science Inquiry workshop for grades 5-8 teachers of Science will be going on concurrently at Montana Learning Center. It is a great opportunity for teams of teachers to experience the beautiful atmosphere as well as receive high quality professional development.

For more information contact Kathy Hill at [kathymarie56@hotmail.com](mailto:kathymarie56@hotmail.com). Or visit the website at [montanamath.org](http://montanamath.org) to register.

### Don't miss out!

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# MONTANA MATHEMATICS

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## President's Message

Happy Spring Everyone! It is about time, I thought it would never warm up! I can handle the snow, but the cold this year was just never ending!! Hey, how was the Math Contest in your area? The contest in Billings was great! It makes me happy to see all those kids taking time out of their busy schedules to participate in the contest. Thanks to all the volunteers both at the local and state levels for all their hard work in making the contest a success. Don't forget about the test writing opportunity this summer. MCTM pays for your expenses as well as provides a stipend to write the tests over a two day time period. For more information about this opportunity, check out the MCTM website at [www.montanamath.org](http://www.montanamath.org).

While on the web, check out our summer professional development opportunities, as well as available scholarships and much more. The MCTM Math Coaches Retreat will take place at MLC on August 9 and 10. MCTM is also sponsoring a K-6 PDA on Implementing the Algebra Standard K-6. Angel Zickefoose (Greenley) is presenting in Billings on the MSUB campus July 19-22. Mary Buck and Mary Wren are presenting our first Middle School PDA. It is also on Implementing the Algebra Standard but in the 5-9 grade band. Previous academy attendees expressed an interest in a middle school workshop and MCTM listened. This workshop is at MLC at Canyon Ferry July 12-15.

It is time once again to vote for new MCTM board members. This newsletter provides information of those people running, what grade level, and what regions we need to represent us, as well as the ballot. Please take the time to fill out the ballot and send it in. Thank you to those people running for the board. We appreciate your commitment to MCTM and quality teaching. If you are interested in being a board member please let one of the current board members know so we

can be sure and contact you when it is time once again to nominate people.

MCTM is once again looking forward to the MEA/MFT conference in October. The 2010 conference will be held in Helena October 21 and 22. We are currently asking for presenters for the conference. If you are interested in presenting you can find a link on the MCTM website at [www.montanamath.org](http://www.montanamath.org). The deadline to register as a presenter is May 7th. Don't put it off, register today!

Be thinking about people that you would like to nominate for the Dean Preble Award. Nominations are due in June but can be sent in any time. In the May newsletter Gary Bauer will be writing a feature article about the award so be sure and check it out. All the pertinent information for nominating a colleague is on the website as well. Please help us to honor a quality Mathematics Educator in Montana. Have a wonderful spring everyone and thanks for all you do!

Lisa Wood  
MCTM President



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## Lesson Plans

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

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### K-6

#### **Indy 500: Addition with Regrouping**

Submitted by Emily Herlihy

Students learn many strategies to add 2 and 3-digit numbers. Once they have mastered addition without regrouping and place value up to hundreds, the next important skill is to understand when and how to regroup. One card game that I have found to be a really fun way to teach this skill is Indy 500. The students race each other to the finish line, which working as a team to determine when and if regrouping is needed. Place value mats and discs are manipulatives that have made learning more accessible for many of my students. I adapted the game from Singapore Math materials found in the Standards Edition 2A Teachers Edition, 2008.

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### High School

#### **UNIT CIRCLE CONSTRUCTION**

Submitted by Marcia Anderson

Students will construct a circle with degree measures of the special angles used in trigonometry (all multiples of  $30^\circ$ ,  $45^\circ$ ,  $60^\circ$  from  $0^\circ$  to  $360^\circ$ ). Then they will do the same for radian measures of the same angles. Finally they will construct a unit circle with  $(x,y)$  coordinates of the special angles. This organizes and keeps all of this information in one place.

It can be used in solving special right triangles, solving trigonometric equations, graphing trig functions, and inverse trigonometric functions. It helps with the understanding of what a radian is.

Months after the construction, students still refer to the circle (one class called it the “Wheel of Fortune”)

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### Middle School

#### **Building with Toothpicks**

Submitted by David Erickson

Students use toothpicks to build four different figure and then predict what the fifth figure will look like. next steps include finding the perimeter of the given figures, the perimeter of the nth figure and also discussing the area of the figures. This is a rich math lesson that can be used at all levels!

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## Nominations Sought for the 2010 Dean Preble Memorial Award for an Outstanding Teacher of Mathematics

The Dean Preble Memorial is awarded annually to a Montana educator who has made significant contributions to the teaching and learning of mathematics and who has consistently assumed a leadership role among math educators. Teacher-leaders at all levels, kindergarten through university, are eligible.

### The Award

This award is given in memory of our colleague Dean Preble, who passed away from cancer in the fall of 1998. Dean was recognized for his unfailing support for mathematics education in the state of Montana. His dedication to the mathematics teaching profession, his love of his students, his involvement in state and national mathematics organizations, and his devotion to the improvement of mathematics education for all were unparalleled.

One of Dean's wishes was to establish an annual award to recognize outstanding teachers and leaders of mathematics in Montana. In keeping with his wish, MCTM created the Dean Preble Memorial Award. The award consists of an inscribed plaque, a \$300 stipend, and a lifetime membership in MCTM. The award is presented at the MCTM annual meeting in October.

### Award Criteria

- Any member of MCTM may submit a nomination. Current members of the MCTM Board of Directors may not be nominated for this award.
- The nominee must be a current MCTM member.
- The nominee must have taught mathematics in Montana.
- The nominee must have a record of significant and consistent contributions to the teaching and learning of mathematics.
- The nominee must have a substantial record of participation and leadership in professional activities involving mathematics education

### Nomination Procedure

Nominations should consist of a maximum of two, double-spaced, typewritten pages and should directly address the criteria outlined above. The name, address, telephone number, and present position of both the nominee and the nominator must be included.

Deadline for submissions for the 2009 Dean Preble Memorial Award is June 15. Nominations may be sent or e-mailed to:

Cliff Bara  
Box 610  
Troy - MT - 59935  
cliffbara@hotmail.com



## Aunt Sally

Dear Aunt Sally,

You asked for a suggestion for a name for the years 2010 - 2019 like the "Roaring Twenties" or "Dirty Thirties". I must say that I did not think that the writer of the Aunt Sally column was old enough to remember those days, he (she) sure has lots of people fooled. It was my grandparents who explained those terms to me.

Anyhow - How about the "Tantalizing Teens?". I thought you might like that one.

Best to you, MCTM, and Sally.

Dan Dolan

40 Year MCTM member.

*Dear Dan*

*I appreciate your response and your compliment on my age. Sonny, don't let my youthful picture fool you. I was alive long before you worked on the Columbus Project (the math project, not the Christopher-sail around the world thing).*

*Signed,*

*Your Dear Aunt Sally*

*Dear Readers,*

*Like any good teacher, when my students run out of questions, I start asking the questions.*

*We have had the MCTM Math Contest for many years, touching many students' (and teachers') lives. I would like to know what parts of the contest you like and what MCTM could do to make it better.*

*MCTM has a webpage to get your input. We would like you to go to this webpage and complete a short survey. Please feel free to give this web address out to your students so we can also get their input.*

*This may shape the MCTM contest for the future so make sure you participate in the survey, even if it is to keep things as they are.*

*The web address is: [montanamath.org/contestsurvey](http://montanamath.org/contestsurvey)*

*Thank you,*

*Your Dear Aunt Sally*

### A Little Math Humor

Why did the Math Book cry?  
It had too many problems.

How do you make 7 even?  
Take away the s.

Where did the math student eat his lunch?  
At the multiplication table!

Which knight helped King Arthur build his round table?  
Sir Cumference!

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## This is a test. This is only a test...

*This is a test. This is only a test. For the next sixty seconds, this station will conduct a test of the Emergency Broadcast System. This is only a test. ... If this had been an actual emergency, the Attention Signal you just heard would have been followed by official information, news or instructions. ... This is only a test.*

Do you remember when we used to hear this message on our radio or television? Stations were required to broadcast this test once a week from 1963-1997 in order to make sure all the equipment was working properly in the event of a national emergency. There were times that this announcement led to anxious responses from listeners. If you are like me, most of the time you probably just ignored it because you got so used to it not meaning anything. You kept right on with life as you knew it.

At the 2010 MCTM/MSTA Leadership Conference in Bozeman we were reminded that, in our classrooms, assessment should not be “only a test.” The main theme of the conference was How to Get Every Child Ahead Using Standards and Assessment. Judy Snow (Montana OPI State Assessment Director), Jean Howard (Montana OPI Math Curriculum Specialist) and Katie Burke (Montana OPI Science Curriculum Specialist) helped us to think through the use of formative assessment as well as connecting our assessment to the State Standards in our classrooms.

Formative assessment is a means for teachers to stay in touch with the progress of their students. As a teacher checks for understanding, they make adjustments to meet the needs of the students in their classroom. Formative assessment is also a means for students to be aware of areas they are weak in. Students can be given time to reflect on areas of improvement and then the teacher can offer feedback for change. Types of formative assessment might include journals,

portfolios, projects, in-class questioning, teacher-student dialogues, or even quick quizzes.

It is important to connect our lessons and assessment to the Montana State Standards. To do this well, we begin with the appropriate standard being covered. We then design formative assessments that will give students the opportunity to demonstrate proficiency. After we have designed our assessment, we can then develop lessons based on the standard. This will ensure our assessments measure what we have taught to our students.

On Friday afternoon, Sue Solomon and Kim Komar from Riverside Middle School in Billings, shared with us what they were doing with their students. Their presentation, Standards-Based Math Teaching Using Formative Assessment, was very inspiring. It gave us a perspective on how the concepts we were considering could be implemented in the classroom. Sue and Kim stressed that this approach was difficult and took extra time outside of the classroom. Yet, it was very effective in helping all students learn. I was encouraged by their experience and their story helped give a “big picture” context to the content we were learning. If I were to re-write the announcement from the beginning of this article, it would go something like this:

*For the next 180 days this classroom will be a safe environment for learning. The teacher will work hard at developing assessments and lessons aligned to the State Standards. When you are assessed, it will be followed by more appropriate instruction, information or activities to help you learn...it is not only a test.*

Submitted by Jesse Sauskojus



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Greetings Fellow Math Educators,

Please sign up or nudge your colleagues in signing up for the monthly Content Standards Informer.

The Content Standards Informer (CSI) will be distributed the first Friday of each month through the Content Standards Informer Listserv. If you would like to receive the CSI each month please sign up for the listserv at: <http://lists.opi.mt.gov/mailman/listinfo/contentstandardsinformer>

Some of the information found in the CSI includes the following.

Short but concise articles on Math instruction, learning, research, and effective programs from Johns Hopkins University, Center for Research and Reform in Education and Institute for Effective Education can be found on the Best Evidence Encyclopedia web site. [www.bestevidence.org/better](http://www.bestevidence.org/better) <<http://www.bestevidence.org/better>>

Please take time to familiarize yourself with the National Common Core Standards Initiative. Information including the overview, College and Career Ready Standards draft, previous drafts of the K-12 Common Core Standards, as well as Montana response to each draft can be found at [http://www.opi.mt.gov/Curriculum/Index.html#gpm1\\_7](http://www.opi.mt.gov/Curriculum/Index.html#gpm1_7) It is now time for public comment is now (information below). Please take time on your own or with your colleagues to respond to the draft.

**DRAFT K-12 COMMON CORE STATE STANDARDS AVAILABLE FOR COMMENT**  
*NGA Center, CCSSO Release First Official Public Draft*

**WASHINGTON**—The National Governors Association Center for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO) today released the first official public draft of the K-12 standards as part of the Common Core State Standards Initiative, a process being led by governors and chief state school officers in 51 states, territories, and the District of Columbia. These draft standards, developed together with teachers, school administrators and experts, seek to provide a clear and consistent framework to prepare our children for college and the workforce.

The NGA Center and CCSSO have received feedback from national organizations representing, but not limited to teachers, postsecondary education (including community colleges), civil rights groups, English language learners, and students with disabilities. The NGA Center and CCSSO encourage those interested in the standards to provide further feedback by Friday, April 2, 2010, at [www.corestandards.org](http://www.corestandards.org) <<http://www.corestandards.org>> .

Submitted by Jean Howard  
OPI Math Curriculum Specialist

What do you get if you divide the circumference of a jack-o-lantern by its diameter?

Pumpkin Pi!

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## Dean Preble Award

I am honored to write a brief article about the Dean Preble Award and I want to encourage everyone to do two things. FIRST—go to the MCTM website ([montanamath.org](http://montanamath.org)) and read about the award and about Dean. SECOND—nominate a colleague you believe exemplifies the person Dean was.

When you visit the web site, you will see a list of people who have been honored to receive this award. If you have taught mathematics in Montana for any length of time, you will recognize the names. It is of special note to recognize that there is now a single award given each year and is independent of the grade level at which one teaches.

I was blessed to know Dean as a colleague, a friend, and a leader in mathematics education at the local, state, and national levels—and he was a gift and inspiration in each role.

As a colleague, Dean was as gifted a teacher as I have known. He knew the content of his profession like few do. More importantly, he taught with a passion that engaged students, helped them be better than they might have thought they could be, and he did it with a heart as big as he was.

As a friend, he was unparalleled. He was there in the up times always willing to lend a hand and give thoughtful suggestions regarding a project. He was there in the down times with the compassion and caring that personified his life. With Dean, the proverbial saying “What you see is what you get” could not have been more true. He was the epitome of integrity, friendship, honesty, and caring.

As a leader, he had a style about him that brought the best out in people. He was far more likely to quietly help others contribute to the task at hand than he was to grab the limelight for himself. He certainly knew how to roll up his sleeves and work tirelessly but he also knew how to empower others.

So as you read about Dean on the MCTM website, take to heart who he was and what he stood for in mathematics education. Nominate a deserving colleague TODAY. **Deadline for nominations** for the Dean Preble Memorial Award **is June 15** annually. Nominations may be sent or e-mailed to:

Cliff Bara  
Box 610  
Troy - MT - 59935  
[cliffbara@hotmail.com](mailto:cliffbara@hotmail.com)

Submitted by Gary Bauer

### **Richard Seitz is the Winner of the Trip to San Diego for the NCTM Convention!**

MCTM hosted a membership drive. Every member that recruited a new member was entered twice into a drawing for a trip to the NCTM Conference in San Diego on April 21, 2009 through April 24, 2009. (See <http://www.nctm.org> for more details about the conference.) Richard is a high school math teacher in Helena.

Richard will receive paid registration at the NCTM member rate of \$265, airline ticket, three nights at a hotel at approximately \$220/night and food expenses of \$25/day for three days. The total prize is not to exceed \$1500.

The winner of the trip to San Diego was drawn at the Leadership Conference in Bozeman on February 6, 2010. Richard was selected by generating a random number on a calculator.

There will be another chance to win a trip to a NCTM Conference. The contest will begin in September of 2010. This trip will be to Indianapolis, IN on April 13-16, 2011. So, get ready to recruit new members!

Congratulations Richard!



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## Notes from the Montana Learning Center at Canyon Ferry Lake “Learning at the Lake”

### **Nominate an Amazing Science or Mathematics Teacher to Become an Ambassador for Montana Mathematics and Science!**

The Montana Learning Center has a unique leadership grant from the Qwest Foundation. We are looking for 10 mid or earlier career mathematics and science teachers who have demonstrated initiative and creativity in teaching. The group will identify and create workshops and presentations that will highlight the creativity of science and mathematics innovations and address the current issues facing us all as members of the global society. We will be mentoring these younger teachers for leadership at the state and national levels. To nominate a teacher, please send a brief bio of the nominee and the reason for your nomination to Richard Seitz ([rseitz@hsd1.org](mailto:rseitz@hsd1.org)) or Rick Jones ([jonesr@billings.k12.mt.us](mailto:jonesr@billings.k12.mt.us)). **Nomination deadline is March 15 (but may be extended).**

### **MCTM and MSTA Combine Academy Efforts**

Mary Buck & Kathy Hill (MCTM) are organizing the MCTM middle school Academy "Implementing the Algebra Standard 5 - 9" to be held July 12 - 15 at MLC. [For MCTM academy details, go to [www.montanamath.org](http://www.montanamath.org).] By design, Beth Thomas (MSTA and MLC Board member) is offering the MSTA Science Inquiry Professional Development Academy on those same dates. Gr. 5 - 8 teachers will learn to create a classroom culture that supports inquiry. Scientific topics will be explored as the inquiry approach to learning is modeled. Teachers are encouraged to participate as individuals but math and science teachers attending from the same school/district will find much to discuss and share. [Go to

[www.montanalearning.org](http://www.montanalearning.org) for further information including registration details.]

### **Student Summer Camps CAMP DISCOVERY**

What: A four day science day camp for primary students

Who: Students entering grades K-3

When: July 19th – 22nd, 2010

Cost: \$190 per camper

Instructor: Chris Ralph, Helena Public Schools

### **YOUNG NATURALIST'S**

What: A four day, three overnight math and science camp

Who: Students entering grades 4-7

When: July 19th -22nd, 2010 (entering grades 4-5) July 26th-29th, 2010 (entering grades 6-7)

Cost: \$290 per camper per week

Instructor: Beth Thomas, Great Falls Public Schools

### **INNOVATIONS 1 & 2**

What: A week long camp in which math and science will be explored in the outdoors.

Who: Students entering grades 8-10

When: July 18th -24th; July 25th – 31st (different topics each week)

Cost \$490 per camper per week

Instructor: Jody Brown, Augusta Public Schools

Refer your math/science interested students or their parents to [www.montanalearning.org](http://www.montanalearning.org) for descriptions of each camp's activities and registration details. Contact Carol Bock at [cbock@montanalearning.org](mailto:cbock@montanalearning.org), (406) 475-3638, and fax: (406) 475-3871.

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## NCTM Representative's Report

### Beyond Standards: Coherence

#### It's about Students' Learning and Understanding of Mathematics!

Are we paying sufficient attention to students' coherent mathematical learning while the media and current policymakers focus attention on the Common Core State Standards Initiative and on reports of groups of states banding together into consortia to contract for assessment packages?

We know that too many of our students leave our schools with a vision of mathematics as a set of unconnected and independent facts with no clear sense of how the ideas fit together nor of how mathematics can help them earn a living, guide them as citizens, or affect their daily lives. You, the Council, and I have the responsibility to see that our students receive a coherent mathematical experience as they progress through the grades, one that expands their vision of mathematics and their connections to it. Go to <http://www.nctm.org/about/content.aspx?id=25138> to read the full article.

### New NCTM Releases

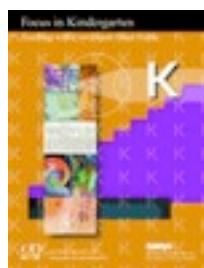
[\*Focus in Prekindergarten: Teaching with\*](#) illustrates learning paths for the prekindergarten focal point as presented in [\*Prekindergarten through Grade 8\*](#)

[\*Focus in Kindergarten: Teaching with\*](#) representational supports for teaching and stimulate productive discussions about foundation for fluency in the core ideas.



[\*Curriculum Focal Points\*](#) describes and mathematical concepts and skills of each [\*Curriculum Focal Points for Mathematics: A Quest for Coherence\*](#).

[\*Curriculum Focal Points\*](#) includes powerful learning that can facilitate understanding, mathematical thinking, and provide a



### NCTM E-Seminar

#### Effective Mathematics Instruction: The Role of Mathematical Tasks (General)

#### Why Don't My Students Have Number Sense? (Grades 6-8)

**Presenter:** [Eric Milou](#), Rowan University, Glassboro, NJ

April 28, 2010

2-3pm Mountain Time

Seminar participants will be presented with methodology, activities, and strategies that can lead to improved number sense in students. The focus of this session will be to discuss the difference between and the relationship of computational proficiency and number sense. Content included in the presentation will be whole number computation, fractions and decimals.

Go to <http://www.nctm.org/profdev/content.aspx?id=23402#Feb%2024> for more information.

Submitted by Lisa Scott, NCTM Representative

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## Candidate Biography

### Mandy Bighorn

**Name:** Mandy Bighorn

**Home Address:** 1005 Picador Way

**Region #:** 4

**School:** Newman Elementary

**City:** Billings

**Present Teaching Assignment:** 4th Grade

**Education Background:** Bachelor's Degree in Elementary Education, Reading Endorsement, Master's Early Childhood Education

**Teaching Experience:** 4 years

**Activities in MCTM:** MEA-MFT panel member for first year teachers, sponsored by MCTM, current member of MCTM

**Other Information (activities, awards, organizational memberships, etc.):** Newman Elementary Mathematics Professional Learning Community, Teachers Integrating and Learning Technology in Billings Public Schools, Billings Technology Cadre, Audubon Grant Participant, One Class at a Time grant recipient to purchase math manipulatives, Billings Education Foundation grant recipient to purchase a Mimio.

**What positive traits will you bring to the board?** When I began teaching, my lack of self confidence in teaching mathematics challenged me to strengthen my knowledge in this area. Over the past four years I have developed a passion for teaching, learning, and understanding mathematics that I never thought was possible. I am completely dedicated to improving student learning in mathematics because I can relate with students who lack self confidence, as well as those students who thrive to challenge themselves beyond grade level expectations. I am a dependable hardworking person who has the willingness to be a life long learning by being part of a larger education network to develop common math learning outcomes for students.

**What role should MCTM take in Montana mathematics?** I believe students and teachers across all grade levels would benefit most from having power standards aligned with common formative and summative assessments. With the new Essential Learning Expectations, scheduled to be released shortly, MCTM's next step would be to assist OPI with the alignment of the Essential Learning Expectations to formative and summative assessments for teachers around the state. I also believe that the foundations of a strong mathematics background begins at the elementary level, and MCTM can continue to support elementary teachers in building the foundation by providing professional development for teachers at all grade levels.

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## Candidate Biography

### Melissa Romano

I am currently a Kindergarten thru 8<sup>th</sup> grade Math Instructional Coach with the Helena School District. Prior to my role as a math coach, I had seven years of elementary teaching experience. While teaching in the primary grades, I discovered a real love for teaching mathematics and began to focus my professional development around math and problem solving. Early in my teaching career with Helena I attended a Cognitive Guided Instruction (CGI) for Algebraic Thinking workshop with Education Northwest and became enthused and enlightened about teaching mathematics to young children. During 2009, I had the honor of being recognized and written about in Education Weekly as I continued to refine and use CGI practices in my classroom. As a math coach, my primary role is to help lead CGI professional development for educators in Helena. During 2008-2009 I worked with a team of educators across the state to draft and write new Montana mathematics standards and helped write and edit the Montana essential learning expectations for the new standards. I am trained in Assessing for Learning through the Exploratorium in San Francisco and look forward to using skills gained with educators in Helena. I was recently elected to serve on the board for the Montana Learning Center and look forward to meeting more educators across the state and applying new knowledge. In my spare time, I love to exercise and run and would love to run a marathon in the near future. I like to hike and be outdoors with my husband and two children, and put to use my photography degree as well.

### MCTM Early Career Scholarship

MCTM is offering an "Early Career" scholarship worth \$500. This scholarship will be given to one K-12 Montana teacher each year to attend either the K-6 or the 7-12 MCTM Professional Development Academy (PDA) during the summer. This scholarship may not be used for any other convention or conference.

#### To be eligible for this scholarship you must

- 1) have taught math in Montana for at least one (1) year and not more than five (5).
- 2) be contracted to teach math this coming year in Montana.
- 3) be a current member of MCTM

#### You must also fill at least one of the following criteria:

- 1) an elementary teacher who teaches at least one section of math during the day or
- 2) a secondary teacher who teaches at least 3 sections of math each day or
- 4) special education teacher who has at least one period of math each day or
- 5) a Title 1 math teacher who teaches at least 2 periods of math each day

The deadline for a completed and submitted application is April 30<sup>th</sup> of the year of the PDA.

In the event that the original winner is unable to attend, an alternate will be chosen.

Please visit [www.montanamath.org](http://www.montanamath.org) for more information.

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## COLLABORATION IN IMPROVING THE MATHEMATICS CURRICULUM

By working together mathematics teachers and supervisors can do much to improve teaching and learning in mathematics. Collaboration is important to develop high quality objectives, learning opportunities, and appraisal procedures in teaching pupils. Each participant needs to be well informed of recommended procedures, research, and technology in instructional settings.

A special section in the school library needs to house instructional materials for mathematics teachers. Thus, university level teaching of mathematics textbooks, professional mathematics teaching journals, different series of math textbooks K-12, video tapes on mathematics instruction, among other references sources need to be available for teacher referral and use.

### **Curriculum Improvement in Mathematics**

With the team approach, participants may share ideas and engage in higher levels of cognition to solve problems in teaching mathematics. There are a plethora of points of intervention. First, the objectives of instruction need scrutiny in terms of raising the following questions:

- \* Are the objectives relevant for learners in school and in society, as well as for those going into the professions?
- \* Do they stress a balance between subject matter knowledge and skills in mathematics?
- \* Are they arranged sequentially in moving from what is taught and understood to those which are gradually more complex?
- \* Is meaning making and deriving sense in ensuing mathematical lessons being emphasized?
- \* Are attitudinal objectives being stressed adequately?

Collaboration in studying and evaluating objectives in mathematics is time well spent. The objectives need to possess clarity and stated in measurable terms so that it may be ascertained if, after instruction, they have been attained by pupils.

Periodical review of what is taught leads to a better understanding of what pupils are experiencing and which innovations need to be advocated. With collaboration, mathematics teachers might well try out revised objectives in their classrooms and report back to the group how well teaching and learning transpired. Problems identified here need study and recommendations made to further improve the mathematics curriculum.

Learning opportunities for pupils to achieve the objectives also need indepth study by participants in collaborative endeavors. Learning opportunities must be varied to provide for each pupil so that he/she may attain as optimally as possible. Different kinds of learning opportunities need to be discussed to determine what works and what changes/modifications need to be made. Active participation in collaborative endeavors may be fostered by paying attention to relevant, not trivial, items in teaching and learning situations. Video tapes of classroom teaching might well provide a basis for analyzing teacher and pupil behaviors in mathematical units of study. The following identified problem areas need consideration:

- \* What should be the role of the latest in technology in the math curriculum?
- \* Must inservice education be emphasized to assist mathematics teachers to fully utilize technology to assist pupils in meaningful leanings?
- \* Which additional kinds of technology, than those possessed, are necessary to aid in the instructional arena?
- \* Would an increased use of technology stimulate pupil interest in ongoing experiences in the classroom?
- \* What is the role of more traditional procedures in teaching such as carefully chosen textbooks, workbooks, and work sheets?

The mathematics teacher models quality attitudes toward content, skills, and an appreciation for efforts made by mathematicians in developing

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# MONTANA MATHEMATICS

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knowledge and skills in the mathematical arena. It is vital for teachers to keep up with the latest developments in the teaching of mathematics. Technology continues to come out at a rapid rate and teachers must be aware of what will assist pupils to do well in math achievement. Learning by discovery, problem solving, as well as creative and critical thinking need to permeate the math curriculum.

Collaboration by teachers in assessing pupil achievement is vital. Certainly, a quality assessment program is necessary. With standardized testing, math teachers need to attach meaning to the following concepts pertaining to assessment:

- \* validity of the test and how its is determined
- \* reliability and its role in the development of tests
- \* the definition of standardized tests
- \* formative and summative evaluation as well as measuring benchmarks of pupil progress
- \* accompanying Manual and its uses.

Teacher written tests are salient to use at selected intervals to measure achievement. Multiple choice test items should possess the following standards:

- \* each test item should generally have four distractors.
- \* the distractors should be of simulator length so that clues are minimized/eliminated as to the correct response.
- \* the stem and each of the four distractors should make for a grammatically correct sentence.
- \* no pattern should exist in terms of which is the correct response.

Face validity may be used when writing teacher written tests. Thus, after a concept or generalization has been taught, the mathematics teacher may then apply the same content in writing a test item. Clarity and meaning must be inherent in each test item written. Few teachers use test/

retest approaches to check reliability. Reliability emphasizes that a test measure consistently. Test/retest reliability means giving the same test two times within a few days apart to notice if learners, basically, received the same/similar percentile or number of correct test responses. If the scores differ much from one testing to the next for the same pupil, the chances are the test times are vague or do not measure what was taught, among other factors. Alternative forms reliability emphasizes the mathematics teacher write two separate tests covering objectives in the lesson or unit of study taught. Teachers generally do not have the needed time to do this. However, split half reliability requires administering the teacher written test once, and then comparing the even numbered with the odd numbered responses for all pupils in a class. Does the test measure consistently in that generally Pupil A is highest in both the odd/even comparison; pupil B is second high whereas pupil C is third high, and so on.

Teacher written essay test items may do a good job of assessing mathematics achievement if selected criteria are met such as the following:

- \* the items are written on the understanding level of pupils. If reading is a problem, the teacher may read the test items aloud. The writer when teaching in a two teacher rural school had two seventh graders in one grade level only. It did not take long to notice that reading caused difficulties in solving word problems; these were then read aloud to the two pupils who then did fairly well on the arithmetic facet.

- \* essay test items need to be delimited, but not to the point of requiring factual answers. Thus, a problem solving approach is recommended whereby pupils need to deliberate and think to ascertain answers. Problems in mathematics need to involve indepth thought in which critical and creative thinking are involved.

- \* the test length should measure objectives stressed in class, but not to the length whereby



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learner fatigue sets in when responding. The purpose is to measure mathematical problem solving skills and not endurance.

\* pupils may show procedures used in problem solving. Mathematics teachers might then view how pupils responded as well as the answer obtained. This provides feedback to the teacher as to what needs reteaching and emphasis necessary to optimize pupil achievement.

There are additional avenues of collaborative thinking in improving teacher evaluation in the mathematics curriculum. These include teacher observation of learner performance. Collaboration here must stress how observation of pupils in ongoing math lessons and units of study can be made more effective. The following should be considered carefully:

\* examples of knowledge to be used in highly specific procedures to solve mathematical problems. In-depth math knowledge needs to be used here. Too frequently, this may be lacking when arriving at a solution.

\* ways of assisting pupils to learn inductively

\* emphasizing mathematical reasoning in observations made

\* recording dated observations and

summarizing results

\* filing observational data for each pupil to be used in making subsequent comparisons

There are a plethora of means to use collaborative thinking in the mathematics curriculum. Working together harmoniously, mathematics teachers may collaboratively solve problems pertaining to objectives, learning opportunities, and appraisal procedures.

Submitted by Dr. Marlow Ediger

**Dad, can you help me find the lowest common denominator in this problem please ?**

Don't tell me that they haven't found it yet, I remember looking for it when I was a boy!

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#### Editor: Angel Zickefoose

Montana Mathematics is a newsletter published for all member of the Montana Council of Teachers of Mathematics. The publication comes out 5 times/year and is free to all member of the MCTM. Any information pertaining to MCTM can be sent to Angel Zickefoose at 18 S. Santa Fe Drive; Billings, MT 59102 or e-mailed to [zickefoosea@billings.k12.mt.us](mailto:zickefoosea@billings.k12.mt.us). All entries will be reviewed