



MONTANA MATHEMATICS

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OPI Mathematics Curriculum Specialist Report

Greetings Fellow MCTM Members,

As the Office of Public Instruction (OPI) mathematics curriculum specialist, I am proud to give an update on various projects: revision of content standards, benchmarks, performance descriptors, development of essential learning expectations, production of the mathematics forum, creation of the Content Standards Informer, design of a toolkit for selection of standards-based materials, formation of Level 1 mathematics professional development workshops. A huge thank you goes to the Montana teachers who have helped work on these projects

The revised **Mathematics Standards/Benchmarks and Performance Descriptors** were adopted by the Board of Public Education, September 12, 2009. The implementation of these standards requires content, process, proficiencies, and principles. The document *Vision for Montana Mathematics* describes all of these components. Mathematics Content Standards and Performance Descriptors, *Vision for Montana Mathematics*, and other resources can be found at:

<http://www.opi.mt.gov/Math/index.html>.

The Essential Learning Expectations (ELE) for grades K, 1, 2, 3, 4, 5, 6, 7, 8, and 9-12 indicate the learning progression at each grade level necessary to reach the desired benchmarks. A team of teachers began this arduous task in August and continued through November. The

document will be sent to Education Northwest, formerly known as Northwest Regional Educational Laboratory, for review in November and December. The document will be revised based on the review and the plan is for the final draft of the ELE to be available in February at the MCTM/MSTA Leadership Conference.

The State of Montana Mathematics Education Forum in September: Eighty educators from across Montana joined their colleagues to learn more about Montana K-12 Standards-Based Education. Participants listened to a district's journey toward standards-based education, examined the differences being made through a showcase of some K-12 and postsecondary collaboration projects, and worked collaboratively with colleagues during the forum. The PowerPoints, summaries, graphics, articles, and discussions captured from the forum are available on the MT-Math-Forum Wiki found at: <http://mt-math-forum.wikispaces.com/>. Please join the Wiki and participate in the discussions.

The Curriculum and Instruction Unit at the Office of Public Instruction invites you to sign up for the listserv to receive a monthly issue of the **Content Standards Informer** (CSI). The CSI contains information about communication arts, gifted and talented, science, technology, information literacy/library media, and mathematics. You can view the November issue at: <http://www.opi.mt.gov/pdf/Accred/Informer/09NovCSI.pdf>. The 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>.

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MCTM President's Message

Wow! Already November!! The school year is flying by. It was good to see everyone at the conference in Billings. Thank you to all our presenters as well as our participants. A special thank you to Kerry Gruizenga, Tony Riehl, and Mary Ann Bryd, for organizing the math portion of mea-mft as well as the T³ conference. We appreciate all your hard work.

Have you recently checked out the MCTM website at www.montanamath.org? You can find information about our professional development opportunities for the summer, the MSTA/MCTM Leadership Conference in January, the MCTM Mathematics Professional Development list of presenters and how to be included, as well as applications for teacher scholarships and how to invite a NASA Educational Specialist to your school. The website also includes lesson plans and activities for different grade levels as well as a cornucopia of other information. Thank you to Tony Riehl, who is our talented webmaster!

The focus of this summer's professional development academies is: Implementing the Algebra Standard. There are two PDA's scheduled for this summer, focusing on K-6 with Angel Greenley Zickefoose presenting and focusing on 5-9 with Mary Buck and Mary Wren presenting. Previous attendees had mentioned that they would like to see a PDA that concentrated on the middle school grades. MCTM responded by adding in a middle school PDA to the rotation for summer academies. Each Academy will be presented two years in a row, once at Canyon Ferry and once in Billings. This summer high school is out of the rotation but will be back the summer of 2011.

The MSTA/MCTM Leadership Conference will be held in Bozeman, February 5-6 at the Comfort Inn. The topic for this year's conference is "How to Get Every Child Ahead Using Standards & Assessment". The keynote is Superintendent Denise Juneau. Jean Howard, OPI Math Specialist, Katie Burke, OPI Science

Specialist and Judy Snow, State Assessment Director will present classroom standards-based instruction incorporating formative assessment. This year's registration is online. You can register at the MCTM website at www.montanamath.org by clicking on "Click here to Register for Leadership Conference". Registration is on a first come first serve basis.

At the Annual MCTM meeting in October members voted to increase the membership dues. The increase will go into effect on January 1st, so if you are thinking about renewing, now is the time to do it. A one year membership will cost \$20, two years for \$30, ten years for \$100 and a lifetime membership will be \$200. The student membership has not changed and will continue to cost \$8.

Jean Howard, Math Specialist with OPI and a group of dedicated teachers are working on the Essential Learning Expectations for the newly revised Montana Mathematics Standards. It is labor intensive as well as a labor of love. Thank you to those people who are volunteering their time to complete this very important task. Learn more about the ELE's and the process at the MSTA/MCTM Leadership Conference in January or log onto the OPI website.

The Holidays are right around the corner. I hope that you are able to spend them with the people you love. Enjoy the season, enjoy your students and I hope to see you in January in Bozeman.

Submitted by Lisa Wood, MCTM President

"Math is like love -- a simple idea but it can get complicated."

Lesson Plans

Complete lesson plans are available at www.montanamath.org

K-6

The Ten-Thousand Game

Submitted by Kathy Hill

This lesson extends student's experience looking for patterns on the hundreds chart to 10,000 chart. It is appropriate for 2nd – 4th grade and can be adapted for use with fractions and decimals for 5th and 6th grade.

Middle School

Graphing Data

Submitted by Lisa Wood

I used this activity as an ice breaker at the beginning of the year. I used it in Advanced Placement Statistics, Algebra I and Algebra 3. It could be used before or after univariate data has been introduced.

Tape a question to the back of each student in class. Questions like, "How many siblings do you have?" (A list of possible questions can be found at MCTM website.) Each student traverses around the room, answering questions and having their question answered. The student records the answers given to their question. After all students have had their question answered by everyone, they need to make a graphical display of their data. When everyone has completed their graph they must present their graph, introduce themselves and guess what the question was on their back.

High School

Piles Patterns

Submitted by Margaret Aukshun

One of the objectives of this lesson is to represent functions in a variety of ways including tables, graphs or diagrams, verbal descriptions and symbolic expressions. The other is to describe the relationship between a physical pattern and its symbolic equation. There is a detailed lesson plan as well as numerous handouts to utilize during this lesson. They can be found on the MCTM website.

“Pure mathematics is, in its way, the poetry of logical ideas.”

Albert Einstein

TEACHER OBSERVATION TO EVALUATE MATHEMATICS ACHIEVEMENT

There are a plethora of assessment techniques to use in the evaluation of student achievement in mathematics. Each has its pros and cons; however, selected methods of assessment do a more comprehensive job than do others. Too frequently, mandated tests provide most of the emphasis on evaluation in educational literature. And yet, the most frequently used procedure needs to be teacher observation. Teacher observation may be used continuously in the classroom. Immediately, the teacher may diagnose and remedy a difficulty faced in mathematics by one or more students at their desks. Mandated tests are given once a year and then in selected grade levels. Also, feedback from these tests are not adequate to provide information on specific errors made by learners to be used for remedial purposes. How might teacher observation of students help in teaching and learning situations?

Assessing Mathematical Progress

Each teacher of mathematics must have a good knowledge of subject matter as well as of teaching methodology to do quality work in observing learner progress. They need to be upper most in the teacher's mind when observing. Alert minds are necessary in the observation process. Which characteristics of student behavior need to be noticed by the teacher in the observational process?

- * is the student on task and engaged in learning?
- * does the learner show interest, not boredom, in mathematics?
- * what specifically does the student not understand in an ongoing activity?
- * how might this student best understand how to remedy the deficiency?
- * what do individual learners need as background information in order to attach meaning to the ensuing learning experience?
- * does the learning style of the student favor individual or cooperative endeavors?
- * do students reflect upon past mathematical experiences?

Assignments in mathematics need to make provision for individual differences. Students are of different ability and interest levels and need to make sequential progress. The mathematics teacher may notice if a sequence is not working when students fail to make continuous progress in the curriculum. The assignments need to be clear and relevant. Adequate prerequisite information must precede each new process being emphasized. There is a zone of proximal development (Vygotsky, 1986) for each student; thus, the student has a present achievement level, for example in adding negative numbers and the ensuing learnings require their multiplication. The gap is reasonable in being ameliorated. In small steps with meaningful experiences, the teacher can assist the learner to realize what was intended.

Vygotsky (1986) also stressed the importance of students mediating experiences through language such as discussions in large and small group sessions. This might, too, involve peer mediated discussion groups.

Teacher observation of student participation in discussions should include the following:

- * meaningful mathematical learnings are being developed
- * observing that all participate, but no one dominates the activity
- * ideas circulate among the participants
- * enthusiasm for learning is in evidence
- * ideas are being expressed with clarity
- * indepth discussions are being stressed
- * optimal achievement is a focal point for each student (Ediger and Rao, 2001).

What might a mathematics teacher observe specifically about "meaningful mathematical learnings are being developed," listed at the top of the enumerated items? What is accomplished must make sense to the student. Thus, if a student is unable to come up with the correct answer to a set of three two place numerals with carrying, what might be some possibilities for error? The teacher needs to evaluate if the learner understands the concept of addition. The student may even need to use markers to show the sum of two addends. A place value chart with ones and tens columns might well assist the learner to attach meaning to adding two and then three digit numerals. If meaning is lacking, then it is very difficult to proceed to more complex learnings, such as regrouping from the ones to the tens column. Understanding place value is very important here. Problems might even arise in terms of writing numerals legibly for ease of comprehension. Once student understanding is in evidence, the use of technology, such as hand held calculators/computers, can truly make subject matter learnings interesting and challenging (Ediger, 2006).

Anecdotal Records and Student Portfolios

Teacher observations may and should be recorded. Observations may be forgotten or modified unless a careful system of record keeping is involved. Each recording needs to contain vital data with clarity in writing. The observer might then review as well as notice patterns of student behavior in mathematics. What needs to be recorded? If a student has problems with reducing fractions to lowest terms, he/she may not understand factoring. Or in division of fractions, the learner may not attach meaning as to why the divisor is inverted and then the operation of multiplication is emphasized. By recording specific errors, the teacher may diagnose and remediate student sequence for the next lesson in mathematics.

Portfolios can be an excellent way for students showing progress, in time, in ongoing lessons and units of study. The contents chosen by the student with teacher guidance need to stress a representative sampling of the learner's completed work in mathematics. The duration of time emphasized within the portfolio might be a semester or entire school year. The contents of a student's portfolio may consist of the following entries, among others:

- * mathematical work completed on paper from textbook use
- * relevant worksheets showing important work of the learner
- * drawings made of geometrical figures
- * graphs, charts, and tables of data from ongoing lessons and units of study
- * printouts of the involved student's test results in mathematics
- * self evaluation by the student, using agreed upon teacher/learner criteria, of his/her progress in mathematics (Ediger, 2006).

Portfolio results should be viewed/discussed by the parents in parent/teacher conferences. Agreed upon ways of assisting the student in achievement should be an end result of the conference. The home and school need to work together for the good of the learner. Independent evaluators may also assess the portfolio contents for purposes of noting student progress and teacher accountability. The focus is upon the child in improving mathematics achievement. Teacher observation is needed, here, to diagnose and remedy problems of the student in mathematics achievement. As a result of assessing the portfolio, the following questions need consideration:

- * how might the teacher guide the learner in attaining as optimally as possible?
- * which objectives need to be stressed specifically?
- * what kinds of learning opportunities will assist the student to achieve these objectives?
- * what should be done to help the student to reflect upon his/her progress and monitor the self adequately?

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Aunt Sally

Dear Aunt Sally,
A student asked me why the solutions to a quadratic function are called roots. I told her that I didn't know why, but would find out. Do you know?
Signed,
Anita Root

*Dear Anita,
That is a great question. I don't know why they are called roots, but I will find out. Dear readers: If you have a good explanation for why solutions to quadratic equations are called roots, email your answer to: auntsally@bresnan.net
Signed,
Your Dear Aunt Sally*

Dear Aunt Sally,
Someone told me that the definition of an expert presenter is "someone that is from more than 100 miles away". Do you believe that?
Signed,
Justin Participant

*Dear Justin,
If that is true in your area, you must not live within 100 miles of Montana. We have amazing presenters every year at the fall MCTM conference and most of them are classroom teachers from every part of Montana. I believe that every teacher is an expert at something. I would bet that you have amazing teachers in your school and one in your classroom. I would like you to encourage your neighbor teachers to join you in giving a presentation at MCTM conference in Helena next fall.
Signed,
Your Dear Aunt Sally*

Dear Aunt Sally,
I took your advice and went to Billings for the fall conference and now I am having nightmares. I drove through the roundabout by the airport and now I have a reoccurring nightmare that my city thought that if one roundabout is good, then two would be better. They build two roundabouts side by side. I dream that I enter them at one end and are stuck in it for infinity.
Signed,
Round Robin

*Dear Round,
Those roundabouts don't resemble a large 8, do they?
Signed,
Your Dear Aunt Sally*

Please email questions or comments to Aunt Sally at: auntsally@bresnan.net. Check out her website at www.montanamath.org/auntsally/

Spring Time in the Rockies Conference – Math, Science, Technology March 26 - 28, 2010 Montana Learning Center

In what ways can we extend student learning within and outside of the classroom? What resources are untapped? These and other technology related questions will be addressed during this conference for Grade 7 - 10 science and mathematics teachers. Ideas discussed will not only help visionary curriculum programs but also assist in creating more time on task for programs attempting to meet NCLB standards. Further information will be available at the MLC website (montanalearning.org) and in the next MCTM newsletter.

News Notes from the Montana Learning Center at CF Lake (MLC)

Mathematical Modeling for Montana Green Technology Projects (M3GTP)

This new grant from Office of the Commissioner of Higher Education (OCHE) funds teams of educators, college and high school, to explore answers to challenging environmental problems. Application deadline: Dec. 20, 2009 (See more detailed article in this MCTM Newsletter.)

Spring Time in the Rockies Conference - Math, Science, Technology

Save **March 26 - 28, 2010**, to collaborate with other teachers at the Montana Learning Center Conference on the use of technology to extend your Gr. 7 - 10 students' learning opportunities. (See additional article in this MCTM Newsletter.)

Exciting "Kids Camps" Scheduled for Su'10.

Beth Thomas (North MS - Great Falls) has organized a variety of learning opportunities for students entering Gr. 1 - 10 this coming summer:

- Camp Discovery: July 19 -22 (Day camp for Gr. 1 - 3)
- Young Naturalists Adventures: July 19 - 22 OR July 26 - 29 (Gr. 4 - 7)
- Innovation is Math and Science: July 18 - 24 OR July 25 - 31 (Gr. 8 - 10)

Request an informational brochure and/or check details at the MLC website: montanalearning.org.

Honor one of your students by nominating her/him to attend a camp.

MLC Booth and Auction at MEA-MFT

Many of you stopped to chat at the MLC information booth during the Billings MEA-MFT Conference Oct. 15 - 16. It is always fun to reconnect, particularly with teachers working the adjacent MCTM and MSTTA booths! More than 50 people filled out a "free" raffle slip to win the much sought-after MLC t-shirts or water bottle. Winners were:

Kari Fischer and J.M. McDonald (t-shirts); Becky Grey and Darlene Rector (water bottles).

Thanks also to those who donated items for and volunteered to help at the MLC/Montana Professional Teaching Foundation Silent Auction. Kudos to Cathy Warner (MEA-MFT Business Manager) and her associates for making this successful fundraising effort possible.

Holiday Gift Suggestions from MLC

- MLC water bottle (\$2.50 + shipping) and/or t-shirt reading "Montana - Do the Math and Science" (\$10 + shipping; sizes child; adult S - adult XL)
- Honor a friend or relative with a \$100 full scholarship or \$50 partial scholarship in their name for a summer "kids camp" attendee. Contact Carol Bock at cbock@montanalearning.org for more details



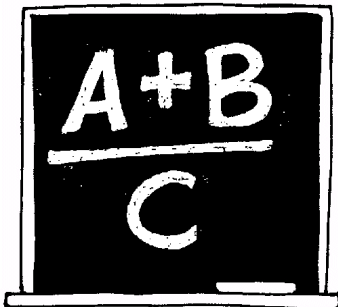
MEA-MFT Conference Thank You!

The only way that we can have a successful fall conference is with teachers will to share their expertise and experiences. A huge thank you to everyone who presented at the 2009 MEA-MFT conference for MCTM – you rock! They are:

Margaret Aukshun
 Rick Billstein
 Maurice Burke
 Becky Byer
 Georgia Cobbs
 James Elander
 Skye Faulkner
 Melissa Gackle
 Kerry Gruizenga
 Elizabeth Ann Hills
 Rick Hannula
 Kathleen Hodik
 Doug Kraft
 Jennifer Luebeck
 Jody McIlvain
 Paula Moeller
 Todd Morstein
 Karma Nelson
 Darlene Rector
 Hilary Risser
 Rex Sonsteng
 Donald Tunstall
 Kasey Ward
 Lisa Wood
 Angel Zickefoose

Don Bigwood
 Jennifer Brackney
 Elizabeth Burroughs
 Terry Caekaert
 Kathje Dalton
 David Erickson
 Bethany Fuchs
 Yvonne Gebardt
 Jim Hamling
 Gail Hafeman
 Jim Hirshein
 Jean Howard
 Brian Kroll
 Darryl Marchand
 Nina Miller
 Jennifer Moore
 Courtney Niemeyer
 Ke Norman
 Tony Riehl
 Lisa Scott
 Lisa Stevens
 Debbie Walter
 Brittany Wolf
 LeAnne Yenny

Please take the time this school year to find something that you do well and sign up to share your ideas in Helena next October. We're getting started on plans for next year, so start thinking about ways to share those great ideas with everyone!



MCTM Membership Update

MCTM currently has 398 members. 43 of these have lifetime memberships, 41 are retired.

MCTM TEACHER SCHOLARSHIP

The MCTM teacher scholarship was established by the MCTM board in 1992 to award teacher scholarships. The amounts were increased to \$200 for instate and \$400 for out of state conferences by the MCTM board in 2006. The intent is to encourage our membership to participate in conferences and to help defray some of the expenses in attending conferences.

Any teacher who is an MCTM member is eligible to receive the scholarship except for current MCTM Board members. The application for a scholarship must be submitted at least **thirty** calendar days prior to the starting date of the conference. The recipient must also write an article for the newsletter on a useful idea acquired at the conference. This article should be mailed to the Chairperson of the Scholarship Committee within **thirty** calendar days of the end of the conference. The chair will then submit the article to the newsletter and authorize the issuance of a check to the scholarship recipient. Scholarships will be limited to the applicants each calendar year that:

1. Submit a completed application to Jim Hamling, scholarship chairman.
2. Receive confirmation that the scholarship has been awarded.
2. Attend the conference.
3. Submit an article to the scholarship chair for the newsletter.

The scholarship chairperson / committee will screen the applications as necessary. Incomplete applications will not be considered. After the chairperson/committee has approved an application, a letter will be sent out to the applicant restating the above requirements and timelines. When the newsletter article is received by the scholarship chair, it will be submitted it to the newsletter editor. The chair will then authorize the MCTM treasurer to issue a check for the appropriate amount.

The Chairperson may obligate up to \$2000 per calendar year. So far only \$200 of the \$2000 has been allocated for 2010. This is basically “free” money. There is very little commitment on the recipient’s part. If you are interested, please fill out the application that can be found by logging onto : montanamath.org for an application. You may either send a completed application to Jim Hamling 1110 W. Water Lewistown MT 59457 or email at : hamling@midrivers.com Jim’s phone is 406-535-3263.

MCTM Membership Form

<input type="checkbox"/> New Member	<input type="checkbox"/> Renewal	Annual Dues (January – December)	
<input type="checkbox"/> Elementary	<input type="checkbox"/> MS	<input type="checkbox"/> HS	<input type="checkbox"/> College
Name _____	_____ Regular (1 yr)	_____ Regular (2 yrs)	\$15
Address _____	_____ Regular (10 yrs)	_____ Life Time	\$100
_____	_____ Student	_____ Retired Educator	\$8
Phone Number: _____	_____ MCTM & MSTA		FREE
Email: _____			\$30

Send form with correct amount to:
 Pam Koterba, MCTM Membership Chair
 101 Turquoise Drive
 Lewistown, MT 59457
pkoterba@winifred.k12.mt.us

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The Curriculum and Instruction Unit staff of the Montana Office of Public Instruction (OPI) would like to provide school districts with a **toolkit** that contains materials to guide the **evaluation and selection of instructional materials and resources** that support implementation of the content standards. The working group will begin their work in November/December.

Education Leaders' Montana Standards Professional Development will be a 20-minute "Infomercial" to provide an introduction and orientation to Montana Standards-Based Education, content standards and performance descriptors, how to support teachers in implementing standards, and what standards-based classrooms look like. **Educators' Level 1 Content Specific Standards Professional Development** will be a three-hour workshop to provide an introduction and orientation to the content standards and performance descriptors and the Montana Standards-Based Education. The six-part workshop will be provided by the curriculum specialist and/or facilitators from the five Regional Service Areas.

Please contact Jean Howard (406) 444-0706, or jhoward@mt.gov, if you are interested in working on the projects described or on future projects.

Special Invitation to Mathematics and Science Teachers

We are pleased to announce that the Montana Learning Center has received funding for a Title II grant, entitled Mathematical Modeling for Montana Green Technology Projects (M³GTP), from the Office of the Commissioner of Higher Education in Montana. In the first stage of our project, we are inviting

teams of high school and college science and mathematics teachers from throughout Montana to come to the MLC for a workshop (April 9 – 11, 2010), conducted by two nationally recognized specialists in the field (Frank Giordano and Bill Fox), where participating teachers will learn about and experience mathematical modeling related to environmental issues. Participants will then return to their homes and explore environmental issues of regional concern with local companies or organizations. After studying specific local problems, these teachers will reconvene (October 1 – 3, 2010) to formulate the regional issues into well-stated, open-ended problems that can be used in their classrooms.

An electronic copy of the flyer describing this project and the application form can be found at www.montanalearning.org. Please share this information with individuals at your school who might be interested in participating in our project. Note that applications must be from teams of high school and college mathematics and science teachers (one from each level in either or both disciplines) and the deadline for applications is December 20, 2009. For additional information on M³GTP, email or call the grant director, Marie Vanisko at mvanisko@carroll.edu or 406-422-5842.



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 and
- 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 30th of the year of the PDA.

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

The \$500 will be paid to the scholarship recipient if they:

- 1) write and submit an article about the PDA to Jim Hamling (scholarship committee chair) for the MCTM newsletter. This article must be submitted within one month of the completion of the PDA and
- 2) enclose a letter, written by the facilitator of the PDA, indicating that the awardee successfully completed the PDA.

Send applications and the newsletter article to:

Jim Hamling
Early Career Scholarship
1110 W Water
Lewistown MT 59457
hamling@midrivers.com

Great Websites to Check Out!

NCTM Illuminations:

www.illuminations.nctm.org

Find the new link to **Dynamic Paper** where you can create nets, graph paper, number lines, number grids, tessellations, shapes and spinners!

Math Dictionary for Kids:

www.amathsdictionaryforkids.com

This site contains animated definitions, examples, activities, practice and calculators for students.

Mathwire - Standards Based Math

www.mathwire.com

This site contains a little bit of everything. I really like the Template Library where you can get BLM for almost anything you need in math!

PBS Teacher Online

www.pbs.org/teachers

There is an abundance of links and help on this website! Resources include Teacher Line, Lesson Plans, Online Professional Development, Articles and much more!

Trackstar

www.trackstar.4teachers.org

Wow! I love this website. Put in a keyword search, click on View in Text and there is a ton of websites that it will direct you to. You can also create your own track for students.

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* how can the student be motivated more thoroughly in developing an inward desire to learn?

* how might the student become more conscientious in careful proof reading?

Portfolios provide feedback to the teacher on how to assist students in overcoming selected problems as well as make for continuous progress in mathematics. Decisions may then be made on large group, small group, and individual student endeavors. The teacher needs to use the feedback wisely in providing for individual differences among learners (See National Council Teachers of Mathematics, 1989).

Improving the Classroom Environment

Classroom environments are highly significant in improving mathematical achievement. The teacher must observe what hinders achievement due to environmental factors. Criteria need to be posted and rules enforced to optimize learner achievement and progress in mathematics. What are selected behaviors which hinder students attending to ongoing lessons and units of study? Student distraction from attending to a lesson disrupts sequential learnings. Learners then loose out on specific and major ideas. On task behavior is very important.

Sometimes, students are rude to ideas presented in a discussion. This hinders the free flow of ideas discussed in mathematics. Rules need to be set up for discussions such as all participating but no one dominating, interrupting others should be avoided if at all possible, respect for the thinking of others must be adhered to, and active participation is important. Steen (2007) wrote the following:

Experience shows that many students fail to master important mathematical topics. What's missing from traditional instruction is sufficient emphasis on three important ingredients: communication, connections, and contexts. Colleges expect students to communicate effectively with people from different backgrounds and with different expertise and to synthesize skills from multiple areas. Employers expect the same things. They emphasize that formal knowledge is not, by itself, sufficient to deal with today's challenges. Instead of looking primarily for technical skills, today's business leaders talk more about teamwork and adaptability. Interviewers examine candidates' ability to synthesize information, make sound assumptions, capitalize on ambiguity, and explain their reasoning. They seek graduates who can

interpret data as well as calculate with it and who can communicate effectively about quantitative topics. To meet these demands of college and work, k-12 students need extensive practice expressing verbally the quantitative meanings of both problems and solutions. They need to be able to write fluently in complete sentences and coherent paragraphs; to explain the meaning of data, tables, graphs, and formulas; and to express the relationships among the different representations.

In Closing

Mathematics teachers need to assist each student to achieve as optimally as possible. Strategies must be developed to guide learner progress. The demands of the work place require increased proficiency in mathematics. The elementary, middle school, and high school years are essential for students to attain as well as possible. The basics need to be taught in problem solving experiences. However, for selected students, essential content may be taught more systematically. The psychology of learning must be stressed in teaching and learning situations. This includes making learnings interesting, meaningful, as well as purposeful. The learning style of the individual student needs adequate consideration in the curriculum. Thus, students should learn in cooperative settings as well as individually. Connections must be made by the student to relate what is acquired in the school setting with that in society.

What is learned needs to be used in school and in society. Relevancy is then in evidence. A rich mathematics vocabulary needs to be in the offing. Remedial assistance must be provided as necessary.

Ediger, Marlow (2006), "Writing in the Mathematics Curriculum," the Journal of Instructional Psychology, 33 (1),120-123.

Ediger, Marlow (2006), "Testing Versus Portfolios to Assess Achievement," OASCD Journal, 13 91), 31-31-32.

Ediger, Marlow, and D. Bhaskara Rao (2001), Teaching Mathematics Successfully. New Delhi, India; Discovery Publishing House.

National Council Teachers of Mathematics (1989), Curriculum and Evaluation Standards for

NCTM Information

Lisa Scott, NCTM Representative

NCTM E-Workshops January 2010

<p>http://www.nctm.org/profdev/content.aspx?id=23713 - # Reasoning with Data and Probability - Grades 9-12 E-Workshop Leader: Fred Dillon</p>	<p>January 11 and February 22 2-3:30pm</p>
<p>http://www.nctm.org/profdev/content.aspx?id=23713 - # Geometric Thinking - Grades 3-5 E-Workshop Leader: Wendy Schudmak</p>	<p>January 13 and February 24 5-6:30pm</p>
<p>http://www.nctm.org/profdev/content.aspx?id=23713 - # Geometric Thinking - Grades PK-2 E-Workshop Leader: Emily Hendricks</p>	<p>January 20 and March 3 2-3:30pm</p>
<p>http://www.nctm.org/profdev/content.aspx?id=23713 - # Problem Solving - Grades 6-8 E-Workshop Leader: Jen Seay</p>	<p>January 25 and March 8 5-6:30pm</p>
<p>http://www.nctm.org/profdev/content.aspx?id=23713 - # Exploring Mathematics through Literature - Grades 3-5 E-Workshop Leader: Beth Skipper</p>	<p>January 26 and March 9 2-3:30pm</p>

Go to <http://www.nctm.org/profdev/content.aspx?id=23713#feb22jan11> to register and obtain more information.

NCTM E-Seminar on December 15th from 2-3 PM

Intriguing Mathematics I've stumbled Upon: Engaging Content to Enrich High School Classes - Grades 9-12

Presenter: Jim Rubillo, former Executive Director of NCTM

Register by December 8th at <http://www.nctm.org/profdev/content.aspx?id=23402#nov>.

NCTM Reflection Guides

Reflection Guides are written by members of NCTM's Professional Development Services Committee (PDSC). These guides are used to reflect on journal articles and books published by NCTM. This is an excellent method of professional development that may be used with learning communities.

Go to <http://www.nctm.org/profdev/content.aspx?id=8332> for the reflection guides.



Leadership Conference 2010

Building a Better Future for Montana's Children

You are invited to attend the 2010 Math and Science Leadership Conference held in Bozeman, Montana February, 5-6, 2010. In order to broaden the leadership network that exists in Montana, you are encouraged to invite and bring a fellow educator or administrator.

Registration will begin at 7:45 AM on Friday, February 5, 2010. The conference will start at 8:15 AM and conclude by 12:00 PM on Saturday, February 6. The conference will be held at the Comfort Inn located at 1370 North 7th Ave., Bozeman, MT 59715. Rooms have been blocked for Thursday and Friday nights. Please contact the Comfort Inn at (406) 587-2322 to reserve a room in your name. The reservations must be made by January 20, 2010 to assure the conference rate of \$62 for a single and \$72 for a double.

The cost for this conference is \$125 for MCTM/MSTA members. Registration for non-members is \$150 and includes a two-year membership in either MCTM or MSTA. The registration price includes meals. Renewal credits through OPI will be offered. **You can register by going to the MCTM website at www.montanamath.org and clicking on "Click Here to Register for Leadership Conference" or e-mailing Angel Zickefoose at zickefoosea@billings.k12.mt.us** *Registration is first come first served basis and will begin October 1, 2009.*

The topic of this year's conference is "How to Get Every Child Ahead Using Standards & Assessment". The opening keynote is Superintendent, Denise Juneau. Jean Howard, OPI Mathematics Specialist, Katie Burke, OPI Science Specialist and Judy Snow, State Assessment Director will present classroom standards-based instruction incorporating formative assessment.

In addition, members of the Montana math and science community will be presenting on a variety of topics addressing standards and inquiry-based teaching and formative assessment in addition to sessions about leadership opportunities for Montana educators. The topics will be appropriate for all grade levels. Opportunities will be available for teachers to discuss ideas for presentations at local, state, and national levels. The "State of the State" address for both math and science is always a highlight.

The goals for the 2010 Math and Science Leadership Conference are:

- To encourage leadership by fostering partnerships between math/science teachers, students, and university faculty
- To continue to build a network of colleagues within the K-16 math and science community
- To enhance professionalism by bringing new teachers into math and science leadership roles in Montana.

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MCTM/MSTA Leadership Conference

February 5-6, 2010

Friday

7:45 AM	Registration/Breakfast	Gallatin Room
8:15 AM	Welcome	Lisa Wood, MCTM President Shirley Greene, MSTA President Elect
8:20 AM	Introduction	Lisa Scott
8:30-9:00 AM	Vision of Standards-Based Education in Montana	Superintendent Denise Juneau
9:00-11:30 AM	How to Get Every Child Ahead in Math & Science Using Standards & Assessment	Jean Howard, Math Curriculum Specialist & Katie Burke Science Curriculum Specialist & Judy Snow, State Assessment Director
12:30 -3:30 PM	How to Get Every Child Ahead in Math & Science Using Standards & Assessment (continued)	Jean Howard, Math Curriculum Specialist & Katie Burke, Science Curriculum Specialist & Judy Snow, State Assessment Director

3:45-4:45 **Breakout Session I**

Room	Session	Presenters
Madison	Elementary Science: Inquiry-Based Teaching and Learning	Ken Miller
Gravelly	Middle School Science: Inquiry-Based Teaching and Learning	John Graves
Beartooth	High School Science: Inquiry-Based Teaching and Learning	Dave Jones
Spanish Peaks	Standards-Based Math Teaching using Formative Assessment-A Teacher's Experience	Kim Komar & Sue Solomon

SATURDAY

7:30 AM	Breakfast	Gallatin Room
8:15-8:30	MEA/MFT Presentations	Lisa Scott
8:30-8:45	Presidential Awards	John Graves
8:45-8:50	Overview of Break-outs	Lisa Scott
8:50-9:50 AM	Breakout session II	

Room	Session	Presenters
Madison	Elementary Math Standards Intro	Emily Herlihy
Gravelly	Middle School Math Standards Intro	Lisa Scott
Beartooth	High School Math Standards Intro	Lisa Wood
Spanish Peaks	Inquiry-Based Science Teaching using Formative Assessment-A Teacher's Experience	John Graves

9:50-10:00 AM	Break – C/O of Rooms	
10:00-10:45 AM	State of the State	
10:45-11:45 AM	Bringing Standards and Assessment Together	Dennis Parman, Deputy Supt.
11:45-12:00 PM	Wrap up/Prizes	Lisa Scott

MCTM NEWSLETTER

**c/o Angel Zickefoose
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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. All entries will be reviewed