

INTERCHANGE

September-October 2004

Volume 11, Number 4

From the Regional Math & Science
Center at Grand Valley State University

*Our Vision: Math and Science: Excitement in
Learning for Success in Living*

*Our Mission: Provide and coordinate
leadership, programs and services to achieve
excellence for all in the teaching, learning and
application of mathematics and science.*

In this Issue...

Details about the **MCTM annual conference**, an invitation to the **Fall Science Update Seminar**, **Earth Science Week** is coming in October, a new **Geometry and Measurement Series** is offered, *pages 2-3*

Science and Math Update includes the mystery of "disappearing" land carbon, being fit and fat, and the benefits of calcium, *pages 4-5*

NEED Energy Workshop coming in November, **STEPS summer camp** review, *page 6*

The **Calendar of Events** and this past summer's **science day camps**, *pages 7-8*

New College of Liberal Arts and Sciences Established at GVSU

On July 1, 2004, a major restructuring occurred at GVSU as academic units were reorganized to form the College of Liberal Arts and Sciences (CLAS). The Regional Math and Science Center (RMSC) is now a part of the Science and Mathematics Cluster within the CLAS. In addition to Mathematics and the Natural Sciences, CLAS also includes the arts, social sciences, and humanities, and offers the RMSC an unprecedented opportunity to take curricular and scholarly advantage of this new interdisciplinary collaborative.

Within this new infrastructure, the RMSC will continue our support of K-12 students and teachers in science and mathematics. At a time when K-12 teachers are looking toward integration as an efficient and effective approach in the face of increasing demands being made on their time in the classroom, we embrace the prospect of broader collaboration among the departments in the College, with more faculty interaction, and an emphasis on academic clusters.

During these exciting and challenging times, we will rely heavily on the leadership of our new Associate Dean, Dr. Neal Rogness, who has been an ardent supporter of the work of the RMSC. In his most recent position as Assistant Dean of the Science and Mathematics Division, Neal has been



Associate Dean Dr. Neal Rogness

responsible for student-related matters including recruitment and graduation. He also helped propose and develop the Science and Mathematics Advising Resource and Transition Center and worked as a freshman faculty advisor during summer orientation. He spearheaded a committee that successfully proposed the *Student Research Day* sponsored by the Division. After 2 years, the event became university-wide and was renamed *Student Scholarship Day*. Neal also organized the *Michigan Statistics Poster* competition sponsored by the Department of Statistics and the RMSC with support from the Michigan Council of Teachers of Mathematics. Under Neal's leadership, this event has grown over the years and Michigan students took 4 of the top 12 national awards in 2004. His rich variety of experience working directly with students coupled with his enthusiasm for mathematics and science, will serve him well in his new position.



Dean Dr. Frederick J. Antczak

At the RMSC, we look forward to continuing the fine working relationship that we have enjoyed with Neal.

It is with excitement that we look forward to the leadership of Dr. Frederick J. Antczak, the founding Dean of the College of Liberal Arts and Sciences. Fred's impressive curriculum vitae lists notable accomplishments in program building, scholarship, publishing, and scholarly presentations, with the common themes of collaboration and communication evident throughout his distinguished career. He sees the formation of the CLAS as a pivotal point in GVSU's history and promises to lead the College in an adventure of building on the strengths and traditions of the synergized departments to create the best undergraduate liberal arts and sciences experience offered at a public university in Michigan. Dean Antczak has already taken the time to acquaint himself with the staff at the RMSC and the work that we do in providing and coordinating leadership, programs, and services to achieve excellence for all in the teaching, learning, and application of mathematics and science. We anticipate an exciting and productive relationship with Dean Antczak.

MEAP, GLCE, and More at MCTM!

Plan to attend this year's Michigan Council of Teachers of Mathematics (MCTM) Annual Conference in Detroit on October 29-30. This event, *Renaissance Visions: Connecting Mathematics*, is the ultimate professional development package for mathematics teachers and educators. With excellent presentations, workshops, exhibits, and networking opportunities, this conference provides unparalleled opportunities for participants to tailor their professional development experiences to their needs, the needs of their students, and the needs of their colleagues and community.

Of particular interest to teachers this year will be Saturday's sessions focusing on the new MEAP and Grade Level Content Expectations (GLCE). In the keynote session, participants will be provided with an overall view of the new K-8 mathematics grade level expectations and the changes being made in the MEAP testing program by Edward Roeber, MDE Senior Executive Director of Assessment; Kyle Ward, MDE Mathematics Assessment Coordinator; and Chuck Allan, Retired MDE Mathematics Education Coordinator. Following the keynote session, participants will be invited to move to kindergarten through eighth grade-level breakout sessions (one for each grade) for a first-hand look at the expectations for their grade level as well as a detailed description of which expectations will and will NOT be assessed on the 2005-06 MEAP. Participants will leave with a resource kit (currently under development by MCTM) that will include the alignment of various textbooks and classroom materials to the new GLCEs.

INTERCHANGE

Where information is given and received for the purpose of advancing excellence in mathematics and science education. Published six times. Deadline for copy for the November issue of *Interchange* is October 22, 2004.

Regional Math & Science Center
328 Henry Hall
Grand Valley State University
1 Campus Drive
Allendale, MI 49401

Telephone: 616-331-2267
Facsimile: 616-331-3412
e-mail: mthscctr@gvsu.edu
Web Page: www.gvsu.edu/rmsc

Mary Ann Sheline, *Director*
Mary Ann Watters, *Office Coordinator*
Karen Meyers, *Assistant Director*
Steve Mattox, *Newsletter Editor*
Tari Mattox, *Newsletter Editor*
Margo Dill, *Program Coordinator*
Linda Decker, *Program Coordinator*
Rita Cooper, *Secretary*
Shelly Micho, *Secretary*

These materials were developed under a grant awarded by the Michigan State Board of Education.

The full conference program (including the pre-conference NCTM Assessment Mini-Academy) and registration form is now available on-line at www.mictm.org. Register by October 11 for the best rate!

Attend Fall Science Update Seminar!

The Regional Math and Science Center cordially invites you to join us as we celebrate the 20th anniversary of the Fall Science Update Seminar on Wednesday, November 17 from 4:00 to 9:00 p.m. on Grand Valley State University's Allendale campus.

The theme for this year is "*Changes in Science Education: Developing a Passion for Science.*" This theme was chosen to reflect the past 20 years of scientific changes and spectacular gains in science education. Our keynote presenters will highlight this progression at a unique science show. Don't miss this special event!

Other sessions will provide content information and teaching strategies in biology, forensic science, chemistry, earth science, physical science, and engineering. Some sessions will use web-based technology as tools for discussion and experimentation. Opportunities for student learning adventures, both as field trips and/or classroom experiences, will also be presented. These are just a few of the exciting learning opportunities available for our participants.

Whether you are a new or returning teacher, this mini-conference promises to be an informative and relaxing evening where you can enjoy collegiality with other teachers, as well as take time to explore new trends and ideas in education. As always,

there will be a wide range of grade-appropriate sessions from which you may choose. The brochure can be downloaded from the RMSC web site at the end of September at www.gvsu.edu/rmsc or call (616) 331-2267 for additional information.

Participate in Earth Science Week

The week of October 10-16, 2004 has been designated as Earth Science Week. Since October 1998, the American Geological Institute has organized this national and international event to help people gain a better understanding and appreciation for the Earth Sciences and to

encourage stewardship of the Earth. This year's theme is "Living on a Restless Earth".

Teacher and student materials, suitable for elementary through college-age classroom use, are now available. Kits include posters, fact sheets, activity booklets, and bookmarks. Several contests are offered in the areas of photography, visual arts, essay, and lesson plan design. For more information and a monthly newsletter, "*Earth Science Week Update*", visit the Earth Science Week website at www.earthsciweek.org.



New Geometry & Measurement Series Offered

Michigan's new Grade Level Content Expectations (GLCE) document has raised the bar as to what students are expected to know and do in mathematics. This series is designed to give teachers the content knowledge they need to effectively teach geometry and measurement. During this five-session workshop, taught by GVSU faculty member, Karen Novotny, participants will focus on the concepts addressed in the Geometry and Measurement strands of the GLCE's through interactive learning situations. For each of these two strands, the following domains will be addressed:

- Geometry Goals (GLCE): Geometric shape and properties, and mathematical arguments, spatial reasoning and geometric modeling, transformation and symmetry
- Measurement Goals (GLCE): Units and systems, techniques and formulas, problem solving

Elementary teachers taking *Geometry and Measurement* will be equipped to give their students the tools they need to understand and model geometric situations, solve real world problems involving geometry, and justifying geometric arguments throughout their school careers. They will also gain an understanding of how these two content areas in mathematics are related to one another.

This five-session series will meet from 4:30–8:30 p.m. on October 19, November 2, 9, 30, and December 14, 2004 on the GVSU Allendale Campus. The cost for the series is \$125, which includes a light supper and all materials. One graduate credit is available for the series (5 sessions) with additional tuition fees. The registration form may be downloaded from the RMSC website, www.gvsu.edu/rmsc. The registration deadline is October 8, 2004. For more information contact Karen Meyers at (616) 667-2278 or meyersk@gvsu.edu.

“Disappearing Act” of Land Carbon in Water

Bopi Biddanda, Annis Water Resources Institute

One of the larger unsolved mysteries in the “Great Global Carbon Cycle Mystery” is: What happens to terrestrial carbon as it enters the aquatic ecosystem, and journeys through streams and rivers down to lakes and the ocean? Annually, a large amount of carbon, equivalent to ~1% of the terrestrial primary productivity, is transported by the world’s streams and rivers. Terrestrial plant-derived organic matter (predominantly composed of complex lignocellulose molecules) is generally considered to be resistant to microbial enzymes, preventing their direct utilization by bacteria in nature. Nevertheless, only traces of terrigenous matter are found in receiving lakes and ocean basins. How could this happen? One of the prevailing hypotheses to explain this “disappearing act” is as follows: Sunlight impacting on terrestrial organic matter (as it moves from the dark soil environment into the lighted aquatic ecosystems) photochemically cleaves these compounds into simpler substrates that are then rapidly utilized by the aquatic biota.

For organic matter to be photoreactive, it must first absorb sunlight – preferably in the ultraviolet (UV) region that is most responsible for initiating photochemical reactions. The bulk of organic carbon transported from terrestrial to aquatic environment is in the form of dissolved organic matter (DOM). A large portion of DOM originating from the terrestrial landscape is colored

or chromophoric dissolved organic matter (CDOM). Sunlight penetrating natural waters is predominantly absorbed by the CDOM fraction, and hence this is the most photochemically reactive component in the carbon pool. Photodegradation of CDOM is known to initiate several changes in aquatic watersheds, including the availability of nutrients for microbes, inorganic carbon production, release of free radicals, and increased penetration of UV light into the water.

only traces of terrigenous matter are found in receiving lakes and ocean basins

In the present study, the objectives were: 1. To examine sunlight-initiated changes in CDOM entering two west Michigan watersheds (the relatively impacted Black Creek, and the relatively pristine Cedar Creek – both located in the Greater Muskegon Area), 2. To examine photodegradation of DOM along the land to lake gradient (Cedar Creek – Muskegon River – Lake Michigan), and 3. To consider the impact of sunlight-mediated processes on the aquatic biota.

Preliminary results from the Summer 2003 indicated that sunlight causes rapid photodecay of CDOM from both watersheds. Water samples exposed to natural solar radiation in sunlight-transparent quartz bottles lost between 50-80% of their CDOM-specific absorbance relative to dark (aluminum foil wrapped)

controls over a 2-week period. Higher rates of CDOM decay (by about 20%) prevailed in Black Creek over the relatively pristine Cedar Creek. Higher rates of biological utilization (respiration) of DOM were also measured in Black Creek over Cedar Creek – suggesting a linkage between photochemical degradation of CDOM and its utilization by the stream biota. Could the observed enhanced rates of photochemical reactivity and the correspondingly enhanced biological utilization of carbon in the impacted Black Creek watershed over the relatively pristine Cedar Creek watershed be indicative of anthropogenic acceleration of the watershed’s carbon cycle?

The preliminary results complemented earlier findings: the most reactive part of the CDOM pool at all 3 sites was in the UV range. Cedar Creek (a tributary of Muskegon River) had the highest DOC content and DOC-specific absorptivity, whereas Muskegon River had intermediate values, and Lake Michigan had the smallest values. Furthermore, bacterial production, bacterial respiration and the efficiency with which bacteria grow on available organic carbon was highest closer to land (Cedar Creek) and lowest farthest from land (middle of Lake Michigan) –suggesting photodegradation enhances the availability of substrates for bacteria – with greatest enhancement taking place closer to land than in offshore environments.

We estimate that the measured rates of photodegradation alone are sufficient to explain the loss of approximately one third to one half of terrestrial carbon entering the watershed during its transit

SCIENCE *AND* MATH UPDATE

from the watershed to Lake Michigan. Overall, the results of our two-year study suggest that the combined activity of sunlight and microbes are a major sink for terrestrial carbon during its transit to receiving basins.

A Michigan Space Grants Consortium Seed Grant Award to Bopi Biddanda supported this study during the 2003-2004 period. Dan Kroll and Sarah Barnhard, both GVSU undergraduates majoring in Chemistry and Biomedical Science, respectively, worked as summer student interns and contributed to this report.

Calcium: Fat Buster

Steve Glass, Department of Movement Science

Do you get your dairy? If not, you may be at risk for obesity to take hold of your life. It is well known that low levels of dietary calcium can contribute to calcium loss from the bone, but now researchers at the University of Tennessee have found a strong link between dietary calcium and the metabolism of fat. They have studied a specific gene (the agouti gene) that is involved in fat metabolism. They used mice specially bred to express this gene ("transgenic mice") and fed them a low calcium diet. The mice responded by gaining weight and adding fat. When the same mice were fed a high calcium diet, there was a loss of body fat. This fat loss seems to occur even in the face of over consumption of calories. The response appears to be tied to 1,25 dihydroxyvitamin D. When low levels of dietary calcium are present, this substance is greatly

increased, resulting in increased fat cell formation, a reduction in the breakdown of fat and subsequent fat gain. High levels of dietary calcium suppress 1,25 dihydroxyvitamin D, resulting in increased fat breakdown, less fat cell filling and subsequent fat loss! Researchers do note that the fat loss benefits are more pronounced when the calcium source is from dairy sources, rather than calcium supplements. This is likely due to the variety of other "bioactive" compounds found in the dairy

Can a person really be fit and still be fat?

sources (and not in a supplement). So, adding some low fat sources of calcium to your diet (low fat milk, cottage cheese) seems to be a simple and prudent way to help control body fat. So get your daily dose of dairy!

Fit AND Fat?!

Dawn P. Coe, Department of Movement Science

Is it really true? Can a person really be fit and still be fat? It was traditionally thought that to be considered healthy and fit that a person had to be lean. A recent multi-center study conducted at four medical health centers nationwide found results contrary to this popular belief. This study looked at 936 women (average age 58 years old) over the course of a four-year time period. Outcomes

of this study included overweight/obesity levels and the incidence of a cardiovascular event (i.e., heart attack, stroke) which would indicate cardiovascular disease. Obesity levels of the women were assessed using the body mass index (BMI). BMI gives an index of overweight and obesity. According to the BMI scale, a person with a BMI greater than or equal to 25 kg per square meter is considered overweight and a person with a BMI greater than or equal to 30 kg per square meter is considered obese. Typically, individuals who are overweight and obese have more cardiovascular disease risk factors compared to normal weight individuals. Cardiovascular risk factors include obesity, hypertension, and high cholesterol levels, just to name a few. However, in the current study, when risk factor profiles were adjusted, results showed that levels of overweight and obesity did not significantly contribute to cardiovascular events. It appears that fitness level more significantly affected whether or not the women had a cardiovascular event. This study indicates that a person can be overweight or obese and not be at significant risk for cardiovascular disease as long as they maintain a level of fitness sufficient to promote cardiovascular health. This study does not promote being overweight or obese, it simply states that a person does not have to strive to be extremely thin in order to be fit and healthy.

These pages are produced by faculty from GVSU.

NEED Energy Workshop Planned

The Regional Math and Science Center at Grand Valley State University invites upper elementary and middle school teachers to register for an Energy Education Workshop to be held on the Allendale campus on Wednesday, November 3, 2004. Thanks to the sponsorship of the Dart Foundation and the Michigan Oil and Gas Association, **NEED** is able to provide free registrations to those who attend. We are able to accommodate thirty-five registrants on a first-come, first-served basis.

The **NEED** Project's mission is to promote an energy-conscious and educated society. The workshop helps to achieve that mission by addressing the concepts of force, motion, light, sound, heat, electricity, magnetism, and energy transformations through hands-on activities, games, songs, and much more. The session will be held in the Grand River room at Kirkhof Center, with registration starting at 8:30 am and the workshop concluding at 3:00 pm. A continental breakfast and lunch will be provided.

Participation in this workshop entitles teachers the free use of the **NEED** Science of Energy Kit for teaching key energy concepts. Shelly Baumann, a teacher from North Rockford Middle School, and a team of her students, will lead teachers through activity stations, introduce games, plays, and songs, and work with experiment kits that help discover these key concepts.

All workshop expenses, including lunch, building substitute costs, and curricular materials necessary to carry out the activities covered in the training will be provided by Project **NEED**, with additional support contributed by the RMSC at GVSU.

To obtain more information about the **NEED** Project, go to www.need.org. To learn more about the workshop being offered at GVSU, contact the Regional Math and Science Center at (616) 331-2267. Electronic forms are available at www.gvsu.edu/rmsc.

STEPS Summer Camp a Success

This past summer, the Regional Math & Science Center and the Grand Valley State University School of Engineering sponsored their third consecutive year of residential Science, Technology and Engineering (STEPS) Camps at GVSU. During the course of two one-week sessions, seventy-four seventh grade girls were exposed to the many career opportunities open to engineers. This approach to learning about engineering and science leads them to a deeper understanding as to why they need to take higher level mathematics, science, physics, and technology courses in high school if they want to succeed.

The students built a large model glider airplane to fly and take home. The project included designing, manufacturing and flying their own foam airplane. The girls crafted them using power tools, jigs, and fixtures with the help of over one hundred staff and volunteers. Campers also attended a tour of the Howmet Castings Corporation in Whitehall, MI. There they learned

from female engineers how jet airplane engine parts are manufactured and tested for quality. Additional camp activities and events were planned to make this program a truly memorable experience.

The girls experienced a taste of college life while living together with roommates in campus dormitories and attending scheduled sessions and science classes offered by GVSU faculty members. They made new friends from all over Michigan. By the end of the week, campers left with an expanded perspective of themselves, college life, and others.

Staff and volunteers include: the Regional Math & Science Center staff, GVSU engineering, computer science, physics, biology, and movement science faculty, staff and their students. Additional volunteers were recruited from sponsors and interested parties. Technical flying and model airplane expertise was provided by volunteers who are local members of radio-controlled groups; Grand Valley Radio-Control Club, Warped Wings Flying Club, and the West Michigan Soaring Society.

This year's sponsorship was provided by Grand Valley State University, the Society of Manufacturing Engineers (SME) Educational Foundation, the Nokomis Foundation, Michigan Space Grant Consortium, Howmet Corporation, an Alcoa business, and Eaton Corporation, as well as many others.



Recent graduates of the STEPS program

CALENDAR *OF* EVENTS

SEPTEMBER

23 Thursday

A seminar titled: *DEQ Aquatic Resource Impact Permit: An overview of the permit process and the identification of opportunities for meaningful input* will be presented by Dr. James Fortney of the Michigan Department of Environmental Quality at 3 p.m. at the Annis Water Resources Institute in Muskegon.

28 Tuesday

Genetic Update Conference by Mr. Sam Rhine at GVSU. Designed for high school students and their teachers. For details call (800) 727-2315, or srhine@aol.com.

OCTOBER

2 Saturday

Wetlands Teacher Training from the Jason Foundation for Education. 9 a.m. to 12:30 p.m. at Celebration Cinema. For more information visit www.westmijason.org or call Amy Eifert at (616) 974-3432.

10-16 Sunday-Saturday

Earth Science Week. See details at www.earthsciweek.org.

19 Tuesday

Elementary Mathematics Series: Geometry & Measurement. 4:30–8:30 p.m. on the GVSU Allendale Campus. Series continues November 2, 9, 30 and December 14. For more information contact Karen Meyers at (616) 667-2278 or meyersk@gvsu.edu.

29-30 Friday-Saturday

Michigan Council of Teachers of Mathematics Annual Conference in Detroit. See www.mictm.org for details.

NOVEMBER

2 Tuesday

Elementary Mathematics Series: Geometry & Measurement continues. 4:30–8:30 p.m. on the GVSU Allendale Campus. Series continues November 9, 30 and December 14. For more information contact Karen Meyers at (616) 667-2278 or meyersk@gvsu.edu.

3 Wednesday

NEED Energy Education Workshop for upper elementary and middle school teachers from 8:30 a.m. to 3:00 p.m. at the Grand River room of the Kirkhof Center, GVSU Allendale Campus. See story in this issue for details.

9 Tuesday

Elementary Mathematics Series: Geometry & Measurement continues. 4:30–8:30 p.m. on the GVSU Allendale Campus. Series continues November 30 and December 14. For more information contact Karen Meyers at (616) 667-2278 or meyersk@gvsu.edu

17 Wednesday

Fall Science Update Seminar, "Changes in Science Education: Developing a Passion for Science" from 4:00 to 9:00 p.m. on Grand Valley State University's Allendale campus. The program features dinner, keynote presenters, and dozens of break-out sessions. Visit www.gvsu.edu/rmsc or call (616) 331-2267 for additional information.

30 Tuesday

Elementary Mathematics Series: Geometry & Measurement continues. 4:30–8:30 p.m. on the GVSU Allendale Campus. Series continues December 14. For more information contact Karen Meyers at (616) 667-2278 or meyersk@gvsu.edu

DECEMBER

14 Tuesday

Elementary Mathematics Series: Geometry & Measurement concludes. 4:30–8:30 p.m. on the GVSU Allendale Campus. For more information contact Karen Meyers at (616) 667-2278 or meyersk@gvsu.edu

Science Day Camps Successful

Throughout July and part of August 2004, 75 students from grades 4 through 8 enjoyed one of five week-long summer science day camps that were both fun and educational. Areas explored were flight and space, digging rocks, and forensics. Most of the camps took place at 303 Henry Hall, the new workshop room of the Regional Math and Science Center. Having the camps on the GVSU Allendale campus gave students the opportunity to get a taste of college life while taking advantage of a rich array of resources including a geology lab for the digging rocks classroom, large open spaces for the launching of rockets, the use of equipment such as microscopes on loan from the Integrated Science department for Forensics, an entire campus for geology field study, and the generous sharing of time and expertise by science and mathematics faculty members.

One exciting addition to the camp repertoire was the Forensic Science class. With the popularity of television's *CSI* and other shows about using science to solve crimes and enforce the law, there is a great deal of interest among

students in this field of study. The class filled rapidly and many students were placed on a waiting list. Kids were able to talk with an FBI agent, meet a police tracking dog and his trainer, record and examine their own fingerprints, experience a simulated crime scene, and take a field trip to the new state of the art Michigan State Police Forensic Laboratory in Lansing.

The camps combined classroom and experiential opportunities and each of them culminated with a field trip where students were able to observe real world applications of the principles and

concepts they had learned. At Kent County International Airport, students toured the Aeromed Helicopter Facility, the Fire and Rescue facility, and a flight training school where they had an opportunity to take a short plane ride with a certified pilot. In another camp, students took a short helicopter ride over the Grand Rapids area and then went to the Grand Ledge National Guard Helicopter facility. They were given a tour and were lucky enough to see several helicopters taking off and landing. Students attending the Digging Rocks camp went to Grand Ledge and

explored the 300 million year old sandstone formations from which the town got its name.

Camps ran four days each week from 9:00 a.m. to 3:00 p.m. Thanks to a grant from the Michigan Space Grant Consortium, scholarships were offered to 8 underserved students who may not otherwise have been able to attend. The camps have been very well received, with comments from parents such as “*My child wants to be a scientist! Thanks!*” and “*She is looking forward to next year.*” At RMSC, we are already planning for and looking forward to next summer’s camps.



Young scientists delve for evidence at a mock crime scene

Regional Math & Science Center
328 Henry Hall
Grand Valley State University
1 Campus Drive
Allendale, MI 49401

Address Service Requested
#4-26183

NON-PROFIT ORG
U.S. POSTAGE
PAID
GRAND VALLEY
STATE UNIVERSITY

THIRD CLASS