

INTERCHANGE

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Volume 12, Number 6

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.*

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Articles about **Teaching mathematics vocabulary**, **Learning and teaching about the environment**, the **timeline for content expectations**, reviewing **Math Content Expectations**, and an opportunity to discuss **High School Math Content Expectations** are on *pages 2-3*

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The InterChange is going electronic!

The change will be gradual but to help make the transition as smooth as possible **we need your help!** See *page 8* for details.

Attend Math In Action

This February’s annual Math In Action conference will present a lively, informative discussion of current issues in mathematics education centered around the theme “Making Connections.” Math In Action brings together the community of mathematics educators in West Michigan—from practicing K-12 teachers to university faculty to future teachers—and provides the opportunity for all to grow through the sharing of ideas and resources.

This year’s plenary speakers are Drs. David and Phyllis Whitin from Wayne State University. In their presentation, entitled “Literature: The Power of Math-Related Books,” David and Phyllis will discuss a range of high-quality books and show how teachers have used them effectively with their students.

Four concurrent sessions, to be held throughout the day, will feature presentations loosely centered on the theme of Making Connections. These sessions will typically be interactive, thereby giving participants the chance to experience new ideas within an active learning environment. Presentations, given by a variety of different mathematics educators, will include: “A Motivating Context to Explore Functions”, “Doing Math: What’s reading got to do with it?”, “Children Left Behind”, “Algebra & Geometry: Making the Manipulative Connection” as well as many, many more.

Mark your calendars! Math In Action will be held on Thursday, February 23, 2006, from 8:40 a.m. - 3:00 p.m., at the Eberhard Center on the Robert C. Pew Campus of Grand Valley State University. A brochure providing details of the conference, including the schedule and registration information, will be mailed to area teachers and teacher educators in early January. It will also be posted online at Math In Action’s website: www.gvsu.edu/math/MathInAction/.



Teachers solve problems during the 2005 Math In Action conference. This year’s conference is February 25, 2006

Understanding Math Vocabulary

Secondary Mathematics Vocabulary: Possible Pitfalls and Instructional Strategies is a professional development opportunity offered by Kent ISD and the GVSU RMSC. In his *Improving Adolescent Literacy* presentations, Doug Fisher addressed the value of vocabulary development. Research shows the importance of building a rich vocabulary for success in mathematics. Yet, for some students, learning mathematics vocabulary can seem like learning a foreign language. In this session, you will explore possible struggles students have with specific mathematical terms. You will also learn research-based instructional strategies for teaching mathematics vocabulary to help your students' mathematics achievement. The session is January 31, 2006 from 4:00 – 6:00 p.m. at the Educational Service Center Kent ISD, 2930 Knapp NE, Grand Rapids (use parking lot #11).

INTERCHANGE

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

Cost is \$15.00 per person. Please enroll by: January 24, 2006. Save some time and register online at www.kentisd.org, then select "Register Here" in the lower right corner. To pay by check or for other registration questions contact Amanda Walma at (616) 365-2275 or pdhub@kentisd.org.

Environmental Workshops Offered

The Regional Math and Science Center at Grand Valley State University invites teachers of grades 4 through 8 to register for a "pick and choose" environmental workshop series. These workshops are supported by a grant from the Department of Environmental Quality and the curriculum was developed to support Michigan's curriculum framework.

The workshops are free to participants but for a fee teachers will be able to earn 0.3 SB-CEU's per topic attended or have the option of earning one graduate credit hour if they attend four out of the five workshops. Visit the website www.gvsu.edu/rmsc for more information.

- **Air Quality: March 7, 2006. Presenter: Janet Vail, GVSU Annis Water Research Institute** This unit explores health effects of air pollutants and examines current Michigan air quality issues through lessons "Why Should We Be Concerned About Air Quality?" and "How Can We Tell What the Quality of Air is Today?"

- **Energy Resources: March 21, 2006. Presenter: Karen Meyers, Regional Math and Science Center** Learn about energy use and production through activities such as, "Michigan's Energy Resource Mix" and "Generating Michigan's Electricity." Explore renewable and nonrenewable energy sources and students learn about steward-

ship in lessons "Non-Renewable Energy Choices and Impacts" and "Using a Product's Life Cycle."

- **Individuals Impact on Land Use: April 11, 2006. Presenter: Margo Dill, Regional Math and Science Center** This unit is designed to teach students how to analyze and understand issues regarding land use and human impact with lessons like, "Measuring Land Use and Land Cover" and "Analyzing Land Use Changes".

- **Water Quality: April 25, 2006. Presenter: Kelly Heid, Regional Math and Science Center** Discover the vital role water plays in Michigan's economy and our lives using activities such as, "How We Use Water", "Do You Know Where Your Watershed Is?" and "How Healthy Is This Stream?"

- **Ecosystems & Biodiversity: May 9, 2006. Presenter: Michele Svoboda, Mill Creek Middle School** This unit explores the interaction between organisms and their environment and is designed to give students a better understanding of ecosystems with lessons such as, "Ecosystems Basics" and "Michigan Ecosystems – What have they done for you lately?" A second set of materials explores concepts related to Biodiversity and includes such lessons as "Michigan's Web of Life" and "Biodiversity Study".

Timeline for Content Expectations is Out

The Michigan Department of Education has released the time line for the development of high school, middle school and elementary science expectations curriculum work. The Department has received a National Governors' Association Grant to develop content expectations for ELA, Math, Social Studies, and Science from July 2005-July 2007. The work in Science is currently

beginning with the high school expectations, followed by the middle school and elementary expectations starting in May 2006. Final dissemination of the documents for high school will be in December 2006 with middle school and elementary dissemination in November 2007. The full timeline is available online at www.michigan.gov/science. Please note that at the end of the on-line timeline document there is information on which sections of the expectations will be grade level versus grade span at elementary and middle school levels.

Environmental Education Workshop

Teachers, save the date for this exciting opportunity to be immersed in a week-long workshop that will impact the way that both you and your students approach environmental science! During the week of Augusts 7 – 11, 2006, the RMSC in conjunction with GVSU's Annis Water Resources Institute and the Michigan Environmental Council will be offering an in-depth, week-long environmental education workshop that will include:

- training in the GLOBE protocols for collecting atmosphere, water, and phenology data,
- training in the MEECS curriculum units focusing on Air Quality, Water Quality, and Ecosystems,
- instruction in the Murphy Model for Environmental Education, a template for integrating environmental education with other subjects in the curriculum, and
- an introduction to inquiry-based science instruction, including how to use inquiry within the GLOBE and MEECS curriculum.

This week-long workshop, designed for upper elementary

and middle grades teachers (grades 4-9), will be held at the Lake Michigan Center of GVSU in Muskegon, MI. More information about this workshop as well as the registration and application forms will be available on the RMSC website at www.gvsu.edu/rmsc in early February. There is no registration fee for this workshop but registration is limited. Participants must meet the criterion for selection and submit an application form. Questions regarding this workshop may be directed to Karen Meyers, Assistant Director, RMSC, at (616) 331-2515 or meyersk@gvsu.edu

Review Math Content Expectations

On November 15, 2005, DRAFT **High School** Content Expectations (HSCE), developed by the Michigan Department of Education, Office of School Improvement, were presented to the State Board of Education. These expectations were developed to provide a description of what students should know and be able to do in mathematics by the end of high school for post-secondary success. Aligned with national standards and recommendations, the new expectations build on and extend the Michigan K-8 GLCE's and Michigan Curriculum Framework.

The State Board of Education is now seeking feedback on these proposed Mathematics High School Content Expectations. Grouped into four strands – Quantitative Literacy, Algebra & Function, Geometry & Trigonometry, and Statistics & Probability – the expectations are intended to support a rigorous and relevant curriculum for all students to prepare them for higher education and the workforce. In order to receive this feedback, the expectations are now open for public

comment via an online survey at www.michigan.gov/highschool. This online review site will be active through January 15, 2006. Final roll-out and dissemination of these new expectations is scheduled for April 2006. Also available on this site are the new proposed high school graduation requirements, which include four years of mathematics.

RMSC Offers Review of High School Math

In order to assist high school mathematics teachers and administrators in understanding the new mathematics HSCE, the RMSC is offering a Field Review Session on Thursday, January 12, 2006 from 4:30 – 8:30 p.m. on the Allendale Campus of GVSU. This field review session will provide information about the development of the standards and expectations and opportunity for professional dialogues before participating in the MDE on-line survey. In addition, teachers will discuss a process to align the proposed expectations with their curriculum and instructional materials. While this field review session will be targeted to high school teachers, Grade 8 teachers are encouraged to attend as the Grade 8 GLCE's are strategically important in providing the foundation for all students to be able to be proficient on the HSCE before they graduate.

The brochure with more information on and registration form for this work session is available for download on-line at www.gvsu.edu/rmsc. The RMSC will not be mailing brochures for this workshop due to the short timeline. Registration is limited to 30 participants. Questions regarding this workshop may be directed to Karen Meyers, Assistant Director, RMSC, at (616) 331-2515 or meyersk@gvsu.edu.

Why Sports Analysts Get It Wrong - Regression to the Mean

John Gabrosek and Kirk Anderson,
Department of Statistics

Chicago Cubs' first baseman Derrek Lee led the National League in batting with a .335 average for the 2005 season. Through the end of June, Lee was batting .379 having accumulated 110 hits in 290 at-bats. What happened to Lee in the second half of the season that his average dipped to .335? Had his true ability as a batter diminished? Was he tired? Did the pitchers find out what pitches he couldn't handle? One of these explanations could be true, but we doubt it. Prior to 2005, Lee had never hit higher than .282 in any of his 8 seasons in the major leagues. Lee's monthly batting averages for the 2005 season were: April .419, May .313, June .407, July .303, August .284, and September .309. The most likely explanation for why Lee "slumped" in the second of the season is that his monthly batting averages for the first three months were atypically high for him. He batted better than his true ability. In the second half of the season, he batted closer to his true ability. Statisticians call this phenomenon "regression to the mean."

A poor understanding of the concept of "regression to the mean" is at the heart of a plethora of highly suspect, usually erroneous statements made by politicians, news analysts, and, yes, sports fanatics. All have the same

fundamental flaw: they attempt to assign causes to events whose occurrence is explainable by natural and inevitable fluctuations and the regression effect.

Regression was first used as a statistical term by Sir Francis Galton in the paper "Regression towards Mediocrity in Hereditary Stature," published in the *Journal of the Anthropological Institute* in 1886. Galton compared parents' heights to the heights of their children. The results? What

What Galton termed "regression to mediocrity" and we now call "regression to the mean."

Galton termed "regression to mediocrity" and we now call "regression to the mean." Tall parents typically have tall children, but they are not quite as tall as the parents. Likewise, short parents typically have short children, but they are not quite as short as the parents. The children's heights regress back to the mean height of all children and away from the extreme heights of exceptionally tall or short parents.

So what does this have to do with Derrek Lee's batting average? It's easy to understand why Lee's average regressed back to his true ability when you think of batting averages as observations from a distribution of batting averages rather than as isolated

special events. Suppose that Lee's monthly batting averages follow a normal distribution (bell-shaped curve) with a mean of .276 (Lee's career batting average). Now consider the extreme values of this distribution as evidenced by Lee's first three months. It would be illogical to assume that the atypical behavior that leads to these values will continue.

Well, we leave it at that for now. Just remember that often incredible events that are given an assignable cause are due to random chance and the regression to the mean effect. Don't make the mistake that author Gabrosek made at the age of 6 in 1969 when he made an all-star break bet that Reggie Jackson would break Roger Maris' then record 61 home runs in a season. Jackson had 32 home runs at the halfway point in the season. Being no dummy, Gabrosek added 32 + 32 and came up with 64. Jackson would hit 64 home runs and break Maris' record! Well, Jackson regressed to his true ability and ended the season with 47 home runs. Gabrosek's first lesson in regression to the mean.

Sources:

Bland, J.M., and Altman, D.G. (1994). Regression towards the mean. *British Medical Journal*, **308**, 1499.

Galton, F. (1886). Regression towards Mediocrity in Hereditary Stature. *Journal of the Anthropological Institute*, **15**, 246-263.

Hanley, J.A. (2004). 'Transmuting' Women into Men: Galton's Family Data on Human Stature. *The American Statistician*, **58**, 237-243.

These pages are produced by faculty from GVSU.

Mary Jane Dockeray Scholarship

In honor of Mary Jane Dockeray, founding curator of the Blandford Nature Center in Grand Rapids, a scholarship has been established for two graduating high school seniors. The graduating seniors must be from a high school within the Kent, Ottawa or Muskegon Area Intermediate School Districts and be pursuing a career in science to be eligible to apply.

Recipients are selected on the basis of academic achievements and potential for succeeding in a science career. The \$1,000 scholarship is to be applied towards tuition, fees or other educational costs at a two or four-year college or institution. The Regional Math and Science Center must receive your application and recommendation forms by **March 3, 2006**. For more information on application requirements and procedures please visit www.gvsu.edu/rmsc.

Middle School Conference at GVSU

The College of Education at Grand Valley is sponsoring a middle school conference, *Teaching the Good Stuff in the Middle*, on February 11, 2006 at the DeVos Center in Grand Rapids, Michigan. The conference will feature, as the keynote speaker, Linda Perlstein, author of *Not Much Just Chillin': The Hidden Lives of Middle Schoolers*. In addition, breakout sessions will include such topics as learning to give, learning in the community, examining student work, writing across the curriculum, using oral histories, maintaining the middle level in an era of mandates and accountability, best practice in the content areas, and opportunities for conversa-

tions with colleagues. The conference is open to teachers, administrators, and others interested in understanding and educating students at the middle school level. Cost is \$35 with a special rate of \$20 for college students attending. For the full brochure and registration information, please contact Jacquie Melin at melinj@gvsu.edu or (616) 331-6209.

Summer Physics Course Offered

Are you interested in learning how to help your students learn physics or physical science in an inquiry setting? If so, PHY 601 (*Physics by Inquiry*) will give you the unique opportunity to experience from a student's perspective what it means to learn science through inquiry, and to better understand from an instructor's perspective the rewards and challenges of teaching science by inquiry.

PHY 601 is part of the M. Ed. program with Physics Emphasis but is open for all teachers. It is an excellent way to begin the M. Ed program. The course is offered during the Summer 2006 session from June 26 – August 8. Please register as soon as possible to indicate your interest in the course. For additional information, contact Prof. Keith Oliver (331-2722, oliverke@gvsu.edu).

Astronomy from the Ground Up

Applications are now being accepted for a workshop April 19-21, 2006 in Tucson, Arizona. Astronomy from the Ground Up is a National Science Foundation funded program developed to provide informal science education, science centers/museums

and natural history museums with new ways to communicate modern astronomy to their visitors. The workshops include onsite and website varieties and opportunities for science educators to learn fun techniques to present astronomy topics and to interpret current astronomical events and discoveries. Astronomy from the Ground Up was created by the Astronomical Society of the Pacific (ASP) in collaboration with the National Optical Astronomy Observatory (NOAO) and the Association of Science-Technology Centers (ASTC). For more visit: www.astrosociety.org/afgu/index.html

Applicants Sought for Audubon Scholarship

A scholarship of up to \$500.00 is available to help defray the cost of study at a National Audubon Environmental Workshop (website: maineaudubon.org/explore/camp) or a similar environmental focus workshop. Prospective applicants must be 18 years of age, have a strong commitment to the environment, be willing to actively participate in Grand Rapids Audubon Club for one at least one year, and be willing to share the knowledge gained at the workshop with others. Professors, teachers, ecology volunteers, scout leaders and college students are all encouraged to apply. If you would like to apply, send a pre-addressed envelope to Grand Rapids Audubon Scholarship Committee, C/O Hope Bradley, 7064 Thorncrest Dr SE, Grand Rapids, MI 49546 or email at Hope.Bradley@sbcglobal.net. The application can also be printed from the GRAC website www.glsqa.org/grac. Applications are due January 31, 2006.

CALENDAR OF EVENTS

DECEMBER

31 Saturday

Kent County Christmas Bird Count. 7:30 a.m. to 5:00 p.m. Meet tentatively at Kent County Conservation League on Conservation Ave near Ada, MI or possibly Wittenbach Agriscience and Environmental Center in Lowell, MI. Pre-register by calling WWC at (616) 987-1002. \$5.00 for 17 and older, youth free.

JANUARY

31 Tuesday

Secondary Mathematics Vocabulary: Possible Pitfalls and Instructional Strategies offered by Kent ISD and the GVSU RMSC. From 4:00 – 6:00 p.m. at the Educational Service Center Kent ISD, 2930 Knapp NE, Grand Rapids (use parking lot #11). Cost is \$15.00. Register online at www.kentisd.org, then select “Register Here”. To pay by check or for other registration questions please contact Amanda Walma at (616) 365-2275 or pdhub@kentisd.org.

FEBRUARY

23 Thursday

Math In Action from 8:40 a.m. - 3:00 p.m. at the Eberhard Center on the Robert C. Pew Campus of Grand Valley State University. For details visit: www.gvsu.edu/math/MathInAction/.

MARCH

3 Friday

Deadline for **Michigan Statistics Poster Competition** for K-12.

7 Tuesday

Air Quality workshop by Janet Vail of GVSU Annis Water Research Institute. Visit the website www.gvsu.edu/rmsc for more information.

21 Tuesday

Energy Resources by Karen Meyers of the Regional Math and Science Center. Visit the website www.gvsu.edu/rmsc for more information.

APRIL

11 Tuesday

Individuals Impact on Land Use by Margo Dill of the Regional Math and Science Center. Visit the website www.gvsu.edu/rmsc for more information.

22 Saturday

Earth Day Celebration with Live Exhibit Featuring Michigan Reptile Program and Walk. 4-5 p.m. walk. 6:30 p.m. program. At the Wittenbach Agriscience and Environmental Center and Wege Natural Area, 11715 Vergennes (across from the Lowell High School) Lowell, MI. Contact Steve Mueller at (616) 987-1002 or Smueller@lowellschools.com.

25 Tuesday

Water Quality by Kelly Heid of the Regional Math and Science Center. Visit the website www.gvsu.edu/rmsc for more information.

MAY

6 Saturday

Small Animal Day at the Wittenbach Agriscience And Environmental Center and Wege Natural Area, 11715 Vergennes (across from the Lowell High School) Lowell, MI. Contact Steve Mueller at (616) 987-1002 or Smueller@lowellschools.com.

9 Tuesday

Ecosystems & Biodiversity by Michele Svoboda of Mill Creek Middle School. Visit the website www.gvsu.edu/rmsc for more information.

13 Saturday

Bird Migration Count. Variable times and locations to be arranged contact Ranger Steve at WWC or Steve Minard at 616-942-7165. Contact Steve Mueller at (616) 987-1002 or Smueller@lowell-schools.com.

Essay Contest for Middle School

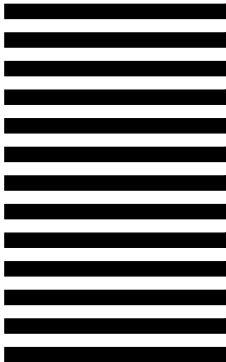
The Michigan Society for Medical Research (MISMR) annually sponsors an essay contest open to all Michigan middle school students. It is part of MISMR's educational outreach program to promote awareness of the benefits and the process of biomedical research, and increase awareness and interest in science. Entries will be judged on originality, creativity, command of the English language, and the demonstration that extra effort was made to learn about biomedical research and why animals are used. Students are asked to describe one specific example of a situation in which animals in research help people. Give as much detail as possible: for example, what kind of animal is involved, why that animal was chosen, and what kind of people benefit the most. Creative answers will be rated the highest. Winners receive cash prizes, plaques, and merit certificates. For a complete description and contest rules see www.mismr.org. Entries are due to MISMR Contest, P.O. Box 3237, Ann Arbor, MI 48106-3237 by December 15, 2005.



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The InterChange is Going Electronic

The Regional Math and Science Center is pleased to announce that our InterChange Newsletter will soon be available electronically. The InterChange will still include interesting math and science updates from the GVSU faculty, information about upcoming workshops, activities, and the calendar of events. The only difference will be that it will arrive via the internet rather than by regular mail.

The hardcopy of the InterChange is not disappearing yet! This will be a gradual change. We will continue to produce the InterChange in both formats (hard-copy and electronic) for the near future. At some point, however, the InterChange will convert solely to the electronic version. So, in order to make a smooth transition between formats, we need your help in compiling our email database. Please complete and mail the *Electronic InterChange Registration Form* found below or visit the Regional Math and Science Center's website at www.gvsu.edu/rmsc/ to complete the form online.

We appreciate your loyal readership and look forward to providing you with continued science/math news and information.

Electronic InterChange Registration Form

Name _____

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