# Mathematics in Action 

> ＂Data Analysis Throughout the Mathematics Curriculum＂

a conference for K－12 mathematics educators
Thursday，February 26， 2004


The Eberhard Center The Robert C．Pew Campus in downtown Grand Rapids Grand Valley State University Thursday，February 26， 2004

8：30 am－3：00 pm


## GRANDVALLEy <br> State University

www．gvsu．edu／math／MathInAction

## Session A: 8:40-9:40 am

A1 What Can We Learn from Pioneers? Math, Beauty, and Perseverance in Children's Literature
Victoria Swenson, Cornerstone University
Math Strands in 2-D geometry, mapping, and patterns will be addressed with activities based on books about varied kinds of "pioneers" who show the quality of Perseverance. Winter-related art activities and handouts. Grades $K-6$

## A2 The Power of Trash

Jo Anna Berry, North Muskegon Public Schools
This session will provide an excellent example of how to integrate data collection in your classroom. The power of trash is a project that you can take back to your school and get kids involved in, not only recycling and reusing, but also in data collection. Grades 4-7

## A3 Spinners - What Can They Teach Us?*

Tara Maynard, Creekside Middle School
Spinners are good for more than just games! We will see how spinners can be used for graphing, understanding fractions, data collection, probability, and more. Grades 5-8

A4 Probability in Action! (Part 1 of a 2 part session)
Christy Schultz, Valleywood Middle School
Cindy Schoonbeck, Crestwood Middle School
This session will entail a variety of middle school probability activities involving technology and manipulatives. Our resources include some traditional texts, CMP, M3RP activities, technology, and our own personal teaching experiences. PARTICIPANTS MUST SIGN UP FOR BOTH A4 AND B4. B4 is not a repeat, it is a continuation. Grades 6-8

A5 Helping Middle School Students Make Sense of the Statistical Investigation Process (Part 1 of a 2 part session)
Christine Browning, Western Michigan University
Amy Bessen, Western Michigan University
Diane Rogers, Kalamazoo Public Schools
The statistical investigation process involves posing questions, collecting data, analyzing data, and interpreting results. Tasks/activities that help students make sense of this process, including activities incorporating the use of graphing calculators and data-collection devices, are presented. PARTICIPANTS MUST SIGN UPFOR BOTH A5 AND B5. B5 is not a repeat, it is a continuation. Grades 6-8

## A6 Integrated Middle School Data Analysis Projects*

Kim Duhamel, West Michigan Academy of Arts \& Academics Jeff Bretz, West Michigan Academy of Arts \& Academics How can chewing gum, student lunches, and temperature offer students content integrated opportunities to gather and analyze data? Explore actual middle school projects that integrate across the four content areas. Grades 7-8

## A7 Do Dogs Know Calculus?*

Tim Pennings, Hope College
Elvis Bogaart Wales Pennings, Welsh Corgi
When I play "fetch" with my Welsh Corgi, Elvis, at the beach does he choose the quickest path (involving running and swimming) to the ball? We will tell what we found when we tested this hypothesis. Grades 11-12
A8 School Improvement Project*
Gail Sutton, Forest Hills Central High School
Students set a school improvement goal, gather baseline data, determine strategies and implement them, then gather follow-up data. These steps will be shared along with specific projects and grading rubrics. These can be used in coordination with NCA school improvement goals! Grades 9-12

## Session B: 9:50-10:50 am

B1 Collecting and Analyzing Data Found in Children's Literature
Charlene Beckmann, GVSU Mathematics
Nancy Patterson, GVSU School of Education
We naturally tell stories and learn through them. Illustrating mathematical concepts through stories helps students build on their intuitive understanding. Collecting and analyzing data through several books will be shared. Grades 4-8
B2 The Use of Statistics in Analyzing the Space Shuttle Challenger Data
Terri Faitel, Trenton Public Schools
Participants will watch clips of the Challenger Investigation and engage in statistical analysis of the 23 launches using graphing techniques and the TI-83 graphing calculator. Grades 6-12

## 33 Tetrahedron Kite Construction

Melissa Cragg, Park City Mathematics Institute (GLIMers)
Participants will make a piece of a tetrahedron kite to take home. We will then collect data on perimeter, surface area, and volume. Awesome activity to start the year with! Grades 7-12

B4 Probability in Action! (Part 2 of a 2 part session)
Christy Schultz, Valleywood Middle School
Cindy Schoonbeck, Crestwood Middle School
This session is a continuation of A4. PARTICIPANTS MUST SIGN
UP FOR BOTH A4 AND B4. Grades 6-8
B5 Helping Middle School Students Make Sense of the Statistical Investigation Process (Part 2 of a 2 part session)
Christine Browning, Western Michigan University
Amy Bessen, Western Michigan University
Diane Rogers, Kalamazoo Public Schools
This session is a continuation of A5. PARTICIPANTS MUST SIGN UP FOR BOTH A5 AND B5. Grades $6-8$
B6 Spinners - What Can They Teach Us?*
Tara Maynard, Creekside Middle School
This session repeats A3. Grades 5-8
B 7 Do Dogs Know Calculus?*
Tim Pennings, Hope College
Elvis Bogarrt Wales Pennings, Welsh Corgi
This session repeats A7. Grades 11-12

## General Sessions and Lunch: 11:00 am - 12:40 pm

## Professor Deborah Ball, University of Michigan

Participants will attend one of the general sessions and eat lunch during the other session.
G1 Making Mathematics Reasonable (Grades: Elementary, Middle, and Higher) 11:00-11:45 am
Mathematical reasoning is central to proficiency with mathematics. This session will engage participants in the work of helping students learn to reason about mathematics, to give and expect mathematical explanations, to justify claims, and to compare and analyze alternative solutions and arguments. What are the key elements of mathematical reasoning and how can they be developed in school classrooms? What are the challenges and how can these be mediated?
G2 Teaching and Learning Mathematical Definitions (Grades: Middle and Higher) 11:55 am - 12:40 pm
Mathematicians agree that precise use of terms is a cornerstone of mathematical practice, and yet helping students develop such sensibility and skill is not always successful. This session will engage participants in investigating the role of definitions in learning and teaching mathematics. Participants will examine the role of precise language in the development of students' mathematical proficiency and how this might be fostered in classrooms. We will also consider ways to balance encouraging students to express their ideas while also developing the value of precision.

## Session C: 12:50-1:50 pm

## C1 Cookies and Coke? A Balanced Statistical Meal

John Gabrosek, GVSU Statistics
Phyllis Curtiss, GVSU Statistics
Two hands-on activities using cookies and coke that illustrate experimental design, numerical summaries of data, probability, and hypothesis testing concepts. Participants are encouraged to bring TI calculators. Grades 3-6

C2 Developing the Probability Strand Using Performance Tasks*
Donna Davis, Glencoe/McGraw-Hill
Introduce probability. Compare experimental and theoretical probabilities. Apply data collection skills and analysis by sampling. Explore fairness and improve chances of winning. Test predictions about outcomes. Analyze combinations of events. Grades 6-9

## Session C (continued): 12:50-1:50 pm

## C3 Pros and Cons of Block Scheduling

Rhonda Pardue, Black River Public School
This is a combination talk and discussion of the pros and cons of block scheduling. Problems and successes of three different kinds of blocks will be mentioned. Grades 6-12

## C4 Can You Fathom It?

Shanna Greer, West Ottawa High School
Fathom is an innovative software recently introduced into mathematics. Students can discover the world of probability by manipulating data, moving and creating outliers, adjusting mean and median, etc. Grades 7-12
C5 What if One Standard Function Isn't Enough?

## Reva Kasman, GVSU Mathematics

Practical data cannot always be represented by a single polynomial, exponential, or other standard function. This session will focus on defining and graphing piecewise functions to model data.
Grades 9-12

## Session D: 2:00-3:00 pm

## D1 Logical Reasoning

Louise Honea, WGVU-PBS Television
Fun is the order of the day as students put pictures of Hacker and his pals in the correct sequence in terms of time. Learning objective is for students to use and explain their reasoning to solve a visual logic puzzle. Using logic to determine a sequence. Grades 3-5

## D2 How Long Until We "Pig Out"?

Mary Richardson, GVSU Statistics
David Coffey, GVSU Mathematics
Using the 'dice' game Pass the Pigs, participants will explore experimentally and theoretically how many tosses it takes before a player rolls a "pig out". Grades 6-12
D3 Solving Complex Probability Problems in Four Simple Steps - Applying the Monte Carlo Procedure
Gina Garza-Kling, Western Michigan University
The Monte Carlo Procedure is a simple, four-step process for estimating solutions to complex probability problems. Learn how to apply this powerful problem-solving technique to interesting real-world situations. Grades 6-12+
D4 Movie Money Making - An Exponential Explosion
John Golden, GVSU Mathematics
Looking at real movie money histories, we will make and check predictions, seeking to understand the patterns and the marketing. Grades 9-12

C6 Integrated Middle School Data Analysis Projects*
Kim Duhamel, West Michigan Academy of Arts \& Academics Jeff Bretz, West Michigan Academy of Arts \& Academics This session repeats A6. Grades 7-8

## C7 The Price is Right

Mary Richardson, GVSU Statistics
Diann Reischman, GVSU Statistics
The speakers will guide participants through an activity that is used to illustrate simple linear regression and correlation. Data consist of guessed prices and actual prices of various items. Grades 9-12

## D5 School Improvement Project*

Gail Sutton, Forest Hills Central High School
This session repeats A8. Grades 9-12
D6 Developing the Probability Strand Using Peformance Tasks*
Donna Davis, Glencoe/McGraw-Hill
This session repeats C2. Grades 6-9

## D7 Taking Chances

Mike Meyers, Calvin College
Participants will perform simple and fun probability experiments and analyze the results. Grades 3-6

## D8 From Misconception to Classroom Lesson

Karen Meyers, Regional Math and Science Center, GVSU
Follow the evolution of a lesson on the use of variables - from analyzing student work that reveals a misconception, designing a lesson based on the new GRPS mathematics instructional model, experiencing the lesson, and discussing modifications for improving the lesson. Grades 5-8

## Mathematics in Action Registration Form


(One registration per form...duplicate as needed - this form is also available at www.gvsu.edu/math/ MathlnAction)


## You will NOT receive a confirmation!

NOTE: Sessions offered more than once are marked with an *.

## (Place appropriate session codeintheblanks. Please indicatesecond choices.)

Session A: I need a receipt.
$1^{\text {st }}$ Choice $2^{\text {nd }}$ Choice

Session B:
$1^{\text {st }}$ Choice $2^{\text {nd }}$ Choice

Session C:
$1^{\text {st }}$ Choice
$2^{\text {nd }}$ Choice
Session D:
$1^{\text {st }}$ Choice $2^{\text {nd }}$ Choice

Enclose your registration fee of $\$ 22.00$ per teacher/ educator $\$ 11.00$ per preservice teacher (make checks payable to GVSU) and mail this completed registration form postmarked by February 13, 2004 to:

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



#### Abstract

From US-131 Northbound: US-131 Northbound - Exit at Pearl Street (\#85B). Turn left onto Pearl Street and stay in left lane. Proceed West underneath U.S. 131 and Mt. Vernon Avenue is immediately after the highway. Turn left onto Mt. Vernon Avenue and continue South to Fulton Street. Turn left onto Fulton Street and the complimentary Conference Guest parking lot will be on the right.

From US-131 Southbound: US-131 Southbound - Exit at Pearl Street (\#85B). Proceed through the light and go one block South to Fulton Street. Turn left onto Fulton Street and the complimentary Conference Guest lot will be on the right.

From I-196 East/ West: Exit at Ottawa Street (\#77). Proceed through the light and continue South on Ottawa Street to Fulton Street. Turn right onto Fulton Street and proceed one block West over the Grand River and the complimentary Conference Guest parking lot will be on the left. Overflow parking is available in the Watson Lot noted on the map above.


January 3, 2004
Dear Educator,

The Department of Mathematics at Grand Valley State University is pleased to announce its annual Math In Action Conference. This year the conference will be held on Thursday, February 26, 2004 in the Eberhard Center on GVSU's Robert C. Pew Campus in downtown Grand Rapids and will run from 8:3 0 am to 3:00 pm. The topic for this year is "Data Analysis throughout the Mathematics Curriculum".

There will be four sets of concurrent sessions addressing this theme. They will offer teachers the opportunity to experience a variety of interactive projects and activities that other educators have found successful. Each session will offer possibilities from across the K-12 curriculum on a host of topics; please examine the session descriptions in this program with titles and abstracts for further information.

This year we are pleased to have Professor Deborah Ball from the University of Michigan giving our plenary addresses. Professor Ball is a world renowned mathematics educator who conducts research on mathematics instruction and on the processes of learning to teach. She is a former elementary teacher who now chairs several national panels and study committees including the Glenn Commission on Improving Mathematics Education for the 21st Century and the National Research Council study panel that produced Adding It Up.

As the attendees for Math In Action have diverse backgrounds in the K-12 curriculum, Professor Ball will give two differently focused addresses. One will focus on encouraging mathematical explanations in the elementary, middle and high school grades. The other address will focus on the role of definitions in the learning and teaching of mathematics at the middle and high school grades. Both addresses will be motivating to K - 12 educators and dynamically presented in a multi-media format.

This year's conference will be an exciting time of learning and idea-sharing filled with innovative and practical teaching methods centered on the mathematics classroom. We look forward to you joining us.

Co-chair, Math in Action

## Marge Friar

Co-chair, Math in Action

