2006 PROM/SE
SUMMER MATHEMATICS ACADEMY

ACADEMY GOALS: Please join us for the PROM/SE Summer Mathematics Academy, co-sponsored by Calhoun ISD, High AIMS consortium, Ingham ISD, SMART consortium and St. Clair County RESA. Spend time delving deeply within one content area in courses taught by experts in K-12 mathematics education. Academy participants will develop a deeper mathematical knowledge for teaching in the areas of:

- Pedagogy for teaching mathematics
- Student learning and how students come to understand concepts and ideas
- Development of content over time and through experiences.

"AFTER ATTENDING THE ACADEMY I AM CONVINCED THAT A FORMAT OF MATH INSTRUCTION THAT INCLUDES MATHEMATICAL THINKING, PROBLEM SOLVING, AND STUDENTS EXPLAINING SOLUTIONS WILL LEAD TO DEEPER MATHEMATICAL UNDERSTANDING FOR MY STUDENTS"

- 2005 participant

WHO CAN PARTICIPATE? PROM/SE Mathematics Associates, as well as teachers from PROM/SE buildings. Please register early. Space is limited. ***Registration deadline is June 2.***

IS THERE A COST? There is no charge to attend. A daily stipend of $75 will be paid to registered participants who attend the entire day and sign in/out.

HOTEL: For those traveling more than 50 miles one way, please contact your PROM/SE site representative for more details.

CREDITS: CEUs are available at no charge. University graduate credit (pending approval) is available for an extra fee. To be eligible for CEUs or credit, participants must attend the entire academy. University credit requires completion of extra assignments.

ABOUT PROM/SE: Supported by the National Science Foundation, PROM/SE is a comprehensive research and development effort to improve mathematics and science teaching and learning in grades K-12, based on assessment of students and teachers, improvement of standards and frameworks, and capacity-building with teachers and administrators. PROM/SE has six partners in Michigan and Ohio: Calhoun ISD, MI; High AIMS Consortium, OH; Ingham ISD, MI; Michigan State University; SMART Consortium, OH; and St. Clair County RESA, MI. For more information visit www.promse.msu.edu.

HIGH SCHOOL COURSES:

Making Decisions with Data and Chance   *Teachers of Grades 10-12*
Mathematically literate high school graduates should understand the key elements of making decisions based on data and chance. These include: designing studies to answer questions of interest; organizing and analyzing data; using measures of center and spread; understanding the basic elements of inferential reasoning; and being an educated consumer of data that are used in the media and the workplace. Participants in this course use technology to investigate statistical concepts and to develop the fundamental notions of inference.

New **Algebra II for All: A Data Driven Approach**   *Teachers of Grades 10-12*
Real-world contexts and applied problems can be effective tools for motivating fundamental ideas of algebra. This course engages students in exploring the use of formulas from a variety of areas, modeling relationships, and developing connections among different representations and areas of mathematics. The content is linked to the second-year algebra curriculum. Technology plays a central role in the activities.

The Mathematics of Change   *Teachers of Grades 7-12*
The mathematics of change can be used to describe the way a plant grows or how one catches up to a friend by running down the street. Participants deepen their understandings of rate of change and experience ways to teach the concepts of change in different ways. In addition to providing mathematical background for middle and high school teachers, the course addresses pedagogical approaches and technological innovations for instruction that incorporate foundational ideas in the mathematics of change in grades 7–12.

"I HAVE HAD TO DEVELOP MY OWN EXPLANATIONS EACH YEAR FOR DIVISION OF FRACTIONS. AFTER TAKING THIS COURSE I HAVE EXPLANATIONS DEEPLY EMBEDDED THAT WILL BENEFIT MY TEACHING."

-2005 participant

MIDDLE SCHOOL COURSES:

Geometry and Measurement II   *Teachers of Grades 5-8*
The content trajectory for elementary-grade concepts of perimeter, area and volume is extended to apply to more complex shapes and the relationships are explored between these measurements for two- and three-dimensional shapes. The course takes into consideration state expectations/benchmarks/indicators across the grades. It includes mathematical tasks that demand different levels of cognitive skills and introduces strategies that might successfully be employed by students. Applications include developing an understanding of the Pythagorean Theorem, a key tool in working with some of the shapes.

Equations and Lines   *Teachers of Grades 6-9*
The standards/benchmarks/indicators for the middle grades contain a strong emphasis on understanding equations and their solutions, formal strategies for finding solutions, graphing linear functions, and finding and recognizing equivalent expressions and equations. The course provides teachers with strategies for helping students understand the underlying mathematics and for considering elements of lessons that lead to understanding. They will also consider the role of tasks and the level of cognitive demand as key elements in the instructional process. *(Offered at Cleveland and Cincinnati only)*

New **Fraction and Decimal Operations**   *Teachers of Grades 4-7*
Fractions, decimals and percents are central elements in upper elementary and lower secondary mathematics. Participants consider strategies to help students operate with fractions, decimals and percents and to exploit the connections among the different representations in ways that enhance student learning. Suggestions from research provide underlying guidelines for the activities.

New **Angles and Their Relationship to Lines and Shapes**   *Teachers of Grades 4-8*
This course begins with the notion of angle as both a static figure and as the amount of turn. Participants investigate ways in which angles can be quantified and measured, and angle theorems relate to lines (vertical angles, corresponding angles, alternate interior angles). The formula for the sum of the angles in a triangle will be developed and extended to polygons and other relationships that emerge as a consequence. Course activities include strategies for presenting the concepts and suggestions from research about teaching and learning in this area.

ELEMENTARY SCHOOL COURSES:

New **Number and Operations: Making Meaning of Operations**   *Teachers of Grades K-5*
Participants examine the actions and situations modeled by the four basic operations. The seminar begins with a view of young children's counting strategies as they encounter word problems, moves to an examination of the four basic operations on whole numbers, and revisits the operations in the context of rational numbers. The work consists of viewing and discussing videotapes of mathematics classrooms, analyzing lessons and reading overviews of related research. Participants will read case studies between class sessions. *(Offered at Michigan and Cincinnati only)*

New **Number and Operations: Building a System of Tens**   *Teachers of Grades K-5*
Participants explore the base-ten structure of the number system, consider how that structure is exploited in multidigit computational procedures, and examine how basic concepts of whole numbers reappear when working with decimals. The work consists of viewing and discussing videotapes of mathematics classrooms, analyzing lessons and reading overviews of related research. Participants will read case studies between class sessions.

Geometry and Measurement I   *Teachers of Grades 3-5*
This course engages teachers in the mathematics of perimeter, area and volume, laying out a coherent trajectory for the key concepts, including some core geometric relationships involving lines and angles. Participants examine different attributes of size, develop facility in composing and decomposing shapes, and apply these skills to make sense of formulas for area and volume. They also explore conceptual issues of length, area, and volume, as well as their interrelationships.

Fractions   *Teachers of Grades 3-5*
This course provides teachers with a deeper understanding of the different representations of fractions, such as points on a number line, indicated division, decimals, and percents. Participants will analyze instructional models used to develop concepts of fractions and consider their strengths and limitations. Participants discuss ways to help students construct meaning for concepts such as equivalence, ordering, and comparing fractions.