What Is Outreach?

• Outreach is any activity which supports the math learning needs of the broader community.

• A career in math outreach is one in which the main focus is on addressing the needs of the community.

• Outreach is critical because the mathematical sophistication needed by the broader community has increased, and systems (including universities) have not yet changed to meet these needs.
Changed Math Education Goals

• The emerging global economy requires a workforce with sophisticated problem solving skills

• Conceptual understanding and technical communication skills are now needed by more people

• Teaching algorithms is no longer the primary goal

• College readiness AND practical workforce skills for every student
Common Core State Standards

• Slated for full implementation in 45 out of 50 states by 2014

• Elementary curricula emphasize development of number sense and autonomous problem solving

• Middle and High school curricula emphasize real-world modeling and proofs
Computational Skill Stages

• Concrete understanding of the meaning
  - Use of manipulatives and drawings
  - Applications motivate the skill

• Students devise and discuss their own approaches
  - Flexible number sense and mental computation
  - Strategic insight into properties of operations

• Fluency and Algorithms – delayed, but still important
Be a Rock Star: Nim Games

• Easily adapted to any age!

• Guaranteed to establish instant rapport with teachers and students alike!

• Provides an entrance to many fascinating math topics!
Algebraic Thinking

• Manipulate Numerical Expressions
  - Connect with real-world scenarios
  - Flexibly generate multi-step expressions

• Understand the Value of Generalization
  - Develop formulas to solve recurring problems

• Discover ad hoc Methods
  - Guess and Check, strategic use of graphs

• Codify the Legal Moves
Be a Rock Star: Fermi Questions

• A great vehicle for teaching algebraic thinking!
• Easily adapted to any age!
• Appealing to students of all confidence levels!
Priorities

• Computation – more flexibility

• Fractions – conceptual approach

• Algebra – meaningfulness and critical thinking

• Real-World Mathematical Modeling
Recommendations

• 5th through 8th grade math taught by math specialists

• Professional development and support for current and future teachers on Common Core State Standards

• Allow students to devise and discuss own strategies

• Teach for mastery and foster autonomy

• Incorporate technology appropriately
RCMC Initiatives

- Professional Development for local teachers
- Encouraging pre-service teacher preparation
- Promoting involvement of mathematicians around the country in education
- Math Circle Institute (week of July 7th, 2014)
- Linking business leaders and educators
- Math Circles
- Community Events
How You Can Help

- Start departmental conversations about the preparation of future teachers.

- Consider reforming traditional math courses for all majors to increase critical thinking requirements and mathematical depth.

- Start a Math Circle for students and/or teachers!
Getting Started

- Work for a university which has a Center for Math Outreach (or start such a Center).
- Become a math education consultant for schools.
- Work for a science or math museum.
- Work for the emerging Math Circle movement (under the auspices of MSRI, AIM, the MAA, or other organizations).
- Start your own community Math Center.