Math is for Everyone!
Community Outreach from Mason Experimental Geometry Lab

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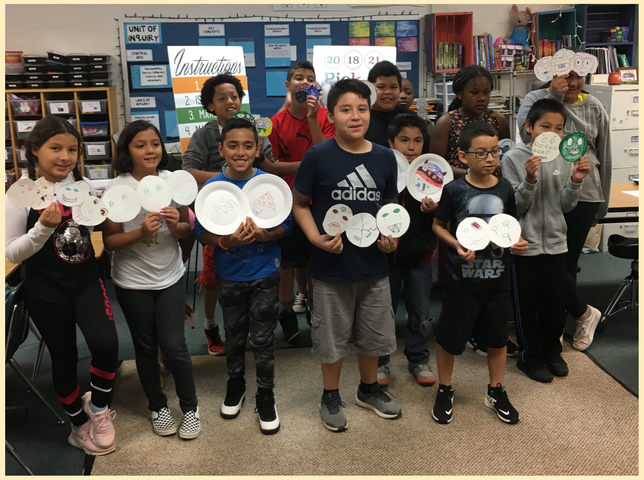
Overview

Math outreach has played an important role in MEGL since its inception in 2015. We at MEGL know that mathematics can be challenging—but we also know that it is beautiful, fun, and enthralling. Our goal is to share the positive side of mathematics with students in the local community and beyond.



Our future scientists, inventors and developers need to love math. It's everywhere! We aim to provide positive, enriching mathematical experiences to young people. Even if they don't grow up to be scientists and engineers, never having to utter the phrase "I hate math" can only be a good thing!

Our Activities

The mathematical experiences we offer are hour-long, interactive activities, centered on some mathematical theme and designed for a classroom-sized audience. Here is a brief overview of our current offerings.

You Can Count on Monsters!

In this activity students grades 1st - 3rd explore prime numbers, the "atoms" of the number system. They use glass beads to arrange and deconstruct rectangles in order to find the prime number building blocks of larger numbers. Then they use their findings to craft multi-headed monsters from paper plates, markers, crayons, and their imaginations. Each monster encodes a prime number decomposition. The picture to the left gives an idea of the results.

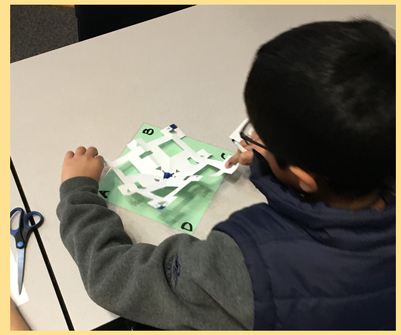
Really Big Numbers!

This activity for 4th - 6th graders explores growth patterns and touches on the idea of infinity. The students experience linear growth as they run a relay race, polynomial growth by playing a high-five game, and exponential growth with buckets of ping pong balls. The students experience larger and larger numbers and faster and faster growth, but in the end realize how tiny the biggest numbers are compared to infinity.

Playground of the Infinite!

As *Really Big Numbers* tried to approach infinity, this activity for 5th and 6th graders gets us there. They start by using rubber chickens and lizards (obviously) to learn how to count infinite sets, then they discover how to check in to an infinite hotel that's booked solid, and finally we look for infinities larger than infinity.

Snowflake Symmetry



Symmetry is pervasive in mathematics and nature. In this activity students make paper "snowflakes", experiment with them, create a language for their symmetric properties, and discover the rules of the language. Students get to experience three key components to mathematical discovery: experimentation, pattern-finding, and explanation. These are tools mathematicians use to explore the abstract world and the real world alike.

Your Teachers are Lying to You

This activity for high school students, with its subversive title, turns mathematical "truths" on their head by questioning the assumptions under which they hold. Students discover that $2+2$ is not always 4, that the angles of a triangle do not always add to 180°, and that $1/0$ does have a well-defined home among the other numbers. We also link these seemingly esoteric mathematical discoveries to things we use everyday like smart phones and online shopping. The image at the bottom left of this poster shows students engaged in this activity, exploring triangles on curved surfaces.

Future directions

The five activities we currently offer were designed for hour-long periods in a typical classroom. We would like to develop activities for other venues, such as fairs/festivals, where a diverse audience may visit a station or booth for a few minutes at a time. Pictured here is one of our contributions to the Maker Faire at GMU in 2018, where visitors could play with mathematical objects and learn something interesting about them. We also see potential for enthusiastic but mathematically inexperienced undergrads to work with our research teams to design stations that communicate our work to a general audience.

This would allow our research to reach a broader audience, and also provide a broader range of undergrads with access to mathematics research.