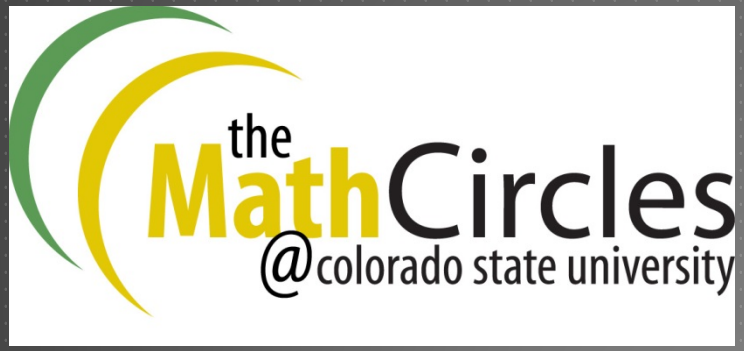
A MATH CIRCLES CAMP AT COLORADO STATE UNIVERSITY



Lori Ziegelmeier, Macalester College

2015 Joint Mathematics Meetings

MAA Session on What Makes a Successful Math Circle

BACKGROUND ON OUR PROGRAM

- Began in 2009 as a program for middle school girls.
  - The first summer 13 students enrolled.
  - Explored ideas from graph theory and developed an initial understanding of related elementary proofs.
  - Initiated by faculty member Dan Rudolph, a local mathematics teacher, and a couple graduate students as a week-long camp.
- Program has continued to run for 6 consecutive years.
  - Over 230 students have been involved.
  - Approximately 15 faculty members, 25 graduate students, and a handful of undergraduate students have helped to run the program.

HOW DID I GET STARTED?

- I was asked...
  - After initial organizer passed away, I became a co-organizer, along with co-organizers Elly Smith, Jaime Shinn, and Melissa Adkins.
  - I organized the program for four years as a graduate student.
- Then, I asked other faculty and graduate students to participate as well.
  - Encouraged colleagues to do a session on something they knew about or were interested in learning.
  - Recruited graduate student “helpers” to work with the students.

FORMAT OF OUR PROGRAM

- Week-long non-residential summer camp
- Target enrollment:
  - Boys and girls entering 8th or 9th grade
  - 25 students of each gender
  - First course in algebra recommended, but interest in mathematics most important
- Typical layout:

Time	Activity
9:30-10:00	Combined welcome/refreshments
10:00-11:45	Girls: Session 1 Boys: Session 2
11:45-1:00	Lunch
1:00-2:45	Boys: Session 2 Girls: Session1
2:45-3:00	Combined discussion/refreshments

SAMPLE TOPICS

- Having a central theme is key!
  - Mathematics through the Ages
  - Logic, Puzzles, and Games
  - Notions of Shape and Space
  - Go Wild! Mathematics in Nature
- Examples of Schedules/Topics

(http://www.math.colostate.edu/mathcircles/mathcircles.shtm

LOGISTICS OF TREASURE HUNT

- Teams of 4-5 students, with support of a graduate student hunt for puzzles around campus.
- Typically 5 “big” questions and then smaller questions to get from location to location.
  - Example 1: **Lucky you, Mr. Spencer!**

    An absentminded bank teller switches the dollars and cents when he cashed a check for Mr. Spencer, giving him dollars instead of cents, and cents instead of dollars. After buying a five cent newspaper, Mr. Spencer discovered he had left exactly twice as much as his original check. What was the amount of the check?
  - Example 2: **Pentominoes**

    Tetris pieces consist of four squares each sharing an edge with another square. How many pentominoes (configurations of five squares) are there?
- Question order is permuted for each team.
- All teams end at the location of the hidden treasure, often object used in next day’s session

FINAL DAY OF CAMP

- Half-day session
- Fun, combined activity
  - Constructing images of each student using mathematical algorithms
  - Panel of various mathematical careers
  - Minimal surfaces and soap films
- Closing ceremony
  - Parents attend
  - Address by Department Chair
  - Slide-show of student activities
  - Presentation of certificates and T-shirts

MATH CIRCLES
Mathematics Through The Ages
@ Colorado State University

MATH CIRCLES
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MATH CIRCLES
@ Colorado State University
GO WILD
MATHEMATICS IN NATURE

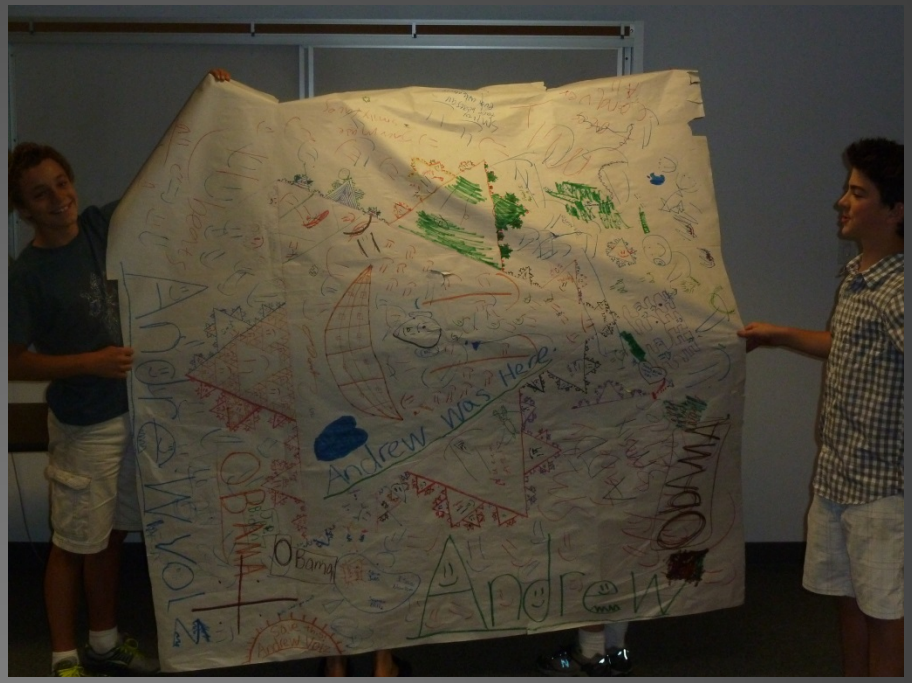
NOTIONS OF SHAPE & SPACE
MATH CIRCLES
@ Colorado State University

BUILDING COMMUNITY

- If participants feel comfortable, they are more likely to engage and view the program, and hence mathematics, more positively
- Build community by
  - Having a picnic
  - Joining students for lunch
  - Talking about interests, mathematics, careers, college and graduate school
  - Playing games of Ultimate Frisbee, capture the flag, SET
  - Having fun!




WHY THE SPLIT IN GENDER?



A FEW REFLECTIONS

- The program can be run with very little money.
  - Received support from the Department of Mathematics and College of Natural Sciences.
  - Attendees pay a small fee that covers the cost for t-shirts, prizes, snacks, and lunch.
- The program requires support from many different people.
- The program fosters a sense of community from staff to participants to faculty to graduate students.
- The program is fun and inspiring!

QUESTIONS?