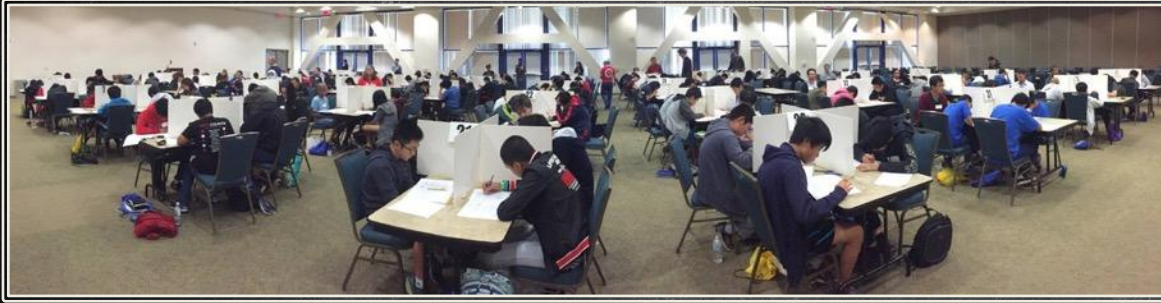


"MATH-OUTREACH" TO HELP OUR COMMUNITY



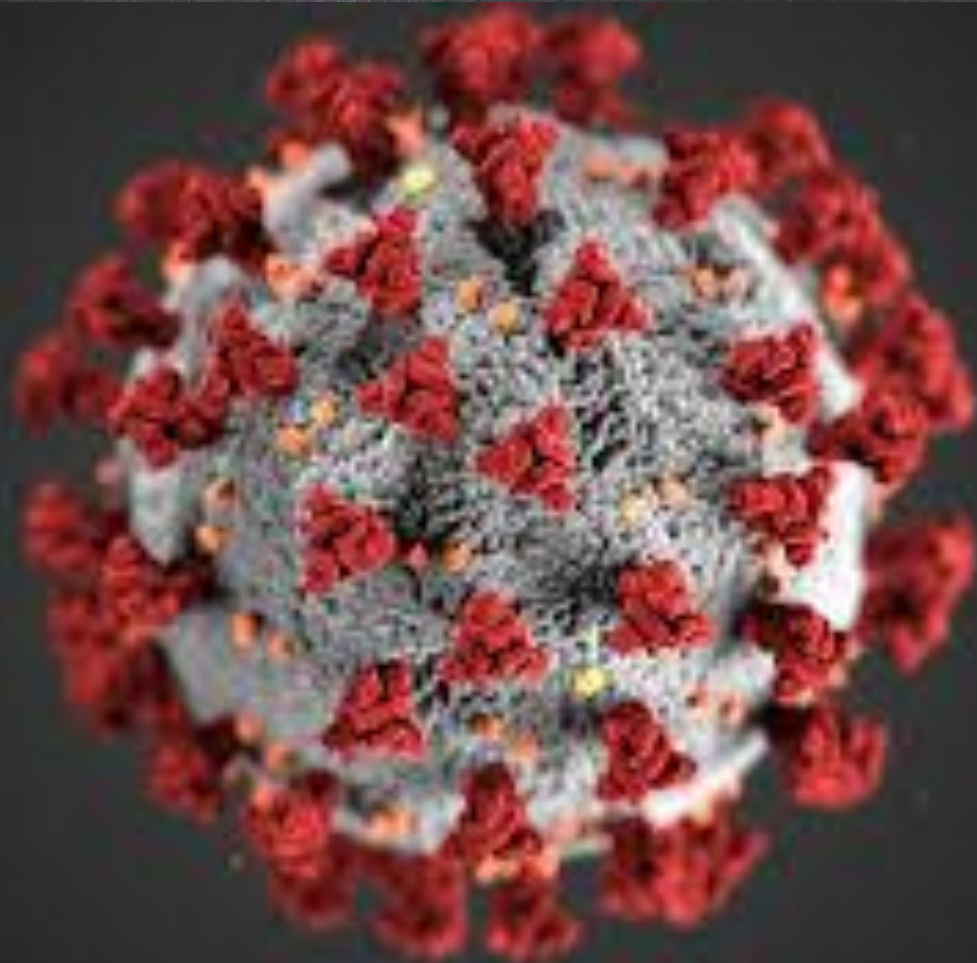
MATHCOUNTS



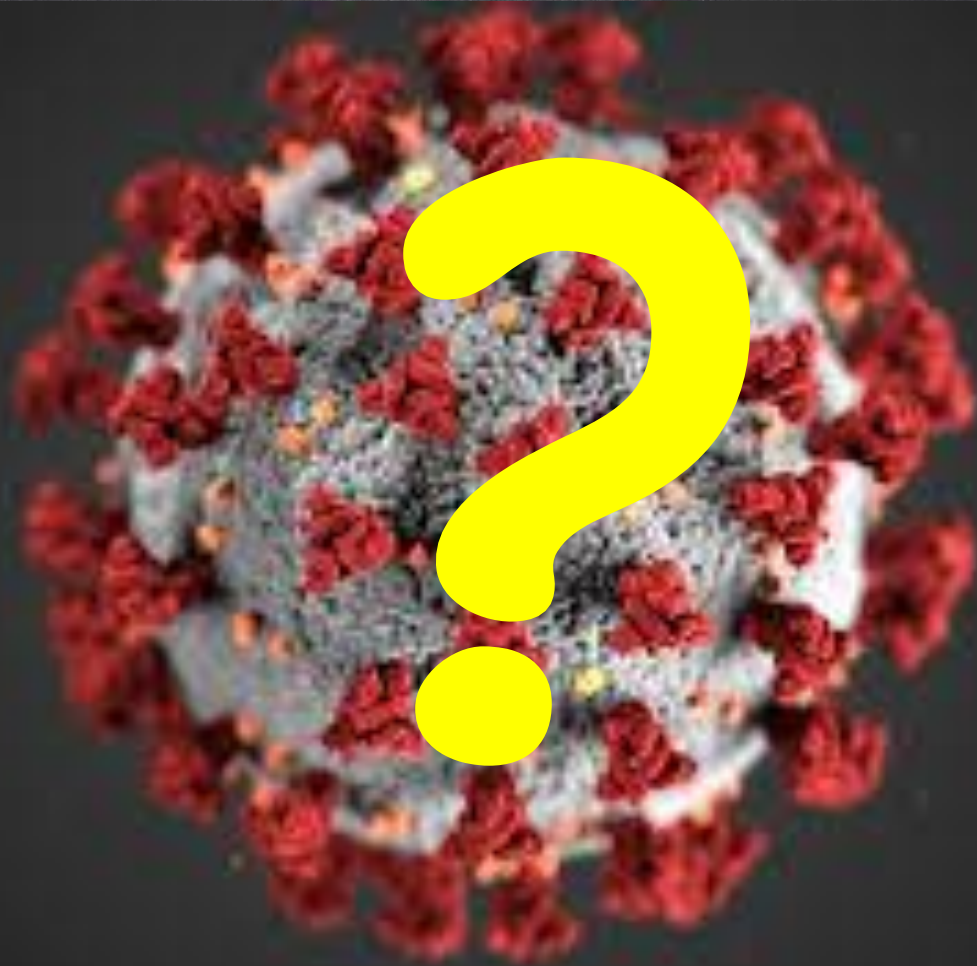
The UCI Department of Mathematics
(and earlier, the School of I&CS) has hosted
MathCounts Competitions since 1992.

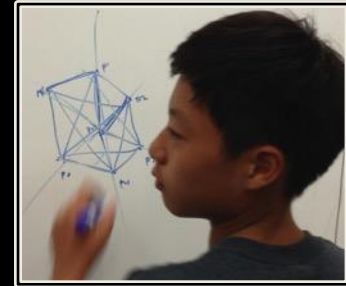
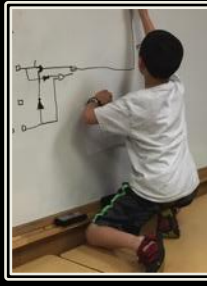
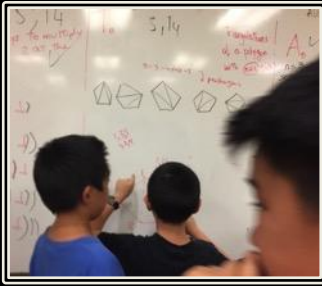
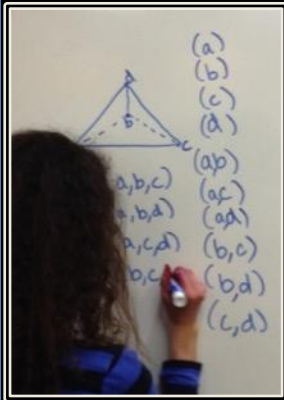
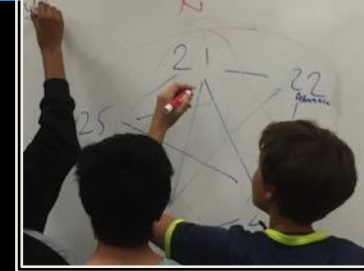
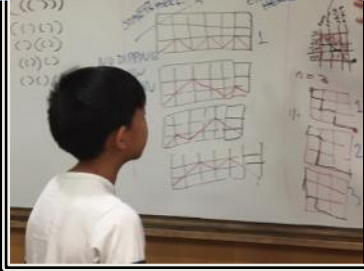
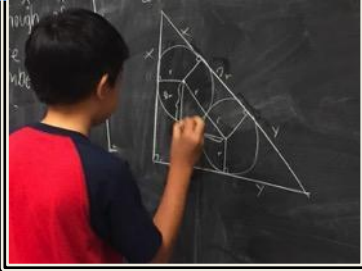




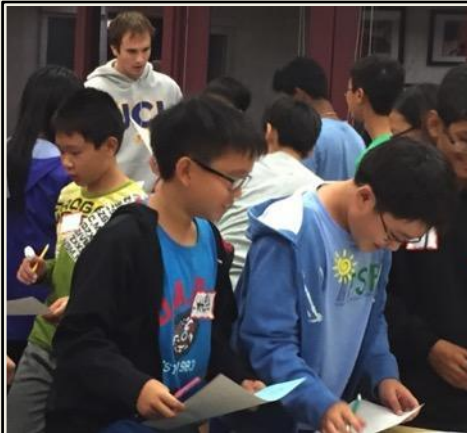
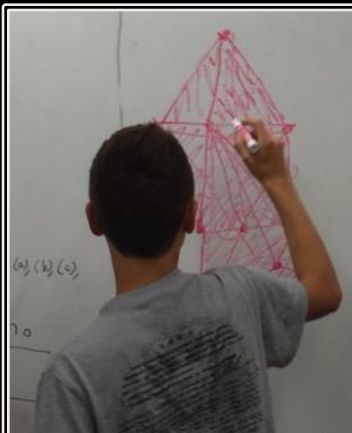
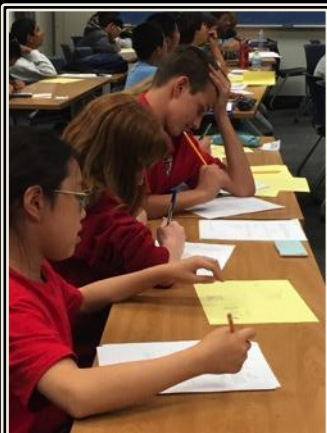
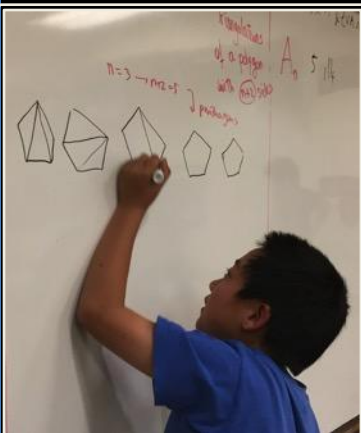
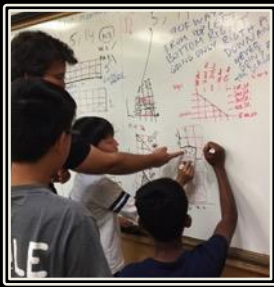
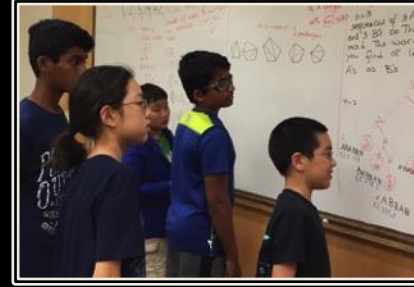
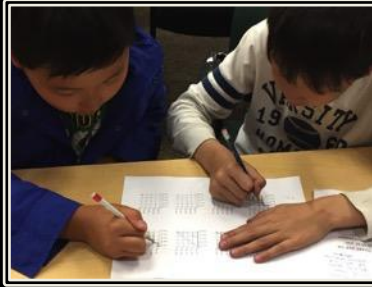
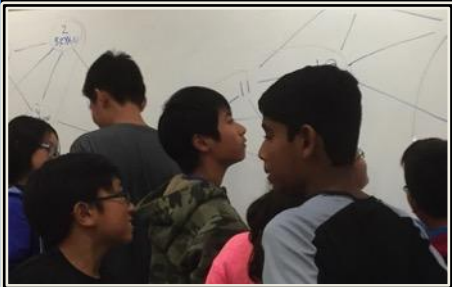


MATHCOUNTS

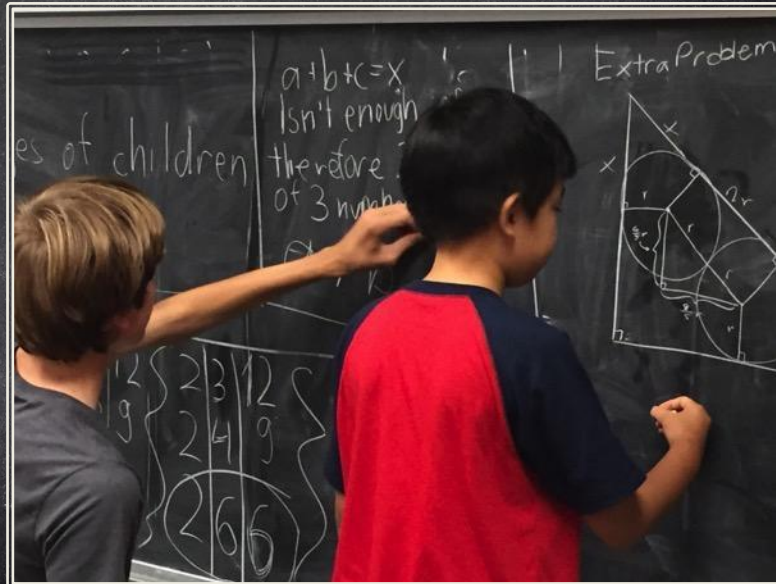
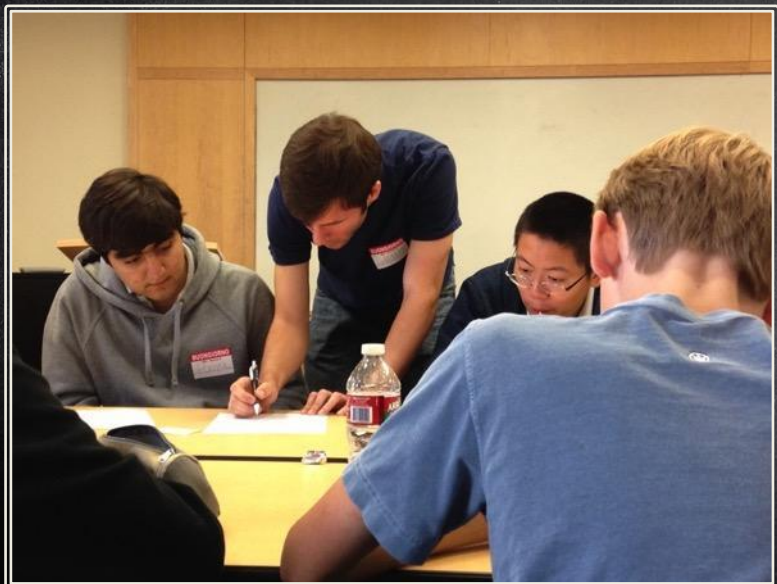
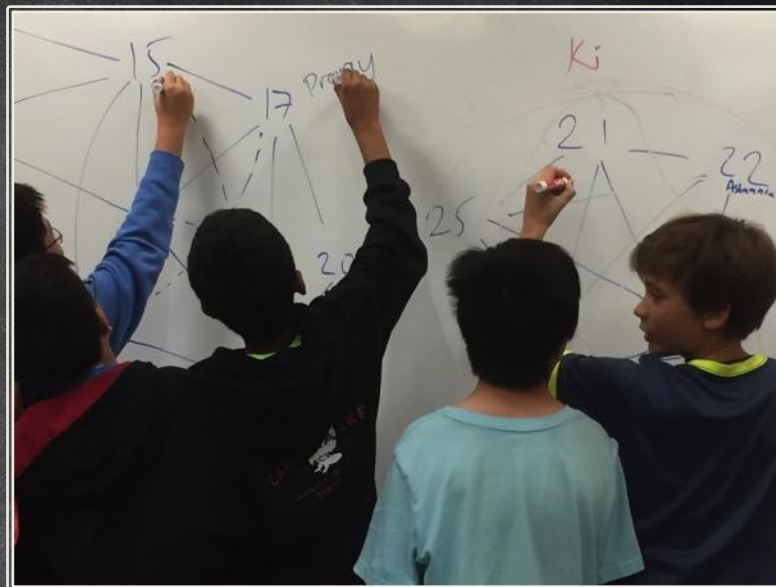
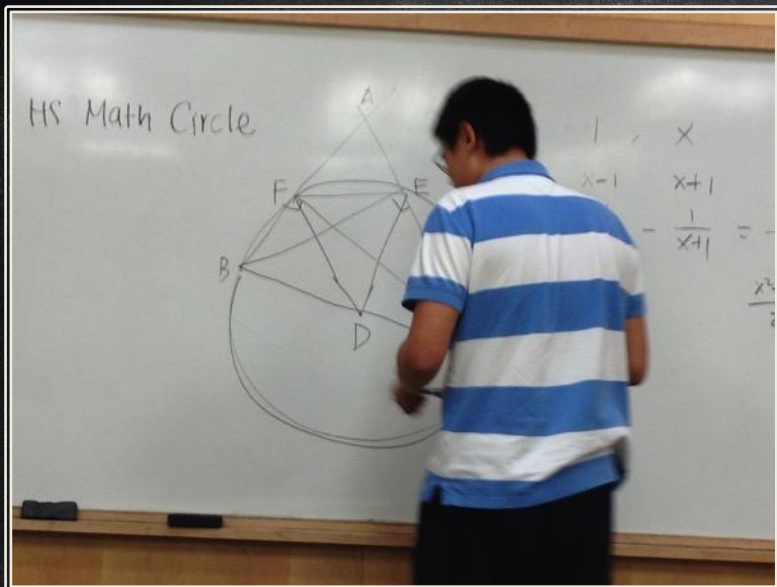




The UCI Math Circle



To provide enrichment to mathematically talented students

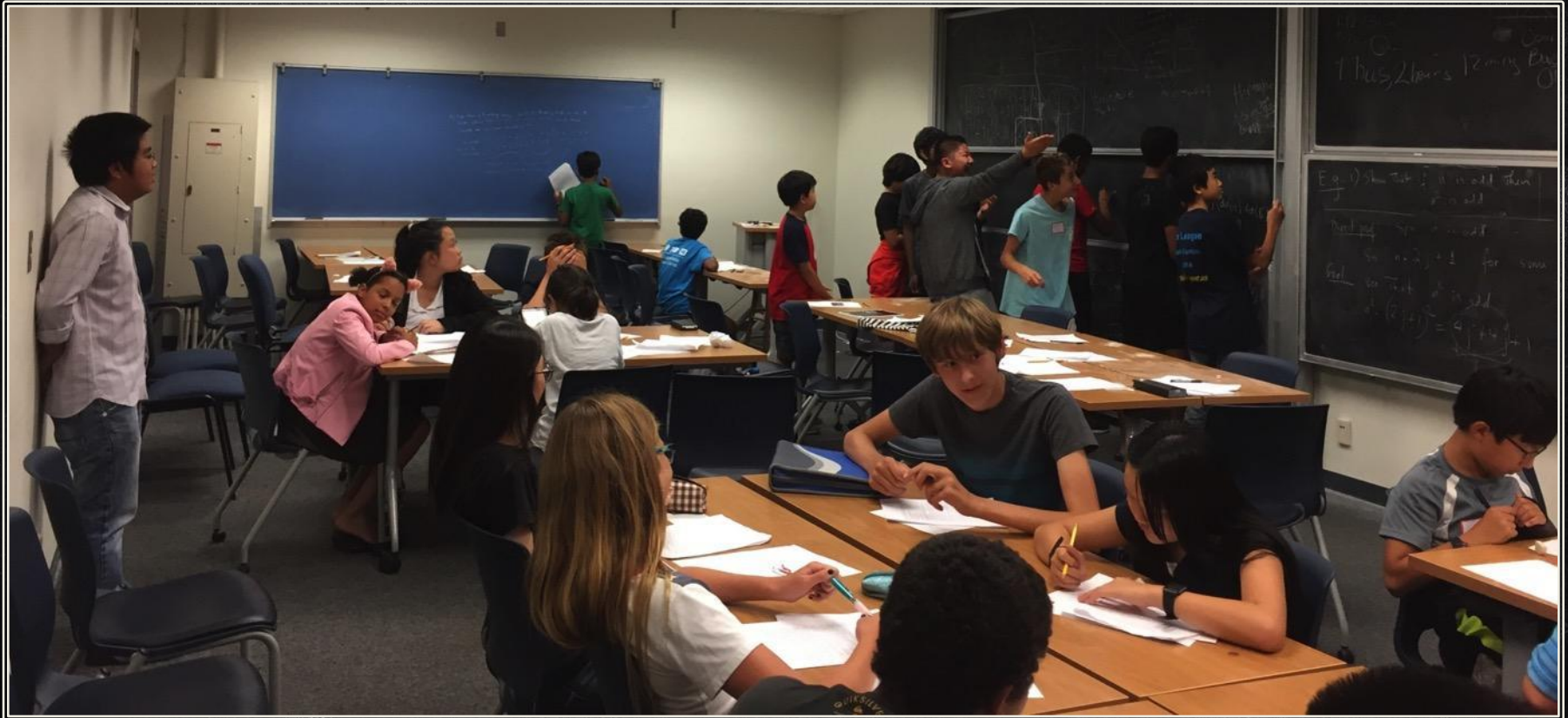


and promote the **joy of mathematics**



Offers an open environment...

- Math faculty or graduate students lead the investigations
- **Students explore interesting mathematics in groups**



UCI Math Circle: Polynomials

UCI Math



Problem 1

Find the

Problem

a) Show same poi

b) beat to the same

Problem

Draw the



Problem 1

Polynomial $ax^2 + bx + c$ has no roots, and $a + b + c > 0$. What is the sign of a ?

Problem 2

For which natural a and b the roots of the equation $x^2 - abx + a + b = 0$ are integers?

Problem 3

Consider all lines that meet the graph of $y = 2x^3 + 7x^2 + 3x - 5$ in four distinct points. $(x_1, y_1), (x_2, y_2), (x_3, y_3), (x_4, y_4)$. Show that

$$\frac{x_1 + x_2 + x_3 + x_4}{4}$$

UCI



Problem 1

For which values of a

$$x^2 - ax + 1 = 0 \quad \text{and} \quad x^2 - x + a = 0$$

have a common root? The same question for equations

$$x^2 + ax + 1 = 0 \quad \text{and} \quad x^2 + x + a = 0$$

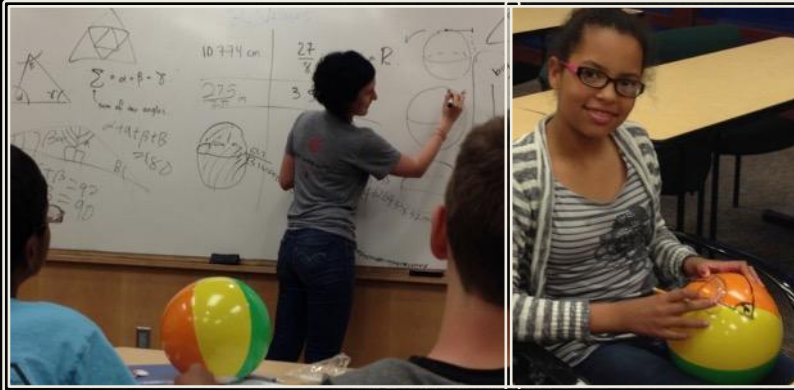
Problem 2

Draw the set of points (x, y) on the coordinate plane such that $(|x| - 1)^2 + (|y| - 2)^2 = 16$

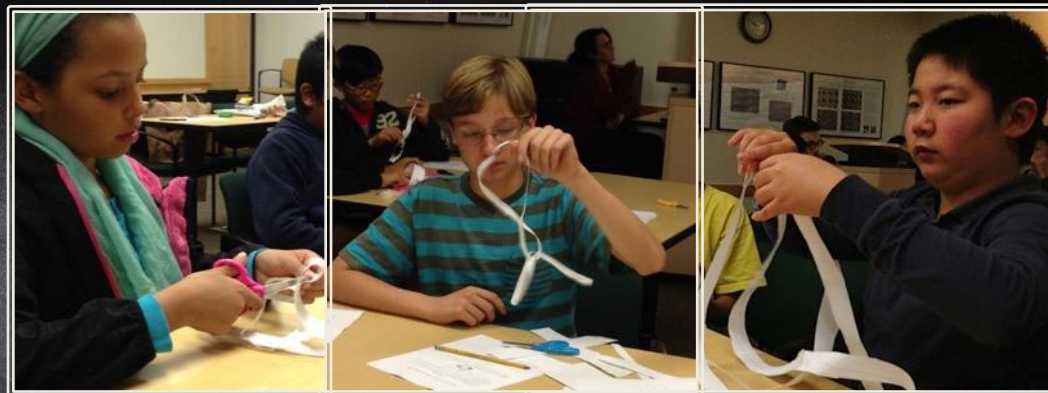
Problem 3

The polynomial $x^2 + px + q$ has roots x_1 and x_2 . Find a polynomial that has

LEVEL 2

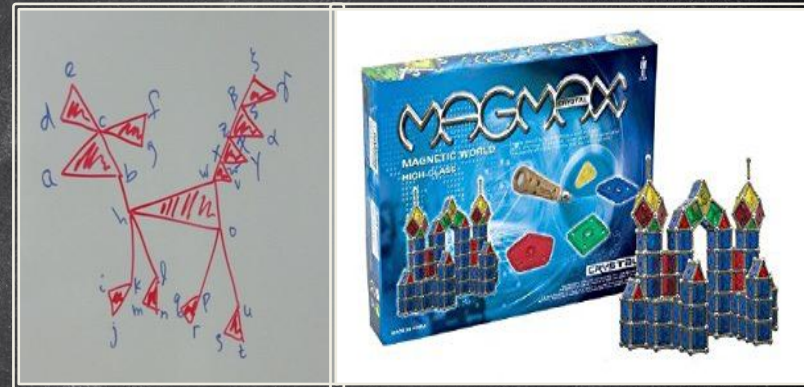


SPHERICAL GEOMETRY ON BEACH BALLS

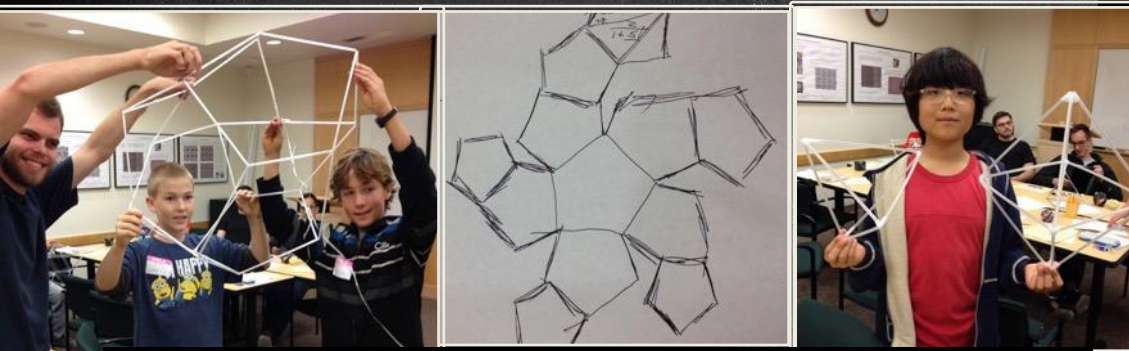


PAPER MOEBIUS BANDS

ORIGAMI

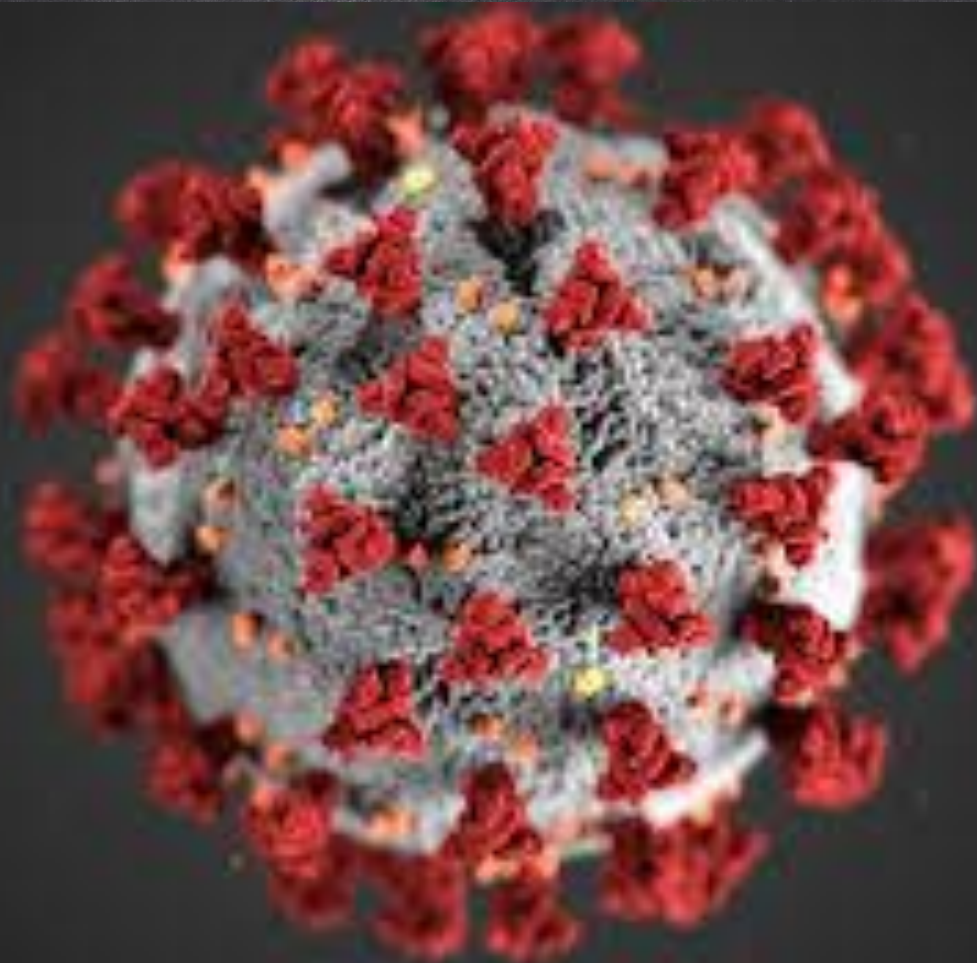


SIMPLICIAL COMPLEXES WITH MAGNETIC BLOCKS



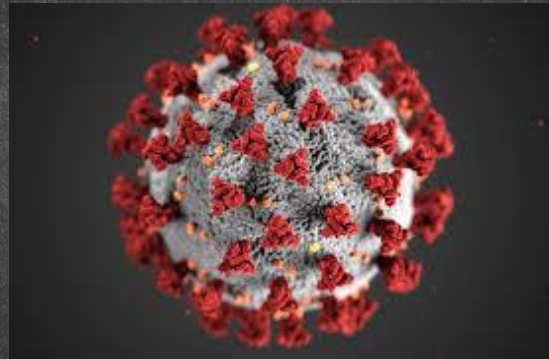
POLIHEDRA WITH STRAWS

LEVEL 1



UCI MATH CIRCLE

Each quarter
From
Fall 2012
+
To
Winter 2020



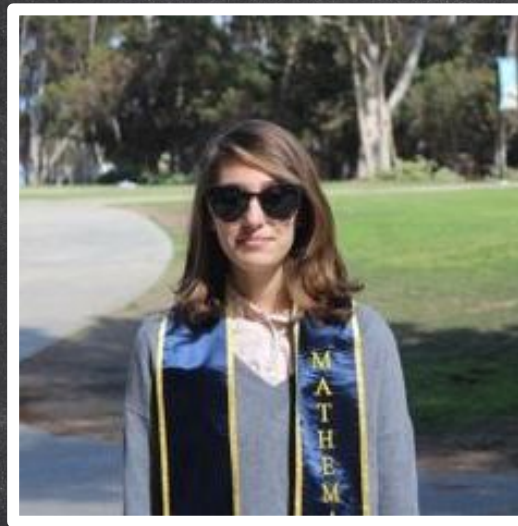
=
No
Math Circle
In
Spring
2020

UCI MATH CIRCLE

Fall 2020



+



=

Online
Math Circle

UCI MATH CIRCLE

Welcome to Math Circle!

Before we start today's activity, think about how you could solve the following problem...

Six positive integers are picked between 1 and 2020 at random. What is the probability that some pair of these integers has a difference that is a multiple of 5?

Did you know? The Pigeonhole Principle can be used to solve all kinds of interesting problems, and it often appears in solutions to competition math problems. One famous application argues that there must be two people in London who have the same number of hairs on their heads.

UCI MATH CIRCLE

Last Week's Challenge Question

Pool Testing Challenge Question:

Suppose that a pool test that is positive for an infected person is only 90% accurate, and a pool test that is negative for a non-infected person is only 80% accurate. How would this change your strategy when considering the scenarios in the activity? How about if the number of infected people is unknown? How would you adjust your strategy?

Julia Robinson Math Festival



Julia Robinson
Mathematics Festival

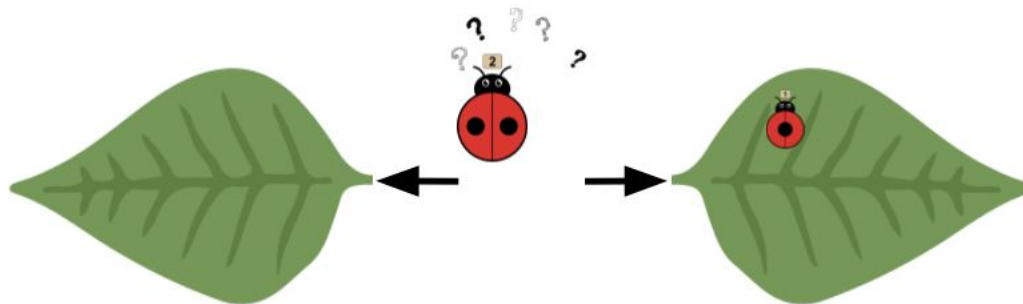
Sum Free Ladybugs

Setup:

The game starts with two empty leaves, a **Left Leaf** and a **Right Leaf**, and ladybugs each with a different number of dots on their back wings.

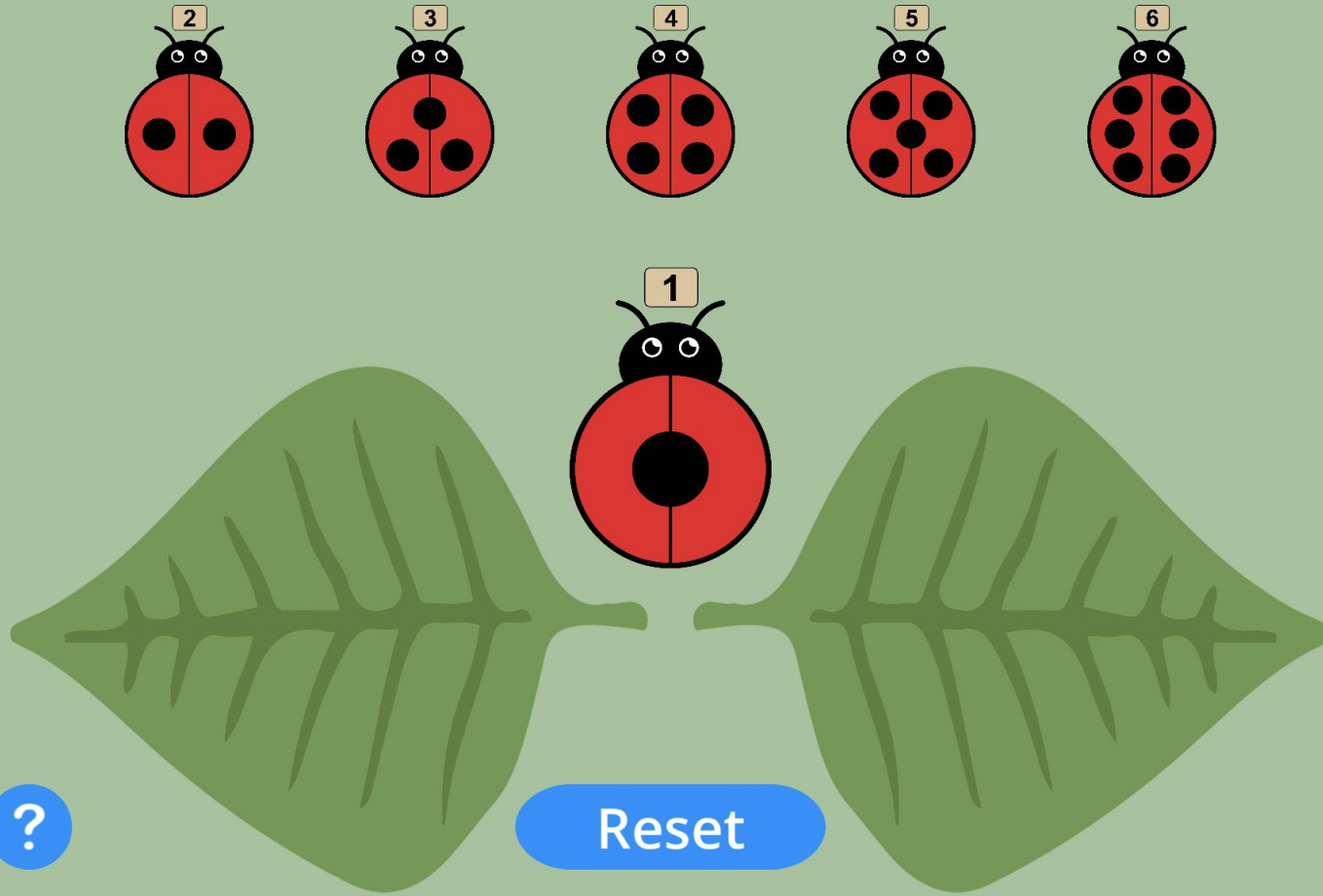
Rules:

1. The First Player starts the game by placing **Ladybug One** on one of the two leaves. The Second Player places **Ladybug Two** on one of the two leaves. The game continues by placing **Ladybug Three**, **Ladybug Four**, and so on, in order.



2. If the number of dots on **two** of the ladybugs' backs **add** up to the number of dots on a third ladybug's back on the same leaf, then the current player loses and all of the ladybugs fly away!
3. The winner is the player that places the last ladybug.

Digital App

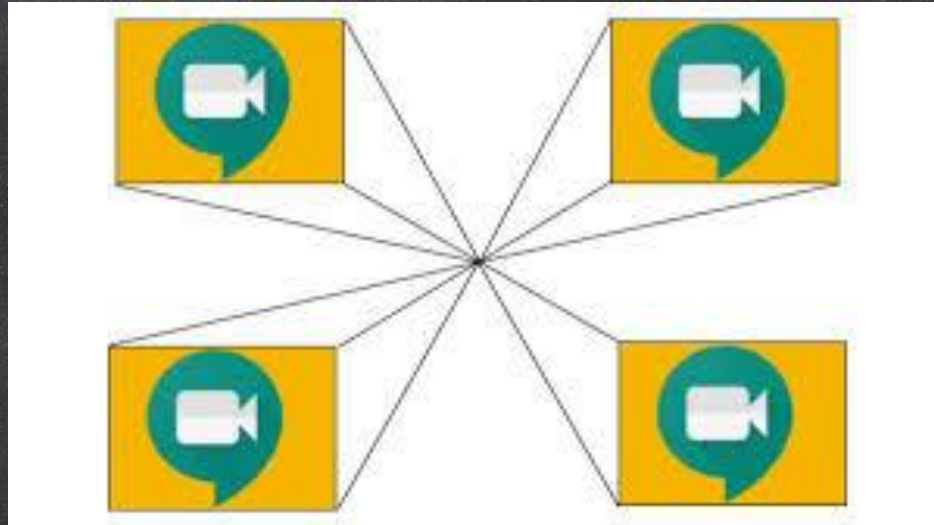


Breakout rooms

~ 50 students
(grade 4- 13)

Volunteer List:

- Yasmeeen Baki
- Nick Treuer
- Dong Yan
- Jennifer Pi
- Lili Yan
- Deborah Patricia Tonne
- Irene Gao (UG)
- Zhiqin Lu (Prof)

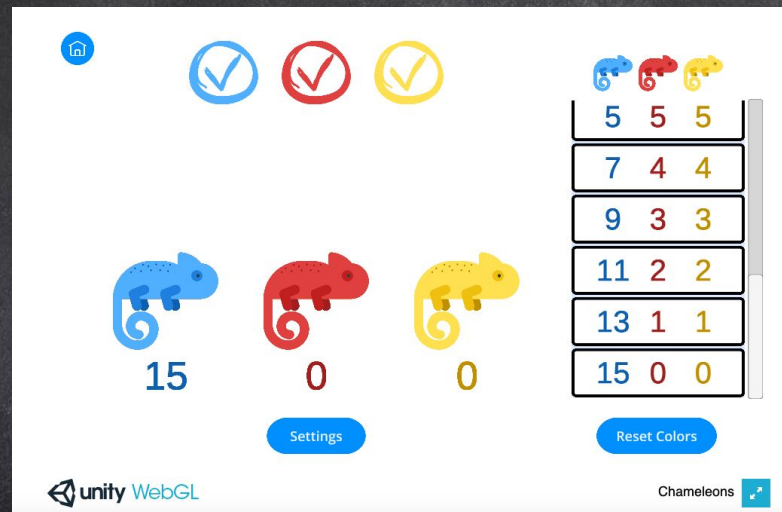


We need more volunteers!!

VOLUNTEERING FOR THE MATH CIRCLE

**MEETING
WITH STUDENTS**
Monday 6:30-7:30

TRAINING
Friday 10-11am



Weekly training for mentors

The image displays three overlapping screenshots from a Zoom meeting, illustrating a training session for mentors. The primary focus is a game interface titled "Wolves and Sheep" running on a WebGL canvas. The game board is a grid where red squares represent sheep and white squares represent wolves. The interface includes controls for the number of sheep, rows, columns, and wolves, along with a "Reset" button and a "Show All Attacked Squares" checkbox.

Handwritten mathematical formulas in pink ink are overlaid on the game interface in the middle and bottom screenshots. These formulas include:

- $n^2 - 2(n-1) - n$
- $2 \sum_{k=1}^{n-2} k$
- $(n-2)(n-1)$
- $n^2 - (n-1) - (n-1)$

The Zoom meeting interface is visible in the background of each screenshot, showing a grid of participants including John Treuer, Yasmeen Baki, Zhiqin Lu, Irene Gao, and Jennifer Pi. The bottom screenshot also shows the Zoom control bar with options like "Participants", "Chat", "Share Screen", "Record", and "Reactions".

UCI Math CEO (2014)

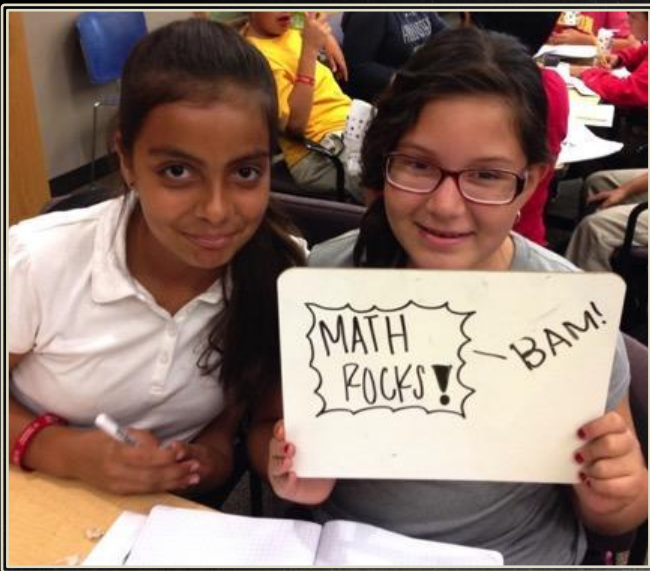
Community Educational Outreach



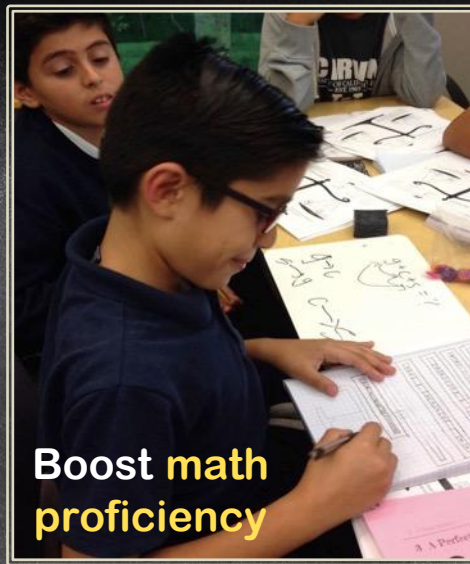
To provide **authentic mathematical experiences**
to underserved youth in our community

BROADENING THE REACH

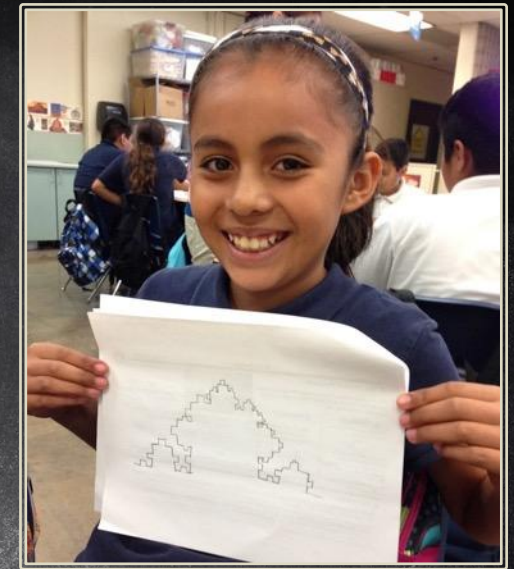




Inspire **love for learning** (math)



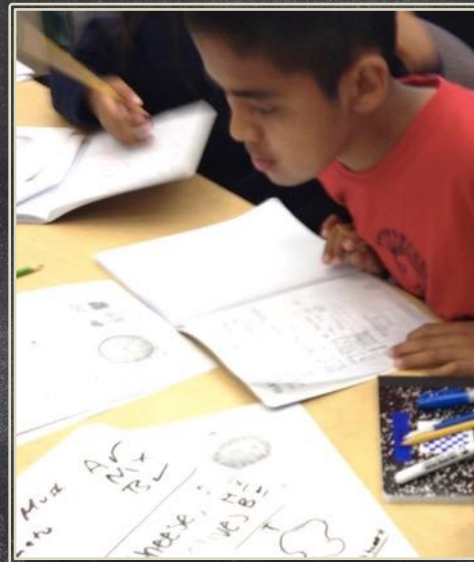
Boost **math proficiency**



Communicate the **beauty of mathematics**



Train students to **persevere on hard tasks**



Promote **critical thinking**



Inspire students to **reach for more** (pursue college and **STEM careers**)

FIELD TRIPS TO UCI



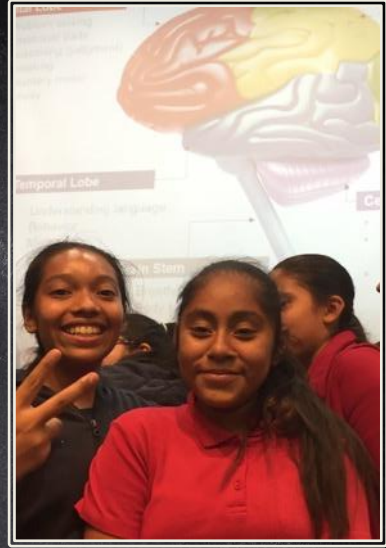
For the kids, the fieldtrip is the true highlight of the program



Climate Change



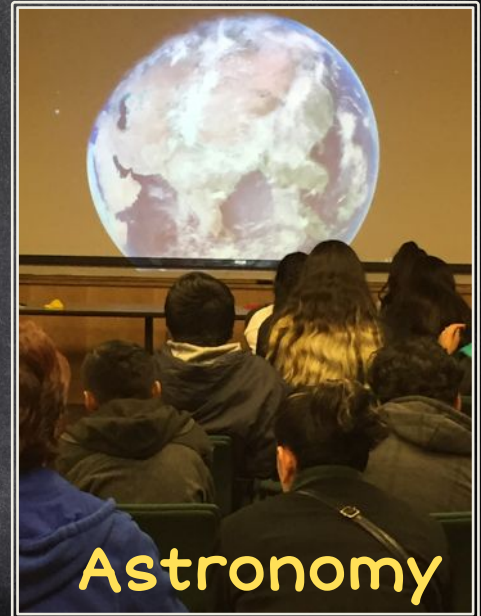
Chemistry Lab



The Brain



Physiology Lab



Astronomy



Lunch with Mentors



Campus tour

How much does college cost?



College panel



What kind of classes

do you take if

your undecided?

Bilingual college workshops for parents

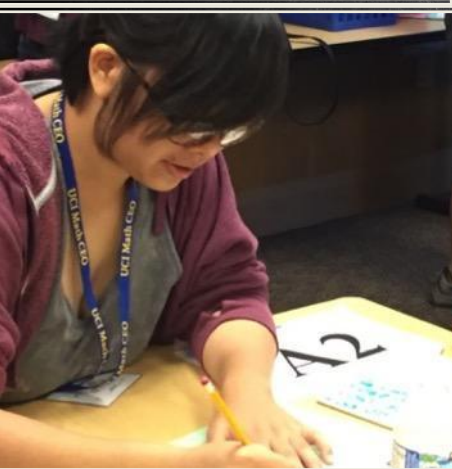
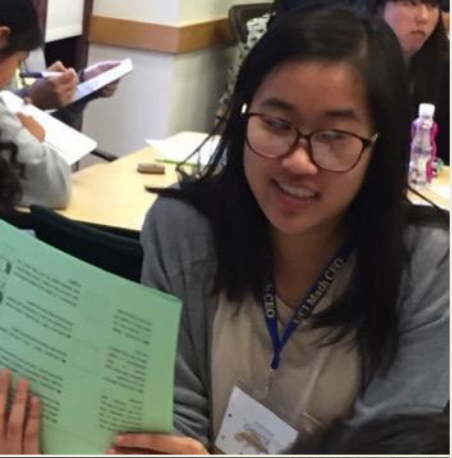


"It resonated with me that their parents are from Mexico and they still continued with their studies."



Weekly Math Circles

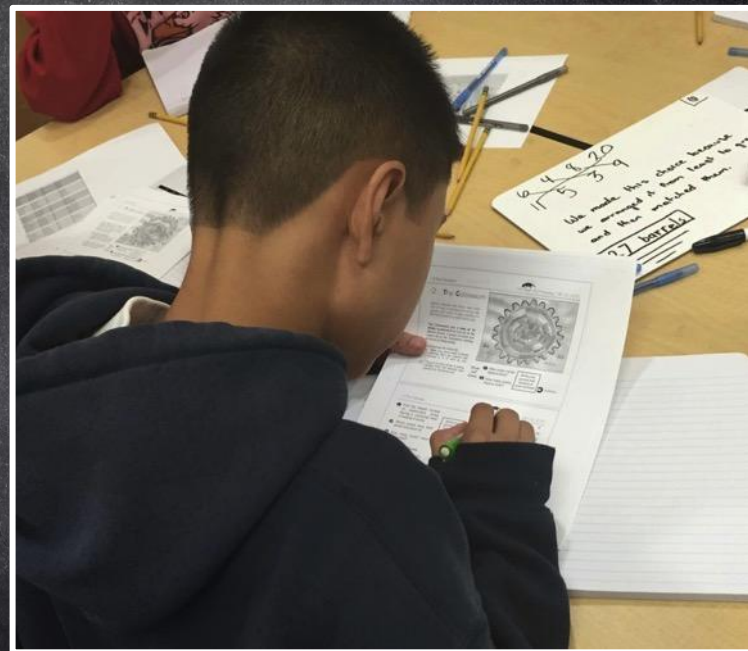
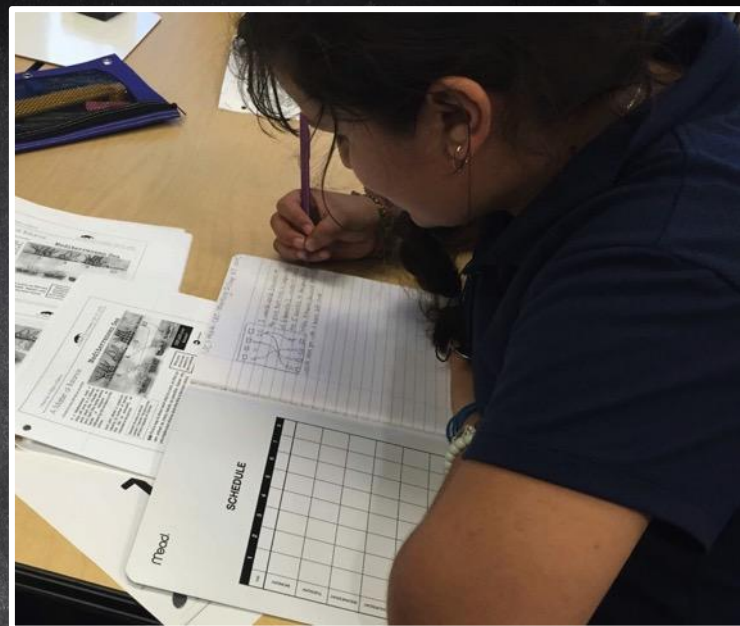
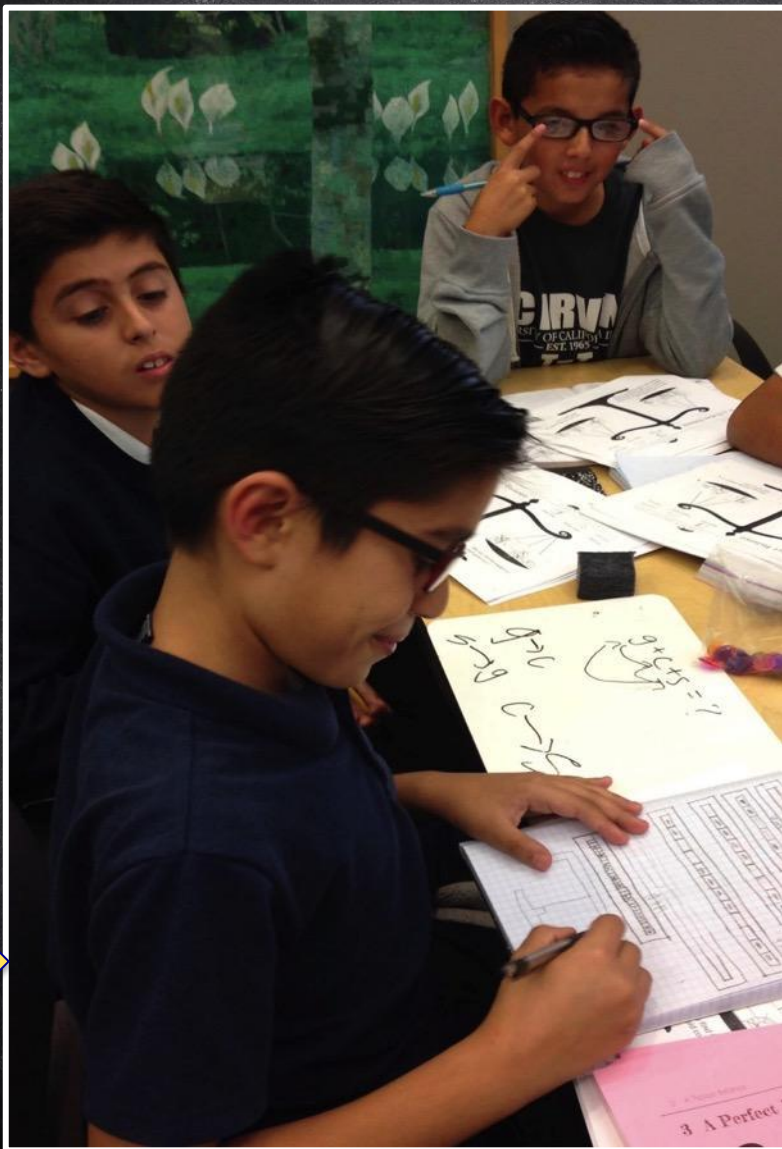
Every week, middle school and high school students meet with our team of UCI (graduate and undergraduate) mentors to work on fun and interesting mathematics problems

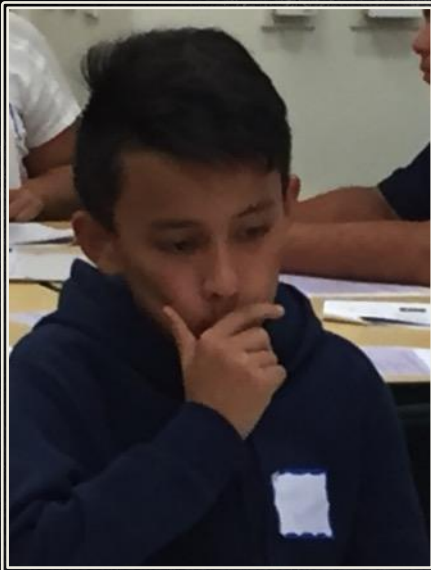


Amazing Mentors

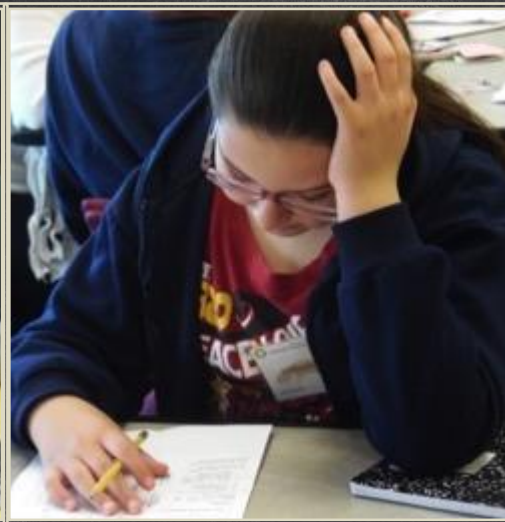


During the math circles, students work hard



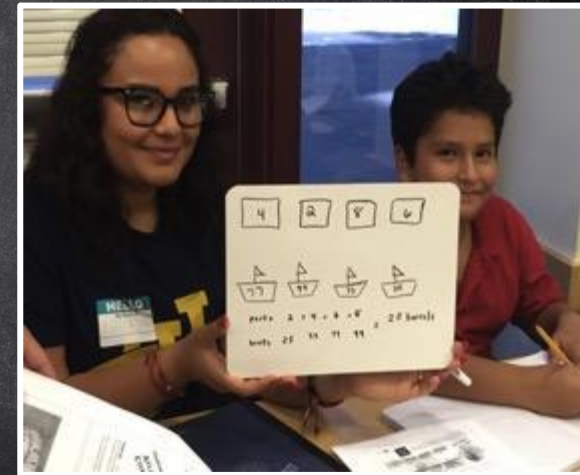


The math can be challenging....

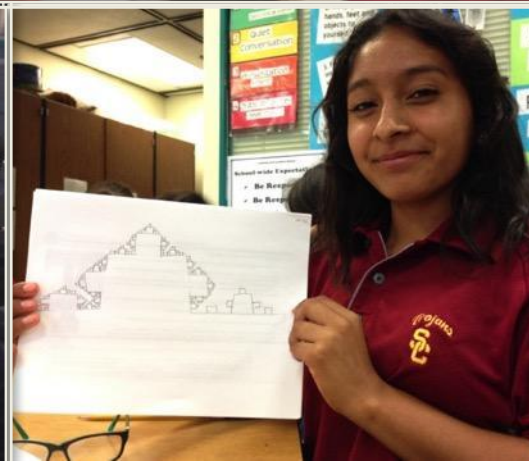
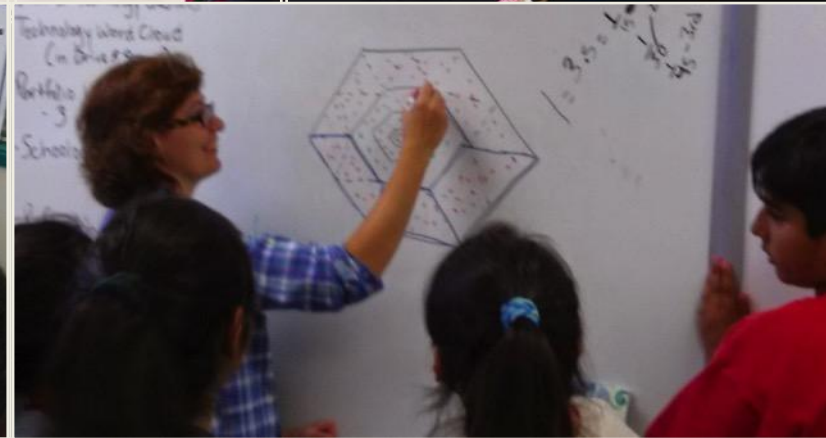
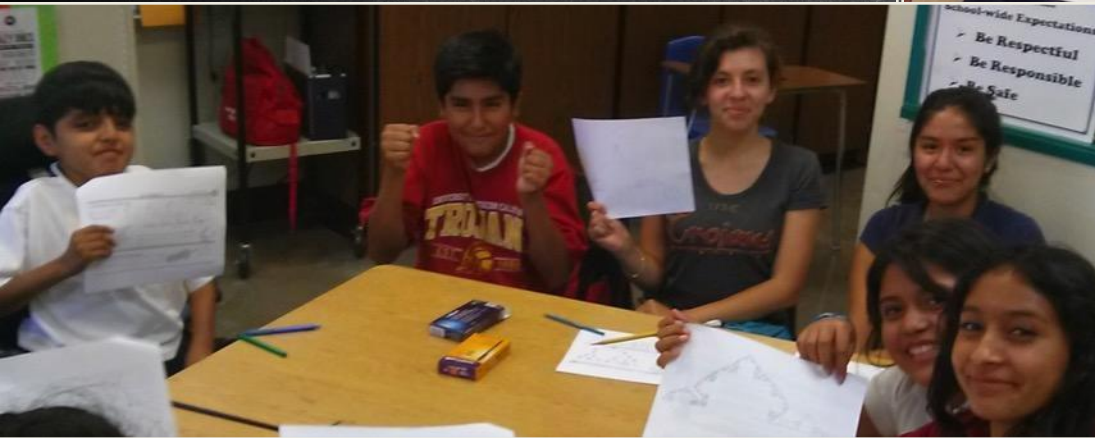
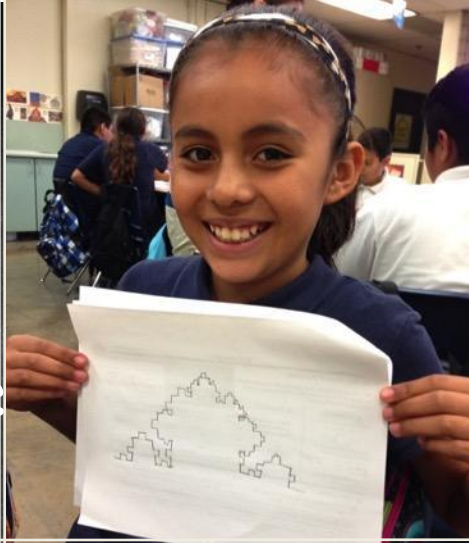




...but there's always someone to help

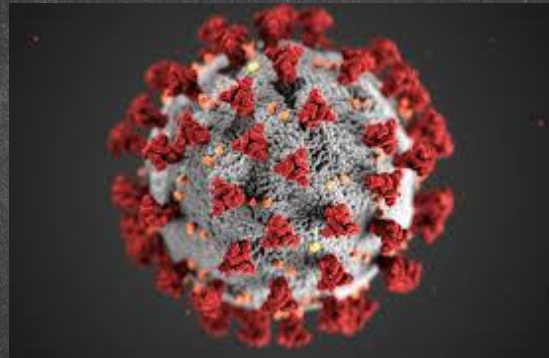


PILOT PROGRAM
2014
MATH CIRCLE
@ Lathrop Intermediate



UCI MATH CEO

In Fall and
winter 2020
we worked with
~350 students
(5 MS + 1 HS)
+ 120 UCI mentors



=>

Online
Math CEO
In
Spring 2020
(MS only)

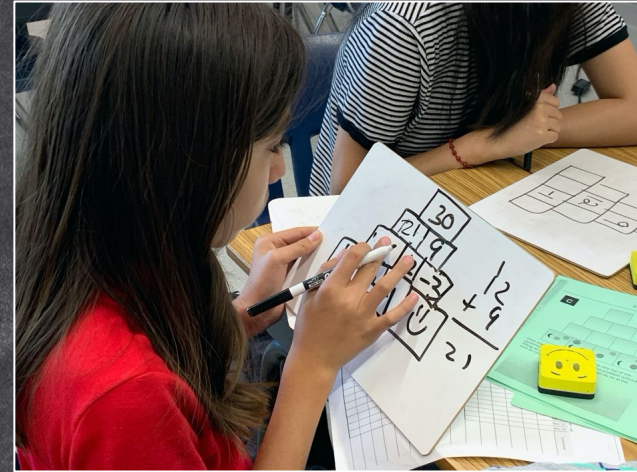


What's next?

UCI MATH CEO: FALL 2020

MS PROGRAM

- 4 schools
- Meetings: T 3:30-5pm
or: TH 3:30-5pm
- Training: M 3:00-4:00
or M 4:00-5:00



HS PROGRAM

- 2 schools
- Meetings: TH 3:30-5pm
- Training: T 3:30-5

We can use more help!!

UCI MATH CEO: HS PROGRAM

Become a mentor for high school students through mathematics!

Math CEO is a free after-school outreach program jointly organized by CSUF and UCI students and faculty to serve the community and help navigate high school students to college.



CSUF-UCI Math CEO

After-School Math
Enrichment

Contact
Dr. Shoo Seto, Math Department CSUF
shoseto@fullerton.edu

Dr. Li-Sheng Tseng UCI Math Department
ltseng@math.uci.edu

Logistics

1. Weekly meetings via Zoom.
2. Help students work through weekly math topics.
3. Socialize with and mentor high school students.

Benefits

- Network with students and faculty from CSUF and UCI.
- Fieldwork and teaching experience.
- Online Mentoring Training

**Need help
developing
curriculum:**

*math in context of
real-world
applications*

"Math in Action"

MORE IDEAS

For outreach the community or to UGs?



To find out more...

<https://sites.ps.uci.edu/mathceo/>

- MS: Alessandra Pantano
- HS: Li-Sheng Tseng

<https://www.math.uci.edu/~mathcircle/>

- Alessandra Pantano
- Yasmeen Baki
- Nick Treuer