MOVES 2025

Tuesday Schedule (Aug 12)

	Room 101		Room 102		Auditorium 109	
	Talk	**Abstract**	**Talk**	**Abstract**	**Talk**	**Abstract**
10:10 - 10:30 am	**Innovating the Abacus: Expanding Math Accessibility with 3D Printing** *Samuel Foulkes*	*This presentation highlights how universal design and 3D printing can promote math literacy. We demonstrate the power of a multi-modal children's book titled Juniper and the Red Swoosh, featuring an innovative 3D-printed abacus called the 3D-Click™, that makes math accessible to children by combining math, storytelling, and tactile learning.*			**Re-Scrambling Connections Puzzles Optimally** *Jim Propp*	*Can rescrambling the clues in a Connections puzzle help us solve it more quickly? Can we design rescramblings of the sixteen clues that will make each pair of clues appear next to each other exactly once? Ideas from combinatorics, number theory, and abstract algebra can help answer such questions.*
10:35 - 10:55 am	**Archimedes's Stomach: a Puzzle You'll Love to Digest** *Yossi Elran*	*In this talk, we will explore Archimedes's Ostomachion puzzle, its historical context, its relationship to tangrams and similar dissection puzzles and its mathematical properties. We'll also review some modern mathematical analyses of the puzzle and present some new puzzles and challenges.*			**Daily Day-Weekday Puzzle** *Sy Chen*	*Inspired by the popular A-Puzzle-A-Day puzzle, these new puzzle pieces use combined tetromino and tromino sets. The main placing board is a 6 x 7 grid board showing weekdays and days without months. The main goal is solving the puzzle daily to show the correct weekday space and the correct day space.*
11:00 - 11:20 am	**Bounds on the Mosaic Number of Legendrian Knots** *Wing Hong Tony Wong*	*Legendrian knots are knots that respect the standard contact structure in a three- dimensional space. We decompose Legendrian knots into a collection of essential components and represent them in a set of tiles. We then investigate the minimum number of tiles needed to construct various knots.*			**The Math Behind Puzzles and Games** *Rik Sengupta*	*I'll talk about some puzzles and games, and relatively lesser known variants of them, that tend to interest mathematicians.*

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1:45 - 2:05 pm	**64=65: A Geometric Vanish Paradox Puzzle Studied by Lewis Carroll** *Stuart Moskowitz*	*Tucked behind his lecture notes for a course on Geometry, Lewis Carroll scribbled several pages of notes explaining how a square cut into four pieces can be rearranged into a non-square rectangle with an area greater than the square. We analyze his notes, and we explore the puzzle's history.*	**The Double Dodecahedron Dissection** *Jeannine Mosely*	*We present a puzzle consisting of a ring of edge connected, alternating tetra- and penta- hedra, that can be folded up to make either a regular pentagonal dodecahedron, or a rhombic dodecahedron! While the pentagonal dodecahedron is solid, the rhombic dodecahedron has an interior void in the shape of a concave dodecahedron.*	**SET: the Last Six Cards** *Gary Gordon*	*When playing the card game SET, the smallest (non-zero) number of cards that can remain is six, and when this happens, those six cards have some very special properties. We explore several of these, including how often they form a triple interest.*
2:10 - 2:30 pm	**One Equals Zero and Other Mathematical Surprises** *Nitsa Movshovitz-Hadar*	*When we face two contradictory assertions, both of which proved plausibly, we know that at least one proof must be erroneous and we feel curious and eager to resolve the conflicting results. I'll challenge the participants with amazing examples from the book "One Equals Zero and Other Mathematical Surprises."*	**Playing Ball in Number Fields** *Hester Graves*	*A ball is all points a fixed distance, or radius, from its center. We are comfortable with real 2-D and 3-D balls: circles and spheres. What about other spaces, like number fields? How do measure distance? What do 'balls' look like? Are they even round?*	**On Some Relatives of the Card Game Set** *Jonathan Lenchner*	*The classic game of Set can be viewed as a game played over a finite 4-dimensional vector space. We develop three card games similar to Set, inspired by their connections to linear algebra, each with unique flavors. We consider their mathematical properties and describe various open problems.*
2:55 - 3:15 pm	**Mathematics of Gozinta Boxes** *Tanya Khovanova*	*A magician presents a black box and then reveals a red box inside. Then, the magician places the black box inside the red one. Recently, Ivo David Oliveira introduced triple Gozinta boxes. I will present mathematical structures behind these boxes, which my students studied in my PRIMES STEP program.*	**Cube Compound Puzzles** *George Bell*	*A compound of n cubes is a polyhedron formed from the union of n identical concentric cubes. These polyhedra are dissected into interlocking pieces, making assembly puzzles. We discuss the design of such puzzles.*	**Quad Shapes and Quad Packing** *Lauren Rose*	*Quads is a SET-like game where the goal is to find sets of 4 cards that satisfy a pattern. We will describe how to classify and count quads using geometric shapes and use this to determine how many quads can be packed into a layout of k cards.*
3:20 - 3:40 pm	**Crochet, Projective Planes, and Mutually Orthogonal Latin Squares** *Liz McMahon*	*There is a projective plane of order n if and only if there is a full set of n-1 mutually orthogonal nxn Latin squares. Fortunately, there's a way to make a crochet quilt that vividly illustrates both of these concepts as well as their connection.*	**Stacking Shapes for Super Scores** *John Harris*	*The object of the board game "NMBR9" is quite simple: arrange special number-shaped tiles in a stack so that your score is as high as possible. In this talk, we will investigate just how high that score could be. We will also consider some fun variations of the game.*	**What's the Best Seat in the Game Left, Center, Right?** *David Richeson*	*Left, Center, Right is a popular dice game. We analyzed it using Markov chains and Monte Carlo methods. We computed the expected game length for two to eight players and determined each player's probability of winning. We will discuss the surprising conclusions about which players have the highest and lowest chance of winning and propose a slight rule change that makes the game fairer.*

Room 1302	
Talk / Presentation	**Abstract**
Playing with Polygons and Searching for Similarity in Electronic String Art Images *Steve Erfle*	*PwP is a free resource that extends traditional string art and allows instantaneous exploration of hypotheses by manipulating 4 parameters using scroll arrows. Even young users can create and watch images change as parameters change. Due to its strong visual appeal, even those with limited math backgrounds can enjoy PwP.*
Paper Airplanes: Collecting Data to Find the Best Model *Laura Kyser Callis*	*How do you build a math forest with variables? 3-Body can help.*
Gerrymandering Puzzle Challenge *Madhukara Kekulandara*	*This interactive puzzle simulates political redistricting through strategy-based challenges across three difficulty levels. Players draw district boundaries to ensure their party wins an election, gaining hands-on insight into gerrymandering practices. Blending logic, math, and civic education, the challenge fosters critical thinking in a fun, competitive environment for all.*

13th Floor Lounge
Family Activity
The Mathematics of String Art (*Ena Bahk-Pi*) *In this hands-on activity, participants will explore the connection between string art and mathematics by creating their own string art design to take home. In doing so, this process will uncover mathematical patterns and structures, revealing connections to geometry, symmetry, and combinatorics.* **Minimal Surface Bubbles** (*Samantha Pezzimenti*) *Bubbles (yes, bubbles) are amazing mathematical objects. Imagine the craziest bubble wand you can think of. What will the bubble look like? It turns out that the bubble formed will always minimize the surface area inside the shape – an object called a "minimal surface." In this activity, we will explore minimal surfaces on various objects, build our own, and use this concept to solve interesting puzzles!* **Building Lego Graphs** (*Jonathan Needleman*) *In this activity you will be challenged to build a variety of graphs out of Lego bricks. This fun and accessible for all ages.* **Möbigrams: Wordplay with a Half-Twist** (*Bill Gerdts*) *What happens when you trace the surface of a Möbius strip with language? In this activity, participants creatively fill in blanks on sentence fragments, one on each side of a paper strip. A half-twist joins these two fragments into one looping thought, offering a playful entry point into topological thinking.*
One-Cut Wonders (*Heather Clayson*) *What shapes can you make by folding a sheet of paper and then making a single, straight cut? A square? Triangle? Or something more complicated, like a five-pointed star, or a polygon with a different polygon-shaped hole in it? Join us to find out, and create your own one-cut wonders!* **From Squares to Wings: Exploring Math with Origami & Kirigami Butterflies** (*Silvia Aldana*) *Discover the math in butterfly wings! Fold origami Monarchs learning about squares, triangles, and migration data. Create symmetrical kirigami butterflies, exploring geometry and mechanical stress. Engage in symmetry puzzles with perforated paper, perfect for ages 7 and up.* **Choose-Your-Own-Adventure Origami Tessellation Design** (*Madonna Yoder*) *Origami tessellations are repeating patterns folded from a single sheet of paper, one twist at a time, from the center out. Audience members will make up to 10 binary choices as the folding progresses that determine what pattern is folded, resulting in hundreds of possible designs!* **Fold, Cut, and Tile: Discover the Magic of the Einstein Monotile!** (*Uttam Grandhi*) *Discover the magic of geometry with a hands-on fold-and-cut activity featuring the Einstein monotile! Audience will explore how a single straight cut through folded paper reveals this fascinating shape. Fun, educational, and surprising, this activity blends art and math, engaging participants of all ages in mathematical creativity and discovery.*