Games & Me

• I grew up playing games - home, car, playground
  • game nights & groups - playing & playtesting

• So so did my kids

• MSB - curriculum?

• More intentional - concentration/memory games for language, art, etc.

• ConcenFraction & PriMemory - additional strategy & interaction

I ❤️🎮
Games Class for Homeschoolers

Who Don’t Like Math

- No visible numbers - colors, shapes - logic, geometry
- SET, Qwirkle, Logicon, …

Game Design Camp

- Game Theory - Prisoner’s Dilemma, Probability, Graphs; Isomorphism
- Game Design - goals, obstacles, interactions, theme, objects, rules
- Play games, Design & Create games, Playtest each other’s
- Only camp extended - twice

Laugh-A-Rade
Chance for Chess
♠ ♦ Suit Yourself ♥ ♠ Battle Chips
Chip Attack
Roles of Games in Math Circles

- Sometimes the topic is the game play - Nim, Queen's Move
  - predicting the outcome, patterns of winning positions, strategies
- Sometimes it's about the underlying structure of the cards - SET, Spot it!
  - analyze, combinatorics
  - $\mathbb{Z}_3^4$, finite projective plane

From Magic to Games

New goal: start every math circle with a related game
Arrival Activity at Math Circle
Short 2-Person Game

Method

- Pair up as arrive
- If odd #, I play until next person arrives
- Sometimes have earlier pairs split up and explain to later arrivals
- Can choose to watch a pair instead – get role of keeping score, checking validity, …
- When appropriate, suggest playing cooperatively

Arrival Activity at Math Circle
Short 2-Person Game

Advantages

- Get involved as soon as walk in
- Start gaining insight into topic
- Late arrivals are fine
- Interaction almost required
- Shyer kids immediately have someone to talk to and not too many people
- Fun, exciting, …
Arrival Activity at Math Circle
Short 2-Person Game

Disadvantages

• Fostering competition
• Can be too engaging!

Gamifying Classic Math Circle Activities

Map Coloring

• each person has 1 or 2 colors
• both people have 2 or 3 or 4 or 5 colors
• winner is the last colorer
Gamifying Classic Math Circle Activities

Ramsey Theory

- connect 6/5 dots trying to make/avoid a triangle in your color
- high school: more dots, more colors, make monochromatic quadrilateral
- checking (ties on 6), collaborate to avoid (on 6)

Gamifying Classic Math Circle Activities

Calkin-Wilf tree

- each small card deck has fractions in first 4 rows
- go-fish or rummy style - goal is to get rid of cards
- put down binary subtrees of the form
- variation - can add to others’
Whenever there's an activity involving repeatedly placing or removing things until a condition is met, it can be turned into a 2-person game by alternating the moves with the winner being the one who made the last move.

This one is a JRMF activity inspired by Greisy Winick-Landman

**Prime Cubes Instructions**

**Objective**
- The winner is the last player to place a number on the cube while following the rules.

**Rules**
- Players take turns placing one of the numbers from 1-8 on the vertices of a cube.
- Players do not need to place numbers in numerical order, e.g., Player 1 can start with 3.
- A number cannot be used more than once.
- If an edge connects two numbers, their sum must be prime.

---

**Thank You**

Skona@SBFamilySchool.com