

Building a Noyce Community through Math Teachers' Circles



Dr. Angie Hodge-Zickerman, NAU

Dr. Cindy S. York, NIU

Dr. Kathy Jaqua, WCU

Who we are...



Angie



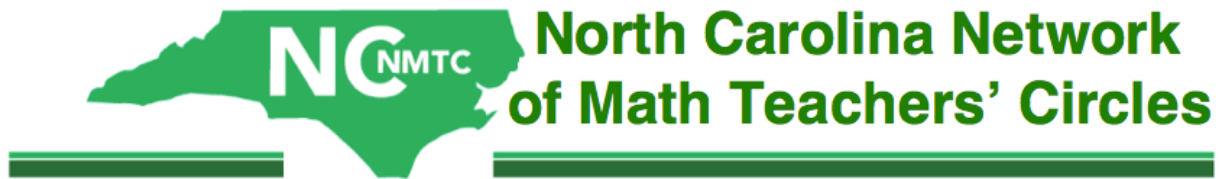
Cindy



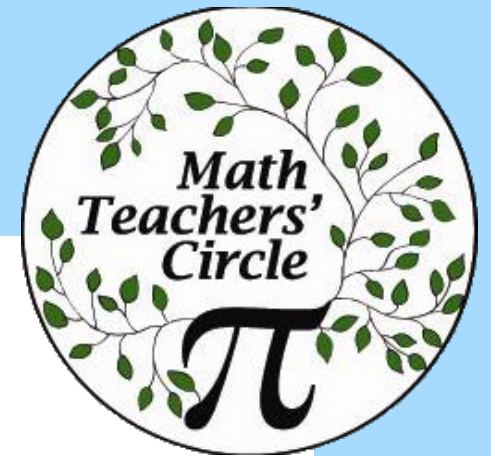


The MTC Folks

- Sloan Despeaux
- Nathan Borchelt
- Angie Hodge-Zickerman
- Cindy York



Smoky Mountain MTC



The Smoky Mountain MTC establishes an encouraging, collaborative, and non-competitive community of mathematics educators in Western North Carolina for the purposes of exploring rich mathematics tasks and encouraging personal, professional growth through fun and engaging experiences. We serve the seven western-most counties of NC (Clay, Cherokee, Graham, Macon, Swain, Jackson, and Haywood).



A typical active MTC has two components:

Summer immersion programs

Teachers engage in open-ended problem-solving activities guided by professional mathematicians and experienced facilitators.

School-year meetings

Teachers connect both socially and through mathematical problem solving activities.



The MTC Folks

- Sloan Despeaux
- Nathan Borchelt
- Angie Hodge-Zickerman
- Cindy York

From idea to a platform for Noyce

A group from Western Carolina University attended Math Teachers' Circle training in Washington. This is where Angie joined the team.

In 2014, we began with one Math Teachers' Circle (MTC) that served the seven westernmost counties of the state.

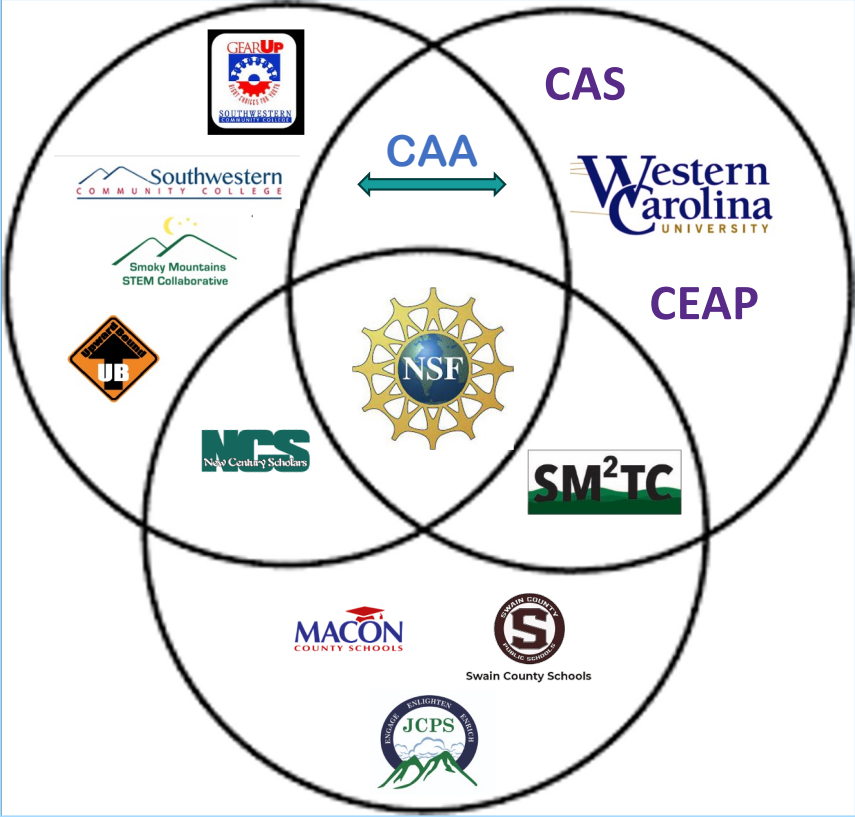
Ten years later, with the help of the NC GlaxoSmithKline Foundation, our North Carolina Network of Math Teachers' Circles (NcNMTC) has grown to include several MTCs from across the state.

Each MTC is a professional learning community of K-12 teachers and college mathematicians who meet regularly to engage in rich mathematical tasks side by side to develop teamwork, compassion, empathy, grit, and perseverance when approaching mathematics, important skills that they then impart to their students.

Counties Served

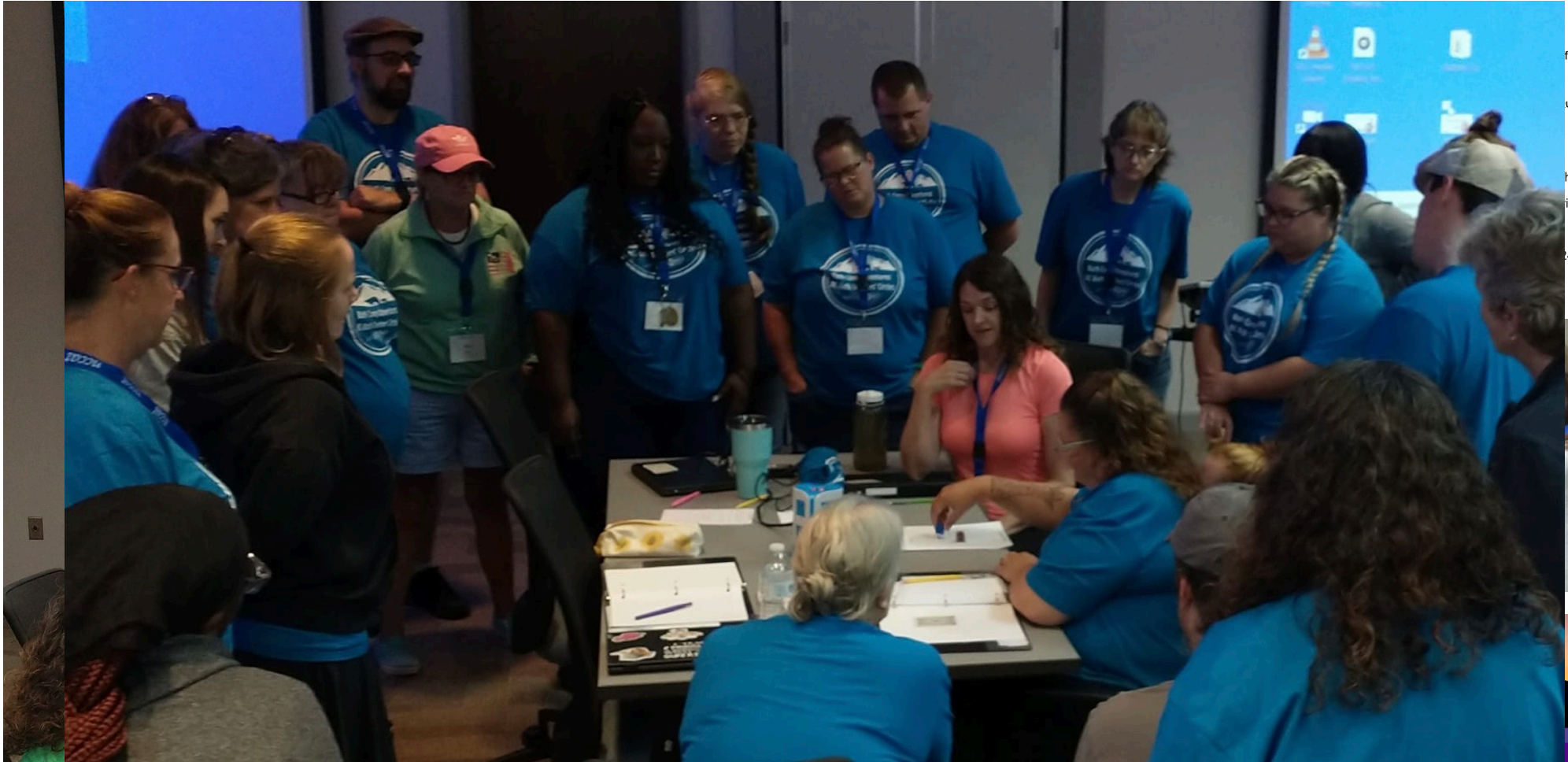
- Smoky Mountain MTC (founded 2014): serving the seven westernmost NC counties.
- Blue Ridge MTC (founded 2015): serving Asheville and surrounding counties.
- Triangle MTC (founded 2016): serving the NC Triangle.
- East Carolina MTC (founded 2016): serving Greenville and surrounding counties.
- Wilmington MTC (founded 2017): serving Wilmington and surrounding counties.
- Charlotte MTC (founded 2017): serving Charlotte and surrounding counties.
- High Country MTC (founded 2018): serving Boone and surrounding counties.
- Sandhills MTC (founded 2018): serving Fayetteville and surrounding counties.
- Triad MTC (founded 2019): serving the NC Triad.
- Foothills MTC (founded 2019): serving Hickory and surrounding counties

Intersecting Circles: Building Capacity for the Smoky Mountain Noyce Scholars

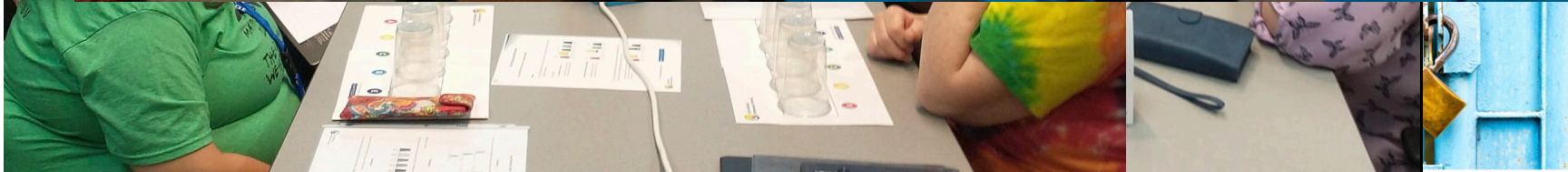


SOME RECENT PAST EVENTS

- February 29, 2024: Leap Year Fun and Axe Throwing at Catamount Jaxe
- November 2, 2023: Problem-Solving Expo at Innovation Station in Dillsboro
- September 7, 2023: MTC picnic with WCU Math Ed students
- April 29, 2023: Spring Social and Math Bonanza
- September 10, 2022: Fall Social at Innovation
- April 28, 2022: A Very Taxing Problem at East Laporte Park in Cullowhee
- November 20, 2021: Science building scavenger hunt
- August 29, 2021: MTC Desmos Workshop with Sloan Despeaux



first female
uilt and Se
he Retroc
ing Around
4



**APRIL 29TH:
ESCAPE
ROOM!**

The Noyce Team...



Mathematics & Computer Science
Arts & Sciences, WCU

Dr. Sloan Despeaux, Professor, Mathematics
Dr. Nathan Borchelt, Professor, Mathematics Education
Dr. Kathy Jaqua, Professor, Mathematics Education
Dr. Stacey Zimmerman, Assistant Professor, Mathematics Education

School of Teaching & Learning
Education & Allied Professions, WCU

Dr. Pamela Buskey, Teaching Associate Professor, Education

Southwestern Community College

Dr. Barbara Putman, Executive Dean of Instructional Services
Ms. Alison Carter, Instructor & Department Chair, Mathematics

Northern Arizona University

Dr. Angie Hodge-Zickerman, Professor

Smoky Mountain Noyce Scholars Program

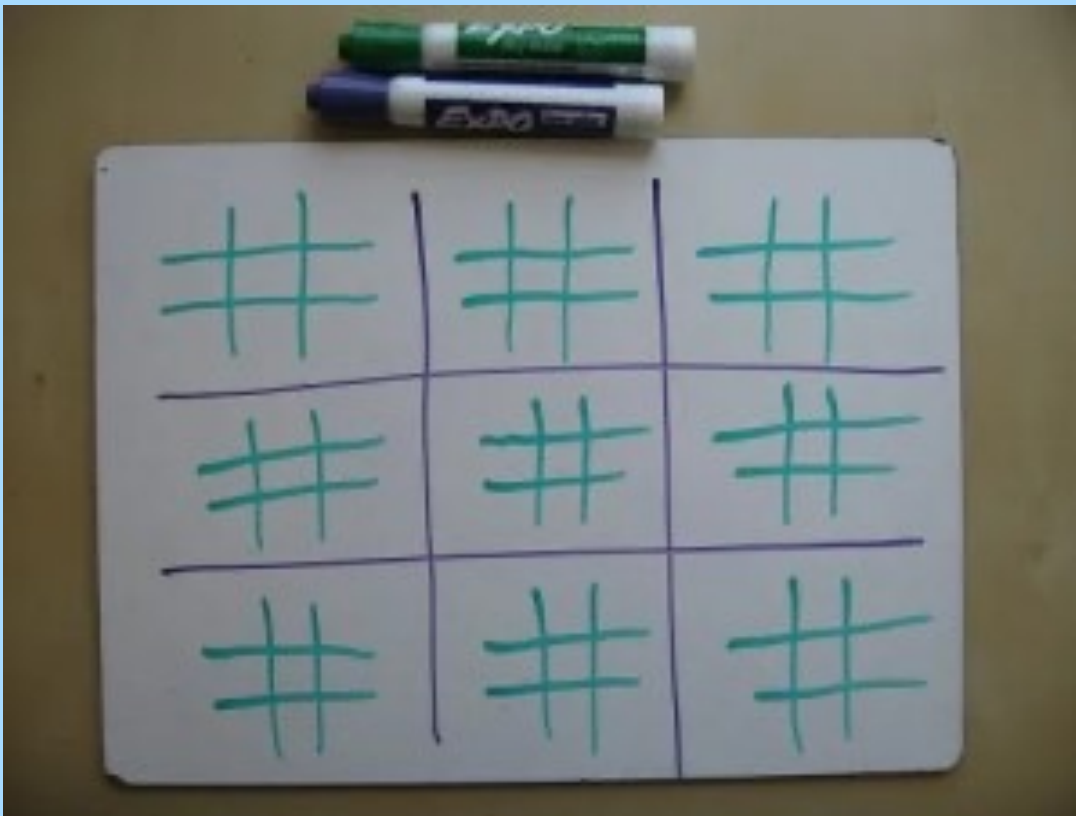
Aims to serve the national need to recruit and train high school mathematics teachers in rural areas.

- Will collaboratively develop a cohort-based, pre-service teacher pipeline energized by community colleges serving Western North Carolina through a three-pronged approach of curricular support, early field experiences, and mentoring.
- Participants will benefit from focused advising and supplemental instruction to have a direct and successful path through college.
- Early work as mathematics tutors will help participants better discern their future as teachers.
- Participants will network with and obtain mentorship from practicing teachers through Math Teachers' Circles.
- Through the practical assistance, real-world experience, and valuable networking and mentoring, this project aims to increase the number and motivation of quality secondary mathematics teacher available to high-need schools in rural Western North Carolina.

Sample MTC...

- The idea is problem-solving, not seeing how fast one can get "the answer."
- Try the game!
- Collaborate!
- Have fun!
- No "searching" for answers.
- Think about (and write down/share) mathematical questions that you have related to the activity.

Ultimate Tic Tac Toe

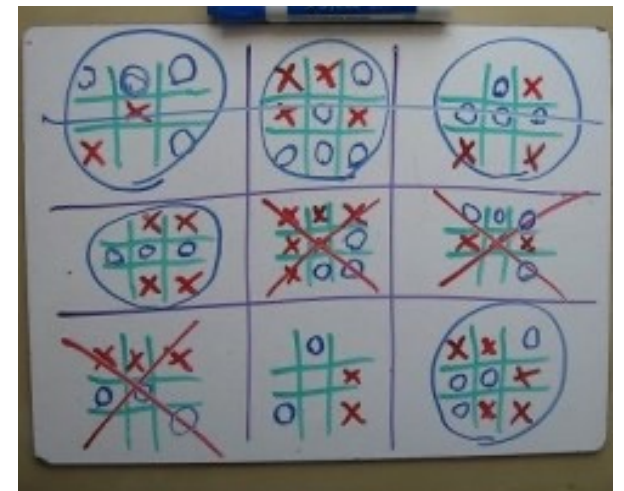
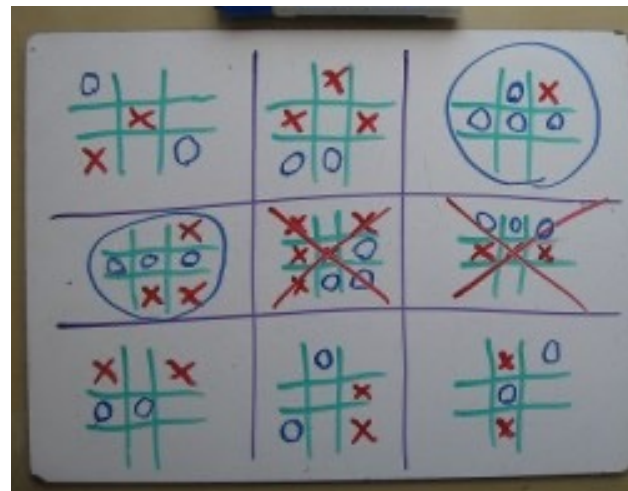
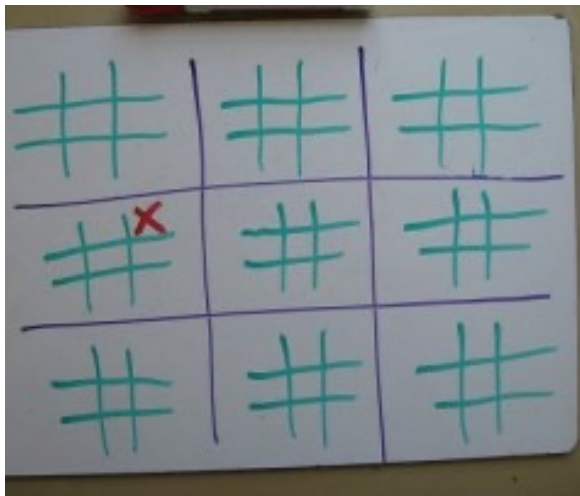


As explained by Ben Orlin

- <https://mathwithbaddrawings.com/2013/06/16/ultimate-tic-tac-toe>

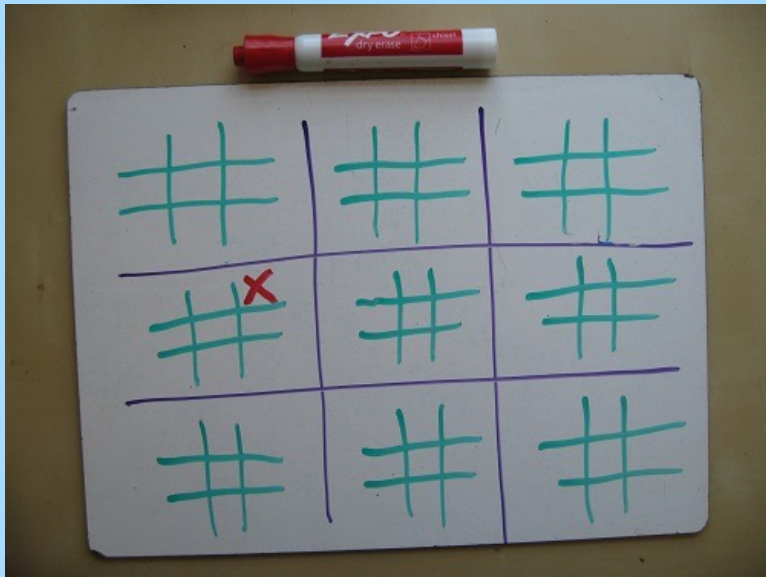
Rules

1. Each turn, you mark one of the small squares
2. When you get three in a row on a small board, you've won that board.
3. To win the game, you need to win three small boards in a row.

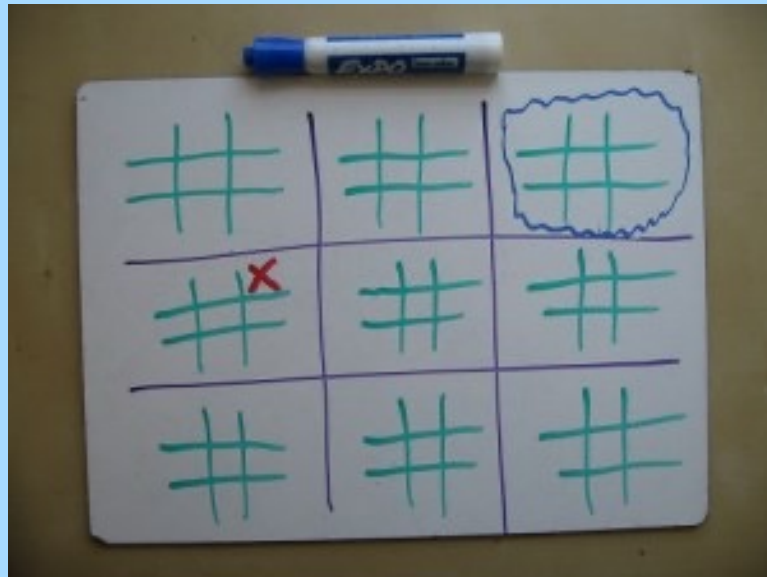


Most important rule

- You don't get to pick which of the nine boards to play on. That's determined by your opponent's previous move. **Whichever *square* he picks, that's the *board* you must play in next.** (And whichever square *you* pick will determine which board *he* plays on next.)
- For example, if I go here:



You must go here:



Clarifying rules

1. *What if my opponent sends me to a board that's already been won?* Tough luck. If there are open squares, you must pick one. While you can't really affect that board, you can at least determine where your opponent will go next.
2. *What if my opponent sends me to a board that's full?* In that case, congratulations – you get to go anywhere you like, on any of the other boards. (This means you should avoid sending your opponent to a full board!)

For more puzzles/games with Tic Tac Toe:

<https://mathwithbaddrawings.com/2013/11/18/tic-tac-toe-puzzles-and-the-difference-between-a-puzzle-and-a-game>



Variant: Players alternate choosing a number from 1 to 9 (each number can only be used once in all). The first player to collect three numbers that sum to 15 wins. The game turns out to be identical to Tic-Tac-Toe because 15 is the magic constant of a normal 3×3 magic square. So, the strategy is exactly the same, and (in theory) the game should be equally boring – but it's generally not, because *realizing* that the strategy is the same is nontrivial.

Or

Variant: A player is not restricted to only playing X or only playing O. For example, I might play X to start, you might play O and then on my next turn, I decide to piggyback on your move, and I switch to O. The winner is whoever completes a three in a row first, regardless of whether it is X or O.

What did you learn?

How could you use elements of an MTC for your Noyce scholars (or future scholars)?

Thank you

Angie Hodge-Zickerman

Angie.Hodge@nau.edu



Cindy York

Cindy.York@niu.edu



Kathy Jaqua

kjaqua@wcu.edu

