

AMTNJ News

Association of Mathematics Teachers of New Jersey

January 2022 • Volume XLIV, Number 1

IN THIS ISSUE

The Engage Series, **p. 2**

AMTNJ Scholarship Program,
Joan J. Vas, p. 3

AMTNJ announces 2021
Max Sobel Awardee,
Joan J. Vas, p. 5

Assessment Area:
Brief Comments on How the
Start Strong Results Should be
Used,
Dianna M. Sopala, p. 6

Reaping the Rewards of Success!
Wendy Thompson, p. 7

The Importance of Vocabulary
and Language
in the Math Classroom,
John Kerrigan, p. 10

Mathematics Research &
Writing Elective for
High Schoolers,
Anne Paoletti Bayna, p. 12

15 Words,
Julie Norflus-Good, p. 17

New Teachers' Corner, **p. 18**

Puzzle Corner, **p. 18**

**"The whole purpose
of education is to
turn mirrors into
windows."**

Sydney J. Harris

President's Message

Collective Teacher Efficacy is the belief that teachers have in the ability to positively impact student learning as a team. Collective Teacher Efficacy is strongly correlated with student achievement and is vital for the health of a school. For perspective, John Hattie assigns Collective Teacher Efficacy an effect size of 1.57. This is almost three times the effect of positive classroom management. Collective Teacher Efficacy is more than just a growth mindset. It is the fundamental, powerful belief that teachers cause learning, not students. Teachers working together with high expectations can have a formidable impact on all students.

You may be wondering why I am starting my first President's message writing about Collective Teacher Efficacy. It is because Collective Teacher Efficacy captures the essence of everything I believe about the mathematics teachers of New Jersey. Together we are stronger. Together we have the power to make mathematics accessible for every child in our state. It has been a difficult two years. Now more than ever, we realize that our colleagues are the best source of support; that as a group, we can learn together how to make virtual school, hybrid school or in-person pandemic school work. I am passionate about the "collective" in teacher efficacy. This is why I became President of AMTNJ.

Together, the members of AMTNJ work to make a difference. I appreciate everyone who has joined us learning together through our Engage Series and I cannot wait to learn together in-person again. I appreciate everyone who took the time to join our organization. Your dues help support our learning opportunities, scholarships and contests. I am especially grateful to those who are at a point in their lives and careers that allows them the time to volunteer. We are a volunteer organization and every bit of help is important and valued. We will have more information on volunteer opportunities in our next newsletter!

I am honored to have the office of President and to serve the teachers and students of New Jersey. Together, we will navigate the end of this pandemic and build a future full of students who grow to be mathematical thinkers and happy, healthy people.

Andrea Bean

AMTNJ President 2022

The Engage Series



AMTNJ was proud to resume our Engage Series again this past fall due to the unavailability of in-person conferences. The Engage Series is a set of three virtual one hour sessions all on the same topic, with each individual session expanding or adding onto the previous session. The first Engage Series was on *Personalized Learning* with Dianna Sopala. Sessions included "Personalized Learning and What it Looks Like in the Mathematics Classroom," "The Difference Between 'Just in Time' and 'Just in Case' Intervention," and "Just in Time Intervention in the Mathematics Classroom." This series was generously sponsored by *Heinemann*. The second Engage Series was on *Social Emotional Learning* with Andrea Bean. Sessions included "Structures that Support SEL," "Instructional Choices that Support SEL," and "Infusing Your Curriculum with the Skills in the CASEL Framework." This series was generously sponsored by *Heinemann*. The third Engage Series was on *Equity and Inclusivity* with Jessica Cincotta, Melissa Pearson, and Susan Totaro. Sessions included "Involving Students in Change Making and Elevating Voices," "Learning in a Global Classroom Through Mathematics," and "Using Strength-based Language in the Mathematics Classroom." This series was generously sponsored by *Heinemann* and *American College of Education*. We appreciate our many members who joined us virtually and provided very positive feedback on the sessions!

Coming Up!

For this spring, we will be continuing our Engage Series with three new offerings:

- ***Assessment and Intervention (February)***
- ***K-5 Mathematics Learning and Teaching (March)***
- ***Wellness for Teachers and Students (April)***

All sessions will be free of charge and offered on Monday evenings from 7-8 PM. Recordings will be made available for members only through the AMTNJ website.

February Engage Series

Series #1: Assessment & Intervention			
Title	Date/Time	Presenter(s)	Session Description
SAT Mathematics: A Content and Reasoning Perspective	Mon 2/7, 7-8 PM	Dr. John Kerrigan, Middletown Township Public Schools	This session gives secondary teachers an overview of the content of the SAT Mathematics section. A particular emphasis will be placed on alignment to NJSL, strategies for infusing SAT reasoning and problem-solving skills in Algebra 1, Geometry, and Algebra 2 classes, and a look at sample items for further discussion. Resources will be provided to teachers to bring back to their classrooms for next-day use.
A Model of Just in Time Intervention	Mon 2/21, 7-8 PM	Emily Carlock and Jacqueline Tishler, Middletown Township Public Schools	We know that students, especially this year, are displaying gaps in their knowledge, but addressing these deficiencies is challenging. To accommodate this, we designed chapter pre-assessments targeting prerequisite skills needed for success with the upcoming topic using the Achieve the Core Coherence Map as a guide to help identify the continuity of standards. Before starting the chapter, these pre-assessments are administered to determine the gaps or weaknesses that need to be addressed "right now". Results help guide classroom instruction and identify students who may need more intense intervention.
High School Mathematics Intervention	Mon 2/28, 7-8 PM	Dr. Kara Teehan, Middletown Township Public Schools	The speaker will discuss Tier I intervention strategies that all teachers can implement in their high school math classes to reach most students in the normal classroom setting. She will describe the process of identifying and working with intervention students, including goal setting and progress monitoring. She will speak about ideal push-in intervention practices with specific examples from freshman and sophomore high school math classes and discuss Tier II and Tier III intervention for high school students in small group and one-on-one settings.

For February Engage Series sign up [HERE](#).

Join AMTNJ!

We rely on your membership to continue providing quality PD, scholarship and other services for mathematics teachers in New Jersey.



WE ARE A COMMUNITY OF PEOPLE INTERESTED IN THE TEACHING AND LEARNING OF MATHEMATICS.



AMTNJ Invests in Potential New Math Teachers Through Renewing Scholarship Awards

Joan J. Vas, Executive Coordinator of
AMTNJ Scholarship Program

Renewal Awardees

Five candidates received \$1,500 each for their AMTNJ Scholarship renewal for 2021-2022. They were Marless Butryn, Samantha Cohn, Caroline Luckhowec, Jacqueline P. Metz, and Emily Elias.

Marless Butryn is entering her third year at Monmouth University where she is majoring in mathematics and secondary education. Despite the difficulty of attending university remotely through zoom this past year, the faculty and staff were extremely helpful when it came to adapting to these new and uncharted circumstances. She could meet in person with professors for extra help, scheduling recommendations and clinical placements. All her clinical observations were done virtually. She was placed in a 6th grade math class where students only spoke Spanish. With her high school Spanish, she could understand the math being taught. It was an amazing experience. In the spring she was placed in a 5th grade class of students with learning disabilities. She got to work with individual students in breakout rooms and, for the first time, got to teach math to the full class. She could not be more excited to start her junior year.

Samantha Cohn is entering her junior year at Rutgers University where she is majoring in mathematics and education. This was a difficult year for Caroline as she struggled to learn remotely from professors who were struggling to teach effectively on Zoom. Caroline's hard work and devotion helped her understand lessons and do well. In her education classes she learned various methods of teaching and how each can impact the students. The class in teaching special education opened her eyes to the endless possibilities for teaching children with special needs.

Caroline Luckhowec is entering her junior year at the University of Connecticut where she is majoring in mathematics and teaching. Samantha has now been elected as Secretary of the UConn Future Educators Club. She is excited to take on a leadership role with the organization. In the months since she has been home from school she has been a substitute teacher in grades K-8. She has learned to alter her teaching style based on the age and academic levels of the students. This opportunity has provided her with critical experience. It is amazing for her to be back in the classroom working with students.

Jacqueline Metz is entering her junior year at Pennsylvania State University where she is majoring in mathematics and secondary education. This past year Jacqueline enjoyed all of her classes but particularly the Curriculum & Instruction class as it required you to tutor a student for at least 6 hours. She is now paid by the University to tutor student athletes. This is allowing her to further her teaching experience.

Emily Elias is entering her second year at The College of New Jersey majoring in Mathematics Secondary Education. She enjoyed her classes this year and is really looking forward to next year when she will begin taking education classes where she will start her classroom experience.

Last, but by far, not least, I would like to recognize the AMTNJ Scholarship Renewal Review Committee for 2021 whose dedication and commitment to excellence in mathematics education has been the driving force in student selection. They are as follows: Past President Lena Komitas, Past President Tom Walsh, Julie Norflus-Good, Anna Maria Graf and Past President Joan J. Vas, Executive Coordinator, AMTNJ Scholarship Program.

REMEMBER: Any member of AMTNJ can nominate High School students who indicate that they have a desire to become mathematic educators and who are about to graduate from high school. The current application is available on the AMTNJ website, <https://amtnj.org/scholarships/>. The deadline for submitting applications is April 15, 2022. A committee evaluates these applications and awardees are announced each May. All awardees are able to apply for renewal of their scholarships for the subsequent three years. The applicants **MUST** be majoring in mathematics education and maintain good grades. The amount of monies awarded each year is dependent on available funds.



AMTNJ has a strong history of supporting current and future mathematics educators, and we ask that you consider join us in this important work. In order to support the AMTNJ Scholarship Program, you can either use PayPal at <https://amtnj.org/donations/> or mail a check payable to the AMTNJ Scholarship Program. The check should be mailed to: *AMTNJ, 111 Third Avenue, Belmar, NJ 07719*. AMTNJ is a tax-exempt (501C3) organization and your contributions are fully tax deductible.

AMTNJ ANNOUNCES 2021 MAX SOBEL AWARDEE – DR. JULIE NORFLUS-GOOD

Joan J. Vas, Max Sobel Award Committee



AMTNJ created the Max Sobel Award in 1990 as the Outstanding Mathematics Educator Award for New Jersey. Our first awardee was Dr. Max Sobel, former National President of NCTM and long-time mathematics education professor at Montclair State University. We are now naming our 32nd awardee in 2021, Dr. Julie Norflus-Good, Full Professor of Teacher Education and Director of the Master of Arts in Special Education at Ramapo College of New Jersey. Julie recognizes the importance of strong

math education for Special Education teachers and provides tremendous support to her students to become teachers who can successfully support Special Education students in ALL subjects including mathematics.

Julie joined AMTNJ as the Special Education Liaison in 1995 and has remained a vital contributor to AMTNJ for 27 years. She has written 19 newsletter articles on teaching strategies for mathematics from 2010-2021 for AMTNJ. She has spoken at 26 AMTNJ Conferences including Keynote Speaker at the most recent AMTNJ/Special Education Conference, 4 NCTM Conferences, 14 NJEA Conferences, 3 NJDOE Conferences and 2 International/National CEC (Council for Exceptional Children) Conferences. She has served on the Board of Trustees, as a Journal Article Reviewer, and on the Scholarship and Nominating Committees.

Julie is currently the President of the New Jersey Council for Exceptional Children (NJCEC), as well as a member of various advisory board of the New Jersey State Department of Education, including Special Education Stakeholders Advisory Group, Strengthening Gifted & Talented Education, NJ Collaborative Home of Interdisciplinary Leaders and NJ Task Force for Transition Planning.

Despite her demanding job and multiple commitments, Julie remains very active with AMTNJ. Look for her informative, extremely useful articles in the AMTNJ Newsletters. It is truly my pleasure to write this article on Dr. Julie Norflus-Good. She is so very well deserving of this award.

Congratulations!

Assessment Area: Brief Comments on How the Start Strong Results Should be Used

Dianna M. Sopala, Northern Valley Regional High School Mathematics Teacher

AMTNJ Past President & Executive Coordinator of Teacher Outreach

NCTM Board of Directors 2021-2024

Recently, school districts have received the Start Strong assessment results. Interpreting these results can be beneficial to educators and should be used in conjunction with other data. The Start Strong results can not be interpreted the same way as the NJSLA and should not be used to compare results of this assessment to other students' results, schools, districts, or the state, or the previous NJSLA results. The Start Strong assessment did not test every standard. During the last couple of school years, each student had their own individual learning experience; therefore, comparisons should not be made between students. The results from the Start Strong assessment should be used to support district and department level curriculum planning, revisiting prerequisite concepts and skills, and evaluating scope and sequence based on students' support needs. So, how can teachers, supervisors and curriculum directors use this data? To answer this question, educators must understand the purpose of the Start Strong assessment, which was to identify the level of support their students would require to be able to learn the current grade level or current course material. The content of the 2021 Fall Start Strong assessment consisted of items (questions) testing standards from the previous grade with the exception of the high school courses. The Algebra 1 students were tested on the algebra relevant eighth grade standards. The Geometry students were tested on the geometry relevant eighth standards. The Algebra 2 students were tested on the Algebra 1 standards. Both teachers and supervisors can identify the percent of students in three categories, which are "strong support needed", "some support needed", and "less support needed" for all students in the district and in the Every Student Succeeds Act (ESSA) subgroups. The Start Strong assessment results can be used to identify the following:

- the areas where the students in the district need the most support in math
- the areas and which students need targeted interventions for any major concept
- the ESSA subgroups needing the most support
- the students who need to receive various interventions and supports allowing them to academically progress in mathematics
- the areas of the curriculum that need revising
- which major areas teachers need to spend more time teaching
- the types of intervention strategies, such as practicing some concepts on IXL, learning or doing some work in Khan Academy, or working in a smaller group with a math specialist

The individual student report (ISR) should be delivered to parents or guardians in the NJ Parent Portal. The ISRs should be used to provide parents or guardians information about the type of support their child needs in the tested content areas and major mathematical concepts.

Reference: NJDOE Assessment <https://www.nj.gov/education/assessment/>

Reaping the Rewards of Success

Wendy Thompson, Ed.D, Demonstration Teacher at New Jersey City University



Since 1931, the A. Harry Moore Laboratory School, which is a part of New Jersey City University, has provided a high level of comprehensive academic, therapeutic, pre-vocational and social programs; it's currently supporting approximately 85 students between the ages of three and twenty-one. Operated under the direction of the College of Education, the school supports a diverse population of learners with a range of physical and learning difficulties through an excellent educational experience.

Whether a student has multiple physical, medical or cognitive disabilities they all demand a highly tailored, expert approach to their development. The school caters to children with a range

of disabilities and conditions, from preschool disabled, through learning and language disabled, to those who are multiply disabled. Wendy Thompson, Ed.D., demonstration teacher III at the school explains how they are now using a range of complementary technologies to reward children and encourage and enable the children to learn.

At the [A. Harry Moore Laboratory School](#) a specialized school for students with disabilities, we are always looking for new and inventive ways of supporting those who might be working below the average grade level. It's often hard to find learning content that's appropriate for both their age and ability; it's unfair to give a teenager with learning disabilities an online math learning resource designed for elementary students!

When looking for appropriately aligned learning content we've found that one of the most critical factors in boosting engagement are the rewards students receive, but more importantly rewards that are appropriate to their developmental needs. For example, our students love playing online games. The games will be aligned with the New Jersey State Standards but as far as the children are concerned, they are just having fun. However, despite enjoying this 'play time' they also want to know that they are learning and progressing. Therefore, rewards that are carefully aligned with academic achievement levels are as important for our students as they are for any other learner.

Math

One example of this is in our math learning time. Keeping students engaged in math is difficult even for those without difficulties but for our students it's a particularly challenging subject to teach. We're therefore always looking for new aligned to the curriculum resources that will absorb them and reward them appropriately.

I tell them that I work hard to earn my pay-check and in the same way they have to work hard to earn

their rewards. I often hear a student call out, “I’ve earned my pay-check.” A few months ago, our technical supervisor downloaded [SplashLearn](#), a K-6 curriculum aligned math learning resource that is completely free of charge for schools. We set up the app on our school iPads and each class took it in turns to explore the learning activities. This has proven to be ideal for us, as the learning activities are all game based, so the students find it fun without realizing that the work is embedded in the games.

I am very aware that while they are always more than happy to play these fun math games, they do all need to feel they are progressing. This particular resource offers gradual reinforcements and a reward system. If the student does the work and accomplishes a specific skill milestone, they earn a reward. These positive re-enforcements help them make it through the more difficult times. We therefore try to use as many reward-based systems as possible.

I use our math resource in three different ways.

Firstly, it’s ideal as a source of learning content for those students who have worked on an activity with

the rest of the class but are struggling with a particular topic and need extra help. I can easily select more ‘games’ at a similar or slightly lower level that they can ‘play’ to help them to understand the mathematical skill and then consolidate their learning. I can assign different activities to students with different learning styles. Within my class I have six very unique learners, all on a different level of development, each with vastly varying needs. More than any other students, ours need diversity in their learning.

I also find it’s ideal for supplemental work for students who may be working on a particular skill but are not engaged in learning through a textbook. Many of our students have limited fine motor skills, meaning that writing answers can be more difficult than tapping a key on a keyboard. They can therefore be working on the same skill

as another student who is learning from a textbook but by using a Universal Design for Learning (UDL) framework for learning we are making it easier for them. Adding in different modalities to suit each child’s specific needs makes it so much easier for them to stay engaged.

And finally, there are times when I’ll run a full-class activity. I project the game up onto the big screen or interactive whiteboard, and we all ‘play’ it together. The children love this and remain engaged but more importantly they are also learning about collaboration, turn taking and working with their peers; all very different but equally important aspects of their learning.

Data from the resource can be shared into our Seesaw learning



platform which combines important development information on each student's progress. I'm a Seesaw ambassador as I strongly believe in the importance of students having a level of autonomy and pride in building their own learning. I can find an appropriate activity for each student and put the link in [Seesaw](#) to give them their assignment. Whether it's this math challenge that they've solved or a blog that they've written, they get to present their work to the teacher, class families and friends. This may not be a traditional reward, nor give them anything visible but the satisfaction they get gives them a great level of accomplishment.

Parental Involvement

At the A. Harry Moore Laboratory School we value the importance of parental engagement, but because of students' varying ability levels, I like to keep their learning in school until they are really secure in understanding how to use each new resource. Only then will I invite the parents in, to train them and ensure they are giving their children the right level of support. To have their parents see and applaud the work they are doing is another level of reward for our students.

This perfect blend of technologies is ensuring each student is given compensation for their hard work, along with the respect to have a level of autonomy to learn from appropriately aligned engaging, fun and highly effective learning content.



CUSTOMIZED PD

**AMTNJ OFFERS PROFESSIONAL DEVELOPMENT
CUSTOMIZED TO MEET YOUR SCHOOL'S SPECIFIC NEEDS.**

Need more DESMOS? We can help!

Looking for SEL strategies? We got that!

**Just name what you need, and we will check our database of qualified
speakers to suit your specific needs.**

We offer in-person and virtual options.

For more information email: info@amtnj.org

The Importance of Vocabulary and Language in the Math Classroom

**John Kerrigan, Ed.D., District Director of Evaluation & Assessment Practices
Middletown Township Public Schools**

It wasn't until I taught pre-service mathematics teachers when I realized how important it is to be very deliberate and consistent with mathematics vocabulary across the mathematics continuum. Lack of coherence across grades and subjects can lead to students' misunderstanding and confusion as they continue to learn more mathematics. In this article, I highlight a few significant examples for secondary teachers to think about.

For example, consider the word "equation." In middle school, students learn the procedures and concepts associated with solving linear equations. Once in high school, students learn how to solve other types of equations using new methods. This leads many students and educators alike to conceptualize an equation as something that needs to be "solved" when the idea of an equation is much bigger than that. An equation is a sentence/statement of equality between two expressions. It can be TRUE or FALSE. The solutions of an equation are all values of the variables that make the equation true.

As Usiskin (1988) noted, equations can even be called different things, further adding to students' confusion. Consider the five equations below:

$$A = LW \quad 40 = 5x \quad \sin x = (\cos x)(\tan x) \quad 1 = n(1/n) \quad y = kx$$

In each case, we have a quantity on the left side that is equal to the product of two quantities on the right side. They are all equations since they are statements of equality between two expressions. However, in most secondary classrooms, we refer to them as (1) formula, (2) equation, (3) identity, (4) property, and (5) rule. Granted, the names for each of these equations help students understand how many solutions there are to each equation (i.e., an identity is valid for all values of x); however, students may lose sight of the fact that these are all equations once they learn the new vocabulary words. It is important to remind students that equations can have any number of solutions, as they are statements of equality between two expressions that may be either true or false.

The New Jersey Student Learning Standards for Mathematics stress equivalent expressions. Students work with equivalence from a very young age. Yet, when faced with problems that ask students for an equivalent representation, they are often left confused about what the question is asking. This could be due to either (1) not understanding what "equivalent" means, or (2) not knowing what to do without explicit directions. Consider the three SAT questions below (reproduced from released College Board SAT exams):

Which of the following is an equivalent form of

$$(1.5x - 2.4)^2 - (5.2x^2 - 6.4) ?$$

- A) $-2.2x^2 + 1.6$
- B) $-2.2x^2 + 11.2$
- C) $-2.95x^2 - 7.2x + 12.16$
- D) $-2.95x^2 - 7.2x + 0.64$

$$f(x) = \frac{2x - 4}{2x^2 + 2x - 4}$$

A rational function is defined above. Which of the following is an equivalent form that displays values not included in the domain as constants or coefficients?

A) $f(x) = \frac{x - 2}{x^2 + x - 2}$

B) $f(x) = \frac{2(x - 2)}{2(x + 2)(x - 1)}$

C) $f(x) = \frac{1}{x + 1}$

D) $f(x) = \frac{1}{2x^2}$

Which of the following expressions is equivalent to

$$\frac{x^2 - 2x - 5}{x - 3} ?$$

A) $x - 5 - \frac{20}{x - 3}$

B) $x - 5 - \frac{10}{x - 3}$

C) $x + 1 - \frac{8}{x - 3}$

D) $x + 1 - \frac{2}{x - 3}$

In all three problems, students are not told explicitly what to do; they are not asked to “simplify using the distributive property” or to “use polynomial long division.” Instead, they are expected to use their algebraic knowledge to find an equivalent expression using familiar operations and methods. The very same language is used on the New Jersey Student Learning Assessment. These few examples show that stressing “equivalence” over providing explicit directions in the secondary mathematics curriculum is important for curricular coherence across Algebra 1, Geometry, and more.

If you were to ask any high school student what a function is, there is a great chance the student will respond with some version of the vertical line test. Whereas passing the vertical line test is a property functions have, the definition of a function includes correspondence between two sets. The same can be said for congruence; students in high school often see congruence as something static. For example, a high school student may understand two triangles being congruent if they satisfy SSS, SAS, AAS, etc. However, in elementary school, congruence is treated more dynamically. Students in lower grades understand congruence as being able to map one figure onto another through transformations. Somehow along the way, the definition of congruence becomes less interesting and rigid for students. It is important for us as educators to be clear and intentional in our definitions so that students have a coherent understanding across grade levels.

Usiskin (2019) suggests that one way to improve students’ understanding of key mathematical vocabulary is to associate traditional topics with statistical topics to foreshadow larger ideas later on. Statistical topics show up in nearly all high school curricula, so doing this is certainly time well spent. For example, Usiskin (2019) suggests motivating the idea of deviation when teaching the traditional idea of distance, motivating probability notation $P(E)$ when teaching function notation $f(x)$, and motivating translation and scaling of data sets when teaching translation and scaling of graphs. Rooting some of these big ideas into the context of statistics and data analysis makes the definitions more tangible and intuitive to students as they use them in more abstract settings.

References

- Usiskin, Z. (1988). *Conceptions of school algebra and uses of variables*. The ideas of algebra, K-12, 8, 19.
- Usiskin, Z. (2019). *Beauty and Serendipity in Teaching Mathematics*.

Mathematics Research & Writing Elective for High Schoolers

How can mathematics empower students to create a life of purpose?

Anne Paoletti Bayna, Mathematics Teacher at Clearview Regional High School in Mullica Hill, NJ

An earlier version of this article was published in the New Jersey Association for Gifted Children's PROMISE newsletter in the fall of 2021.

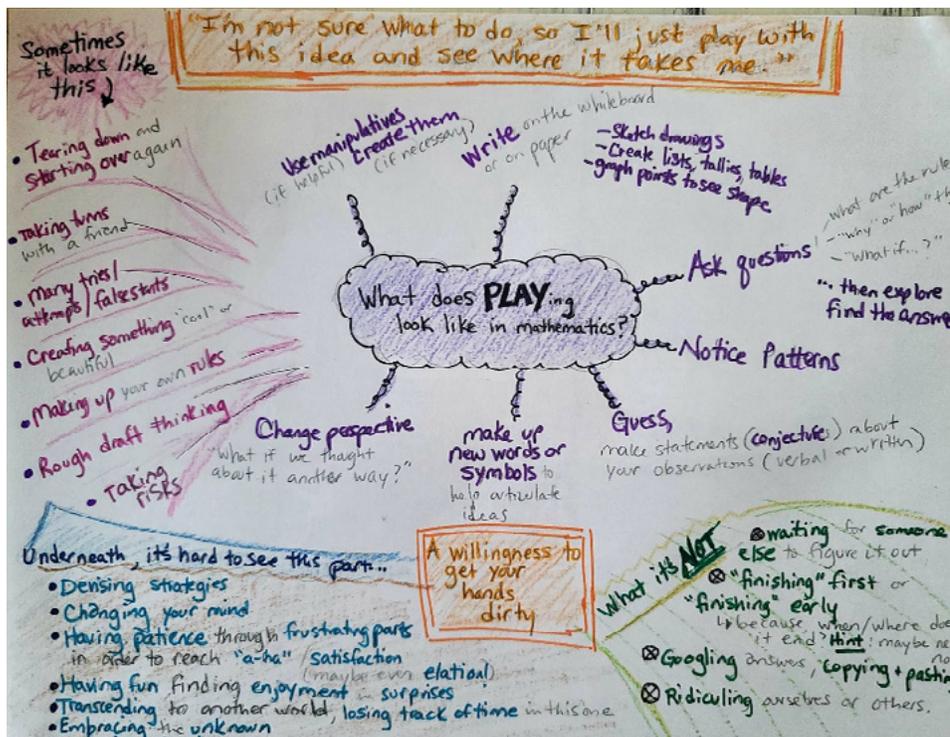
Years of dreaming up a math course that would give students opportunities to creatively explore mathematics finally came to fruition as an elective that runs parallel to students' required math courses. This course is designed to develop habits and writing as well as mathematical content. As an elective, it is designed especially for those students who take an added interest in mathematics.

The Mathematics Research & Writing elective follows four main themes: PLAY, THINK, CREATE and LEAD.

1 - PLAY

PLAY is experiencing math in hidden ways. Games, puzzles, patterns, and challenges invite us into feeling curious again as when we were children. Our minds are drawn into solving problems and wanting to understand how things work. We need to unlearn math as just a subject where notes are taken and procedures are memorized. Instead we discuss, conjecture and debate while we play. Ideas bounce between us. We get to know each other as thinkers with a variety of gifts to contribute to problem solving and this happens in the midst of mathematics.

We press into deep engagement with one another at times and disengage to honor our need to think independently at other times.





Anne Paoletti Bayna @paomaths · Dec 17, 2019 ...
Shhhh....they're thinking deeply! Magical moment in #HSmathresearch today as students are each lured in to their own math world! The room is silent as they begin "playing" and experimenting...a necessary piece to deep understanding.



PLAY includes writing as well. We practice free writing (or stream-of-consciousness writing) to get more comfortable with rough draft thinking and taking risks. As our writing evolves into a more formal description of the mathematical phenomenon that we discover in our play, we strengthen each other's writing through peer review.

We are not striving for perfection as much as trying to understand - that means making several attempts, many of which are expected to be unsuccessful. This is a place where we might change our minds as we uncover new information. We have fun and find enjoyment in surprises. We learn to embrace the unknown because it represents an exciting world we have yet to explore, yet we feel the urge to explore it to gain understanding. We develop patience through frustration to reach the rush of an exciting "a-ha" moment.

PLAY allows us to construct in our minds structures of how mathematics works. We shift from having to be told what to do and how to do it, to fearlessly diving into exploring unfamiliar problems. This playful approach to problem solving builds confidence in handling the unknown and serves us well throughout life.

2 - THINK

THINK stretches our minds in new directions. We dabble in learning about logic - the language spoken among philosophers, mathematicians, computer scientists and lawyers. Formal logic is no longer taught in K-12 mathematics but it is important for several reasons:

- Mathematicians speak in the language of proofs, which are based on logic. Using logic as a common language our minds can exchange ideas about higher level mathematics with others. This course provides students with an interest in mathematics exposure to some of logic's basic components - basic argument analysis, deductive versus inductive reasoning, and propositional logic.
- For the mature mathematician, proof is a form of art. Writing a great proof comes with the deepest sense of satisfaction but may require persisting through the most challenging intellectual struggles. Some problems seem simple yet are still not solved! The heart and mind of a mathematician lives in this space. Mathematicians appreciate each other's work and describe the best proofs as being "elegant." The THINK theme sprinkles the seeds of logic and proof so that students might enjoy developing this type of work in the coming years.
- Later in the course when we begin reading math articles and writing our research papers, we are equipped with tools of logic. Some research topics lend themselves to more

accessible proofs and with our new tools we can incorporate proofs into our writing.

During the THINK theme, we also learn and practice the Question Formulation Technique designed to sharpen students' voices and develop critical thinking. We have reignited their curiosity during PLAY, now QFT provides a structure for strengthening questions and building momentum in their curiosity. Beyond this course, we know that asking questions is essential in learning to advocate for oneself, and by asking more thoughtful questions, students can seize opportunities that might otherwise fizzle out.

We also practice some basic technical writing techniques used across mathematics. This is done while we learn how to express the mathematics of our current traditional math classes. We take detailed handwritten notes in our traditional math class one day, supplement the notes with diagrams and explanations, and then type the detailed notes using technical writing formatting. The notes are written so that a peer who was absent that day in class could learn about all of the mathematics of that lesson simply by using our notes. We feel proud of our work once the final product looks like something out of a textbook.

3 - CREATE

CREATE pushes our limits and tests our patience as we draft and revise (and revise again, and again) our research papers. Completing a math research paper takes a new level of discipline. Luckily, we have a helpful tool, "Writing Math Research Papers - A Guide for High School Students and Instructors (5th ed)." The process has been perfected over years of experience by author, Rob Gerver. Rob has provided a detailed map for students to get started in writing a math research paper by using an existing journal article as a starting point.

We browse through several math journal articles (100+) and set aside the ones that attract our interest. Of our initial choices, each of us narrows our favorites down to our top three and writes a profile of each discussing what caught our attention, what interests us about the topic and what the challenges might be if we continue with it. This process usually leads us to choosing the one article we each decide to base our research.

Once we choose our articles, we gradually become more familiar with the mathematics of the article. The articles are written at the level of a mathematics teacher, not a postdoc math researcher, so we struggle through accessing the mathematics, but are able to slowly make sense out of it. This process takes several weeks of reading and interpreting one paragraph at a time, annotating with questions and ideas, looking up words and journaling our thoughts. With each paragraph of the journal article, we translate the ideas to a language that could be understood by fellow students.

Our papers follow the technical formatting that is used in higher academic and professional communities. Professional mathematicians review our papers and give feedback. Strong papers are recommended and submitted for publication to a math education journal. In the spring of 2020, Aderonke Adejare's paper was published in the journal of the Wisconsin Mathematics Council as an exemplar for student written work in mathematics. Her paper can be found here: <http://bit.ly/AdejareFormalDefinitionofLimit>. In 2022 we hope to have more students' papers published.

The end goal of our research papers is to establish a new sense of purpose in our work - something with more depth and polish than any other work we have created. This is intended to be an experience that raises the bar within ourselves and builds confidence in conquering work that seems impossible.

4 - LEAD

LEAD takes us to a place where with students' newfound confidence and excitement, we share the joy of mathematics with others. We each create a presentation format of our research papers and have the opportunity to shine by sharing our research with the community and inspiring that community not just by what we've done, but also, who we've become. LEAD also takes us back to more playful experiences as we collaborate to host a math fair for our community. We design stations for visitors to experience the joy of mathematics themselves by sampling some fun, quick and creative problems.

This is also a time to wrap up our course by thinking about ways we want to take what we have learned with us into the future. What were our most profound experiences and discoveries this year? Where did we find the most joy? What kinds of careers might employ these characteristics? How will we make choices that fulfill a sense of purpose?



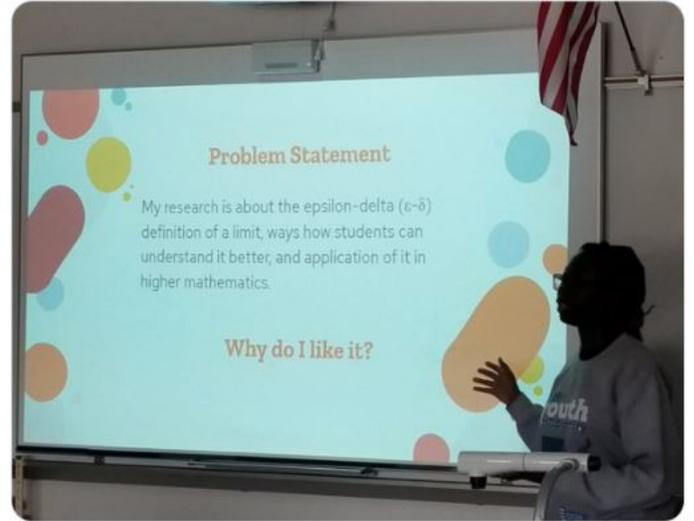
Anne Paoletti Bayna
@paomaths

Getting ready for tonight's open house...looking forward to meeting next year's 9th graders! If you love thinking creatively about math, we're here for you!
[#HSmathresearch](#) [#ViewOneGoodThing](#)



Anne Paoletti Bayna @paomaths · Feb 20, 2020

Today, @ronkeadejare set the bar high as she kicked off our 1st [#HSmathresearch](#) mini presentation! Her research is based on [@NCTM](#) journal article, "Delving into Limits of Sequences" and we all learned something from her.



This course is more than just a course in mathematics. It is a course in leadership and in life. It is intended to build people who find meaning in our work and flourish as humans. It is designed to enrich our lives for the rest of our lives, and perhaps leave us with some new ways to enrich the lives of others as well.

The course ran for one year (2019-2020), took a break during the hybrid year (2020-2021) and is currently running again for its second year (2021-2022). Follow [#HSmathresearch](#) on Twitter.

Here it is for those of us who love a good matrix:

		Dimensions			
		Readings	Developments in Writing	Mathematical Content	Developing habits
PLAY	Mathematics for Human Flourishing (Su) - Ch 4 Play	Life of Pi (Singh) - Ch 10 Phi	Free writing/ Journaling Doodling Mind mapping	Modular Arithmetic Bases Generalization of patterns Encryption & Decoding Fibonacci & the Golden Ratio	Developing curiosity -Noticing & Wondering Solving a simpler problem Brainstorming possibilities Experimenting with ideas Exploring without a map Finding connections Collaborating with others Communicating ideas Releasing creativity Taking risks
	Math Recess (Singh) - Ch 1 Just Play p 7-8				
THINK	Mathematics for Human Flourishing (Su) - Ch 7 Truth	Life of Pi (Singh) - Ch 3 Q.C.D. p 30-41 - Ch 7 ME p 101-109	Question Formulation Technique Learning Technical Writing Through Note Taking in M	Basic components of Logic -Basic Argument Analysis -Inferences, both Deductive & Inductive -Propositional Logic - Symbols Γ Functions -Truth Tables for Propositions	Developing patience Working toward precision Applying courage to fears Finding Γ low Elaborating on ideas Thinking critically Reasoning logically
	Writing Math Research Papers (Gerver) - Ch 5 The Notes You Take in Math Class - Ch 6 Technical Writing Techniques - Ch 12 Resources				
CREATE	Life of Pi (Singh) - Ch 8 ABC'd	Writing Math Research Papers (Gerver) - Ch 6 Technical Writing Techniques - Ch 9 Components of Your Research Paper	Technical Math Writing & Formatting	Student choice	Knowing your audience Revising & strengthening Developing resilience to challenges Communicating precisely Organizing ideas to build Employing discipline Finding purpose in work Enjoying depth of thought
	- Ch 11 Sample Pages from Actual Papers				
LEAD	Math Recess (Singh) - Ch 8 Rabbit Hole - Ch 9 Pure Imagination	Writing Math Research Papers (Gerver) - Ch 10 Oral Presentations	Create presentation from research paper	Student choice	Leading others to math Sharing experiences Finding courage to shine Communicating to audience Spreading joy

About Anne (@paomaths)



Anne is a proud member of the “math family” at Clearview Regional High School in Mullica Hill, NJ, teaching various levels of Algebra 1 and a new Mathematics Research & Writing elective that she has been dreaming up and planning for years.

For professional stretching, Anne works with the Teacher Leadership Program at the Park City Mathematics Institute - an outreach program of the Institute for Advanced Study in Princeton, NJ. She maintains her connection to Boston University’s PROMYS program – a place that has profoundly shaped her as a math teacher.

In 2015, she served on the New Jersey Standards Review Math Sub-Committee. She has served on the Board of Directors for the Association of Math Teachers for New Jersey, participated in the Philadelphia Area Math Teacher Circle, and has consulted on various projects with Student Achievement Partners.

Outside of school, Anne is wife to Ron and stepmom to two talented young adult children, Megan and Andrew. Anne volunteers as an admissions ambassador for Cornell University, meeting with high school seniors applying to Cornell.

15 Words

Dr. Julie Norflus-Good, AMTNJ Special Education Liaison

Years ago a special friend sent me 15 words....

I often sit and stare at these 15 words.

I try to process these simple but effective 15 words.

I try to actualize these 15 words.

I try to execute these 15 words.

Many times, I ignore these 15 words in hope to get to them tomorrow.

I often say to myself, I will definitely do it, but yet those 15 words easily escape me as quickly as I remembered to execute them.

How can I even address these 15 words, especially now?

We are in the latest round of COVID-19, Delta, Omicron, what is next?

We are trying to acclimate back to in-person teaching.

We are trying to work past the COVID student slide.

We are re-teaching concepts that have never been taught in this game plan.

We are dealing with faculty fatigue.

We are dealing with student fatigue.

We are just fatigued!

We are trying to work on that COVID 19 weight gain.

We are trying to be festive and into the spirit of the season, and we are yet again struggling.

What we need to do is to first take care of ourselves. People who pay attention to their own physical and emotional health are better able to handle the challenges of supporting others and getting through the day.

Remember to set small attainable goals. This will certainly make you feel happy that you can check something off your list.

Remember to look for little milestones and celebrate them! Treat yourself and indulge in a new Amazon purchase, a small ice cream cone of your favorite decadent flavor, or some m&m's.

Be kind and patient to yourself. Find something to look forward to, or to laugh about.

Remember that we are all in it together, and that this is not a race. We are there for each other. As you are taking your deep breath, just know you are not alone and "Let it Go".

Here are the 15 words ...

You yourself, as much as anybody in the entire universe, deserve your love and affection.~ Buddha

Be kind and take care of yourself!!! Dr. Julie Norflus-Good - jgood@ramapo.edu

New Teachers' Corner: Advice for New Teachers

"Embrace the lesson and be flexible.
Don't be too hard on yourself.
Take things minute by minute, and know that it's okay if things do not go as planned."

Amanda Moken, a fourth grade teacher, Sayreville Public Schools.

"This year has been difficult for all teachers as the pandemic has created a new educational landscape. **New teachers, thank you for persevering and continuing to show up for your students.** We really need teachers who care now, more than ever. Thanks for your commitment and my advice is to ask for help when you need it. We are all in this together and veteran teachers are a great resource. The new year means we can make resolutions with our students! Try making resolutions with your students to set new academic goals to start 2022 off strong!"

Melissa Dukin, Batcho Intermediate School, Manville School District.



PUZZLE CORNER



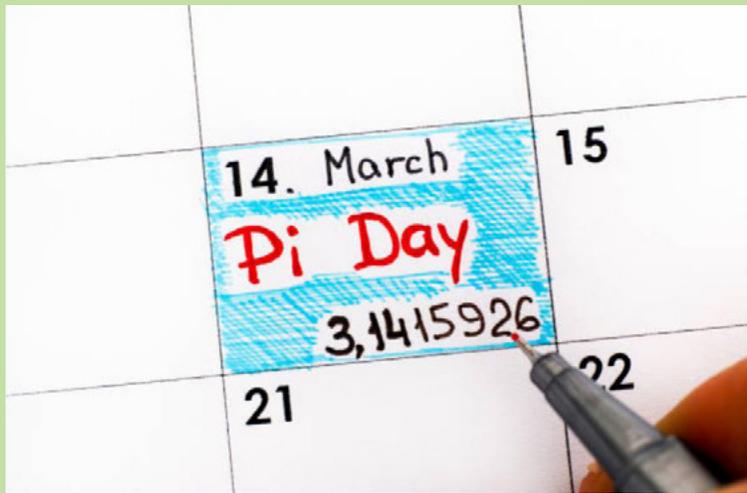
Do you like solving puzzles? What about your students? The puzzles below were created by Erich Friedman. Try to solve them and use them in your classroom to reinforce arithmetic and engage students in problem solving. As Shakuntala Devi once said, "What is mathematics? It is only a systematic effort of solving puzzles posed by nature." If you would like to share any puzzles created by you or your experience solving puzzles with you students, let us know! Email info@amtnj.org or tweet [@amtnj](https://twitter.com/amtnj).

Weird Calculator Puzzles

You own a weird calculator with only 4 buttons, which performs the following 4 operations: $\times 3$ $+7$ -11 $\div 2$. Your challenge is increment the numbers below by pushing only a certain number of buttons on the calculator. For example, $1 \rightarrow 2$ with 3 buttons has solution: $+7 \div 2 \div 2$. Each puzzle below has a unique solution.

5 \rightarrow 6 with 2 buttons	6 \rightarrow 7 with 2 buttons	12 \rightarrow 13 with 2 buttons
13 \rightarrow 14 with 3 buttons	19 \rightarrow 20 with 3 buttons	26 \rightarrow 27 with 3 buttons
4 \rightarrow 5 with 4 buttons	30 \rightarrow 31 with 4 buttons	47 \rightarrow 48 with 4 buttons
61 \rightarrow 62 with 5 buttons	69 \rightarrow 70 with 5 buttons	87 \rightarrow 88 with 5 buttons
42 \rightarrow 43 with 6 buttons	60 \rightarrow 61 with 6 buttons	75 \rightarrow 76 with 6 buttons
117 \rightarrow 118 with 7 buttons	127 \rightarrow 128 with 7 buttons	139 \rightarrow 140 with 7 buttons

For solutions and more puzzles visit <https://erich-friedman.github.io/puzzle/index.html>.



Share with us how you and your students celebrate Pi-Day.

Join a team of passionate math educators to promote quality teaching and learning of mathematics.

To learn more about membership benefits and join AMTNJ visit

<http://amtnj.org/membership/>

Contact Us:

Association
of Mathematics
Teachers of
New Jersey

111 3rd Ave
Belmar, NJ 07719
info@amtnj.org
<http://amtnj.org/>

Follow us
[@amtnj](https://twitter.com/amtnj)

Newsletter Co-Editors:

Greg Eiding
Jelena Komitas
Mark Russo

Executive Board:

President
Andrea Bean

President-Elect
John Kerrigan

1st Vice President
Cheryl Fricchione

2nd Vice President
Kara Teehan

Corresponding Secretary
Denise Varricchio

Co-Treasurers
Allan Johnson
Jelena Komitas

Immediate Past President
Mark Russo

The AMTNJ newsletter seeks to create a space for educators to share their experiences with mathematics teaching and learning, and to update our membership on AMTNJ events. AMTNJ strives for its newsletter to be fair and correct in every way. If you have a question or comment about information in this newsletter contact us at info@amtnj.org

THANK YOU to the authors who shared their knowledge and experience to make this newsletter possible.