

Hanover Township Public Schools

Developmentally Appropriate Approach to Mathematics

Aaron Wasserman

Director of Curriculum, Instruction, and Professional Development

“A Community That Inspires Excellence”



Thank You!

A Community That Inspires Excellence



Hanover Township Board of Education

- Lisa Bomengo, President
- Marc Amoresano, VP
- Karin Coffey
- Christine Egbert
- Gina Johnston
- Chris Mattessich
- William McCabe
- Greg Skiff
- Michelle Stricchiola

K-8 Mathematics Task Force

- Michael Anderson
- Lauren Baranek
- Carmen Cemean
- Rob Cemean
- Rosemary Cataliotti
- Kayte Dietrich
- Jamie Fittipaldi
- Elizabeth Guiheen
- Sherry Koeppen
- Darrin Stark
- Justin Toomey
- Aaron Wasserman
- Sandra Wylie
- Jacob Ziegler

Grade Level Chairs and Area Coordinators

- Kristin Wagner, Kindergarten
- Colleen Downey, Grade 1
- Gabriella Bracho, Grade 2
- Caitlin Vassoler, Grade 3
- Stacey Kohr, Grade 4
- Jessica Sainato, Grade 5
- Dan Diaz, MJS ELA
- Brenda Talbert, MJS Math

Welcome & Purpose

- Understand best practices in math education.
- Discuss research-backed reasons for flexible math grouping and adjusting math acceleration to begin in middle school.
- Conduct a thoughtful roll out to reframe mathematics acceleration to ensure for more flexible, equitable, and effective pathways for students.

Current Math Structure

- **Grades K-3 Grade Level Math Flexible Grouping**

- Flexible Groups that are differentiated. Within BOE Policy Guidelines can go up to 22 students.
- Students may receive resource room replacement, general education grade level with basic skills and gifted support occurring in the classroom.

- **Grades 4-5 Grade Level Math Static Grouping**

- Static Groups that are Homogenous and constant. Average group size 9 students (exception is resource room).
- Grouping is tied to the teachers schedules (specifically our Coordinated Services Teachers) and therefore remain constant for students.
- All are grade level standards and grouped by High Grade Level, Mid Grade Level, Low Grade Level.
- Accelerated and Resource Room – students may not be on the grade level curriculum.
- A greater number of teachers are involved in the process of teaching the grade level content.

- **Grades 6-8 Grade Level Math Flexible Grouping**

- Flexible Groups that are differentiated. Within BOE Policy Guidelines can go up to 25 students.
- Heterogeneously grouped. Accelerated, Grade Level, Resource Room – Average group size is 19 students (exception is resource room).
- Accelerated students will take Algebra in 8th grade. This will not change and non accelerated students can still accelerate post 8th via multiple paths in High School where they will complete AP Calculus and follow a developmentally appropriate acceleration path based on their strengths and interests.

Flexible and Mixed Ability Grouping

- Flexible grouping is the practice of **dynamically grouping students based on specific learning needs, strengths, or skills**, allowing for movement between groups as students grow and develop. Rather than locking students into accelerated tracks early, **flexible grouping** allows for dynamic, responsive instruction that meets students where they are—and helps them grow from there.
- Research supports the benefits of flexible and mixed-ability grouping in elementary mathematics. Studies have shown that heterogeneous grouping fosters deeper mathematical understanding, increases student confidence, and reduces the negative effects of early tracking (Boaler, 2016; Tomlinson, 2014).
- Depth of learning matters just as much as speed. Differentiated Instruction based on data. This approach ensures that all students receive rigorous and differentiated instruction within their classrooms, allowing them to develop problem-solving skills collaboratively and at their own pace.

Academic Experts Partnering with Hanover

Dr. Eric Milou – Rowan University

- Mathematics Professor specializing in K–12 curriculum and instruction
- Co-author of *EnVisions Math* and *Daily Routines to Jump-Start Math Class*
- Former President, Association of Mathematics Teachers of NJ
- Board Member, National Council of Supervisors of Mathematics
- Awards: Max Sobel Outstanding Educator, Rowan's Joseph Barnes Service Award

Nancy Shultz – Conquer Mathematics

- Mathematics Education Specialist, Montclair State University
- Collaborates with school districts on professional development and consulting
- Focuses on conceptual understanding and effective pedagogy to improve math outcomes
- Dedicated to improving student achievement through research-based instructional strategies and curriculum design
- Works closely with teachers to model lessons, design interventions, and promote high-quality math instruction

Best Practices on Math Grouping and Acceleration

- Currently, we are one of the only districts in Morris County and greater surrounding area that accelerates students in elementary school and do not provide flexible grouping for grade level math in Grades 4 and 5.
- While well-intentioned, this practice is outdated and not aligned with current research on best mathematical learning progressions.
- The shift to flexible grouping and acceleration in middle school is designed to ensure that we provide developmentally appropriate and research-backed pathways for all students to thrive in mathematics.

Districts who DO NOT Accelerate until Middle School

- Randolph Township
- Jefferson Township
- Roxbury Township
- Washington Township
- Kinnelon
- Parsippany – Troy Hills
- Florham Park
- East Hanover
- Cedar Grove
- Livingston
- Pequannock
- Millburn
- Morris School District
- Bedminster
- Plainfield
- Mendham
- Denville
- Fort Lee
- Old Tappan
- Wayne
- Florham Park
- Madison

Skipping Foundational Skills and Content When Accelerating

- Currently, we make decisions on when to accelerate students when they are 8 years old (end of Grade 3). Students who are deemed accelerated will skip Grade 4 Math.
- Skipping content means missing out on important concepts that form the foundation. Early acceleration can lead to learning gaps (Illustrative Mathematics, 2020).

Grade 4 Mathematics

Operations and Algebraic Thinking (OA)

Use the four operations (+, −, ×, ÷) with whole numbers to solve problems. Factor pairs: Find all factor pairs for a whole number up to 100. Generate and analyze patterns, such as numerical sequences and rules.

Number and Operations in Base Ten (NBT)

Place value understanding for multi-digit whole numbers. Read, write, and compare numbers up to 1,000,000. Round numbers to any place. Perform multi-digit arithmetic using the standard algorithm (addition, subtraction). Multiply 4-digit numbers by 1-digit numbers and 2-digit by 2-digit.

Number and Operations—Fractions (NF)

Understand equivalent fractions and how to generate them. Compare fractions with different numerators and denominators. Add and subtract fractions with like denominators. Multiply a fraction by a whole number (e.g., $2 \times \frac{1}{4}$). Understand fraction and decimal relationships (tenths and hundredths).

Measurement and Data (MD)

Solve problems involving measurement and conversion of measurements (e.g., inches to feet). Represent and interpret data using line plots. Understand area and perimeter, especially for rectangles. Measure angles and understand concepts of angle measurement.

Geometry (G)

Draw and identify lines and angles (points, lines, line segments, rays). Classify shapes by properties of their lines and angles (right, acute, obtuse). Recognize and draw lines of symmetry.

Math Confidence is the Ultimate Goal of K-8

- Example: A study from the National Council of Teachers of Mathematics (NCTM) found that students with a strong K-8 foundation outperform those who accelerate too soon.
- Research indicates that students who accelerate too early often struggle in high school calculus and beyond.
- Students who skip pre-algebra often struggle later (CavsConnect, 2023)

Our Goal is to Promote the Following for All Learners

- **A Growth Mindset**
Students understand that math ability isn't fixed—everyone can grow with effort and support (Dweck, 2006).
- **Flexible Grouping for all students K-8 (not just K-3 and 6-8)**
Groups shift based on real-time data and progress, allowing all students to get the right support or challenge when they need it (IES Practice Guide, 2009).
- **Peer Learning & Rich Discussions**
Students benefit from hearing diverse strategies and thinking, improving understanding for all (Boaler, 2016).
- **Ensure Equity and Access to All Students**
Flexible grouping reduces the risk of tracking students by race, language, or income—common outcomes in fixed acceleration models (NCTM, 2018).
- **A Future Pathway to Acceleration that is Open**
Delaying formal acceleration decisions prevents early gatekeeping and keeps advanced math options available later (Oakes, 2005).

Our Goal is to Promote the Following for All Learners

- **A Strong K-8 Foundation:**
 - Ensures students thrive in advanced courses, rather than just surviving them.
- **Success in Advanced Courses:**
 - Strong elementary and middle school foundations correlate with AP Calculus success (MDPI, 2022).
- **Building Depth over Speed Promotes Higher Retention Rates:**
 - Conceptual understanding improves long-term math skills.
- **Cognitive Readiness:**
 - Students develop abstract thinking skills around ages 11-13, making them better prepared for algebra and beyond.
 - Example: A high school student who took Algebra I too soon without full mastery might struggle with Calculus because they never truly internalized algebraic manipulation.

We Will Accomplish This By Doing the Following:

- Not make many changes to what we are currently doing.
- Not change or effect students who are currently in their Accelerated Math classes.
- Take a measured and slow approach to moving the entry to Accelerated Math from Grade 4 to Grade 6. This will take three school year.
 - 2025-2026 School Year – Use flexible grouping in the Grade 4 and 5 math classes to meet all student needs. Accelerated Math will continue in Grade 5.
 - 2026-2027 School Year – Use flexible grouping in the Grade 4 and 5 math classes to meet all student needs. At the conclusion of Grade 5, determinations will be made for Accelerated Math prior to entering Grade 6.
 - 2027-2028 School Year – Begin accelerating students in math class in Grade 6 (age 11) and provide flexible pathways into and out of accelerated math throughout middle school. Algebra 1 will be the 8th grade Accelerated Math class same as now and student who are in this path will take AP Calculus as a Senior in High School.

Empowering and Supporting Our Educators

Strengthening Instructional Supports

- Differentiate for All Learners
- Enhanced Co-Teaching
- Drive Grouping with Data
- Maximize In-Class Supports and Coordinated Services Teachers
- Expand Summer Curriculum Work
- Invest in Math PD
- Refine Scheduling

Benefits of Moving the Entry to Acceleration from Grade 4 to Grade 6

- Middle school math courses are designed to provide structured acceleration options.
- At the conclusion of Grade 5, students are assessed for readiness to accelerate in Grades 6-8.
- Grade 5 teachers will use district adopted criteria to make recommendations for acceleration.
 - Example:
 - Grade 6 Accelerated Math is a specialized course that incorporates both Grade 6 and 7 standards.
 - Grade 7 Accelerated Math is Pre-Algebra which is the current offering.
 - Grade 8 Accelerated Math is Algebra I which is the current offering.
- Advanced pathways ensure students can still take Calculus/AP courses in high school if desired.
- Students will still have opportunities to be considered for acceleration at any time from Grades 6-12.

Benefits of Moving the Entry to Acceleration from Grade 4 to Grade 6

- Our acceleration model will be redesigned to be child-centered, research-based, and developmentally appropriate. The National Council of Teachers of Mathematics (NCTM, 2018) and studies such as those by Siegler & Lortie-Forgues (2015) emphasize that premature acceleration can lead to gaps in foundational understanding and negatively impact long-term mathematical success.
- By shifting acceleration to begin in 6th grade, we ensure that students have had the opportunity to build a strong conceptual foundation, setting them up for advanced coursework in later grades.

Recap and Closing

- Current math curriculum will not change.
- A strong elementary foundation leads to success in advanced math.
- Our slow and methodical approach to restructuring the entry of accelerated math will take three years to complete and be age and developmentally appropriate thereby ensuring that all students have equitable access and exposure.
- Delaying accelerated math until middle school will have a zero negative impact on high school achievement and beyond. Students will continue to have equal opportunities to accelerate and achieve the same current levels of Mathematics in high school and beyond.
- Grades 4 and 5 grade level math will use flexible grouping and differentiation of instruction for all students. Instead of excluding students and creating static groups we will be bringing supports to assist and accelerate students into the grade level homeroom class. Being exclusive and labeling students at a young age is not developmentally appropriate.
- Grouping and Services will be more inclusive and occur in the least restrictive environment.

References

- "Guidance for Accelerating Students in Mathematics," Illustrative Mathematics, 2020.
- "Cognitive Foundations of Early Mathematics," MDPI, 2022.
- "Cognitive Skills and Contributions to Math Development," Journal of Cognition, 2022.
- "Accelerated Math: Beneficial or Counterproductive?" CavsConnect, 2023.
- "Increasing Mathematics Achievement and Accelerating Learning," WestEd, 2023.
- Siegler, R. S., & Lortie-Forgues, H. (2015). Conceptual knowledge of fraction arithmetic. *Journal of Educational Psychology*, 107(3), 909–918.
- Boaler, J. (2016). *Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages and Innovative Teaching*. Jossey-Bass.
- Tomlinson, C. A. (2014). *The Differentiated Classroom: Responding to the Needs of All Learners* (2nd ed.). ASCD.

Next Steps

- Continued Professional Development for Teachers
 - Differentiation of Instruction
 - Flexible Grouping
 - Co-Teaching
 - Data Analysis
- Grades 3-5 Curriculum Evening May 22nd
 - SDS Media Center 6:30 – 8:30PM