



Maryland

STATE DEPARTMENT OF EDUCATION

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PreK- 12 Mathematics Policy

Mathematics Branch

Office of Teaching and Learning Instructional Programs & Services

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I. Purpose

The PreK- 12 Maryland Mathematics Policy is designed to catalyze significant improvements to teaching, learning, and achievement in mathematics from early childhood through secondary grades across Maryland.

This policy aligns with and advances the foundational goals of [The Blueprint for Maryland's Future](#) by prioritizing equitable access to rigorous, relevant, high-quality mathematics education for all students in grades Prekindergarten through 12. This policy outlines recommendations for implementation of a coherent math program and support structure that guides students' mathematical development from early childhood through high school. Herein, we focus teaching and learning in mathematics to ensure that students can both conceptually understand and fluently apply math concepts, skills, and strategies. Thus, students will be positioned to further extend these experiences beyond the classroom and apply mathematical skills to their daily lives and future aspirations.

According to data from the 2022 administration of NAEP, 31% of 4th-grade students in Maryland scored at or above proficiency in math, in comparison to 35% of students nationally. Data from the 2022 NAEP administration showed that 25% of Maryland 8th graders scored at or above proficient in math, compared to 26% of students nationally. Historically, Maryland students have exceeded the national proficiency rate in grades 4 and 8, but in recent years, this trend has shifted. Additionally, in 2024, [data from Maryland's state assessment](#), the Mathematics Maryland Comprehensive Assessment Program (MCAP), revealed that student outcomes improved from School Year 2022-2023 across all grade levels, but have not returned to pre-pandemic performance outcomes and remain below Maryland's expectations for student mathematical proficiency.

Acknowledging these challenges with student achievement in mathematics across the state, this policy extends a deep commitment to instructional equity. Maryland State Department of Education (MSDE) and Maryland State Board of Education are committed to building comprehensive systems of support to ensure that all students receive appropriate instructional support when they struggle. These systems must include meaningful daily on-grade-level standard aligned instruction and equitable access to intervention and acceleration which will support student success from Prekindergarten through advanced math pathways in mathematics for all students across Maryland.

Central to this policy is a redesign of the core secondary mathematics sequence to ensure that all students are mathematically college and career ready by the end of 10th grade and have multiple pathways and opportunities to explore rigorous mathematics content thereafter. This readiness equips all students to successfully pursue a diverse range of advanced mathematics pathways, tailored to their interests and future goals. Fundamentally, secondary mathematics success is built on a strong foundation of numeracy in the early and intermediate grades and the development of algebraic thinking and abstraction in the middle grades (SAP, 2021; Siegler et al., 2012).

In addition, the policy acknowledges the historical barriers to high-quality math experiences that exclusionary tracking creates, particularly for historically marginalized student groups (Francis & Darity, 2021; Irizarry, 2021; NCTM, 2018). It therefore is explicit about moving away from exclusionary tracking

and creating structures that create authentic opportunities for all students to engage in advanced math throughout the PreK-12 progression.

Key policy recommendations also include development and implementation of ongoing, job-embedded professional learning opportunities for all educators that promote equitable teaching practices, implementation of High-Quality Instructional Materials (HQIMs) and data-driven pedagogical approaches. Policy implementation will be monitored through the establishment of systemized standardized grade level standard aligned assessments across Local Education Agencies (LEAs). These assessments will evaluate students' progress in defined areas of numeracy development and will enable consistent progress monitoring and support the strategic analysis of student-level data. LEAs will also review and respond to annual student data aligned to equitable access and student outcomes in advanced mathematics. To support implementation, MSDE and LEAs will collectively launch initiatives to involve and support families, communities, and local organizations in mathematics education through regular forums and workshops across the state.

The policy's key strategic recommendations were developed through collaboration with the PreK-12 and higher education math community, including the Charles A. Dana Center Launch Years Initiative. To align recommendations with local context, community feedback played an important role in shaping these policy recommendations.

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II. Definitions

Throughout this policy, several key terms are used. The following section defines these terms as they are intended within the context of this policy's development.

- A. **Essential Content** refers to the core mathematical concepts and skills necessary for students to achieve readiness for algebra and college and career pathways. This includes number sense, fluency with fractions, algebraic thinking, geometry, data, and measurement (NCTM, 2014; National Mathematics Advisory Panel, 2008).
- B. **Responsible Acceleration** (also *Appropriate Acceleration*) refers to an evidence-based, continuous process that provides students with multiple opportunities to advance in mathematics based on their readiness and interest. It ensures that acceleration decisions are data-driven, flexible, and equitable, using a multi-tiered approach that includes in-class on-ramps such as differentiating up (see Definition C). This approach tailors support to individual student needs, and offers advanced content and scaffolds at various stages, starting in early elementary and continuing through high school. The goal is to ensure that all students, regardless of background, have access to advanced mathematics and acceleration opportunities that meet the needs of their mathematical development (NCTM, 2018; NAGC, 2014; Charles A. Dana Center, 2020).
- C. **Differentiating Up** refers to the practice of offering advanced learning opportunities and content to students who demonstrate readiness without moving them to the next course or condensing content. This approach provides opportunities for challenge and growth that act as a potential on-ramp to acceleration. Differentiating up helps avoid rigid tracking and allows all students to access advanced mathematics when appropriate (NAGC, 2014).
- D. **Equitable Access** ensures that all students, particularly those from historically marginalized and underserved groups, receive the support, resources, and opportunities they need to succeed in mathematics. Unlike *equal* opportunity, which treats all students the same, *equitable access* requires a deliberate and intentional approach that addresses historical and systemic barriers to participation in advanced mathematics (DiME, 2007; Leonard, 2009). *Equitable access focuses on ensuring that students who have been historically excluded are intentionally included in advanced pathways and acceleration opportunities, with structures in place to support their success.*
- E. **Equitable Teaching Practices** ensure that all students, especially those from groups that have been historically marginalized in mathematics education, have meaningful engagement with grade-level content and beyond. These practices are intentional and responsive and provide differentiated support and attention to uplift students who might otherwise become disengaged. By tailoring support to individual needs and focusing on building conceptual understanding rather than relying on rote procedures to support students, equitable teaching helps remove barriers to learning, fosters a sense of belonging in mathematics, and cultivates the ability to apply mathematical ideas in new contexts (NCTM, 2018).

- F. **Exclusionary Tracking** refers to the practice of placing students into rigid learning tracks, often arbitrary and based on assumptions about their abilities, which limits their future opportunities in mathematics (NCTM, 2018; Oakes, 2005; Oakes & Guiton, 1995).
- G. **Integrated Algebra** refers to intentional integration of algebra, geometry, and statistics to showcase their interconnected nature for a cohesive and deeper understanding of mathematics. With this approach, students are provided opportunities to use different areas of math (algebra, statistics, geometry) as a lens through which they develop a more holistic understanding of concepts traditionally taught in isolation. For example, students can explore concepts like quadratic relationships not only through the lens of algebra but also by analyzing their graphical representations in geometry and modeling real-world data in statistics.
- H. **Advanced Mathematics** refers to coursework beyond the foundational levels of algebra, geometry, and statistics, including calculus, data analytics, and quantitative reasoning.
- I. **Advanced Math Pathways** offer themed mathematical experiences starting no later than 11th grade that feature advanced mathematics courses that support students in building a unique, tailored path to mathematical college and career readiness. These pathways are aligned with students' goals and interests and increase the relevance of secondary mathematics by acknowledging student autonomy in choosing their own mathematical path. Pathway options include Quantitative Reasoning, Data and Data Analytics, Algebraic Foundations of Calculus, and Statistics and Probability.

III. Advancing Numeracy Through Consistent, Clear, and Effective Mathematics Instruction

- A. This policy is grounded in the commitment to provide every student with meaningful math experiences that emphasize the development of numeracy.
- B. The development of numeracy is supported by mathematics instruction that is both intentional and visible (Hattie et al., 2017) across Tiers I, II, and III. When implemented strategically and systematically, effective mathematics instruction guides students' development of conceptual understanding and procedural fluency, also ensuring that clearly defined processes and goals are transparently communicated. This visible mathematics instruction is grounded in the following principles (NMAP, 2008):
 - 1. Teachers set and communicate clear learning goals to ensure students understand the purpose and focus of their learning and what success looks like.
 - 2. Teachers provide clear models for strategically solving problems with a series of examples.
 - 3. Teachers actively make connections to prior mathematical knowledge, skills, or experiences to promote internalization of new concepts and support students' learning progression.
 - 4. Students are provided with extensive opportunities to practice new skills in a variety of contexts, with deliberate connections made to prior mathematical knowledge.
 - 5. Students are provided space to discuss their approaches with their peers and teachers.
 - 6. Teachers consistently provide timely and specific feedback to guide the mathematics learning progression.
- C. Students demonstrate mathematical proficiency by jointly developing conceptual understanding of and procedural fluency with mathematical concepts, that then can be applied to various problem-solving contexts (NMAP, 2008).
 - 1. Concepts are to be introduced and developed through an appropriate balance of the concrete, semi-concrete or representational, and abstract approach.
 - 2. Instruction should lead students to develop flexible, accurate, and efficient application of mathematical strategies, including the informed use of standard algorithms.
 - 3. Students should develop automaticity, that is the ability to recall facts quickly, accurately, and with little effort, in order to lighten cognitive load and enable more complex problem solving.
- D. The pathway to college and career numeracy develops within four interconnected content domains as students progress from early elementary to secondary mathematics learning experiences. Each domain reflects a developmental progression from fundamental concepts in early grades to advanced skills in high school, and provides students with a multidimensional understanding of numerical and algebraic relationships, spatial awareness and geometric modeling capabilities, proficient data literacy and critical statistical reasoning skills:
 - 1. Number and Operational Sense - Early numeracy development begins with foundational skills in counting, place value, and basic operations which provide the foundation for proportional reasoning. As students progress through their

understanding of whole numbers, fractions, decimals, ratios, and percentages, they build fluency in interpreting and manipulating numerical information. This developmental trajectory enables students to recognize and make use of structure, attend to precision, and reason flexibly about numerical relationships, including proportionality.

2. Algebraic Reasoning - The progression of algebraic thinking starts with identifying and analyzing patterns to create mathematical models. Students advance from early pattern recognition to exploring functions (e.g., linear, exponential, and quadratic) and developing symbolic representations to model mathematical phenomena. As they deepen their algebraic thinking, they learn to algebraically express regularity in repeated reasoning, construct viable arguments, and critique the algebraic reasoning of others as they solve authentic problems in collaborative spaces.
 3. Geometric Reasoning - Development in geometrical reasoning begins with recognizing shapes, symmetry, and measurement concepts. Over time, students expand their spatial awareness to include transformations, trigonometry, and spatial modeling. As they progress, students engage in conjecture, reasoning inductively and deductively, and verifying their conclusions. They learn to use multiple representations to analyze and reason about spatial phenomena and apply these skills to solve both abstract and practical problems.
 4. Reasoning with Data and Statistics - The ability to reason with data and statistics develops as students move from organizing and interpreting information to engaging with variability, probability, and uncertainty. As they progress, they develop statistical models, analyze patterns, and question data sources critically. This growth includes using tools and technology to synthesize information and communicate findings effectively. By the time they reach advanced levels, students are prepared to apply data-driven decision making in complex, real-world contexts.
- E. Adoption and effective implementation of High Quality Instructional Materials (HQIM) supports students in the progression of numeracy development.
- F. Students' attitudes toward math, tied to their math identity, need consistent support throughout their learning journey. To build positive math identities, instruction should include opportunities for mathematical modeling and reasoning, exploring connections between ideas, and strengthening reasoning skills through productive struggle and collaboration. Additionally, students should have experiences that help them see themselves as capable mathematicians, develop a sense of belonging in the mathematics classroom, and recognize the relevance of mathematics in their lives and communities (Aguirre, et al., 2013).

IV. Policy Standards

A. ACCESS AND EQUITABLE OPPORTUNITIES

1. By School Year (SY) 2025-2026, LEAs shall review and revise all scheduling policies and practices to reduce or eliminate exclusionary tracking in mathematics education and ensure inclusive classrooms where all students have access to effective mathematics instruction and robust supports aligned to HQIM. School schedules should be aligned to the expectations below:
 - a. In early grades (PreK-2), there should be no tracking by homeroom or math classes. Enrichment and small group instruction should be utilized to deepen and accelerate student learning.
 - b. In elementary grades (3-5), schools are strongly encouraged to maintain heterogeneous homerooms and may consider regrouping students for mathematics class on a periodic or annual basis. Students should never be permanently grouped by ability.
 - c. In middle grades (6-8), schools must offer accelerated mathematics courses and should maximize the number of students accessing accelerated pathways to access Integrated Algebra I by 8th grade for students who demonstrate readiness.
 - d. In high school (9-12), schools must provide access to a variety of advanced mathematics pathways that align with different career and academic interests.
 - e. Students who demonstrate challenges with mathematics content should always remain enrolled in mathematics courses aligned to grade-level standards in addition to appropriate co-requisite support courses when warranted (Alexander et al., 2003; Fong et al., 2014; Logue et al., 2019).
2. By SY 2026-2027, LEAs must implement a Multi-Tiered System of Supports (MTSS) for math instruction tailored to meet community and student needs. MTSS ensures real-time, evidence-based support aligned with grade-level standards, structured across three tiers:
 - a. **Tier 1:** High-quality, differentiated instruction in the classroom by licensed math teachers using HQIM. It includes scaffolding for struggling students, enrichment for advanced learners, and fostering a supportive environment to reduce math anxiety and promote confidence.
 - b. **Tier 2:** Small-group instruction for students needing additional support beyond Tier 1. Lessons align with HQIM, reinforce core content, and provide opportunities for deeper engagement with math concepts.
 - c. **Tier 3:** Intensive, individualized support for students with significant needs. This includes tailored interventions, foundational skill building, and mentoring for emotional growth and confidence.
 - i. Tier 2 and Tier 3 support supplements but does not replace Tier 1 instruction.
 - ii. All materials must align with grade-level standards and HQIM.
 - iii. School and district leaders should prioritize MTSS in math to enhance student proficiency by the end of elementary school. Further details are in MSDE's MTSS guidance.
3. Beginning SY 2026-2027, LEAs shall adhere to the minimum requirement of mathematics instructional minutes as outlined in guidance.

4. Beginning in SY 2026-2027, all schools and districts must develop and implement accelerated mathematics course pathways that allow all students entering grades 3-7 to have an opportunity for acceleration at least once a school year based on universal screening and student progress review.
 - a. Mathematics course acceleration pathways should never include skipping content standards for any grade level (NMAP, 2008; NCTM, 2014).
 - b. LEAs shall regularly monitor the effectiveness of inclusive classrooms, responsible acceleration strategies, and advanced mathematics pathways. LEAs will be required to submit annual reports to MSDE detailing student outcomes, the success of the implemented strategies, and any adjustments made to improve inclusivity and support. MSDE will develop and communicate a template for reporting by January 1, 2027.
 - c. LEAs are responsible for ongoing engagement with parents and students to communicate the benefits and expectations of the new mathematics pathways and support structures. MSDE will provide resources to support communication.
 - d. LEA acceleration pathways must include differentiated pathways that allow for a student to decelerate when appropriate.
 - i. All students enrolled in accelerated pathways must demonstrate mastery in course content to maintain enrollment.
 - ii. LEAs and schools are responsible for providing timely and robust supports for students who struggle in accelerated courses.
 - e. LEAs must initiate an Automatic Acceleration Planning Process for any student who achieves the highest proficiency level on state assessments to determine the most suitable acceleration pathway. Students who demonstrate the highest level of proficiency on the state assessment are to be evaluated by a school-based committee for accelerated learning.
 - f. Full expectations for acceleration practices can be found in MSDE's Responsible Acceleration guidance.
5. Beginning in SY 2027-2028, all schools must shift from the current Algebra I – Geometry – Algebra II (AGA) secondary mathematics course progression to an Integrated Algebra 1 and Integrated Algebra 2 course progression that launches students into their chosen mathematics pathway.
6. In high school, schools and districts must provide access to a variety of advanced mathematics pathways that align with different career and academic interests.
 - a. In alignment with the Launch Years recommendations, advanced math pathways include Quantitative Reasoning, Data and Data Analytics, Algebraic Foundations of Calculus, and Statistics and Probability as outlined in the Math Guidance documents. School leaders must ensure that these pathways are flexible and allow for movement between them based on student progress or evolving interests.
 - b. District leaders are encouraged to develop innovative models for course offerings including but not limited to dual enrollment and centralized courses in cases where there are limited course offerings.

- c. Consistent with COMAR 13A.03.02.03 and the Launch Years recommendations to create a more coherent and equitable mathematics pathway (Dana Center, 2020), high school mathematics graduation requirements beginning with any student who enrolls in Algebra for the first time in school year 2027-2028 shall be updated to reflect:
 - i. four credits and four years of mathematics
 - ii. two of the four credits with instruction in Integrated Algebra 1 and Integrated Algebra 2 aligned with the statewide assessment for Algebra
 - iii. two credits aligned to courses in Advanced Mathematics Pathways in which Integrated Algebra is a prerequisite
7. LEAs are responsible for ongoing engagement with parents and students to communicate the benefits and expectations of the new mathematics pathways and support structures. MSDE will provide resources to support communication.

B. COLLEGE AND CAREER READINESS MATH STANDARD PROGRESSION

1. LEAs shall prepare for full implementation of the revised mathematics standards and course progression for grades PreK- 12 by SY 2028-2029.
 - a. Beginning in SY 2026-2027, LEAs shall implement curriculum and instruction aligned to Prekindergarten through Grade 8 MCCR mathematics standards.
 - b. Beginning in SY 2027-2028, LEAs shall implement curriculum and instruction aligned to PreK-Integrated Algebra 1 math standards for all students enrolled in Algebra for the first time.
 - c. Beginning in SY 2028-2029, LEAs shall implement curriculum and instruction aligned to PreK-Integrated Algebra 2 math standards for all students who completed Integrated Algebra 1 the prior school year.
 - d. Beyond SY 2028-2029, all students should follow the PreK – 12 course sequence culminating in advanced math pathways as outlined in MSDE guidance.
 - e. Revised math standards will include an emphasis on the development of fluency with number operations and algebraic procedures as well as explicit connections to financial literacy application.
 - f. MSDE shall develop repositories where the mathematics education community can access instructional resources to support implementing revised math standards, including the integrated course sequence and financial literacy application.
2. Beginning in SY 2027-2028, all advanced math courses must be aligned to advanced math pathway standards.

C. SYSTEM OF SUPPORT FOR EDUCATORS

1. Beginning in Spring 2025, LEA system and instructional leaders shall engage in professional learning and information sessions to understand the upcoming changes and start aligning their planning with the revised math standards and prioritized instructional strategies being developed by MSDE.
2. By Fall 2025, LEAs shall identify a team of school-based educators, instructional and system leaders, and counselors to participate in the initial professional learning and serve as LEA

liaisons to support shifts in math standards, Integrated Algebra courses, and advanced math pathways.

- a. MSDE will lead initial professional learning, transitioning to a collaborative model with LEA liaisons to build LEA capacity for ongoing professional learning.
 - b. This team will be responsible for ongoing collaboration and feedback with MSDE.
3. By Spring 2027, MSDE will develop a Maryland Effective Mathematics Teaching course. This course will be available to all math educators and school-based leaders as a component of their Individualized Professional Development Plan (IPDP) towards licensure renewal. LEAs shall collaborate with MSDE to communicate the availability of this course to all educators and provide ongoing opportunities for educator course participation.

D. ASSESSMENT AND ACCOUNTABILITY

1. By Summer 2025, MSDE will develop a Numeracy Development Framework. This will include a grade-by-grade description of the progression toward mathematical college and career readiness, aligned with the identified components of numeracy in Section III. This progression will outline the essential mathematical skills and understandings at each grade level to guide progress monitoring and inform the development of targeted support structures.
2. Beginning in SY 2025-2026, LEAs must identify and implement common curriculum embedded assessments (CEAs) aligned to grade level standards across all schools from grades PreK- 8. LEAs should also develop systems to monitor progress on CEAs across the district by student group and action plan to improve student outcomes across all students.
3. Beginning in Fall 2027, MSDE will provide an annual statewide assessment data analysis report to LEAs. LEAs will be expected to review this data and their own collected equity data and develop an annual report that outlines strengths, areas of improvement, and planned actions to address any disparities. The first report will be submitted in Winter 2027.
Key data points for analysis will include:
 - a. Proficiency levels by cohort in grades 3-8
 - b. Proficiency levels for accelerated students
 - c. Progress for students performing at Level 1
 - d. Integrated Algebra 1 participation and proficiency by grade level
4. Beginning in SY 2026-2027, LEAs are expected to engage with families and students to share student numeracy development progression.
 - a. Families of students in Grades PreK- Integrated Algebra must be notified at least twice a year (December and June) if their child is not progressing in alignment with grade level standards based on their progress on CEAs.
 - b. LEAs must develop a clear communication plan that outlines how families are notified about their child's progress and interventions in place in alignment with the MTSS math framework.
5. Beginning with the graduating class of 2030-2031 (students in grade 9 or below in school year 2027-2028), the Math Mastery option of the College and Career Readiness standard shall be updated to reflect the revised MCCR math standards and course progression.

6. Beginning in SY 2027-2028, earning a final course grade of A, B, or C in an Advanced Mathematics Pathways course in which Integrated Algebra is a prerequisite will be included in the Math Mastery option of the CCR standard.
7. Beginning in SY 2028-2029, LEAs shall administer the Integrated Algebra statewide assessment to all students enrolled in Integrated Algebra 2 in the Winter testing window. In the final quarter and summer of each school year, LEAs shall provide responsive interventions and retesting opportunities to support students in reaching proficiency.
8. Beginning Spring 2025, MSDE shall initiate a statewide effort to engage families, community members, and local organizations in supporting mathematics education.
 - a. Beginning in SY 2025-2026, LEAs shall implement their community engagement initiatives developed in collaboration with MSDE, focusing on sustaining long-term partnerships.
 - b. LEAs should collaborate with MSDE to provide training and resources to support school - based educators to effectively engage with families and the community about this Mathematics Policy.

VI. Timeline Overview

Timeline	Policy Implementation
Winter- Spring 2025	<ul style="list-style-type: none"> • MSDE Mathematics Policy Adoption
Spring- Fall 2025	<ul style="list-style-type: none"> • Adoption of revised mathematics standards for PreK- Integrated Algebra 2 • Mathematics Policy Guidance Documents released • Initial Community & Educator Engagement Sessions • MSDE Numeracy Development Framework released
Beginning in School Year 2025-2026	<ul style="list-style-type: none"> • Ongoing professional learning with LEA Liaisons • LEA led professional learning beginning by Spring 2026 • Equitable scheduling practices implemented • LEAs implement common grade level standard aligned assessments across all schools
Beginning in School Year 2026- 2027	<ul style="list-style-type: none"> • Implementation of revised standards for PreK-8 • Ongoing professional learning • LEAs implement a Multi-Tiered System of Supports (MTSS) for mathematics instruction • MSDE Maryland Effective Mathematics Teaching course released • Required parent notification for student mastery of grade level standard progress

Timeline	Policy Implementation
Beginning in School Year 2027-2028	<ul style="list-style-type: none">• Implementation of revised standards and course for Integrated Algebra 1• LEA annual data reflection and action reports• All students enrolled in advanced math courses aligned to advanced math pathway standards.
Beginning in School Year 2028-2029	<ul style="list-style-type: none">• Implementation of revised standards and course for Integrated Algebra 2• Integrated Algebra State Assessment

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VII. Responsibilities

Local Education Agencies (LEAs), The Maryland State Department of Education (MSDE), and the Maryland State Board of Education will collaboratively work to ensure that all students across Maryland have equitable access to high-quality mathematics instruction to prepare them for their college and career aspirations. This collaboration requires a shared system of responsibilities:

LOCAL EDUCATION AGENCY RESPONSIBILITIES

1. Collaborate with MSDE to implement policies that promote equitable access to high-quality mathematics instruction and eliminate exclusionary tracking as outlined in MSDE guidance.
2. Adopt and implement instruction aligned to the revised MCCR math standards and course progression.
3. Develop and implement grade level aligned standard assessment systems to identify students ready for intervention and acceleration and provide support structures and family communication.
4. Provide ongoing professional learning for all educators to ensure consistency in implementation of equitable math instruction aligned to grade level standards and numeracy development progression.
5. Regularly monitor and report the effectiveness of implementation of courses aligned to MCCR mathematics standards, including the new integrated algebra courses, and the success of advanced mathematics pathways.
6. Provide opportunities for continuous engagement with all stakeholders regarding district's math programming and progress.

MARYLAND STATE DEPARTMENT OF EDUCATION RESPONSIBILITIES:

1. Develop statewide guidance that overviews strategies and structures to eliminate exclusionary tracking in mathematics education, facilitate inclusive math classrooms, and ensure that all students have access to advanced mathematical courses with appropriate support.
2. Provide guidance and resources to support implementation of courses aligned to MCCR mathematics standards, including the new integrated algebra courses and advanced mathematics pathways.
3. Develop guidelines, protocols, and resources to assist LEAs in implementing inclusive and responsible acceleration including Numeracy Development Framework, MTSS guidelines, templates for monitoring and reporting, and annual LEA data reports.

4. Provide ongoing professional learning opportunities and resources to educators, system and instructional leaders, counselors, and support staff to support equitable mathematics education statewide.
5. Monitor the implementation of these initiatives and adjust as needed.
6. Provide opportunities for continuous engagement with all stakeholders regarding statewide math programming and progress.

MARYLAND STATE BOARD OF EDUCATION RESPONSIBILITIES

1. Review and approve the Mathematics Policy developed by MSDE.
2. Review the implementation of this policy in alignment with equity in mathematics education for all Maryland students by analyzing LEA and MSDE annual reports.

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References

- Academic Senate of the California State University Quantitative Reasoning Task Force (CSUQR). (2016). *Quantitative reasoning task force final report*. <https://www.calstate.edu/csu-system/faculty-staff/academic-senate/Documents/reports/QRTF.FinalReport.KSSF.pdf>
- Aguirre, J. M., Mayfield-Ingram, K., & Martin, D. B. (2013). *The impact of identity in K-8 mathematics: Rethinking equity-based practices*. National Council of Teachers of Mathematics.
- Akar, G. K., Zembat, İ. Ö., Arslan, S., & Thompson, P. W. (Eds.). (2023). *Quantitative Reasoning in Mathematics and Science Education* (Vol. 21). Springer Nature.
- Alexander, K. L., Entwisle, D. R., & Dauber, S. L. (2003). *On the success of failure: A reassessment of the effects of retention in the primary grades* (2nd ed.). Cambridge University Press.
- American Institutes for Research (AIR). (2023). *Maryland College and Career Readiness Empirical Study: Final Report*. American Institutes for Research. Retrieved from <https://www.air.org/project/maryland-college-and-career-readiness-empirical-study>
- American Mathematical Association of Two-Year Colleges (AMATYC). (2014). *Position on the appropriate use of intermediate algebra as a prerequisite course*. <https://amatyc.org/page/PositionInterAlg>
- Atteberry, A., Lacour, S. E., Burris, C., Welner, K., & Murphy, J. (2019). Opening the gates: Detracking and the International Baccalaureate. *Teachers College Record*, 121(9), 1–63. https://www.colorado.edu/education/sites/default/files/attached-files/openingthegates_tcr_2019_1008.pdf
- Black, S. E., Muller, C., Spitz-Oener, A., He, Z., Hung, K., & Warren, J. R. (2021). The importance of STEM: High school knowledge, skills and occupations in an era of growing inequality. *Research Policy*, 50(7), 104249. <https://doi.org/10.1016/j.respol.2021.104249>
- Boaler, J. (2019, October). Opinion: Modern high school math should be about data science – not Algebra 2. *Los Angeles Times*. www.latimes.com/opinion/story/2019-10-23/math-high-school-algebra-data-statistics.
- Booth, J. L., Newton, K. J., & Twiss-Garrity, L. K. (2014). The impact of fraction magnitude knowledge on algebra performance and learning. *Journal of Experimental Child Psychology*, 118, 110–118. <https://doi.org/10.1016/j.jecp.2013.09.001>
- Byun, S. Y., Irvin, M. J., & Bell, B. A. (2015). Advanced math course taking: Effects on math achievement and college enrollment. *Journal of Experimental Education*, 83(4), 439–468. <https://doi.org/10.1080/00220973.2014.919570>
- Conference Board of Mathematical Sciences (CBMS). (2016). Active learning in post-secondary mathematics education. <https://www.cbmsweb.org/2016/07/active-learning-in-post-secondarymathematics-education/>

- Chen, X., National Center for Education Statistics (ED), & RTI International. (2013). STEM Attrition: College Students' Paths into and out of STEM Fields. Statistical Analysis Report. NCES 2014-001. *National Center for Education Statistics*. <https://nces.ed.gov/pubs2014/2014001rev.pdf>
- Charles A. Dana Center. (2020). Launch Years: A new vision for the transition from high school to postsecondary mathematics. *Austin, TX: Charles A. Dana Center at the University of Texas at Austin*. <https://utdanacenter.org/launchyears> .
- Charles A. Dana Center. (2024). *Mathematics Pathways: Ensuring all students benefit from relevant, rigorous mathematics pathways*. University of Texas at Austin.
- Daro, P., & Asturias, H. (2019). Branching out: Designing high school math pathways for equity. *Berkeley, CA: Just Equations*. <https://justequations.org/resource/branching-out-designing-high-school-math-pathways-for-equity> .
- DiSessa, A. A. (2018). Computational literacy and “the big picture” concerning computers in mathematics education. *Mathematical thinking and learning*, 20(1), 3-31. <https://doi.org/10.1080/10986065.2018.1403544>
- Diversity in Mathematics Education (DiME) Center for Learning and Teaching. (2007). Culture, race, power and mathematics education. In F. K. Lester (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 405–433). Charlotte, NC: Information Age.
- Douglas, D., Logue, A. W., & Watanabe-Rose, M. (2023). The long-term impacts of corequisite mathematics remediation with statistics: Degree completion and wage outcomes. *Educational Researcher*, 52(1), 7–15. <https://doi.org/10.3102/0013189x221138848>
- Erickson, T. (2019). Awash with Data: An introduction to Data Science and data moves with CODAP. <https://codap.xyz/awash/>
- Fong, A. B., Jaquet, K., & Finkelstein, N. (2014). *Who repeats Algebra I, and how does initial performance relate to improvement when the course is repeated?* (REL 2015-059). U.S. Department of Education.
- Francis, D. V., & Darity, W. A. (2021). Separate and unequal under one roof: How the legacy of racialized tracking perpetuates within-school segregation. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 7(1), 187-202. <https://doi.org/10.7758/rsf.2021.7.1.11>
- GAISE College Report ASA Revision Committee. (2016). Guidelines for Assessment and Instruction in Statistics Education (GAISE) college report 2016. https://www.amstat.org/asa/files/pdfs/GAISE/GaiseCollege_Full.pdf
- Gould, R. (2010). Statistics and the modern student. *International Statistical Review*, 78(2), 297-315. <https://doi.org/10.1111/j.1751-5823.2010.00117.x>
- Gould, R. (2023, December 27). *All students need to learn data science*. EdSource. <https://edsources.org/2023/all-students-need-to-learn-data-science/703117>

Grouws, D. A., Tarr, J. E., Chávez, Ó., Sears, R., Soria, V. M., & Taylan, R. D. (2013). Curriculum and implementation effects on high school students' mathematics learning from curricula representing subject-specific and integrated content organizations. *Journal for Research in Mathematics Education*, 44(2), 416-463. <https://doi.org/10.5951/jresmetheduc.44.2.0416>

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- Gutiérrez, R. (2018). The need to rehumanize mathematics. In I. Goffney, R. Gutiérrez, & M. Boston (Eds.), *Annual perspectives in mathematics education: Rehumanizing mathematics for Black, Indigenous, and Latinx students* (pp. 1–10). Reston, VA: National Council of Teachers of Mathematics.
- Gutstein, E. (2012). *Reading and writing the world with mathematics: Toward a pedagogy for social justice*. Routledge.
- Hattie, J., Fisher, D., & Frey, N. (2017). *Visible learning for mathematics: What works best to optimize student learning*. Corwin.
- Irizarry, Y. (2021). On track or derailed? Race, advanced math, and the transition to high school. *Socius*, 7. <https://doi.org/10.1177/2378023120980293>
- Leonard, J. (2009). “Still not saved”: The power of mathematics to liberate the oppressed. In D. B. Martin (Ed.), *Mathematics teaching, learning, and liberation in the lives of Black children* (pp. 304–330). New York: Routledge.
- Logue, A. W., Douglas, D., & Watanabe-Rose, M. (2019). Corequisite mathematics remediation: Results over time and in different contexts. *Educational Evaluation and Policy Analysis*, 41(3), 294–315. <https://doi.org/10.3102/0162373719848777>
- Maryland State Department of Education (MSDE). (2024). *Blueprint for Maryland's future*. Maryland Public Schools. <https://blueprint.marylandpublicschools.org/>
- National Association for Gifted Children (NAGC). (2014, March 22). *Differentiating curriculum and instruction for gifted and talented students* [Position statement]. National Association for Gifted Children. <https://www.nagc.org>
- Mathematical Association of America (MAA). (2004). Undergraduate programs and courses in the mathematical sciences: CUPM Curriculum Guide 2004.
- National Association for the Education of Young Children (NAEYC) & National Council of Teachers of Mathematics (NCTM). (2010). *Early childhood mathematics: Promoting good beginnings*. Joint position statement of NAEYC and NCTM. Washington, DC: NAEYC.
- National Center on Education and the Economy (NCEE). (2013). *What Does It Really Mean to Be College and Work Ready?*. Retrieved from <https://ncee.org/book-report/what-does-it-really-mean-to-be-college-and-work-ready>.
- National Council of Supervisors of Mathematics (NCSM), & TODOS: Mathematics for All. (2016). *Mathematics education through the lens of social justice: Acknowledgment, actions, and accountability*. Aurora, CO: NCSM and TODOS.
- National Council of Teachers of Mathematics (NCTM). (2014). *Principles and Standards for School Mathematics*. Reston, VA: NCTM.

- National Council of Teachers of Mathematics (NCTM) (2018). *Catalyzing Change in High School Mathematics*. National Council of Teachers of Mathematics.
- National Mathematics Advisory Panel. (2008). *Foundations for success: The final report of the National Mathematics Advisory Panel*. U.S. Department of Education. Retrieved from <https://files.eric.ed.gov/fulltext/ED500486.pdf>
- Oakes, J. (2005). *Keeping track: How schools structure inequality*. Yale University Press.
- Oakes, J., & Guiton, G. (1995). Matchmaking: The dynamics of high school tracking decisions. *American Educational Research Journal*, 32(1), 3-33. <https://doi.org/10.2307/1163210>
- Patall, E. A., Cooper, H., & Robinson, J. C. (2008). The effects of choice on intrinsic motivation and related outcomes: A meta-analysis of research findings. *Psychological Bulletin*, 134(2), 270–300. <https://doi.org/10.1037/0033-2909.134.2.270>
- President's Council of Advisors on Science and Technology (PCAST). (2012). *Engage to Excel: Producing one million additional college graduates with degrees in STEM*". Washington, DC: White House Office of Science and Technology Policy. https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/fact_sheet_final.pdf .
- Riegle-Crumb, C., King, B., & Irizarry, Y. (2019). Does STEM stand out? Examining racial/ethnic gaps in persistence across postsecondary fields. *Educational Researcher*, 48(3), 133–144. <https://doi.org/10.3102/0013189x19831006>
- Rose, H., & Betts, J. R. (2001). *Math matters: The links between high school curriculum, college graduation, and earnings*. San Francisco: Public Policy Institute of California.
- Saxe, K., Braddy, L., Bailer, J., Farinelli, R., Holm, T., & Mesa, V. (2015). *A common vision for undergraduate mathematical sciences programs in 2025*. Washington, DC: Mathematical
- Schoen, H. L., & Hirsch, C. R. (2020). The Core-Plus mathematics project: Perspectives and student achievement. In *Standards-Based School Mathematics Curricula* (pp. 311-344). Routledge.
- Siegler, R. S., Duncan, G. J., Davis-Kean, P. E., Duckworth, K., Claessens, A., Engel, M., Susperreguy, M. I., & Chen, M. (2012). Early predictors of high school mathematics achievement. *Psychological Science*, 23(7), 691–697. <https://doi.org/10.1177/0956797612440101>
- Steen, L. (2001). *Mathematics and democracy: The case for quantitative literacy*. Woodrow Wilson Natl Foundation.
- Student Achievement Partners (SAP). (2021). *Preparation for Success in Algebra: Exploring Math Education Relationships by Analyzing Large Data Sets (EMERALDS)*. Retrieved from <https://www.achievethecore.org/successinalgebra>.
- Tarr, J. E., Grouws, D. A., Chávez, Ó., & Soria, V. M. (2013). The effects of content organization and curriculum implementation on students' mathematics learning in second-year high school

courses. *Journal for Research in Mathematics Education*, 44(4), 683-729.

<https://doi.org/10.5951/jresmetheduc.44.4.0683>

Tauer, S. (2002). How does the use of two different mathematics curricula affect student achievement?

A comparison study in Derby, Kansas. Retrieved from

<https://files.eric.ed.gov/fulltext/ED511909.pdf> .

U.S. Bureau of Labor Statistics. (2021, September 8). *Highest paying occupations*.

<https://www.bls.gov/ooh/highest-paying.htm>

U.S. Department of Education. (2021). *Raise the Bar: Postsecondary and Career Pathways*. Retrieved

from <https://www.ed.gov/raisethebar/postsecondary-pathways> .

University System of Maryland (USM). (2019). *First in the world Maryland mathematics reform initiative*

(FITW MMRI): Project overview. University System of Maryland. [http://ts3.nashonline.org/wp-](http://ts3.nashonline.org/wp-content/uploads/2019/05/FITW-MMRI_One-pager_2019-04-1631.pdf)

[content/uploads/2019/05/FITW-MMRI_One-pager_2019-04-1631.pdf](http://ts3.nashonline.org/wp-content/uploads/2019/05/FITW-MMRI_One-pager_2019-04-1631.pdf)

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