IOWA | Department of Education

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Iowa Comprehensive State Mathematics Plan 2025-26

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Introduction

The Iowa Comprehensive State Mathematics Plan (Iowa CSMP) sets a bold vision for mathematics education, ensuring that every student, from early childhood through high school, becomes a confident and capable problem-solver. Aligned with House File 784 (HF 784), the plan strengthens instruction, intervention, and educator preparation to raise achievement and close opportunity gaps across the state of Iowa. This document serves as the plan for the first year of a multi-year comprehensive plan. The first year of the Iowa CSMP will focus on kindergarten through grade six, building a strong mathematics foundation for students to continue to build on in grades seven through twelve and beyond. The multi-year comprehensive mathematics plan will be created during the 2025-26 school year.

Purpose and Goals

Grounded in coherence and continuous improvement, this comprehensive multi-year plan articulates a unified vision focused on early numeracy, conceptual understanding, procedural fluency, and high expectations for all learners. While the goals outlined in the plan reflect long-term statewide priorities, Year 1 activities are intentionally focused on foundational improvements in K–6 mathematics. The plan employs a systems-level approach to ensure instruction is consistent, intentional, and equitable, providing students with timely and targeted support.

Four overarching goals guide the Iowa CSMP:

1. **All students** demonstrate growth and proficiency across all areas of mathematics—including number sense, algebraic thinking, geometry, measurement, data analysis, and problem-solving—from early learning through graduation, prepared for success in STEM fields, technical careers, and higher education.

2. **Every school** is staffed with effective, qualified, and well-trained educators who provide evidence-based instruction across K–12, ensuring students build deep conceptual understanding and procedural fluency.

3. **Every school** implements a Multi-Tiered System of Supports (MTSS), grounded in high-quality universal instruction and informed by valid and reliable screening and progress monitoring tools, to provide timely and targeted interventions that improve mathematics outcomes.

4. **Families and communities** are essential partners in the learning of mathematics. Every learning community fosters mathematical knowledge and a shared responsibility among stakeholders to enhance outcomes for all students.

Through these commitments, the Iowa CSMP advances a vision where every student is mathematically proficient, confident in problem-solving, and prepared to thrive in an increasingly data-driven world.

Alignment with Iowa State Board of Education Goals and Outcomes

The Iowa CSMP aligns directly with the Iowa State Board of Education's overarching goals to promote equity in education by closing achievement and opportunity gaps and ensuring high-quality teachers and leaders are in every school. Through its clearly defined goals, targeted actions, and use of evidence based practices, the Iowa CSMP provides a statewide framework for advancing both priorities.

The Iowa CSMP supports the Iowa State Board of Education's goal of promoting equity and closing gaps by prioritizing early numeracy development and system-wide coherence in instruction, ensuring that students develop strong foundational skills from the earliest grades. The plan mandates the use of valid and reliable mathematics screeners and progress monitoring tools to identify K–6 students who are persistently at risk, ensuring these students receive timely, personalized intervention. Through the implementation of personalized mathematics plans and a Multi-Tiered System of Supports (MTSS), the plan guarantees that all students receive high-quality core instruction alongside targeted supports. Support is further reinforced through the development of family-centered resources, accessible mathematics guides, and real-world engagement strategies designed to extend learning into the home environment.

The Iowa CSMP supports the Iowa State Board of Education's goal of ensuring high-quality teachers and leaders through an immediate investment in targeted professional development for K–6 teachers and instructional coaches in schools most in need, ensuring alignment with the Iowa Academic Standards for Mathematics and High-Quality Instructional Materials (HQIMs). It strengthens the educator pipeline by requiring teacher preparation programs to include coursework and demonstrated competency in number sense, learning progressions, and evidence-based practices in mathematics. The plan also increases educator confidence and instructional capacity through job-embedded professional learning and implementation support grounded in evidence-based strategies. Additionally, school leaders are supported through aligned coaching models and clear, statewide expectations for instructional improvement.

Together, these actions ensure that Iowa's approach to mathematics education is systemic, equitable, and grounded in the belief that every student deserves access to effective instruction and every educator deserves the necessary resources to deliver quality instruction.

Why Mathematics is Important

Mathematics proficiency is a gateway to opportunity. In today's rapidly evolving world, numeracy is not only essential for everyday problem-solving but also the foundation for participation in an increasingly data- and technology-driven economy. According to the U.S. Bureau of Labor Statistics, STEM occupations are projected to grow 10.4% between 2023 and 2033—nearly three times the growth rate of non-STEM jobs (3.6%)—making mathematical competence a prerequisite for success across disciplines such as engineering, healthcare, advanced manufacturing, computer science, and skilled trades (U.S. Bureau of Labor Statistics, 2023).

Early numeracy is a powerful predictor of long-term academic achievement. While early literacy is critical, research continues to show that early mathematical understanding is often more strongly associated with later academic success across subjects. A recent longitudinal study found that kindergarten mathematics proficiency was a significant predictor of fifth-grade reading and mathematics performance, highlighting early numeracy as a critical foundation for later learning (Nguyen et al., 2016). Additional research reinforces this connection: a 2024 Urban Institute study found that improvements in childhood mathematics achievement had a stronger correlation with adult earnings than improvements in reading or health outcomes (Acs, Werner, Blagg, et al., 2024). While mathematical understanding is a powerful predictor of long-term success, it is important to recognize that mathematics and literacy development are deeply interconnected—improvements in one often support growth in the other. Strengthening early numeracy can enhance comprehension, problem-solving, and reasoning, while strong literacy skills support students in articulating mathematical thinking and engaging with complex tasks.

However, national and state data consistently reveal persistent gaps in opportunity and achievement in mathematics. Addressing these gaps through evidence-based instruction, timely interventions, and family engagement is not only a matter of academic achievement—it is an economic imperative. By equipping every Iowa student with strong math skills and the confidence to use them, we're opening doors to future success - in the classroom, the workforce, and the world.

State of Mathematics in Iowa

Student Achievement Data

According to the 2024 National Assessment of Educational Progress (NAEP) results, Iowa ranks 30th in the nation for 4th-grade mathematics for all students and 23rd for 8th-grade mathematics. Iowa's students with disabilities and students who are English Learners (ELs) have experienced some of the most significant achievement gaps in the nation. While Iowa ranked 30th for 4th-grade mathematics for all students, it ranked 42nd in the nation in the achievement experienced by students with disabilities and 42nd in the nation for English Learners (ELs). Additionally, while Iowa ranked 23rd for 8th-grade mathematics for all students, it ranked 35th in the nation in the achievement experienced by students with disabilities and 37th in the nation for English Learners (ELs).

Statewide, 68.1% of Iowa's students are proficient in mathematics as measured by Iowa's 2024 Statewide Assessment of Student Progress (ISASP). Comparably, 28.5% of students with disabilities and 24.3% of English Learners (ELs) achieved proficient levels. Graph 1: 2024 Iowa Statewide Assessment of Student Progress Mathematics Proficiency Results and Table 1: 2024 Iowa Statewide Assessment of Student Progress Mathematics Proficiency Results provide an overview of the performance discrepancies for students with disabilities and English Learners (ELs) across grades 3-11.

Graph 1: 2024 Iowa Statewide Assessment of Student Progress Mathematics Proficiency Results (Iowa Department of Education, 2024)

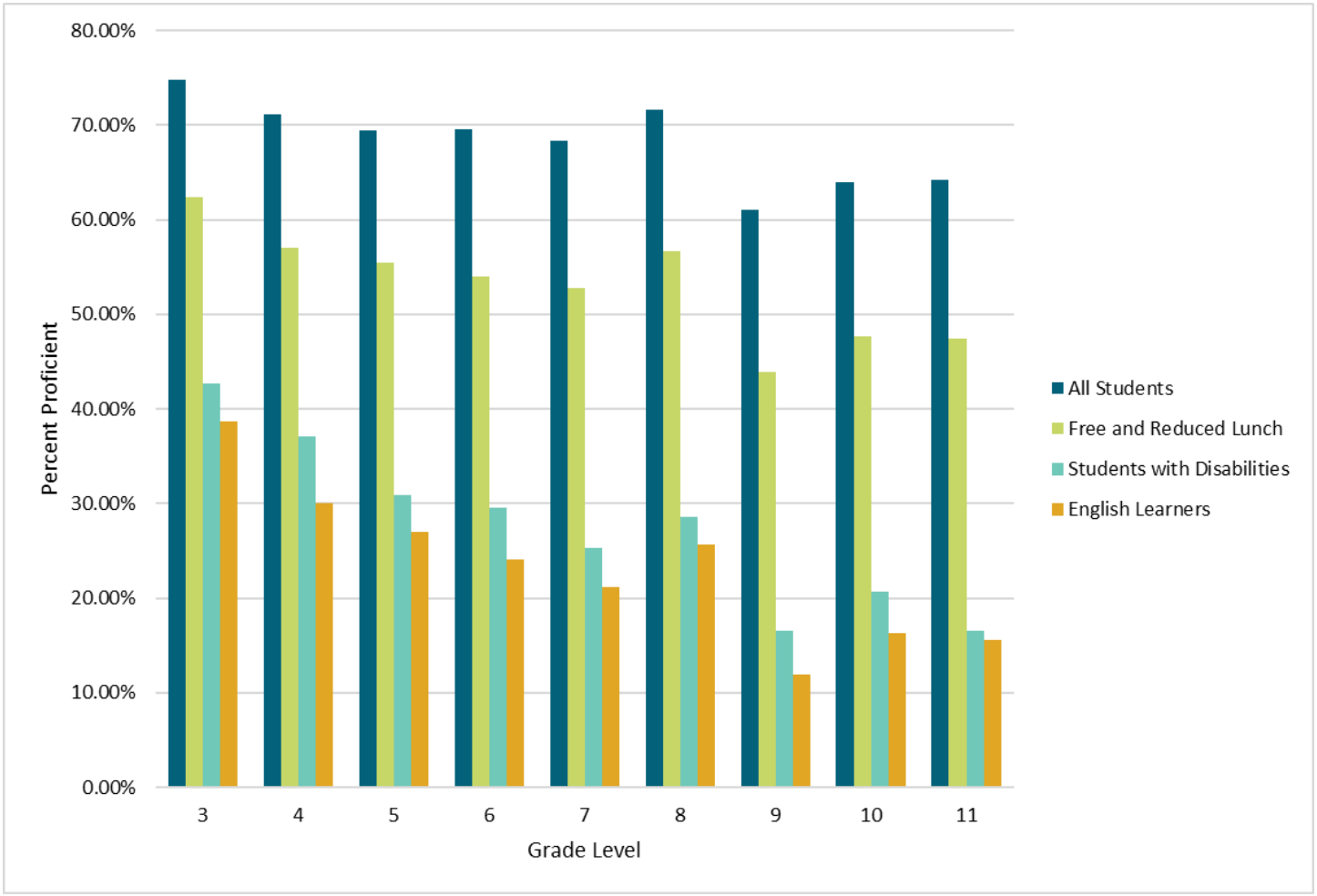


Table 1: 2024 Iowa Statewide Assessment of Student Progress Mathematics Proficiency Results (Iowa Department of Education, 2024)

Grade Level	All Students	Free and Reduced Lunch	Students with Disabilities	English Learners
3	74.80%	62.40%	42.70%	38.70%
4	71.10%	57.10%	37.10%	30.00%
5	69.40%	55.50%	30.90%	27.00%
6	69.60%	54.00%	29.50%	24.10%
7	68.30%	52.80%	25.30%	21.20%
8	71.60%	56.70%	28.60%	25.70%
9	61.10%	43.90%	16.50%	11.90%
10	64.00%	47.70%	20.70%	16.30%
11	64.20%	47.40%	16.50%	15.60%

Access to Algebra II and Upper-Level Mathematics Courses

Expanding access to Algebra II and upper-level mathematics courses begins with a strong K-6 foundation, building deep conceptual understanding and confidence in K-6; we lay the groundwork for all students to thrive in the Iowa High School Mathematics Pathways. Students who complete the standards in Iowa's Algebra II bundle, updated May 2024, are more likely to attend college—predominantly two-year institutions—and demonstrate stronger college persistence and graduation outcomes. More recent research reinforces this connection: taking mathematics in 12th grade, including courses such as the standards in Iowa's Algebra II or more advanced mathematics, provides a significant boost to students' completion of college preparatory coursework and has moderately positive effects on both college enrollment and persistence (Wainstein, Miller, Phillips, Yamashiro, & Melguizo, 2023).

By ensuring students complete the standards in Iowa's Algebra II bundle, Iowa's high school graduates are better positioned for postsecondary success, avoiding remedial mathematics courses. Even beyond traditional STEM fields, the standards in Iowa's Algebra II bundle cultivate essential cognitive skills—analytical thinking, quantitative reasoning, and problem-solving—that benefit a wide range of disciplines and career paths. Graph 2: Percentage of Class of 2024 Students Taking Algebra II or Upper-Level Mathematics, and Table 2 illustrates the discrepancy between student groups in terms of enrollment in Algebra II or upper-level mathematics courses. This data includes only students who enrolled in Iowa public high schools during each of the four years, from 9th to 12th grade.

Graph 2: Percent of Class of 2024 Students Taking Algebra II or Upper-Level Mathematics (Iowa Department of Education, 2024)

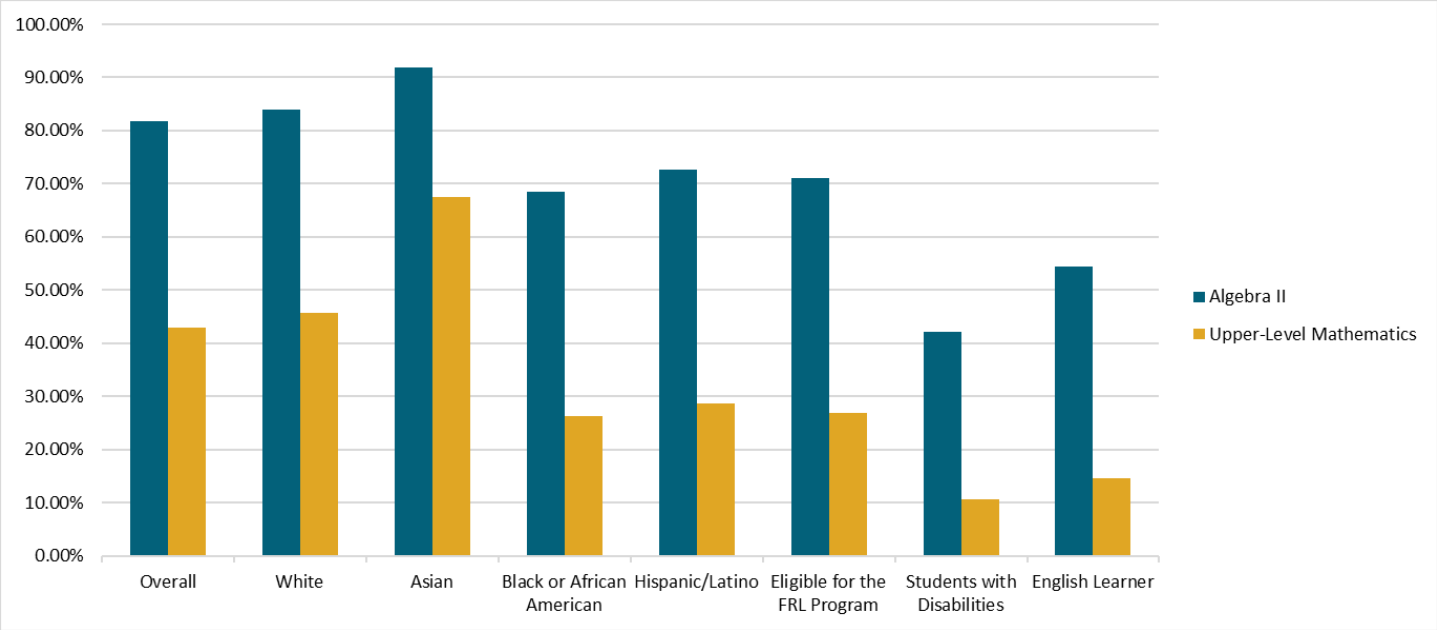


Table 2: Percent of Class of 2024 Students Taking Algebra II or Upper-Level Mathematics (Iowa Department of Education, 2024)

Student Group	Algebra II	Upper-Level Mathematics
Overall	81.70%	42.90%
White	84%	45.70%
Asian	91.80%	67.50%
Black or African American	68.40%	26.30%
Hispanic/Latino	72.60%	28.70%
Eligible for FRL Program	71.10%	26.80%
Students with Disabilities	42.10%	10.70%
English Learner	54.40%	14.50%

Post-Secondary Readiness

Students who are not ready for college-level mathematics often begin their postsecondary journey in developmental or remedial courses—classes that do not count toward a degree or credential. According to the State of Iowa Postsecondary Readiness Report (2024), 5.4% of Iowa high school graduates who enrolled in Iowa public colleges between 2020 and 2022 took a remedial mathematics course within one year of graduation (p. 2). This figure excludes those attending community colleges or institutions outside Iowa.

Reducing the need for remediation is important, but it's only part of the solution. Ensuring that all students complete rigorous coursework—such as Iowa's Algebra II standards bundle—better prepares them for success across a wide range of postsecondary pathways, including military service, skilled trades, technical training,

and direct entry into the workforce. A strong foundation in mathematics strengthens problem-solving, quantitative reasoning, and adaptability—skills that are critical across all career fields. (National Center for Education Statistics, NCES, 2023). Research by Molina and Montti (2013) supports this approach: high school students who complete Iowa's Algebra II standards bundle are more likely to experience positive job market outcomes, including higher earnings and lower unemployment rates. Graph 3: Iowa Public High School Graduates Who Enrolled in an Iowa Public College and Took a Remedial Mathematics Class Within One Year of Graduation, and Table 3 highlights how rates of developmental mathematics vary across student groups, reinforcing the importance of early readiness and equitable access to rigorous coursework.

Graph 3: Iowa Public HS Graduates Who Enrolled in an Iowa Public College and Took a Remedial Mathematics Class Within 1 Year of HS Graduation, Classes of 2020-2022 (Iowa Department of Education, 2024)

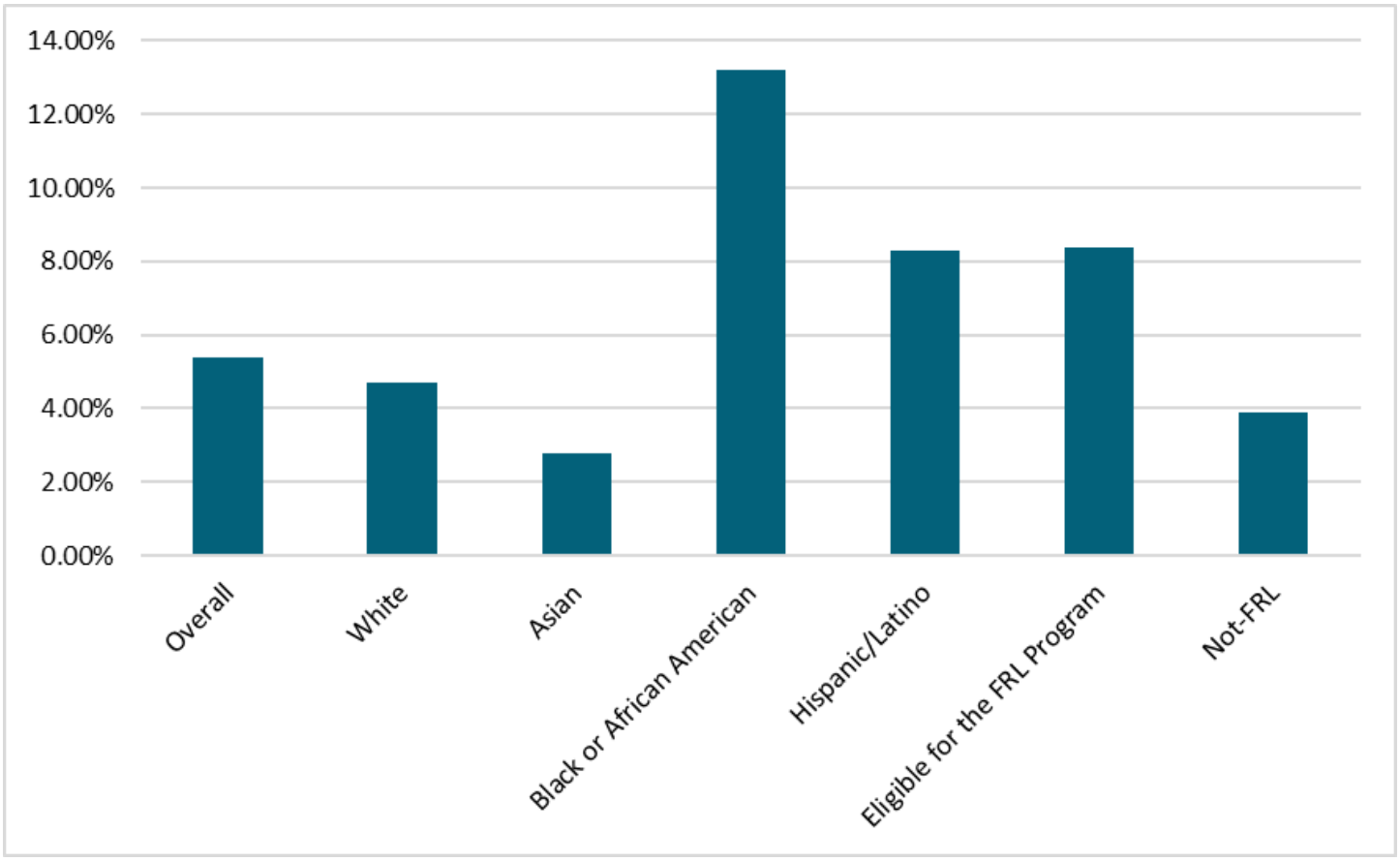


Table 3: Iowa Public HS Graduates Who Enrolled in an Iowa Public College and Took a Remedial Mathematics Class Within 1 Year of HS Graduation, Classes of 2020-2022 (Iowa Department of Education, 2024)

Student Group	Percent of Students
Overall	5.40%
White	4.70%
Asian	2.80%
Black or African American	13.20%
Hispanic/Latino	8.30%
Eligible for FRL Program	8.40%
Not-FRL	3.90%

Recent Iowa Department of Education Efforts to Improve Mathematics

The Iowa Department of Education has taken several critical steps to strengthen mathematics instruction and alignment across the state:

Revised Iowa Academic Standards for Mathematics

The 2024 revision of the Iowa Academic Standards for Mathematics provides a clear, coherent, and focused roadmap for instruction from kindergarten through high school. These standards were updated to reflect the most current research on how students learn mathematics and to align with national best practices in mathematics education.

The revised standards emphasize:

- The instructional shifts of focus (prioritizing instructional time on major content in each grade), coherence (connecting learning within and across grades), and rigor (balancing conceptual understanding, procedural skill, and application).
- Deep conceptual understanding as the foundation for procedural fluency.
- Progressions of learning that build across grade levels, ensuring coherent development of number sense, algebraic thinking, geometry, measurement, data analysis, and problem-solving.
- Mathematical practices that foster problem-solving, communicating reasoning, and modeling and data analysis.
- Instructional alignment with High-Quality Instructional Materials (HQIM), ensuring that content is taught in ways that are accessible, engaging, and rigorous. When educators have access to HQIM, they can focus their energy on planning and delivering strong instruction rather than curating resources to teach the standards.

To support educators in translating these standards into effective classroom practice, the Iowa CSMP includes Appendix A, which outlines the instructional shifts, language-rich mathematics routines (e.g., number talks, mathematical discourse), and high-leverage teaching practices (e.g., facilitating meaningful discourse, eliciting

student thinking) embedded in the standards. This appendix serves as a practical companion to the standards, helping educators implement them with integrity and impact.

Together, the revised standards and accompanying guidance in Appendix A provide a shared foundation for HQIM implementation, professional learning, and instructional improvement across the state.

Model High School Course Pathways

In today's rapidly evolving academic and professional landscapes, students must develop critical thinking and problem-solving skills that position them for long-term success. Among these foundational competencies, mastery of Algebra 1 content serves as a pivotal gateway. Algebra 1 not only lays the groundwork for advanced mathematics but also fosters the analytical reasoning skills essential for college readiness, technical education, and career pathways—including those in STEM, healthcare, manufacturing, and skilled trades.

Algebra 1 content supports academic growth by helping students recognize and apply mathematical relationships, thereby bridging abstract concepts with real-world problem-solving. As students progress through Algebra 1, they build cognitive flexibility and critical thinking skills that support success across disciplines. Educators play a crucial role in ensuring students have early and equitable access to this foundational content—ideally before or by 9th grade, and where appropriate, through accelerated pathways that begin in 8th grade.

To support schools in designing effective course progressions, the Department provides model high school course pathways that reflect multiple ways to bundle and sequence standards. These bundles offer flexible examples of how all required high school mathematics standards may be taught across a three-year sequence. Districts retain local control to determine how best to organize courses and tailor pathways to meet the needs of their students. For example, Integrated Mathematics I, II, and III can be used in place of a traditional Algebra 1–Geometry–Algebra II standards bundle sequence, so long as all students have the opportunity to learn the full breadth of Iowa's required high school mathematics standards.

In addition to meeting the core requirements, a fourth year of high school mathematics is strongly encouraged as part of students' college and career preparation. Engaging in an advanced fourth-year mathematics course offers significant benefits, including:

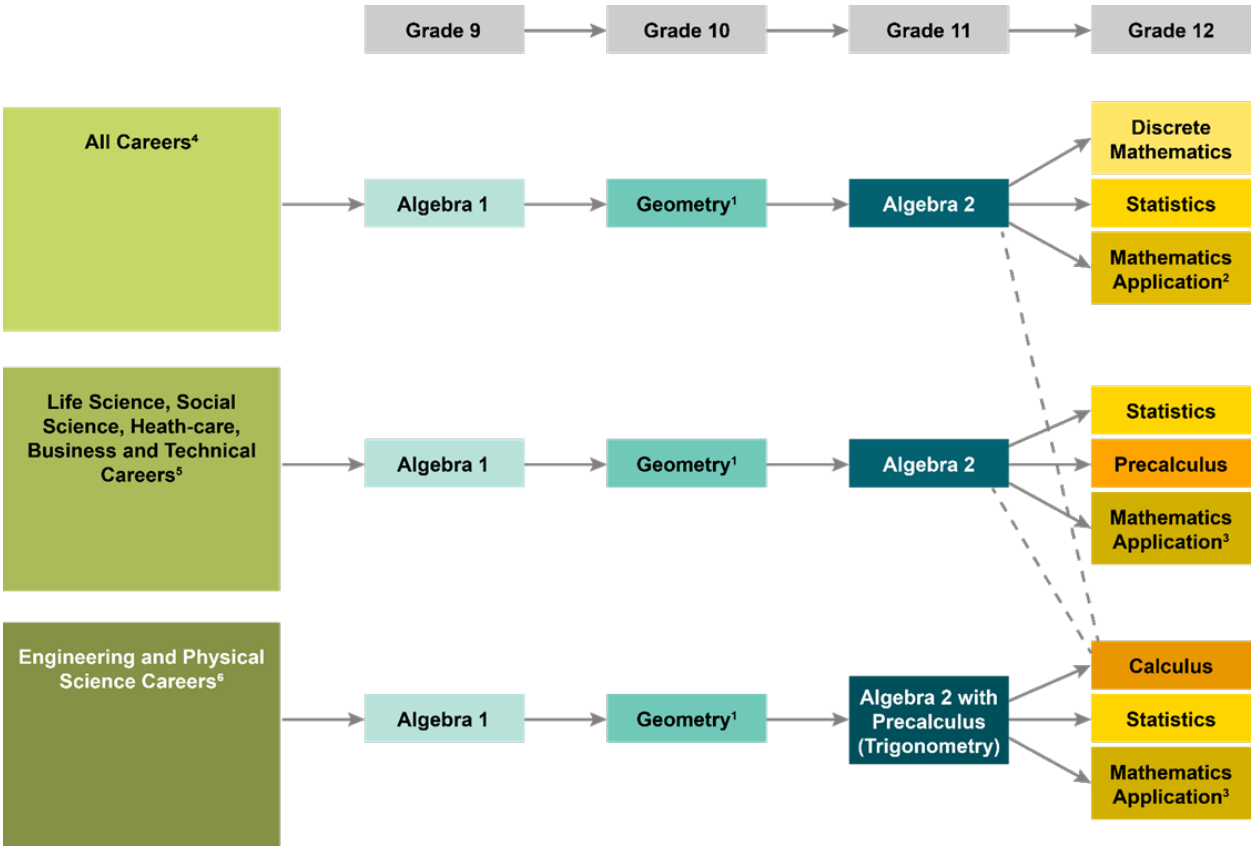
- Strengthened college and career readiness
- Expanded mathematical knowledge and preparation for advanced study
- Improved standardized test performance
- Development of logical reasoning and cognitive skills
- Broader access to postsecondary opportunities and career fields

Taken together, these pathways ensure all students experience a rigorous and relevant high school mathematics education that opens doors for future success.

Model Pathways and SCED Codes

To support local decision-making and ensure alignment with the Iowa Academic Standards for Mathematics, the Department provides SCED (School Codes for the Exchange of Data) code guidance for model high school course pathways. These codes help districts accurately report coursework aligned to Algebra 1, Geometry, Algebra II, and advanced electives such as data science, mathematical modeling, and financial algebra. The model pathways and SCED codes are non-prescriptive and designed to offer flexibility while maintaining coherence and rigor across multiple mathematics trajectories. Model Pathways SCED Codes

Figure 1: Iowa High School Mathematics Model Pathways



Flexibility in Mathematics Pathways

Schools have flexibility in how they structure mathematics pathways, as long as all required standards are met. For example, Integrated Mathematics I, II, and III may be used in place of the Algebra I, Geometry, and Algebra II standards bundle, provided that all required standards are addressed.

The course options below support diverse student goals and align with the standards most frequently addressed within each bundle.

Course Descriptions and Standards Alignment

- Algebra I Bundle (required standards): Develops students' understanding of expressions, equations, and functions. Students solve linear, quadratic, and exponential equations, reason with the real number system, and explore data through graphs and models. Emphasis is placed on building and interpreting functions, as well as applying mathematics to real-world problems.
- Geometry Bundle (required standards): Builds students' understanding of shapes, space, and reasoning. Students explore congruence, similarity, and right triangle trigonometry using transformations and proofs. The course also includes coordinate geometry, constructions, volume, and applications of probability in real-world contexts.
- Algebra II Bundle (required standards): Extends knowledge of expressions, equations, and functions. Students investigate polynomials, rational, exponential, and logarithmic functions, as well as complex numbers. The course introduces trigonometric functions and statistical reasoning, with an emphasis on modeling and real-world applications.
- Advanced Trigonometry and Algebra Topics ("Algebra II-Plus"): Prepares students for Calculus by deepening Algebra II content and introducing key Precalculus concepts. Students study advanced functions, trigonometry, and limits, with a focus on developing algebraic fluency, functional reasoning, and problem-solving skills.

- Statistics and Probability: Focuses on analyzing data, drawing conclusions, and making decisions under uncertainty. Students engage with data distributions, statistical inference, and probability models. Key topics include experimental design, conditional probability, expected value, and the analysis of real-world data.
- Precalculus: Deepens understanding of functions and algebraic structures in preparation for college-level mathematics. Students explore polynomial, rational, exponential, logarithmic, and trigonometric functions, as well as identities, analytic geometry, sequences, series, vectors, and matrices. Emphasis is placed on modeling, multiple representations, and reasoning.
- Calculus: Introduces foundational concepts in differential and integral calculus. Students analyze limits and continuity, apply derivatives to model change, and explore integrals to determine area and accumulate quantities. Topics include differential equations and real-world applications, with an emphasis on conceptual understanding and procedural fluency.

Pathway Considerations and Additional Course Options

- The dashed line in Figure 1: Iowa High School Mathematics Pathways indicates where a Trigonometry or Precalculus course may be needed to ensure readiness for Calculus.
- Geometry standards include algebraic concepts that reinforce geometric reasoning and maintain coherence across the mathematics pathway.
- Mathematics in Trades/Careers and Financial Algebra may serve as rigorous fourth-year mathematics options, particularly for students pursuing applied career pathways.
- Additional fourth-year courses—such as Data Science, Advanced Mathematical Modeling, or Discrete Mathematics—can be offered to align with students' postsecondary interests and goals.
- Students on the All Careers pathway may shift into the Calculus pathway in their senior year if they complete a summer or semester bridge course (as indicated by the dashed arrow in the figure).
- Students pursuing Life Science, Social Science, Healthcare, Business, or Technical Careers may also transition to the Calculus pathway in their senior year if they complete the required bridge coursework.
- Students on the Engineering and Physical Science Careers pathway may choose to take Statistics or Mathematics Applications instead of Calculus during their senior year, depending on their academic and career plans.

Mathematics High-Quality Instructional Materials

The Iowa Department of Education supports the selection and use of High-Quality Instructional Materials (HQIM) as a foundational element of effective mathematics instruction. HQIM are defined as comprehensive, standards-aligned instructional materials that are coherent, rigorous, and promote student-centered learning. These materials are intentionally designed to develop deep conceptual understanding, procedural fluency, productive dispositions, and the capacity to apply mathematical thinking in real-world contexts.

Recognizing that adoption alone is not sufficient, the Department provides robust guidance and professional learning to ensure HQIM is implemented with integrity. This includes support for understanding the instructional shifts outlined in the revised Iowa Academic Standards for Mathematics, embedding language-rich mathematical discourse, and using materials in ways that promote equitable access and student engagement.

To assist in the selection process, the Department offers tools and resources aligned with nationally recognized evaluation criteria, such as EdReports and the Instructional Materials Evaluation Tool (IMET), to help districts make informed, locally relevant decisions while maintaining high expectations for quality. Iowa's approach aligns with EdReports' recommended adoption steps, which include setting a clear instructional vision, establishing a transparent review process, reviewing evidence, and supporting successful implementation through training and support structures.

The Iowa Department of Administrative Services (DAS) published a request for proposals on behalf of the Iowa Department of Education for K–12 mathematics instructional materials. The Department also supported the purchase and district-wide implementation of evidence-based curriculum and high-quality instructional materials in school districts with Extended Comprehensive Support and Improvement (E-CSI) schools, which are identified as CSI for three or more years. Please refer to the Department's Mathematics Instruction webpage for more information (Department, 2024d).

The implementation of HQIM is further reinforced through curriculum-based professional learning (CBPL), job-embedded coaching, and structured unit and lesson preparation routines. These supports are complemented by reference tools—such as Appendix A—which outlines instructional routines and high-leverage teaching practices aligned with Iowa's standards and the design principles of high-quality instructional materials.

By prioritizing both the strategic selection and the effective implementation of HQIM, Iowa aims to ensure that all students, regardless of zip code, have access to consistent, high-quality mathematics instruction that builds toward long-term success.

Approved Evidence-Based Professional Development

As part of Iowa's commitment to high-quality mathematics instruction, and in accordance with HF 2612, the Iowa Department of Education, requested AEAs to submit professional development offerings for approval. The goal is to ensure consistent professional development offerings across the state that support the implementation and continuous improvement of Iowa's strategic priorities. These offerings are aligned with evidence-based practices and designed to support universal instruction, intervention, and educator preparation.

To maximize the impact of these professional learning opportunities, it is essential to couple them with curriculum-based professional learning (CBPL) that supports educators in planning and delivering instruction using high-quality instructional materials (HQIM). While standalone professional development sessions deepen teachers' mathematical content knowledge and pedagogical strategies, CBPL provides ongoing, embedded support tied directly to the scope and sequence of district-adopted curricula. Together, these two components—content-focused PD and curriculum-embedded learning—ensure that educators not only understand the mathematics they teach but are also well-prepared to implement it effectively within the classroom context. This integrated approach strengthens instructional coherence and promotes continuous improvement aligned to Iowa's academic standards.

Beginning July 1, 2025, AEAs may provide mathematics professional learning from the approved list to ensure quality and consistency across the state. To support district planning for the 2025–26 school year, the Department conducted a rigorous review of its offerings proactively. All nine AEAs are approved to deliver the following professional development opportunities:

1. **8 Effective Mathematical Teaching Practices** (*Instructional Practice*)
   This course strengthens teacher capacity using the Eight Effective Mathematics Teaching Practices outlined in *Principles to Actions: Ensuring Mathematical Success for All* (NCTM, 2014). Educators develop skills in goal setting, mathematical discourse, task selection, representation, questioning, fluency building, supporting productive struggle, and using student thinking to guide instruction. These practices support rigorous, equitable instruction aligned with the Iowa Academic Standards.

2. **Numeracy Project 2.0** (*Intervention*)
   Designed to support teachers and leaders in understanding the progression of foundational numeracy skills, this learning experience helps educators identify and address student needs across developmental stages. The training emphasizes coherence across grade levels and effective intervention design rooted in learning progressions.

3. **SOAR: Supporting Ongoing Achievement Responsibly** (*Intervention*)
   SOAR equips educators with tools to assess students' mathematics understanding, identify foundational skill gaps, and design aligned, targeted interventions. The course also immerses participants in the Eight Effective Mathematics Teaching Practices and prepares them to apply these strategies flexibly within a Multi-Tiered System of Support (MTSS) framework.

4. **Making Sense of Mathematics and Teaching K–8 Series** (*Instructional Practice + Endorsement Preparation*)
   This eight-course series is designed to enhance student achievement by increasing teachers' mathematical content knowledge for teaching, shifting beliefs about how students learn, and improving instructional practices. The series aligns with the content areas required for the K–8 Iowa Mathematics Endorsement and supports systemic improvement in instructional quality

5. **Math Intervention for Responsive Teaching** (*Intervention*)
   This offering supports teachers in understanding the progression of critical mathematics domains essential for student success. It emphasizes explicit and systematic instruction across MTSS tiers and special education. Educators are trained to use the Supplemental and Intensive Tiers Guide to assess understanding, pinpoint areas for growth, and set aligned instructional goals.

6. **Universal Mathematics for Early Childhood** (*Early Childhood Instruction*)
   This course builds capacity in early mathematics instruction by aligning the Iowa Early Learning Standards, GOLD Curriculum, and evidence-based practices. Educators develop strategies to support developmentally appropriate instruction in number sense, spatial relationships, and mathematical language for young learners, with a focus on conceptual depth.

Together, these professional learning opportunities offer a comprehensive and coherent approach to enhancing mathematics instruction across grade levels and instructional tiers. They support Iowa's broader goals of ensuring universal access to high-quality core instruction, targeted interventions, and a strong foundation in early numeracy.

Iowa Comprehensive State Mathematics Plan

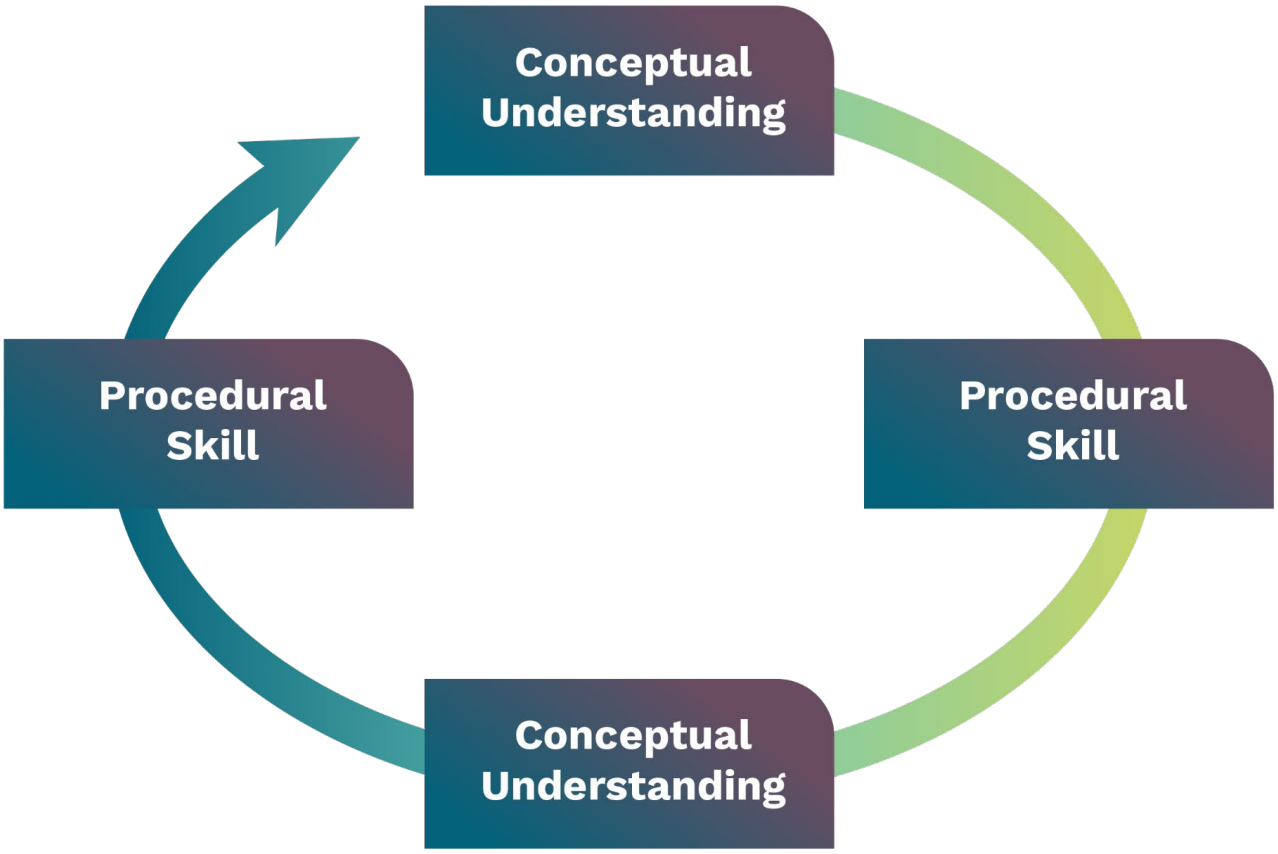
Goal 1: All students demonstrate growth and proficiency across all areas of mathematics — including number sense, algebraic thinking, geometry, measurement, data analysis, and problem-solving — from early learning through graduation, prepared for success in STEM fields, technical careers, and higher education.

Developing mathematical proficiency requires more than procedural skill- it involves fluency, conceptual understanding, and strategic reasoning (National Research Council, 2001). According to Adding It Up and Iowa's Academic Standards for Mathematics, fluency is defined as being flexible, efficient, and accurate with an emphasis on understanding rather than speed.

HF 784 builds on this foundation by requiring early identification of students at risk in mathematics and the implementation of timely, targeted support. A strong multi-tiered system of supports (MTSS) begins with effective Tier 1 (Clark et al., Fuchs et al.) anchored in the use of high-quality instructional materials (HQIM) defined in Iowa's Academic Standards for Mathematics.

HQIM in mathematics focuses on the instructional shifts reflected in the standards, building conceptual understanding alongside procedural fluency, promoting student reasoning, and connecting learning across grade levels. HQIM includes language-rich mathematics routines (e.g., number talks, sentence frames, and structured discourse) that support students in explaining their thinking, using precise vocabulary, and engaging in mathematical argument. They build students' mathematical skills over the school year and vertically across grades.

Figure 2: Conceptual Understanding and Procedural Skill



To support implementation, the department will provide statewide mathematics curriculum-based professional learning (CBPL), starting with schools that are most in need. The state will also develop resources and tools to support HQIM implementation, such as classroom observation tools, collaborative unit and lesson preparation protocols, and role-specific toolkits for leaders. Enhancing teacher capacity to implement high-quality instructional materials with integrity will strengthen instructional coherence and improve mathematics learning for all students. See Appendix A for a complete description of the instructional shifts, mathematics routines, and recommended teaching practices referenced throughout this plan.

During SY 2025–26, the Iowa Early Learning Standards for Mathematics will be revised using a process aligned with the K–12 standards review system and grounded in stakeholder input from across the early childhood mixed-delivery system. This revision will ensure the development of mathematics competencies that align with the Iowa Academic Standards for Mathematics and support continuity from preschool through elementary grades.

Table 4: Goal 1 Action Steps and Outcomes

Action Steps	Outcomes
Develop and publish Appendix A: a statewide reference guide that articulates the benefits of high-quality instructional materials (HQIM) and curriculum-based professional learning (CBPL), defines the characteristics of high-quality materials, and supports districts in evaluating their current materials and identifying and/or adopting HQIM.	Educators have access to straightforward guidance on the instructional shifts, discourse routines, and teaching practices to implement HQIM with integrity.
Offer CBPL on the instructional routines and teaching practices found in the HQIM that teachers are using, prioritizing professional learning for schools most in need of support.	Increased use of language-rich routines and instructional strategies that promote student reasoning, mathematical communication, and conceptual understanding.
Develop and share mathematics-specific classroom observation tools, collaborative unit and lesson preparation protocols, and role-specific toolkits to support the implementation of HQIM.	Educators are implementing HQIM with integrity.
Begin planning for a mathematics-focused "HQIM Leadership Academy" to support district and school leaders in using the tools in their role-specific toolkits.	A core design for the HQIM Leadership Academy has been drafted.
Revise the Iowa Early Learning Standards for mathematics during SY 2025–26 using a process aligned with the Iowa Department of Education K–12 standards review—convening a revision team, soliciting feedback from early childhood mixed-delivery providers statewide, and drafting developmentally appropriate mathematics competencies for preschoolers.	A research-informed, stakeholder-validated set of early childhood mathematics standards ready for implementation beginning SY 2026-27, ensuring consistency with the Iowa Academic Standards for Mathematics.

Goal 2: Each school is staffed with effective, qualified, and well-trained educators who provide evidence-based instruction across K-12, ensuring students build deep conceptual understanding and procedural fluency.

Teacher quality is among the most influential school-based factors impacting student achievement in mathematics (Kini, T., & Podolsky, A., 2016). HF 784 addresses this critical need by requiring improvements in both teacher preparation and ongoing professional development (Ball et al., 2008; Thames & Ball, 2010; AMTE, 2017). Pre-service mathematics teachers in educator preparation programs must demonstrate competency in number sense, learning progressions, conceptual understanding, procedural fluency, and mathematical application, including the effective use of high-quality instructional materials aligned with the Iowa Academic Standards for Mathematics.

For pre-service teachers, revised expectations for teacher preparation programs will ensure that methods coursework is aligned with HF 784. These programs must prepare candidates with a deep understanding of mathematical content, coherent learning progressions, and evidence-based pedagogy that reflects the rigor and instructional shifts of the revised Iowa standards. The Department will support revisions to teacher preparation programs in alignment with HF 784. Using the *Mathematics Teacher Preparation Workbook* as a

guide, programs will revise coursework and clinical experiences to ensure that teacher candidates demonstrate competency in conceptual understanding, learning progressions, fluency, and implementation of HQIM. These changes will help ensure a well-prepared pipeline of mathematics educators equipped to meet Iowa's instructional expectations.

To support in-service teachers, the Iowa Department of Education will launch evidence-based professional development in the Fall of 2025. Prioritized for K–6 educators in schools with the greatest need, this professional learning will focus on systematic and sequential early numeracy instruction—specifically targeting subitizing, cardinality, counting, spatial relationships, benchmark numbers, and part–part–whole models (Clements & Sarama, 2009; Witzel & Little, 2016). These sessions will enhance teachers' mathematical content knowledge and instructional capacity, equipping them with strategies to promote student engagement, reasoning, procedural fluency, conceptual understanding, and real-world problem-solving (National Research Council, 2001; NCTM, 2014, 2023).

Instructional leaders—including administrators, directors, and coaches—play a pivotal role in scaling and sustaining high-quality mathematics instruction. Also beginning in Fall 2025, the Department will provide targeted professional learning and implementation support for K–6 instructional leaders to strengthen their ability to lead mathematics improvement. This training will deepen leaders' expertise in early numeracy progressions and HQIM-aligned teaching practices (Darling-Hammond et al., Kraft et al.) Leaders will learn to model effective instruction, facilitate adult learning, and utilize data to guide continuous improvement through coaching cycles and Professional Learning Communities (PLCs).

By leading collaborative professional learning that focuses on embedding language-rich routines and applying research-based strategies, leaders will help foster instructional coherence and a culture of mathematical excellence across schools. These efforts ensure that all students benefit from consistent, high-quality mathematics instruction.

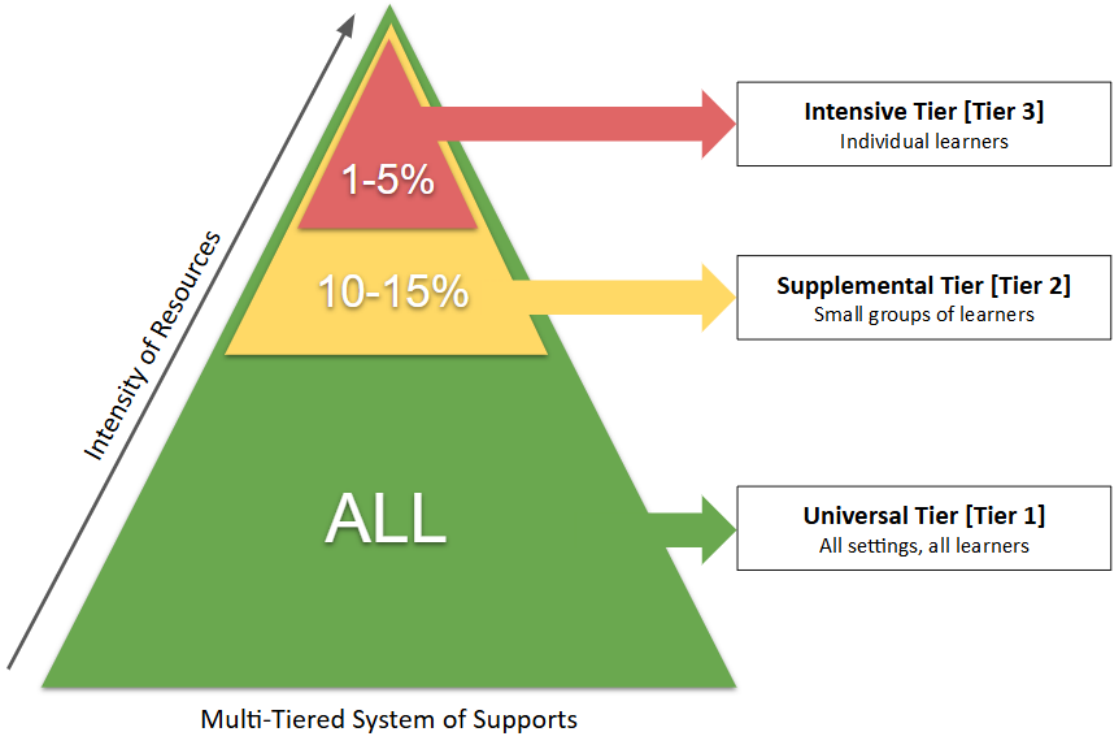
Table 5: Goal 2 Action Steps and Outcomes

Action Steps	Outcomes
Launch targeted professional development, starting with K–6 educators in high-need schools, Fall 2025, focused on embedding systematic and sequential instruction in early numeracy guidance and training, focusing on subitizing, cardinality, counting, spatial relationships, benchmark numbers, and part–part–whole models.	Increased teacher capacity to deliver high-quality instruction and improve student outcomes.
Launch targeted professional development and implementation support for instructional leaders for grades K-6, starting with high-need schools, in Fall 2025.	Increased instructional coach capacity to support teachers in implementing early numeracy progressions, facilitating professional learning, and promoting the effective use of HQIM in K–6 classrooms.
Support revisions to educator preparation programs in alignment with HF 784 by using the *Mathematics Teacher Preparation Workbook* to guide updates focused on building number sense, addressing misconceptions, and implementing high-quality instructional materials (HQIM) with integrity.	By Fall 2025, educator preparation programs will revise their mathematics methods coursework to ensure that teacher candidates demonstrate competency in conceptual understanding, learning progressions, procedural fluency, and effective use of HQIM. As a result, pre-service teachers will enter the profession better prepared to meet Iowa's instructional expectations.

Goal 3: Every school implements a Multi-Tiered System of Supports (MTSS), grounded in high-quality universal instruction and informed by valid and reliable screening and progress monitoring tools, to provide timely and targeted interventions that improve mathematics outcomes.

A Multi-Tiered System of Supports (MTSS) offers a proactive, data-driven framework for delivering mathematics instruction and interventions with increasing levels of intensity.

Figure 3: Multi-Tiered System of Supports (MTSS)



At its core, MTSS begins with Tier 1, where all students receive intense, grade-level instruction using High-Quality Instructional Materials (HQIM) aligned to the Iowa Academic Standards. Standards-aligned learning targets, common formative and summative assessments, evidence-based instructional strategies, and aligned professional learning help educators strengthen Tier 1 practices.

For students not meeting benchmarks, Tier 2 offers targeted small-group interventions aligned with Tier 1 instruction and grounded in research-based strategies, including—but not limited to—explicit instruction. Teachers use progress monitoring data to adjust their instruction, ensuring that interventions are responsive to students' needs. Educators are encouraged to utilize resources and practices from approved professional learning opportunities, such as Numeracy Project 2.0 and SOAR (Supporting Ongoing Achievement Responsibly), to guide diagnostic assessment and design targeted interventions. Tier 2 can also extend learning for students who show early proficiency. Students requiring additional support move into Tier 3, where they receive intensive, individualized instruction. As students move through the tiers, rigor should not decrease; instead, educators provide scaffolded entry points to grade-level content while backfilling prerequisite skills, giving students the additional time and practice needed to succeed.

HF 784 strengthens MTSS implementation by requiring:

- K-6 educators to adjust instruction for students based on the results of a state-approved, validated and reliable mathematics screener that is given three times annually;

- Biweekly progress monitoring for students identified as persistently at risk, defined as not meeting benchmarks on two consecutive screeners;
- Development of personalized mathematics plans for each student identified as persistently at risk;
- Partnerships with families to ensure they are informed and engaged in their child's support plan.
- These requirements bring coherence and consistency to mathematics intervention efforts statewide and build on existing MTSS structures used in other academic areas.

Table 6: Goal 3 Action Steps and Outcomes

Action Steps	Outcomes
By July 1, 2025, publish and disseminate a vetted list of K–6 mathematics screeners and progress monitoring tools to support statewide MTSS implementation.	Schools will have a list of valid and reliable screening and progress monitoring assessments to choose from.
Require all K–6 schools to administer approved screeners three times annually beginning Fall 2025 and identify students "persistently at risk" based on HF 784.	All K-6 students will be screened 3 times a year in mathematics.
Provide guidance and technical assistance to support schools in accurately identifying students classified as "persistently at risk" in mathematics, in alignment with HF 784 criteria.	Students identified as persistently at risk will receive evidence-based Tier 2 or Tier 3 interventions, regular progress monitoring, and a personalized plan tailored to their needs.
Provide a model personalized mathematics plan with technical assistance and a webinar to support schools with the implementation of personalized mathematics plans.	Families will be engaged as active partners, with clear communication about their child's performance and the school's support strategies in place.

Goal 4: Families and communities are essential partners in the learning of mathematics. Every learning community fosters mathematical knowledge and a shared responsibility among stakeholders to enhance outcomes for all students.

Family engagement plays a pivotal role in student success, particularly in mathematics. Research shows that when families are well-informed and supported in engaging with their child's mathematics learning, students experience improved achievement, confidence, and motivation (Wang & Wei, 2024). In response, HF 784 requires the development and distribution of resources that empower families to participate meaningfully in their children's mathematics education.

To meet this need, Iowa will launch a structured menu of family engagement support to ensure all families have access to high-quality resources, interactive opportunities, and enrichment experiences. These include visual learning progressions, parent-friendly guides, ideas for real-world applications (e.g., budgeting, cooking, shopping), and resources for events such as family math nights and STEM exploration activities. These supports reinforce classroom learning in low-pressure yet meaningful ways, promoting the perception of mathematics as relevant, achievable, and valuable.

Celebrating mathematical excellence is another key component. Through a statewide partnership with the National Math Stars program, Iowa will recognize high-performing students and actively engage families in celebrating their children's achievements. Families of identified students will receive formal nomination letters, and district offices will receive recognition medals for distribution to the students. Additional collaboration will explore broader use of district testing data to expand participation to 2nd and 3rd-grade students.

Table 7: Goal 4 Action Steps and Outcomes

Action Steps	Outcomes
Design and launch family mathematics resource menus by Fall - Winter 2025 that include learning progressions, parent guides, interactive tools, and real-world application ideas to support at-home learning.	Family mathematics resource menus are distributed statewide, increasing accessibility to tools that support learning at home.
Partner with the National Math Stars program in SY 24–25 to recognize the top 2% of 3rd-grade mathematics performers using state testing data, notify families through a standardized nomination letter, and coordinate award medal distribution through district offices.	Increased family engagement and celebration of mathematics achievement through formal student recognition and visibility of enrichment opportunities.
Collaborate with school districts and assessment coordinators during SY 2025–26 to identify appropriate data sources for nominating high-achieving 2nd and 3rd-grade students to enrichment programs such as National Math Stars.	Expanded identification and recognition of mathematically advanced students in both 2nd and 3rd grades, strengthening partnerships between schools, families, and community-based mathematics programs.

Appendix A: Instructional Practices and Routines for High-Quality Mathematics Instruction

Appendix A provides an overview of instructional practices and classroom routines aligned with the Iowa Academic Standards for Mathematics and High-Quality Instructional Materials (HQIM). These practices support coherent instruction, promote equitable access to mathematics, and build deep conceptual understanding.

The Three Shifts in Mathematics Instruction

The Shifts serve as a framework that outlines how these standards elevate expectations across various aspects of a student's educational journey, encompassing instructional materials, classroom practice, and assessment. They demonstrate how college-and career-ready standards drive transformative changes in the classroom, better preparing students for opportunities after high school.

1. Focus - The first shift requires prioritizing the Major Work of each grade level. Rather than trying to cover topics superficially, the Iowa Academic Standards for Mathematics urge us to significantly narrow and deepen the focus of time and energy in the mathematics classroom.

2. Coherence - The second shift requires coherence within and across grade levels to ensure instruction follows a logical mathematical progression. Iowa Academic Standards for Mathematics are connected and coherent progressions from one grade to the next. Learning is thoughtfully interconnected across grades, allowing students to build upon foundations established in previous years. Each standard serves as an extension of prior learning rather than a standalone event.

3. Rigor - The third shift clarifies the aspects of rigor required to work with mathematical concepts. There are three aspects of rigor.

    a. Conceptual understanding: The standards require a conceptual understanding of key concepts. Students must be able to access concepts from several perspectives to see mathematics as

more than a set of mnemonics or discrete procedures.

b. Procedural skill and fluency: Fluency is the ability to apply procedures efficiently, flexibly, and accurately, including fact, computational, and procedural fluency. Critical end-of-grade-level standards are identified in grades K–8, where fluency should be expected by the end of the grade.

c. Application: Students use mathematics flexibly for applications in problem-solving in real-world contexts. In content areas outside of mathematics, particularly science, students can use mathematics to make meaning of and access content.

Eight Effective Mathematics Teaching Practices

Principles to Actions: Ensuring Mathematical Success for All provides comprehensive guidance for teachers, specialists, coaches, administrators, policymakers, and parents. Building on the original *Principles and Standards for School Mathematics*, it introduces six updated Guiding Principles for School Mathematics. Central to these is the first principle, Teaching and Learning, which is supported by eight essential, research-based Mathematics Teaching Practices. The document also elaborates on the five remaining Guiding Principles, referred to as the Essential Elements, which collectively reinforce effective teaching and learning. Additionally, it addresses common obstacles and highlights both unproductive and productive beliefs that stakeholders need to understand. It clearly outlines the actions of both teachers and students that align with effective instruction and learning (National Council of Teachers of Mathematics [NCTM], 2014). The eight teaching practices are:

1. Establish mathematics goals to focus learning.
2. Implement tasks that promote reasoning and problem-solving.
3. Use and connect mathematical representations.
4. Facilitate meaningful mathematical discourse.
5. Pose purposeful questions.
6. Build procedural fluency from conceptual understanding.
7. Support productive struggle in learning mathematics.
8. Elicit and use evidence of student thinking.

Integration of mathematical language routines (MLRs) to support discourse and language development.

As in other subjects, mathematics students must be able to read, write, listen, speak, and discuss the subject at hand. Often, these multimodal ways of learning and using mathematics skills receive too little attention in curricular materials, and teachers may want to supplement them with classroom activities that provide opportunities for students to use language to discuss the mathematics content they are learning.

The routines below are designed to support a variety of language-focused skill growth: from reinforcing mathematical terminology to scaffolding conversations to providing opportunities for students to deepen their conceptual understanding by describing their work. These routines, performed regularly, can benefit all students, particularly those who are English Learners or struggle with the linguistic components of mathematics. The routines below are from the Understanding Language/Stanford Center for Assessment, Learning, and Equity's Principles for the Design of Mathematics Curricula: Promoting Language and Content Development and the Fostering Math Practices website. The descriptions below come directly from these sources, and more detailed descriptions, step-by-step guidance, examples, and applicable classroom handouts can be found on these websites.

Mathematical Language Routines

A 'mathematical language routine' refers to a structured but adaptable format for amplifying, assessing, and developing students' language. More information and examples of each of the mathematical language routines.

Mathematical Language Routine 1: Stronger and Clearer Each Time

Purpose: To provide a structured and interactive opportunity for students to revise and refine both their ideas and their verbal and written output (Zwiers, 2014).

This routine provides a purpose for student conversation as well as fortifies output. The main idea is to have students think or write individually about a response, use a structured pairing strategy to provide multiple opportunities for refining and clarifying the response through conversation, and then revise their original written response. Throughout this process, students should be pressed for details and encouraged to press each other for details. Subsequent drafts should show evidence of incorporating or addressing new ideas or language. They should also demonstrate evidence of refinement in precision, communication, expression, examples, and/or reasoning related to mathematical concepts.

Mathematical Language Routine 2: Collect and Display

Purpose: To capture students' oral words and phrases into a stable, collective reference.

This routine aims to stabilize the fleeting language that students use, enabling their output to serve as a reference for developing their mathematical language. The teacher listens for and scribes the language students use during partner, small group, or whole-class discussions using written words, diagrams and pictures This collected output can be organized, revoiced, or explicitly connected to other languages in a display that all students can refer to, build on, or make connections with during future discussions or writing. Throughout the course of a unit, teachers can reference the displayed language as a model, update and revise the display as student language changes, and make bridges between student language and new disciplinary language. This routine provides feedback for students in a way that increases sense-making while simultaneously supporting meta-awareness of language.

Mathematical Language Routine 3: Critique, Correct, And Clarify

Purpose: To give students a piece of mathematical writing that is not their own to analyze, reflect on, and develop.

The intent is to prompt student reflection on an incorrect, incomplete, or ambiguous written argument or explanation, and for students to improve their written work by correcting errors and clarifying meaning. Teachers can model how to effectively and respectfully critique the work of others with meta-think-alouds and press for details when necessary. This routine fortifies output and engages students in meta-awareness.

Mathematical Language Routine 4: Information Gap

Purpose: To create a need for students to communicate (Gibbons, 2002).

This routine allows teachers to facilitate meaningful interactions by giving partners or team members different pieces of necessary information that must be used together to solve a problem or play a game. With an information gap, students need to orally (and/or visually) share their ideas and information in order to bridge the gap and accomplish something that they could not have done alone. Teachers should model how to ask for and share information, as well as seek clarification, justification, and elaboration. This routine cultivates conversation.

Mathematical Language Routine 5: Co-Craft Questions and Problems

Purpose: To allow students to get inside a context before feeling pressure to produce answers, to create space for students to produce the language of mathematical questions themselves, and to provide opportunities for students to analyze how different mathematical forms can represent different situations.

Through this routine, students are able to use conversation skills to generate, choose (argue for the best one), and improve questions, problems, and situations, as well as develop meta-awareness of the language used in mathematical questions and problems. Teachers should push for clarity and revoice oral responses as necessary.

Mathematical Language Routine 6: Three Reads

Purpose: To ensure that students know what they are being asked to do, create opportunities for students to reflect on the ways mathematical questions are presented, and equip students with tools used to negotiate meaning (Kelemanik, Lucenta & Creighton, 2016).

This routine supports reading comprehension, sense-making, and meta-awareness of mathematical language. It also supports negotiating information in a text with a partner in a mathematical conversation.

Mathematical Language Routine 7: Compare AND Connect

Purpose: To foster students' meta-awareness as they identify, compare, and contrast different mathematical approaches, representations, concepts, examples, and language.

Students should be prompted to reflect on and linguistically respond to these comparisons (e.g., exploring why or when one might do or say something in a certain way, identifying and explaining correspondences between different mathematical representations or methods, and wondering how an idea compares or connects to other ideas and/or language). Teachers should model thinking out loud about these questions. This routine supports meta-cognitive and metalinguistic awareness, and also supports mathematical conversation.

Mathematical Language Routine 8: Discussion Supports

Purpose: To support rich and inclusive discussions about mathematical ideas, representations, contexts, and strategies (Chapin, O'Connor, & Anderson, 2009).

The examples provided can be combined and used together with any of the other routines. They include multi-modal strategies for helping students make sense of complex language, ideas, and classroom communication. The examples can be used to invite and incentivize more student participation, conversation, and meta-awareness of language. Eventually, as teachers continue to model these strategies, students should begin using them themselves to prompt each other to engage more deeply in discussions.

Instructional Routines

Instructional Routines are specific and repeatable classroom structures that enable all students to engage more fully in learning opportunities that develop their mathematical thinking and reasoning. More information on each of instructional routine. (Student Achievement Partners, n.d.)

Contemplate Then Calculate

Contemplate Then Calculate is an instructional routine designed to shift attention away from mindless calculations and toward necessary structural interpretations of mathematics. This routine fosters structural thinking (Standards for Mathematical Practices 7). Additional contemplate then calculate resources available free of cost. An example of the contemplate then calculate routine, applied to a Student Achievement Partners' math task:

- Looking For and Making Use of Structure – Quadratic Equations 1 A-REI.B.4

Capturing Quantities

Capturing Quantities is an instructional routine designed to focus students' attention on important quantities and relationships in problem situations. The goal of the routine is to develop students' ability to reason abstractly and quantitatively (Standards for Mathematical Practices 2). Additional capturing quantities resources available free of cost. Examples of the capturing quantities routine, applied to Student Achievement Partners' math tasks:

- Banana Pudding 5.NF.B.7
- Sharing Chocolate 5.NF.A, 5.NF.B.3, and 4.NF.B.3d

Connecting Representations

Connecting Representations is an instructional routine that positions students to think structurally as they connect two representations by articulating the underlying mathematics. An essential goal of this routine is expanding students' repertoire of structural noticings (Standards for Mathematical Practices 7). Additional connecting representations resources available free of cost. Examples of the connecting representations routine, applied to Student Achievement Partners' math tasks:

- Delivering the Mail 8.F.B.4
- Profit of a Company A-SSE.B.3

Recognizing Repetition

Recognizing Repetition is an instructional routine that supports the difficult road to generalizing problem situations. Students enlist multiple modalities while they attend to the repetition in their counting, calculating, and constructing processes. In doing so, they leverage their repeated reasoning to make abstract generalizations (Standards for Mathematical Practices 8). Additional recognizing repetition resources available free of cost.

The Three Reads

The Three Reads instructional routine is designed to develop students' ability to make sense of problems by deconstructing the process of reading mathematical situations. Over time, students will internalize this process, thereby creating a heuristic for reading and making sense of mathematical story problems (Standards for Mathematical Practices 1). Additionally, the three reads resources available free of cost. Examples of the three reads routine, applied to Student Achievement Partners' math tasks:

- How Many Teams Part One 4.OA.A, 4.NBT.B, 4.OA.A.3, 4.NBT.B.6
- How Many Teams Part Two 4.OA.A, 4.NBT.B, 4.OA.A.3, 4.NBT.B.6
- Box of Clay 5.MD.C
- Delivering the Mail 8.F.B.4

Decide and Defend

Decide and Defend is an instructional routine in which students make sense of another's line of mathematical reasoning, decide if they agree with that reasoning, and then draft an argument defending their decision. The routine fosters Standards of Mathematical Practices 3, constructs viable arguments and critiques the reasoning of others. Additional decide and defend resources available free of cost. Examples of the decide and defend routine, applied to Student Achievement Partners' math tasks:

- Three Composing/Decomposing Problems (Jose)
- 2.NBT.A Fraction Comparisons with Pictures
- 3.NF.A.3d Cup of Rice 6.NS.A.1, 5.NF.B.7

Early Numeracy Progression

(Build Math Minds, n.d.)

Domain	Progression	Description
Subitizing	Perceptual → Conceptual	Children instantly recognize small quantities and then begin to understand how parts compose a whole.
Cardinality	Counting to Find Out "How Many" → Understanding the Last Number Represents the Total	Children realize that the last number word said in a count tells “how many” are in the entire set.
Object Counting	One-to-One Correspondence → Keeping Track Accurately	Children learn to match each object with one number word and develop strategies to count systematically.
Verbal Counting	Emerging Number Word Sequence → Stable Order	Children begin by informally reciting number words and gradually develop accuracy and consistency in counting.
Spatial Relationships	Relative Position → Mental Mapping	Children learn positional words (e.g., "next to," "under") and progress to visualizing and manipulating shapes and numbers in space.
Benchmark Numbers	Familiarity with 5 and 10 → Use in Composition and Decomposition	Children recognize 5 and 10 as key anchors and use them to combine and break apart numbers efficiently.
Part–Part–Whole	Recognizing Parts → Understanding Number Structure	Children begin to see numbers as composed of two or more parts and use this understanding to solve problems.

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