



Personalized Mathematics Pathways: Opportunities for ALL Georgia Students

Purpose:

The purpose of this presentation is to provide district leaders, school administrators, counselors, and teacher leaders with information related to personalized mathematics pathways for all students to have access to opportunities to advance in mathematics based on their post-secondary goals and aspirations.

BE
INTENTIONAL



Georgia's K-12 Mathematics Standards

Adopted in August 2021
Implementation to Begin in Fall 2023

KEY TAKEAWAYS FROM THE NEW STANDARDS ADOPTION:

- The grade level/course key competencies represent the standard expectation of learning for students in each grade level and course.
- The standards presented for each grade level and course represent the ultimate expectation for mastery at each grade level for each big idea.
- The standards are presented through a logical progression and provide detailed information as students work toward mastery of the key competencies/standards of the grade level/course.
- The standards are each followed by more detailed learning objectives that further explain the expectations for learning in the specific grade level/course standards.
- The Georgia Department of Education does not mandate a specific strategy or approach to solving a problem.



Georgia's K-12 Mathematics Standards

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Implementation to Begin in Fall 2023

KEY TAKEAWAYS FROM THE NEW STANDARDS ADOPTION:

- The philosophy of the Georgia Department of Education is to reinforce a strong foundation of reasoning and fundamentals in the early grades that builds on relevant pathways for future success.
- Allow students to experience a sense of self success and self-worth throughout the process of learning. Students should be provided with learning opportunities that focus on mastering fundamental topics and make connections that strengthen understanding.

UNDERSTANDING THE NEW STANDARDS:

- [Georgia's K-12 Mathematics Standards Explanation of Changes and Improvements](#)

Georgia's New K-12 Mathematics Standards Curriculum Maps

IMPLEMENTATION 2023-2024 SCHOOL YEAR

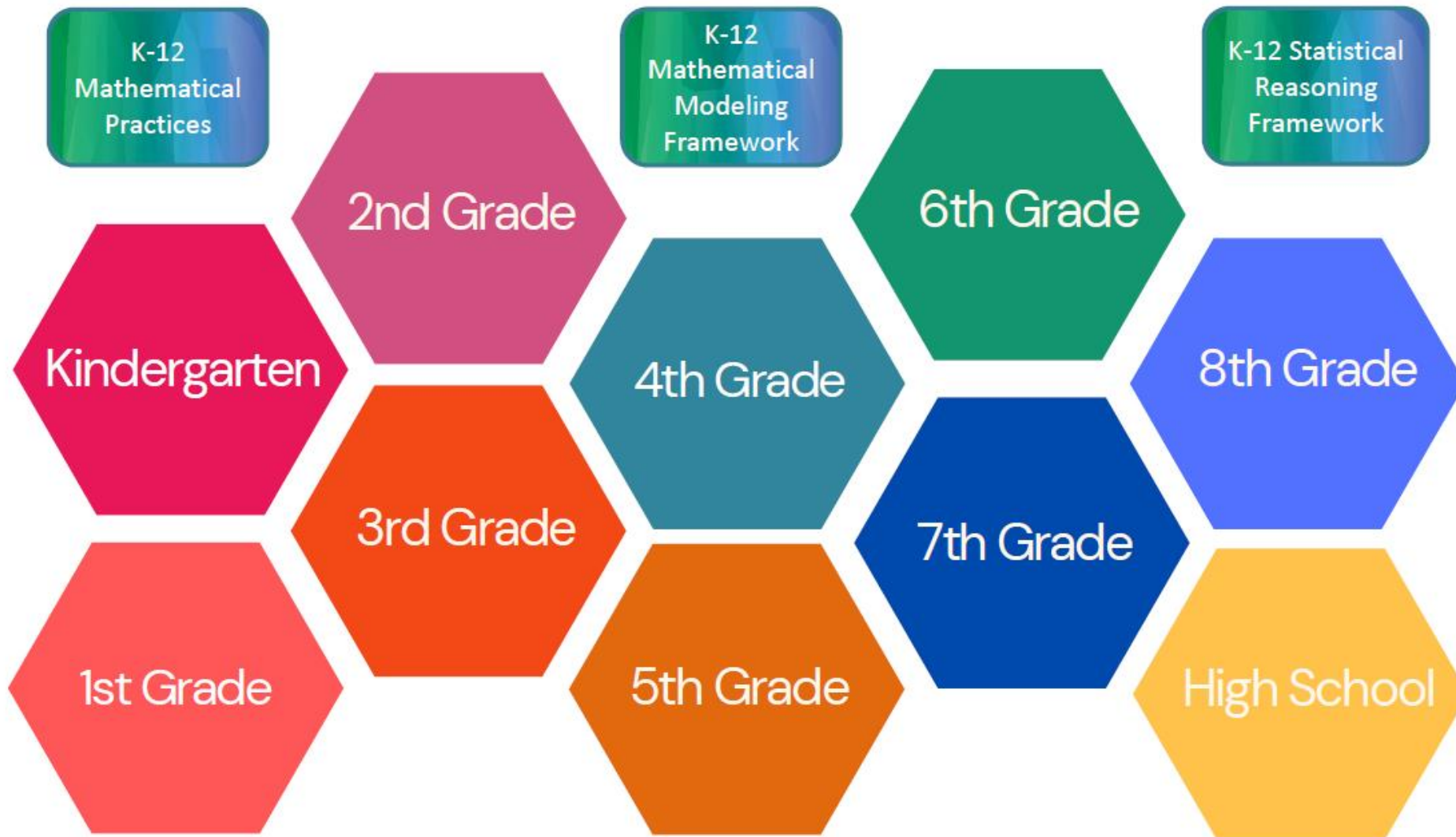


K-12
Mathematical
Practices

K-12
Mathematical
Modeling
Framework

K-12 Statistical
Reasoning
Framework

Georgia
Numeracy
Project



Specialized
Supports for
Students



Georgia's New K-12 Mathematics Standards Grade Level and Course Overviews

IMPLEMENTATION 2023-2024 SCHOOL YEAR

K-12
Mathematical
Practices

K-12
Mathematical
Modeling
Framework

K-12 Statistical
Reasoning
Framework

Whole Child
Supports for
Learner
Variability

ELEMENTARY (K-5)

KINDERGARTEN

FIRST GRADE

SECOND GRADE

THIRD GRADE

FOURTH GRADE

FIFTH GRADE

MIDDLE (6-8)

SIXTH GRADE

SEVENTH GRADE

EIGHTH GRADE

ENHANCED ALGEBRA:
CONCEPTS & CONNECTIONS

HIGH (9-12)

ALGEBRA:
CONCEPTS & CONNECTIONS

GEOMETRY:
CONCEPTS & CONNECTIONS

ADVANCED ALGEBRA:
CONCEPTS & CONNECTIONS

ENHANCED ADVANCED
ALGEBRA & AP PRECALCULUS:
CONCEPTS & CONNECTIONS

HIGH SCHOOL
FOURTH COURSE OPTIONS

Middle School Mathematics

New Pathways Document Available

Georgia's K-12 Mathematics Standards



The State Board of Education approved State School Superintendent Richard Woods' recommendation to adopt the new Georgia's K-12 Mathematics Standards. The 2021-2022 and 2022-2023 school years will be dedicated to teacher training on the new standards, with implementation to follow in 2023-2024.

	2021-2022	2022-2023	2023-2024	2024-2025
Math	Standards Adopted/ Instructional Supports	Continued Training/ Professional Learning	Full Implementation w/ updated assessments	

www.gadoe.org/mathematics

The new standards are truly Georgia-developed. They were drafted by Georgia mathematics teachers with input from educational leaders, parents, students, business and industry leaders, and community members. They are designed to provide a strong foundation, to be clear, understandable, and present a reasonable amount of content in each year.

Throughout the current school year, teachers will receive training and professional learning, new resources will be developed, and assessments will be aligned to the updated standards. In addition, communication will be provided to parents to ensure a smooth transition.

New Resources

- **NEW!** K-12 Mathematics Curriculum Maps (effective Fall 2023)
- **NEW!** Secondary Mathematics Pathways Guidance
- **NEW!** Georgia's K-12 Mathematics Standards Explanation of Changes and Improvements



Middle School Mathematics

The following table provides the minimum assessment and accountability requirements as well as a list of ideas for support, enhancement, and acceleration at each grade level. **This list is not all-inclusive.** Students who successfully complete 8th Grade Mathematics are adequately prepared to enroll in Algebra: Concepts and Connections in 9th grade.



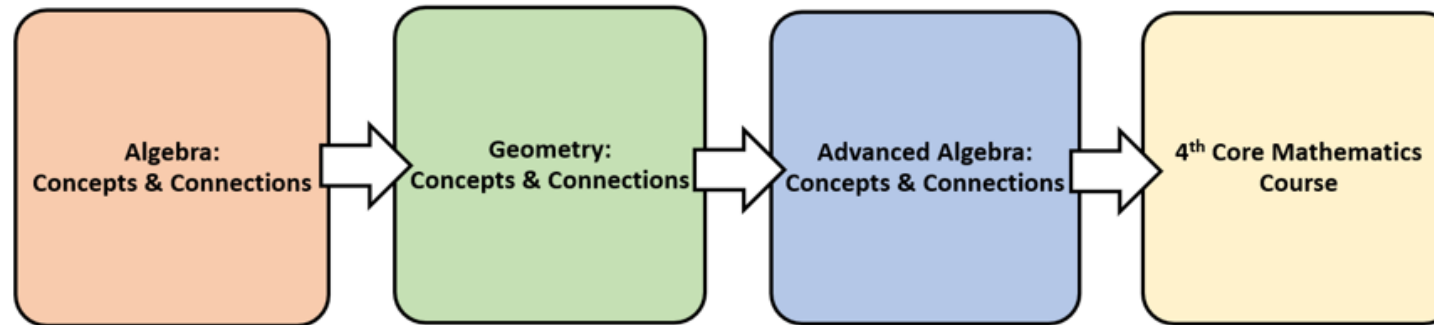
Grade-Level	Grade 6	Grade 7	Grade 8
Assessment & Accountability Expectations	Georgia's K-12 Mathematics Standards 6 th Grade	Georgia's K-12 Mathematics Standards 7 th Grade	Georgia's K-12 Mathematics Standards 8 th Grade
Ideas for Support, Enhancement, & Acceleration	<ul style="list-style-type: none"> • Content and grade acceleration and support • STEM/STEAM interdisciplinary programming with embedded mathematics content • Courses that blend multiple content areas or grade-level standards • *District approved options 	<ul style="list-style-type: none"> • Content and grade acceleration and support • STEM/STEAM interdisciplinary programming with embedded mathematics content • Courses that blend multiple content areas or grade-level standards • *District approved options 	<ul style="list-style-type: none"> • Content and grade acceleration and support • New enhanced course option: Enhanced Algebra: Concepts and Connections • STEM/STEAM interdisciplinary programming with embedded mathematics content • Courses that blend multiple content areas or grade-level standards • *District approved options

***NOTE:** All options include opportunities for support and content acceleration. Local school districts have flexibility to offer additional course options that meet the needs of students in their specific school communities.

Georgia's New K-12 Mathematics Standards Required Course per SBOE Graduation Rule



Georgia's Mathematics Graduation Requirements for High School



Mathematics Programming Considerations for High School

The minimum core mathematics course requirements to earn a high school diploma in Georgia include:

- Algebra: Concepts and Connections or the equivalent
- Geometry: Concepts and Connections or the equivalent
- Advanced Algebra: Concepts and Connections or the equivalent
- A fourth core mathematics course option

Though all students have the same core mathematics requirements for graduation, there are many paths to meet those requirements. For example, STEM/STEAM programming offers unique opportunities for content in mathematics to be blended with other content areas for students to develop a deep understanding of the expectations outlined in each grade level and course.

The Georgia Department of Education has created a catalog of secondary courses to help students meet their graduation requirements. These course options include support, enrichment, enhanced, advanced placement, International Baccalaureate (IB), dual enrollment, and more.

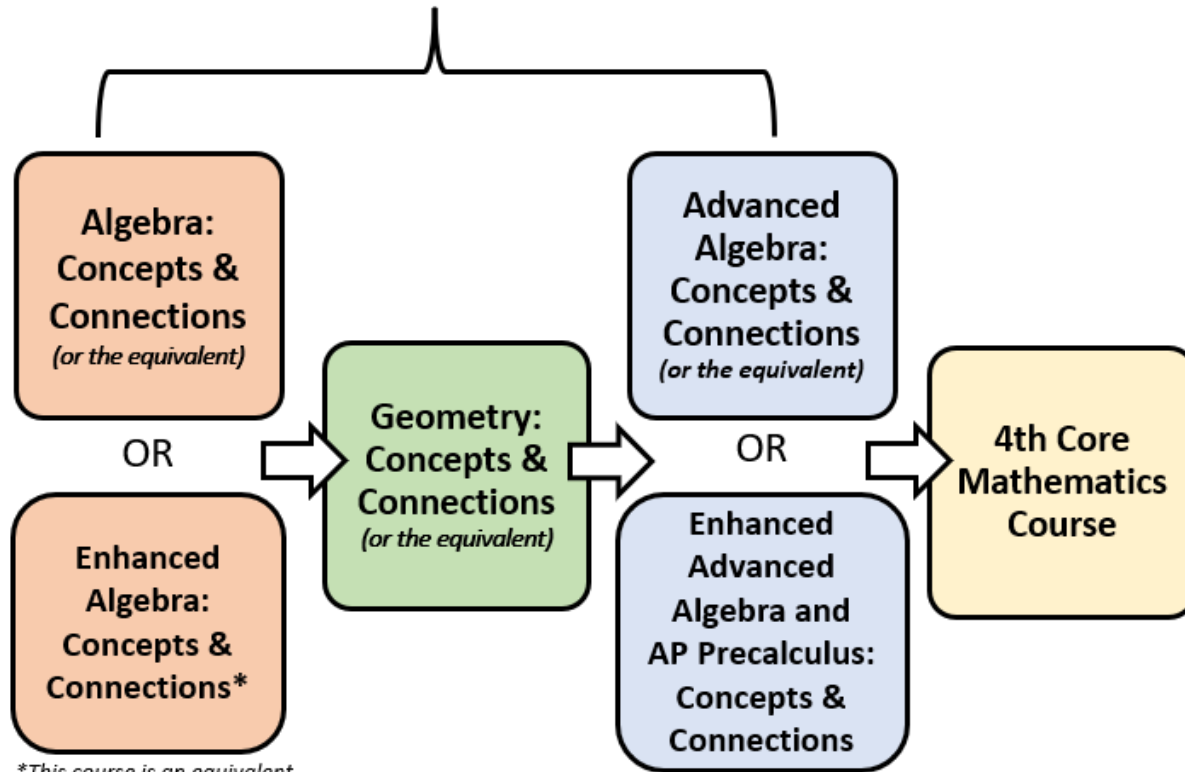
The mathematics pathways of courses should be offered as an option for all students based on student interest and post-secondary goals. All paths should provide open access for all students with multiple on-ramps and off-ramps as they matriculate through the secondary grade levels.

Fourth Course Options for Students

Mathematics Graduation Requirements for High School

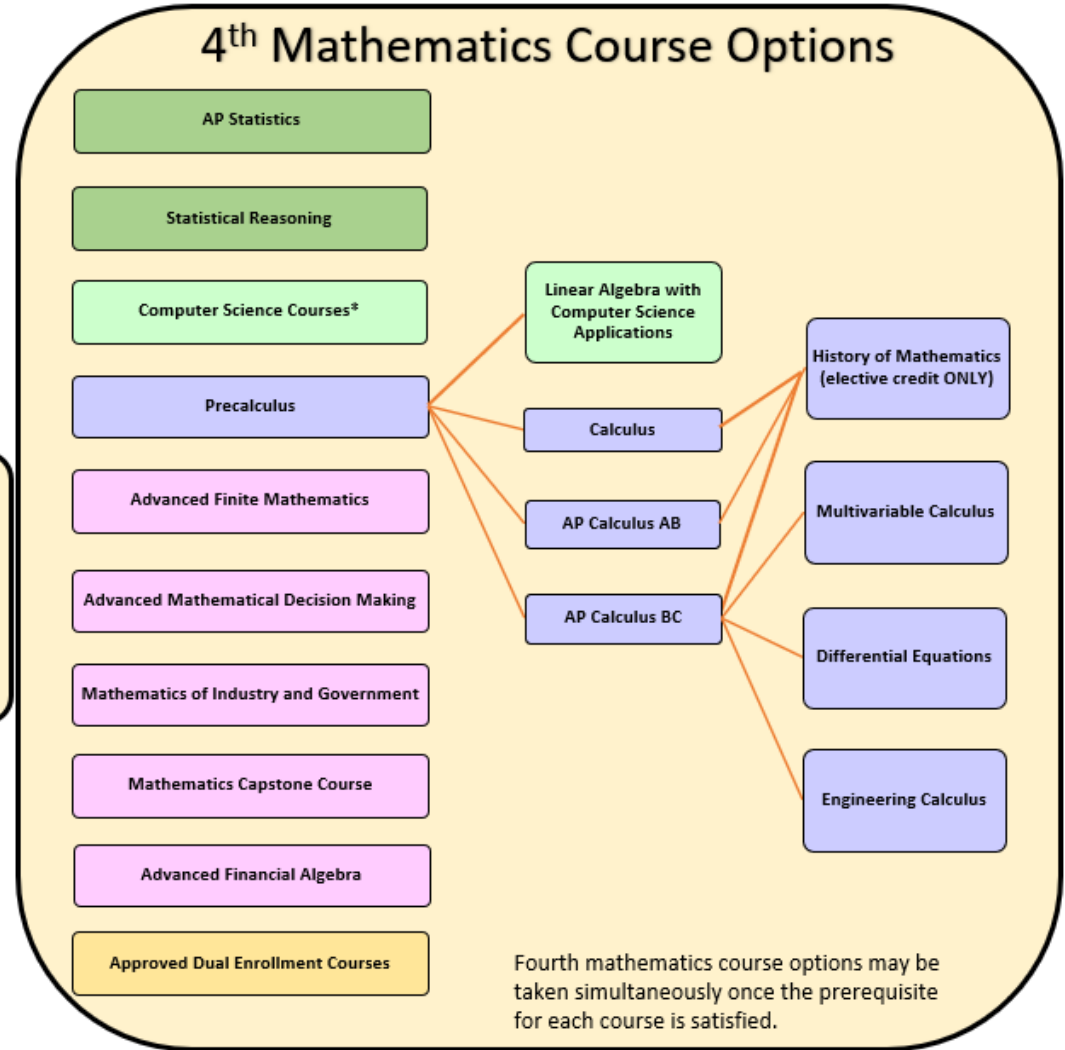


First Three Required Courses



**This course is an equivalent course to high school Algebra: Concepts and Connections for eligible Grade 8 students.*

- Multiple options for 4th core mathematics courses
- Co-Requisite Support courses offered, as needed



Fourth mathematics course options may be taken simultaneously once the prerequisite for each course is satisfied.

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Modernized Advanced Algebra

DATA
SCIENCE

FUNCTIONAL
REASONING

ACCESSIBLE
CONTENT FOR
ALL STUDENTS

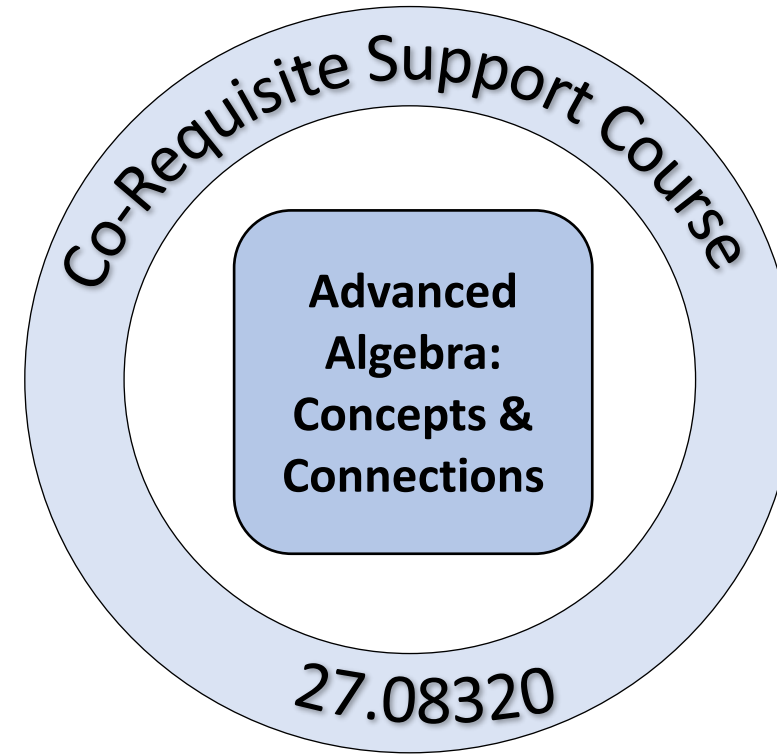
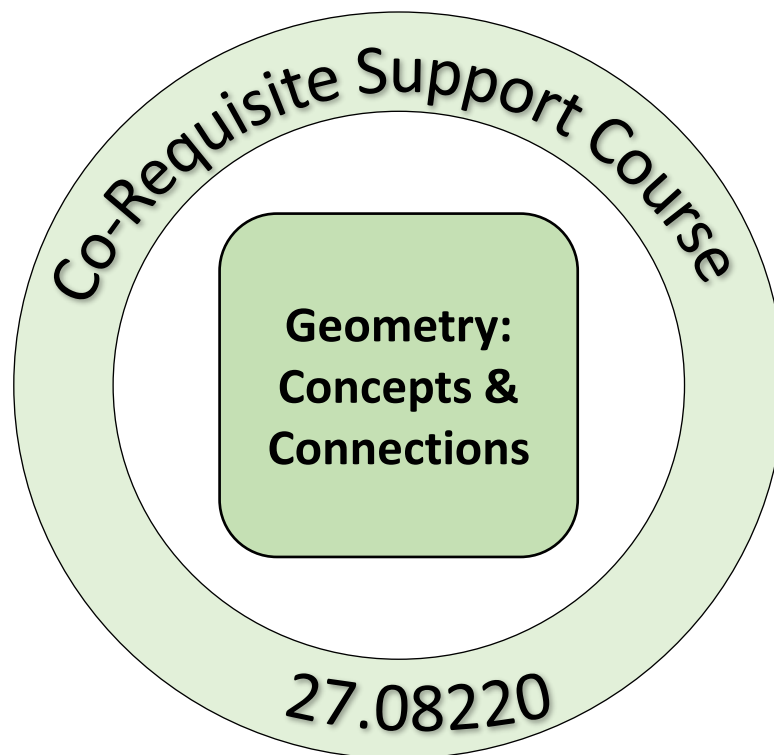
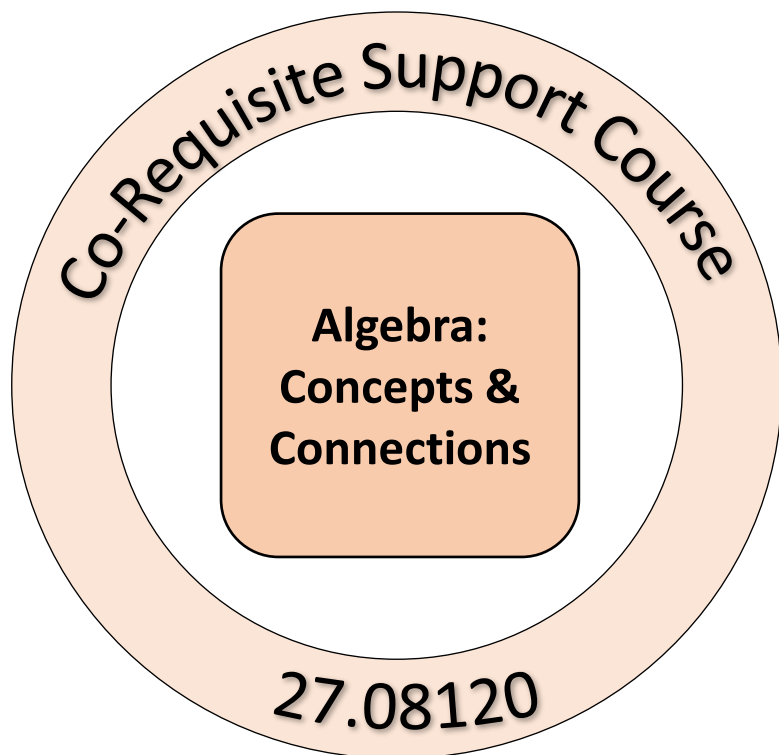
**Advanced
Algebra:
Concepts &
Connections**

21ST
CENTURY
SKILLS

STATISTICAL
REASONING

TECHNOLOGY
ENHANCED

Co-Requisite Support Courses



- The co-requisite support courses are offered for students, as needed, based on local school or district selection criteria.
- The co-requisite support courses are not stand-alone courses; these courses assist students as they work to earn the required core course credit.
- Co-Requisite support courses may be taken in conjunction with the core mathematics courses they are paired
- These co-requisite support courses provide teachers with additional time to implement wraparound interventions and supports for students in real time as the students are learning the standards in the core course required for graduation.

Acceleration in Mathematics using Gifted Services Model

- Acceleration at every grade level, K-12, with the gifted services model
- Alignment with the gifted model and definition of acceleration
- Alignment with the federal expectations of assessment and accountability
- New enhanced mathematics courses that are open-access for students interested in pursuing higher levels of mathematics





NEW

Middle School Enhanced Course

New Middle School Accelerated Option

A new Enhanced Algebra: Concepts and Connections course blending option will be offered for learners seeking advanced and accelerated mathematics in Grade 8. This course option can be provided for all learners seeking to pursue accelerated mathematics content in Grade 8 regardless of the course taken previously. The new Enhanced Algebra: Concepts and Connections course will be provided for students interested in pursuing advanced mathematics courses in middle and high school, including courses that go beyond the four core mathematics course options. This accelerated course option aligns with federal assessment and accountability requirements for the grade level to benefit students and teachers and provides a thoughtful blend of SBOE approved standards.

The Enhanced Algebra: Concepts and Connections course, designed for students who have mastered the Grade 7 Mathematics standards, is a blend of the topics addressed in Grade 8 Mathematics (i.e., linear functions) and the topics addressed in Algebra: Concepts and Connections (i.e., non-linear functions). The content of this course prepares students for the federal assessment requirements, including the content assessed on the Grade 8 EOG and the HS Algebra EOC. Students who successfully complete Enhanced Algebra: Concepts and Connections will be prepared for Geometry: Concepts and Connections as a subsequent course.

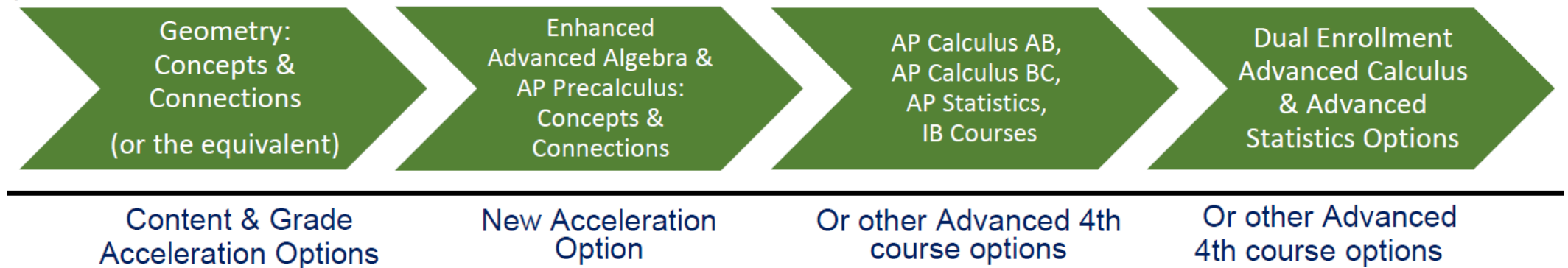
NEW

High School Enhanced Course

A new course blending option has been made available for advanced learners that includes **Enhanced Advanced Algebra and AP Precalculus: Concepts and Connections** starting in **2023-2024**. All learners should have the opportunity to enroll in support courses and advanced placement mathematics courses at the high school level based on their course-taking patterns at the middle school level. All options should be made available for all students.

High School Acceleration

(Local districts may add additional options, as needed.)



*Local school districts maintain the flexibility to offer courses that best meet the needs of students in their school communities.

Personalized Pathways for Students interested in Advanced Calculus Options in High School

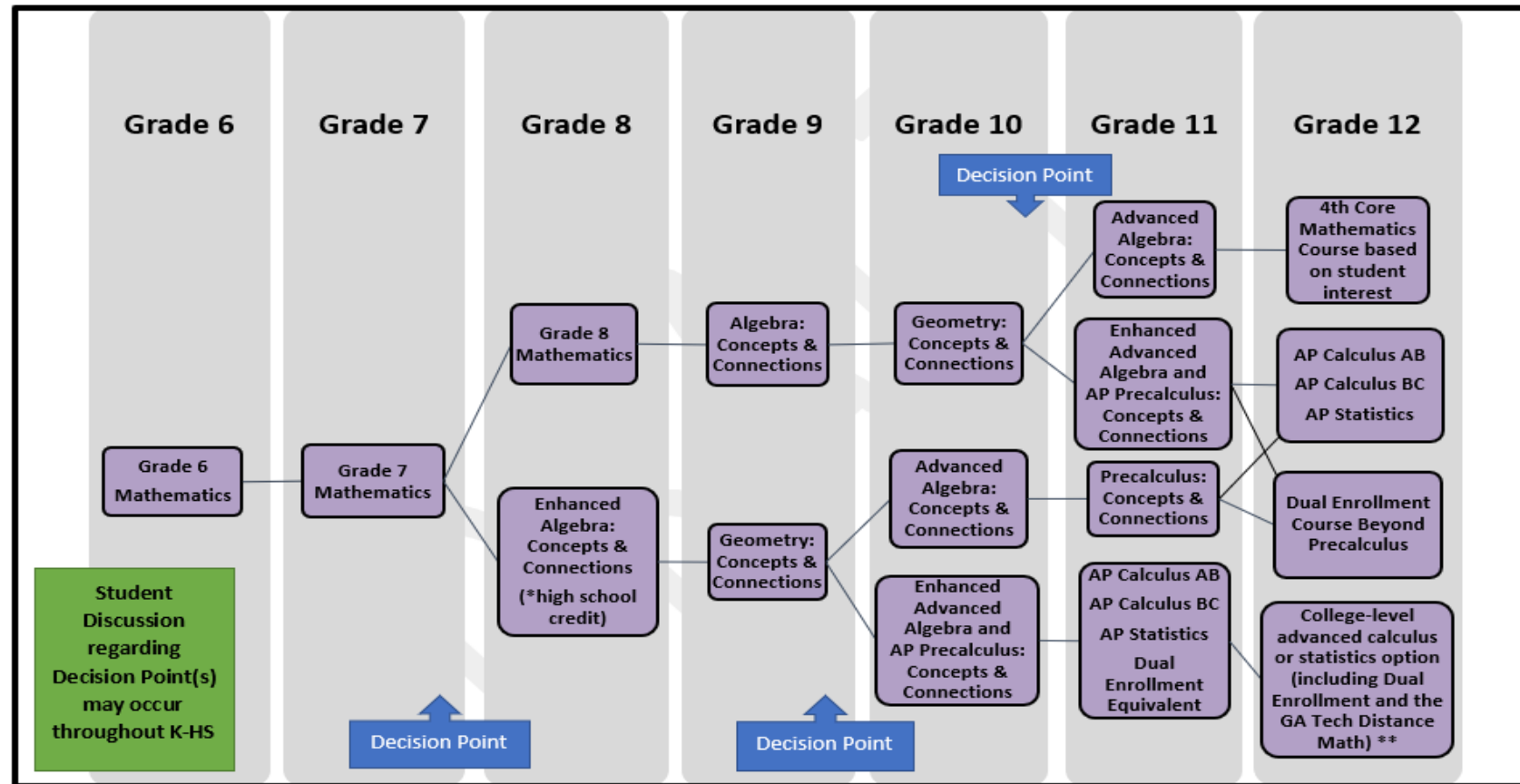
Open Access for ANY interested student

Georgia's K-12 Mathematics Standards Open Access Pathways for Middle and High School

NOTE:

Local Districts have the flexibility to create additional pathways that support student success based on the needs in their individual districts

Personalized, Student-Centered Decision Points



Open Access Secondary Mathematics Pathways

**AP Calculus BC is required for the Georgia Tech Distance Mathematics Program.

**NEW
PATHWAY
SUPPORT**

Appendix A - Guidance for Initial Implementation / Transition Year

If a student completes in 2022-2023 (prior to implementation of new standards)...	INITIAL IMPLEMENTATION/ TRANSITION YEAR	2024-2025	2025-2026	2026-2027	2027-2028	2028-2029
	in 2023-2024, the student should take....					
GSE Advanced Grade 6/7A in 6 th grade	Grade 7 Mathematics*	Enhanced Algebra: Concepts & Connections	Geometry: Concepts & Connections in 9 th grade **	Enhanced Advanced Algebra and AP Precalculus: Concepts & Connections in 10 th grade	AP Calculus AB or AP Calculus BC in 11 th grade	A 4 th mathematics course option in 12 th grade (i.e., College-level Calculus or Statistics course)
GSE Advanced Grade 7B/8 in 7 th grade*	Enhanced Algebra: Concepts & Connections	Geometry: Concepts & Connections in 9 th grade**	Enhanced Advanced Algebra and AP Precalculus: Concepts & Connections in 10 th grade	AP Calculus AB or AP Calculus BC in 11 th grade	A 4 th mathematics advanced calculus or statistics course option in 12 th grade (i.e., College-level Calculus or Statistics)	
GSE Accelerated Coordinate Algebra/ Analytic Geometry A OR Accelerated Algebra/ Geometry A in 8 th grade	Geometry: Concepts & Connections in 9 th grade**	Enhanced Advanced Algebra and AP Precalculus: Concepts & Connections in 10 th	AP Calculus AB or AP Calculus BC in 11 th grade	A 4 th mathematics course option in 12 th grade (i.e., College-level Calculus or Statistics)		
GSE Accelerated Coordinate Algebra/ Analytic Geometry A OR Accelerated Algebra/ Geometry A in 9 th grade	Geometry: Concepts & Connections in 10 th grade**	Enhanced Advanced Algebra and AP Precalculus: Concepts & Connections in 11 th	A 4 th mathematics course option in 12 th grade (i.e., AP Statistics, AP Calculus AB or AP Calculus BC)			
GSE Accelerated Analytic Geometry B/ Advanced Algebra OR GSE Accelerated Geometry B/ Algebra II in 9 th grade	Enhanced Advanced Algebra and AP Precalculus: Concepts & Connections OR Precalculus/AP Precalculus (AP Statistics can be taken in conjunction with either of these courses) in 10 th grade	AP Calculus AB or AP Calculus BC in 11 th grade	A 4 th mathematics advanced calculus course option in 12 th grade (i.e., College-level Calculus or Statistics)			
GSE Accelerated Analytic Geometry B/ Advanced Algebra OR Accelerated Geometry B/ Algebra II in 10 th grade	Enhanced Advanced Algebra and AP Precalculus: Concepts & Connections OR Precalculus/AP Precalculus (AP Statistics can be taken in conjunction with either of these courses) in 11 th grade	A 4 th mathematics course option in 12 th grade (i.e., AP Statistics, AP Calculus AB or AP Calculus BC)				

*Following completion of 7th grade mathematics, all students have the option to take either 8th grade mathematics or Enhanced Algebra: Concepts & Connections.

**Following completion of Geometry: Concepts & Connections, all students have the option to take either Advanced Algebra: Concepts & Connections or Enhanced Advanced Algebra and AP Precalculus: Concepts & Connections.

High School Supports



Support course option,
as needed

***Students must meet
eligibility requirements.*

Course required for all
students,
with
co-requisite support, as
needed.

Course required for all
students,
with
co-requisite support, as
needed.

Course required for all
students,
with
co-requisite support, as
needed.

NOTE: Technical College Readiness as an ACCUPLACER® Prep Support course may be taken, as needed, for students interested in Dual Enrollment Option B. Students must meet eligibility requirements.

Co-Requisite support courses may be taken in conjunction with the core mathematics courses they are paired with to provide students with the necessary intervention support in real time as they are working toward mastery of the grade-level standards. The co-requisite support courses are not stand-alone courses; these courses assist students as they work to earn the required core course credit.

INTERDISCIPLINARY TEACHING AND LEARNING



Georgia Department of Education



GEORGIA'S K-12 MATHEMATICS STANDARDS

MATHEMATICAL PRACTICES

The Mathematical Practices describe the reasoning behaviors students should develop as they build an understanding of mathematics – the “habits of mind” that help students become mathematical thinkers. There are eight standards, which apply to all grade levels and conceptual categories.

These mathematical practices describe how students should engage with the mathematics content for their grade level. Developing these habits of mind builds students’ capacity to become mathematical thinkers. These practices can be applied individually or together in mathematics lessons, and no particular order is required. In well-designed lessons, there are often two or more Mathematical Practices present.

MATHEMATICAL PRACTICES

MP: Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.

Code	Expectation
MP.1	Make sense of problems and persevere in solving them.
MP.2	Reason abstractly and quantitatively.
MP.3	Construct viable arguments and critique the reasoning of others.
MP.4	Model with mathematics.
MP.5	Use appropriate tools strategically.
MP.6	Attend to precision.
MP.7	Look for and make use of structure.
MP.8	Look for and express regularity in repeated reasoning.

Georgia's K-12 Mathematics Standards
August 2021



MATHEMATICAL MODELING

Teaching students to model with mathematics is engaging, builds confidence and competence, and gives students the opportunity to collaborate and make sense of the world around them, the main reason for doing mathematics. For these reasons, mathematical modeling should be incorporated at every level of a student's education. This is important not only to develop a deep understanding of mathematics itself, but more importantly to give students the tools they need to make sense of the world around them. Students who engage in mathematical modeling will not only be prepared for their chosen career but will also learn to make informed daily life decisions based on data and the models they create.

The diagram below is a mathematical modeling framework depicting a cycle of how students can engage in mathematical modeling when solving a realistic problem or task.

A Mathematical Modeling Framework

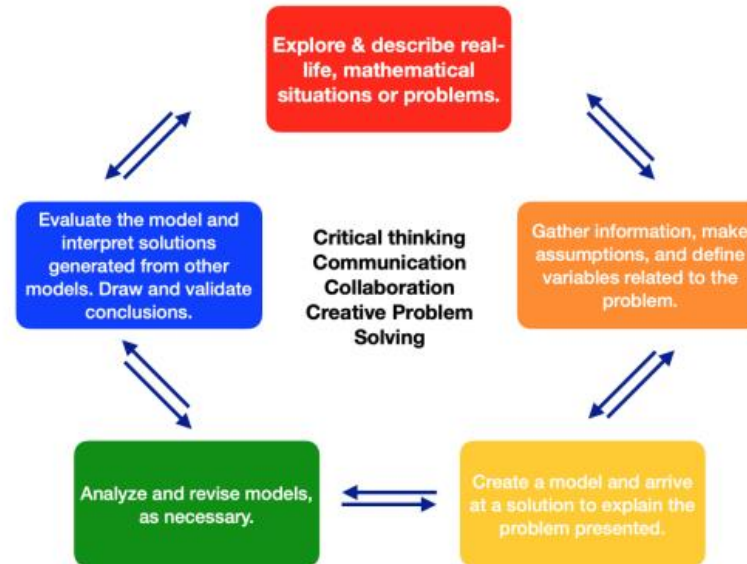


Image adapted from: Suh, Matson, Seitzinger, 2017

FRAMEWORK FOR STATISTICAL REASONING

Statistical reasoning is important for learners to engage as citizens and professionals in a world that continues to change and evolve. Humans are naturally curious beings and statistics is a language that can be used to better answer questions about personal choices and/or make sense of naturally occurring phenomena. Statistics is a way to ask questions, explore, and make sense of the world around us.

The Framework for Statistical Reasoning should be used in all grade levels and courses to guide learners through the sense-making process, ultimately leading to the goal of statistical literacy in all grade levels and courses. Reasoning with statistics provides a context that necessitates the learning and application of a variety of mathematical concepts.

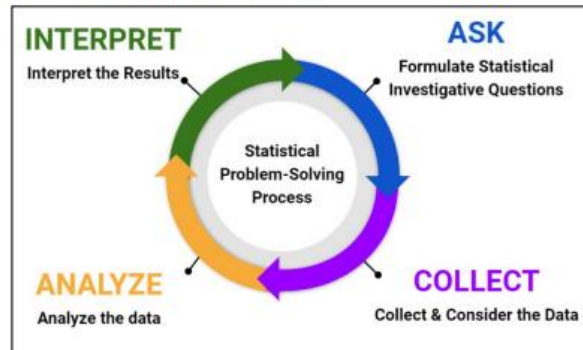


FIGURE 1: GEORGIA FRAMEWORK FOR STATISTICAL REASONING

The following four-step statistical problem-solving process can be used throughout each grade level and course to help learners develop a solid foundation in statistical reasoning and literacy:

- I. **Formulate Statistical Investigative Questions**
Ask questions that anticipate variability.
- II. **Collect & Consider the Data**
Ensure that data collection designs acknowledge variability.
- III. **Analyze the Data**
Make sense of data and communicate what the data mean using pictures (graphs) and words. Give an accounting of variability, as appropriate.
- IV. **Interpret the Results**
Answer statistical investigative questions based on the collected data.



Georgia Department of Education

Customized for School Community and Needs

All content areas considered, but not all content areas must be included for every lesson.



GEORGIA'S K-12 MATHEMATICS STANDARDS INTERDISCIPLINARY UNIT PLANNING TOOL

DRIVING QUESTION/ STATEMENT OF THE PROBLEM (REAL-LIFE PHENOMENA):		
COMPUTER SCIENCE CONTENT & CONNECTIONS	ENGLISH/ LANGUAGE ARTS CONTENT & CONNECTIONS	SCIENCE CONTENT & CONNECTIONS
MATHEMATICS CONTENT & CONNECTIONS		
SOCIAL STUDIES CONTENT & CONNECTIONS	FINE ARTS, HEALTH, PHYSICAL EDUCATION, WORLD LANGUAGES CONTENT & CONNECTIONS	CTAE & WORKFORCE READINESS CONTENT & CONNECTIONS

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Interdisciplinary approaches to teaching and learning

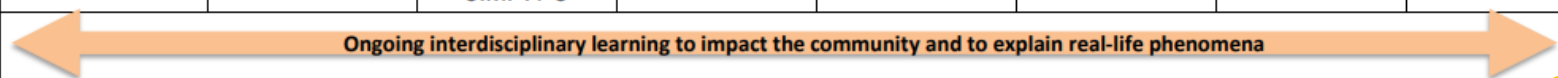
Strong connections with mathematical modeling



INTERDISCIPLINARY CONNECTIONS IN ALL GRADE LEVELS



GRADE 5 MATHEMATICS CURRICULUM MAP

Georgia's K-12 Mathematics Standards GRADE 5							
Semester 1				Semester 2			
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
Investigating Volume of Solid Figures	Building Conceptual Understanding of Place Value Using Measurement and Data Reasoning	Building Conceptual Understanding of Multiplication and Division with Whole Numbers	Building Fraction Understanding	Making Sense of Fraction Multiplication and Division	Extending Place Value and Working with Decimals to Solve Problems	Exploring Geometry and the Coordinate Plane	Culminating Capstone Unit
Interdisciplinary Connection	Interdisciplinary Connection	Interdisciplinary Connection	Interdisciplinary Connection	Interdisciplinary Connection	Interdisciplinary Connection	Interdisciplinary Connection	
2 - 3 weeks	4 - 5 weeks	3 - 4 weeks	3 - 4 weeks	5 - 6 weeks	4 - 5 weeks	3 - 4 weeks	1 - 2 weeks
5.GSR.8 5.NR.5 5.MP.1-8	5.NR.1 5.MDR.7 5.MP.1-8	5.NR.2 5.NR.5 5.MDR.7 5.MP.1-8	5.NR.3 5.MDR.7 5.MP.1-8	5.NR.3 5.MP.1-8	5.NR.4 5.MDR.7 5.MP.1-8	5.PAR.6 5.GSR.8 5.MP.1-8	ALL STANDARDS 5.MP.1-8
 <p>Ongoing interdisciplinary learning to impact the community and to explain real-life phenomena</p>							
<p>The concepts in each unit are presented based on a logical, mathematical progression. Each unique unit in sequence builds upon the previous unit. The Framework for Statistical Reasoning, Mathematical Modeling Framework, and the K-12 Mathematical Practices should be taught throughout the units.</p>							

Mathematical Practices (5.MP.1-8) should be addressed at some point throughout each unit, depending on the tasks that are explored. It is important to note that MPs 1, 3 and 6 should support the learning in every lesson.

Key for Course Standards: NR: Numerical Reasoning, PAR: Patterning & Algebraic Reasoning, GSR: Geometric & Spatial Reasoning, MDR: Measurement & Data Reasoning

THANK YOU FOR ALL YOU DO!!!



Preparing students for life.

www.gadoe.org/mathematics

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