STATE MATCH SUPPLEMENT

Georgia Performance Standards

Mathematics
Grades 8–12

and

EXPLORE®, PLAN®, the ACT®, and WorkKeys®

January 2008

ACT®

List of Supplement Tables

ACT

Preface

This document is a supplement to the *State Match Georgia Performance Standards English Language Arts, Mathematics, and Science Grades 8–12 and ACT's EXPLORE, PLAN, the ACT, and WorkKeys (January 2008)*. This supplement identifies specific ACT College Readiness Standards that correspond to each Georgia Performance Standard in a side-by-side format. The left side of each page presents the Georgia Performance Standards (highlighted if measured by ACT's corresponding testing program). The right side of each page presents the specific ACT College Readiness Standard(s) and WorkKeys Level Skill(s) that correspond to each Georgia Performance Standard.

Georgia standards listed here are from the Georgia Performance Standards as presented on the Georgia Department of Education's website in October 2007.

SUPPLEMENT
TABLES A–V:
MATHEMATICS

TABLE A

GEORGIA Grade 8 Mathematics Performance Standards	EXPLORE Mathematics College Readiness Standards
NUMBER AND OPERATIONS	
Students will understand the numeric and geometric meaning of square root, apply properties of integer exponents and use scientific notation.	
M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.	
a. Find square roots of perfect squares.	**Numbers: Concepts & Properties:** Work with squares and square roots of numbers
b. Recognize the (positive) square root of a number as a length of a side of a square with a given area.	
c. Recognize square roots as points and as lengths on a number line.	**Graphical Representations:** Identify the location of a point with a positive coordinate on the number line
d. Understand that the square root of 0 is 0 and that every positive number has two square roots that are opposite in sign.	**Numbers: Concepts & Properties:** Work with squares and square roots of numbers
e. Recognize and use the radical symbol to denote the positive square root of a positive number.	**Numbers: Concepts & Properties:** Work with squares and square roots of numbers
f. Estimate square roots of positive numbers.	**Numbers: Concepts & Properties:** Work with squares and square roots of numbers
g. Simplify, add, subtract, multiply, and divide expressions containing square roots.	
h. Distinguish between rational and irrational numbers.	
i. Simplify expressions containing integer exponents.	
j. Express and use numbers in scientific notation.	**Numbers: Concepts & Properties:** Work with scientific notation
k. Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.	
GEOMETRY	
Students will use and apply geometric properties of plane figures, including congruence and the Pythagorean theorem.	
M8G1. Students will understand and apply the properties of parallel and perpendicular lines and understand the meaning of congruence.	
a. Investigate characteristics of parallel and perpendicular lines both algebraically and geometrically.	
b. Apply properties of angle pairs formed by parallel lines cut by a transversal.	**Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines
c. Understand the properties of the ratio of segments of parallel lines cut by one or more transversals.	

TABLE A

GEORGIA Grade 8 Mathematics Performance Standards	EXPLORE Mathematics College Readiness Standards
d. Understand the meaning of congruence: that all corresponding angles are congruent and all corresponding sides are congruent.	
M8G2. Students will understand and use the Pythagorean theorem.	
a. Apply properties of right triangles, including the Pythagorean theorem.	
b. Recognize and interpret the Pythagorean theorem as a statement about areas of squares on the sides of a right triangle.	
ALGEBRA	
Students will use linear algebra to represent, analyze and solve problems. They will use equations, tables, and graphs to investigate linear relations and functions, paying particular attention to slope as a rate of change.	
M8A1. Students will use algebra to represent, analyze, and solve problems.	
a. Represent a given situation using algebraic expressions or equations in one variable.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
b. Simplify and evaluate algebraic expressions.	**Expressions, Equations, & Inequalities:** Substitute whole numbers for unknown quantities to evaluate expressions Combine like terms (e.g., $2x + 5x$) Evaluate algebraic expressions by substituting integers for unknown quantities Add and subtract simple algebraic expressions
c. Solve algebraic equations in one variable, including equations involving absolute values.	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations
d. Solve equations involving several variables for one variable in terms of the others.	
e. Interpret solutions in problem contexts.	
M8A2. Students will understand and graph inequalities in one variable.	
a. Represent a given situation using an inequality in one variable.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)

TABLE A

GEORGIA Grade 8 Mathematics Performance Standards	EXPLORE Mathematics College Readiness Standards
b. Use the properties of inequality to solve inequalities.	
c. Graph the solution of an inequality on a number line.	
d. Interpret solutions in problem contexts.	
M8A3. Students will understand relations and linear functions.	
a. Recognize a relation as a correspondence between varying quantities.	
b. Recognize a function as a correspondence between inputs and outputs where the output for each input must be unique.	
c. Distinguish between relations that are functions and those that are not functions.	
d. Recognize functions in a variety of representations and a variety of contexts.	
e. Use tables to describe sequences recursively and with a formula in closed form.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
f. Understand and recognize arithmetic sequences as linear functions with whole number input values.	
g. Interpret the constant difference in an arithmetic sequence as the slope of the associated linear function.	
h. Identify relations and functions as linear or nonlinear.	
i. Translate among verbal, tabular, graphic, and algebraic representations of functions.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
M8A4. Students will graph and analyze graphs of linear equations and inequalities.	
a. Interpret slope as a rate of change.	
b. Determine the meaning of the slope and *y*-intercept in a given situation.	
c. Graph equations of the form $y = mx + b$.	
d. Graph equations of the form $ax + by = c$.	
e. Graph the solution set of a linear inequality, identifying whether the solution set is an open or a closed half-plane.	

TABLE A

GEORGIA Grade 8 Mathematics Performance Standards	EXPLORE Mathematics College Readiness Standards
f. Determine the equation of a line given a graph, numerical information that defines the line or a context involving a linear relationship.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) **Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
g. Solve problems involving linear relationships.	**Expressions, Equations, & Inequalities:** Solve real-world problems using first-degree equations
M8A5. Students will understand systems of linear equations and inequalities and use them to solve problems.	
a. Given a problem context, write an appropriate system of linear equations or inequalities.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
b. Solve systems of equations graphically and algebraically, using technology as appropriate.	
c. Graph the solution set of a system of linear inequalities in two variables.	
d. Interpret solutions in problem contexts.	
DATA ANALYSIS AND PROBABILITY	
Students will use and understand set theory and simple counting techniques; determine the theoretical probability of simple events; and make inferences from data, particularly data that can be modeled by linear functions.	
M8D1. Students will apply basic concepts of set theory.	
a. Demonstrate relationships among sets through use of Venn diagrams.	
b. Determine subsets, complements, intersection, and union of sets.	
c. Use set notation to denote elements of a set.	
M8D2. Students will determine the number of outcomes related to a given event.	
a. Use tree diagrams to find the number of outcomes.	
b. Apply the addition and multiplication principles of counting.	
M8D3. Students will use the basic laws of probability.	
a. Find the probability of simple independent events.	**Probability, Statistics, & Data Analysis:** Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event
b. Find the probability of compound independent events.	**Probability, Statistics, & Data Analysis:** Compute straightforward probabilities for common situations

TABLE A

GEORGIA Grade 8 Mathematics Performance Standards	EXPLORE Mathematics College Readiness Standards
M8D4. Students will organize, interpret, and make inferences from statistical data	
a. Gather data that can be modeled with a linear function.	
b. Estimate and determine a line of best fit from a scatter plot.	**Probability, Statistics, & Data Analysis:** Perform computations on data from tables and graphs
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
M8P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Perform computations on data from tables and graphs Use the relationship between the probability of an event and the probability of its complement Calculate the missing data value, given the average and all data values but one Translate from one representation of data to another (e.g., a bar graph to a circle graph) Determine the probability of a simple event Calculate the average, given the frequency counts of all the data values

TABLE A

GEORGIA Grade 8 Mathematics Performance Standards	EXPLORE Mathematics College Readiness Standards
	Manipulate data from tables and graphs
	Compute straightforward probabilities for common situations
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
	Identify solutions to simple quadratic equations
	Graphical Representations:
	Identify the location of a point with a positive coordinate on the number line
	Locate points on the number line and in the first quadrant
	Locate points in the coordinate plane
	Properties of Plane Figures:
	Exhibit some knowledge of the angles associated with parallel lines

TABLE A

GEORGIA Grade 8 Mathematics Performance Standards	EXPLORE Mathematics College Readiness Standards
	Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure **Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information
c. Apply and adapt a variety of appropriate strategies to solve problems.	
d. Monitor and reflect on the process of mathematical problem solving.	
M8P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
M8P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)

TABLE A

GEORGIA Grade 8 Mathematics Performance Standards	EXPLORE Mathematics College Readiness Standards
M8P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	
M8P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	

TABLE A

GEORGIA Grade 8 Mathematics Performance Standards	EXPLORE Mathematics College Readiness Standards
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context. • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE B

GEORGIA Mathematics 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
ALGEBRA	
Students will explore functions and solve simple equations. Students will simplify and operate with radical, polynomial, and rational expressions.	
MM1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.	
a. Represent functions using function notation.	
b. Graph the basic functions $f(x) = x^n$, where n = 1 to 3, $f(x) = \sqrt{x}$, $f(x) = \|x\|$, and $f(x) = \frac{1}{x}$.	
c. Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the *x*- and *y*-axes.	
d. Investigate and explain the characteristics of a function: domain, range, zeros, intercepts, intervals of increase and decrease, maximum and minimum values, and end behavior.	
e. Relate to a given context the characteristics of a function, and use graphs and tables to investigate its behavior.	
f. Recognize sequences as functions with domains that are whole numbers.	
g. Explore rates of change, comparing constant rates of change (i.e., slope) versus variable rates of change. Compare rates of change of linear, quadratic, square root, and other function families.	
h. Determine graphically and algebraically whether a function has symmetry and whether it is even, odd, or neither.	
i. Understand that any equation in *x* can be interpreted as the equation $f(x) = g(x)$, and interpret the solutions of the equation as the *x*-value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$.	
MM1A2. Students will simplify and operate with radical expressions, polynomials, and rational expressions.	
a. Simplify algebraic and numeric expressions involving square root.	**Numbers: Concepts & Properties:** Work with squares and square roots of numbers
b. Perform operations with square roots.	
c. Add, subtract, multiply, and divide polynomials.	**Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions
d. Expand binomials using the Binomial Theorem.	
e. Add, subtract, multiply, and divide rational expressions.	

TABLE B

GEORGIA Mathematics 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
f. Factor expressions by greatest common factor, grouping, trial and error, and special products limited to the formulas below. $(x + y)^2 = x^2 + 2xy + y^2$ $(x – y)^2 = x^2 – 2xy + y^2$ $(x + y)(x – y) = x^2 – y^2$ $(x + a)(x + b) = x^2 + (a + b)x + ab$ $(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$ $(x – y)^3 = x^3 – 3x^2y + 3xy^2 – y^3$	
g. Use area and volume models for polynomial arithmetic.	**Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
MM1A3. Students will solve simple equations.	
a. Solve quadratic equations in the form $ax^2 + bx + c = 0$, where $a = 1$, by using factorization and finding square roots where applicable.	
b. Solve equations involving radicals such as $\sqrt{x} + b = c$, using algebraic techniques.	
c. Use a variety of techniques, including technology, tables, and graphs to solve equations resulting from the investigation of $x^2 + bx + c = 0$.	
d. Solve simple rational equations that result in linear equations or quadratic equations with leading coefficient of 1.	
GEOMETRY	
Students will explore, understand, and use the formal language of reasoning and justification. Students will apply properties of polygons and determine distances and points of concurrence.	
MM1G1. Students will investigate properties of geometric figures in the coordinate plane.	
a. Determine the distance between two points.	
b. Determine the distance between a point and a line.	
c. Determine the midpoint of a segment.	
d. Understand the distance formula as an application of the Pythagorean theorem.	
e. Use the coordinate plane to investigate properties of and verify conjectures related to triangles and quadrilaterals.	
MM1G2. Students will understand and use the language of mathematical argument and justification.	
a. Use conjecture, inductive reasoning, deductive reasoning, counterexamples, and indirect proof as appropriate.	
b. Understand and use the relationships among a statement and its converse, inverse, and contrapositive.	

TABLE B

GEORGIA Mathematics 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
MM1G3. Students will discover, prove, and apply properties of triangles, quadrilaterals, and other polygons.	
a. Determine the sum of interior and exterior angles in a polygon.	**Properties of Plane Figures:** Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure
b. Understand and use the triangle inequality, the side-angle inequality, and the exterior-angle inequality.	
c. Understand and use congruence postulates and theorems for triangles (SSS, SAS, ASA, AAS, HL).	
d. Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.	**Properties of Plane Figures:** Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure
e. Find and use points of concurrency in triangles: incenter, orthocenter, circumcenter, and centroid.	
DATA ANALYSIS AND PROBABILITY	
Students will use counting techniques and determine probability. Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will organize, represent, investigate, interpret, and make inferences from data.	
MM1D1. Students will determine the number of outcomes related to a given event.	
a. Apply the addition and multiplication principles of counting.	
b. Calculate and use simple permutations and combinations.	
MM1D2. Students will use the basic laws of probability.	
a. Find the probabilities of mutually exclusive events.	**Probability, Statistics, & Data Analysis:** Determine the probability of a simple event Compute straightforward probabilities for common situations
b. Find the probabilities of dependent events.	**Probability, Statistics, & Data Analysis:** Compute straightforward probabilities for common situations
c. Calculate conditional probabilities.	
d. Use expected value to predict outcomes.	
MM1D3. Students will relate samples to a population.	
a. Compare summary statistics (mean, median, quartiles, and interquartile range) from one sample data distribution to another sample data distribution in describing center and variability of the data distributions.	
b. Compare the averages of the summary statistics from a large number of samples to the corresponding population parameters.	

TABLE B

GEORGIA Mathematics 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
c. Understand that a random sample is used to improve the chance of selecting a representative sample.	
MM1D4. Students will explore variability of data by determining the mean absolute deviation (the average of the absolute values of the deviations).	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MM1P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Perform computations on data from tables and graphs Use the relationship between the probability of an event and the probability of its complement Calculate the missing data value, given the average and all data values but one Translate from one representation of data to another (e.g., a bar graph to a circle graph) Determine the probability of a simple event Calculate the average, given the frequency counts of all the data values

TABLE B

GEORGIA Mathematics 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
	Manipulate data from tables and graphs Compute straightforward probabilities for common situations **Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers **Expressions, Equations, & Inequalities:** Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Substitute whole numbers for unknown quantities to evaluate expressions Solve one-step equations having integer or decimal answers Combine like terms (e.g., $2x + 5x$) Evaluate algebraic expressions by substituting integers for unknown quantities Add and subtract simple algebraic expressions Solve routine first-degree equations Perform straightforward word-to-symbol translations Solve real-world problems using first-degree equations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant Locate points in the coordinate plane **Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines

TABLE B

GEORGIA Mathematics 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
	Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure **Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information
c. Apply and adapt a variety of appropriate strategies to solve problems.	
d. Monitor and reflect on the process of mathematical problem solving.	
MM1P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
MM1P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)

TABLE B

GEORGIA Mathematics 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
MM1P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	
MM1P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	

TABLE B

GEORGIA Mathematics 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE C

GEORGIA Mathematics 1 Performance Standards	PLAN Mathematics College Readiness Standards
ALGEBRA	
Students will explore functions and solve simple equations. Students will simplify and operate with radical, polynomial, and rational expressions.	
MM1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.	
a. Represent functions using function notation.	
b. Graph the basic functions $f(x) = x^n$, where n = 1 to 3, $f(x) = \sqrt{x}$, $f(x) = \|x\|$, and $f(x) = \frac{1}{x}$.	
c. Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the *x*- and *y*-axes.	
d. Investigate and explain the characteristics of a function: domain, range, zeros, intercepts, intervals of increase and decrease, maximum and minimum values, and end behavior.	
e. Relate to a given context the characteristics of a function, and use graphs and tables to investigate its behavior.	
f. Recognize sequences as functions with domains that are whole numbers.	
g. Explore rates of change, comparing constant rates of change (i.e., slope) versus variable rates of change. Compare rates of change of linear, quadratic, square root, and other function families.	**Graphical Representations:** Exhibit knowledge of slope Determine the slope of a line from points or equations
h. Determine graphically and algebraically whether a function has symmetry and whether it is even, odd, or neither.	
i. Understand that any equation in *x* can be interpreted as the equation $f(x) = g(x)$, and interpret the solutions of the equation as the *x*-value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$.	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations
MM1A2. Students will simplify and operate with radical expressions, polynomials, and rational expressions.	
a. Simplify algebraic and numeric expressions involving square root.	**Numbers: Concepts & Properties:** Work with squares and square roots of numbers **Expressions, Equations, & Inequalities:** Manipulate expressions and equations
b. Perform operations with square roots.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
c. Add, subtract, multiply, and divide polynomials.	**Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials
d. Expand binomials using the Binomial Theorem.	

TABLE C

GEORGIA Mathematics 1 Performance Standards	PLAN Mathematics College Readiness Standards
e. Add, subtract, multiply, and divide rational expressions.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
f. Factor expressions by greatest common factor, grouping, trial and error, and special products limited to the formulas below. $(x + y)^2 = x^2 + 2xy + y^2$ $(x – y)^2 = x^2 – 2xy + y^2$ $(x + y)(x – y) = x^2 – y^2$ $(x + a)(x + b) = x^2 + (a + b)x + ab$ $(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$ $(x – y)^3 = x^3 – 3x^2y + 3xy^2 – y^3$	**Expressions, Equations, & Inequalities:** Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
g. Use area and volume models for polynomial arithmetic.	**Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
MM1A3. Students will solve simple equations.	
a. Solve quadratic equations in the form $ax^2 + bx + c = 0$, where $a = 1$, by using factorization and finding square roots where applicable.	**Expressions, Equations, & Inequalities:** Solve quadratic equations
b. Solve equations involving radicals such as $\sqrt{x} + b = c$, using algebraic techniques.	
c. Use a variety of techniques, including technology, tables, and graphs to solve equations resulting from the investigation of $x^2 + bx + c = 0$.	**Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs
d. Solve simple rational equations that result in linear equations or quadratic equations with leading coefficient of 1.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
GEOMETRY	
Students will explore, understand, and use the formal language of reasoning and justification. Students will apply properties of polygons and determine distances and points of concurrence.	
MM1G1. Students will investigate properties of geometric figures in the coordinate plane.	
a. Determine the distance between two points.	**Graphical Representations:** Use the distance formula
b. Determine the distance between a point and a line.	**Graphical Representations:** Use the distance formula
c. Determine the midpoint of a segment.	**Graphical Representations:** Find the midpoint of a line segment
d. Understand the distance formula as an application of the Pythagorean theorem.	**Properties of Plane Figures:** Use the Pythagorean theorem
e. Use the coordinate plane to investigate properties of and verify conjectures related to triangles and quadrilaterals.	

TABLE C

GEORGIA Mathematics 1 Performance Standards	PLAN Mathematics College Readiness Standards
MM1G2. Students will understand and use the language of mathematical argument and justification.	
a. Use conjecture, inductive reasoning, deductive reasoning, counterexamples, and indirect proof as appropriate.	
b. Understand and use the relationships among a statement and its converse, inverse, and contrapositive.	
MM1G3. Students will discover, prove, and apply properties of triangles, quadrilaterals, and other polygons.	
a. Determine the sum of interior and exterior angles in a polygon.	**Properties of Plane Figures:** Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles
b. Understand and use the triangle inequality, the side-angle inequality, and the exterior-angle inequality.	
c. Understand and use congruence postulates and theorems for triangles (SSS, SAS, ASA, AAS, HL).	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
d. Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.	**Properties of Plane Figures:** Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure
e. Find and use points of concurrency in triangles: incenter, orthocenter, circumcenter, and centroid.	
DATA ANALYSIS AND PROBABILITY	
Students will use counting techniques and determine probability. Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will organize, represent, investigate, interpret, and make inferences from data.	
MM1D1. Students will determine the number of outcomes related to a given event.	
a. Apply the addition and multiplication principles of counting.	**Probability, Statistics, & Data Analysis:** Exhibit knowledge of simple counting techniques Use Venn diagrams in counting Apply counting techniques
b. Calculate and use simple permutations and combinations.	
MM1D2. Students will use the basic laws of probability.	
a. Find the probabilities of mutually exclusive events.	**Probability, Statistics, & Data Analysis:** Determine the probability of a simple event Compute straightforward probabilities for common situations

TABLE C

GEORGIA Mathematics 1 Performance Standards	PLAN Mathematics College Readiness Standards
b. Find the probabilities of dependent events.	**Probability, Statistics, & Data Analysis:** Compute straightforward probabilities for common situations
c. Calculate conditional probabilities.	
d. Use expected value to predict outcomes.	
MM1D3. Students will relate samples to a population.	
a. Compare summary statistics (mean, median, quartiles, and interquartile range) from one sample data distribution to another sample data distribution in describing center and variability of the data distributions.	**Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs
b. Compare the averages of the summary statistics from a large number of samples to the corresponding population parameters.	
c. Understand that a random sample is used to improve the chance of selecting a representative sample.	
MM1D4. Students will explore variability of data by determining the mean absolute deviation (the average of the absolute values of the deviations).	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MM1P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers

TABLE C

GEORGIA Mathematics 1 Performance Standards	PLAN Mathematics College Readiness Standards
	Perform a single computation using information from a table or chart
	Calculate the average of a list of numbers
	Calculate the average, given the number of data values and the sum of the data values
	Read tables and graphs
	Perform computations on data from tables and graphs
	Use the relationship between the probability of an event and the probability of its complement
	Calculate the missing data value, given the average and all data values but one
	Translate from one representation of data to another (e.g., a bar graph to a circle graph)
	Determine the probability of a simple event
	Exhibit knowledge of simple counting techniques
	Calculate the average, given the frequency counts of all the data values
	Manipulate data from tables and graphs
	Compute straightforward probabilities for common situations
	Use Venn diagrams in counting
	Calculate or use a weighted average
	Interpret and use information from figures, tables, and graphs
	Apply counting techniques
	Compute a probability when the event and/or sample space are not given or obvious
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Work problems involving positive integer exponents
	Work with cubes and cube roots of numbers
	Determine when an expression is undefined
	Apply number properties involving prime factorization
	Apply number properties involving even/odd numbers and factors/multiples

TABLE C

GEORGIA Mathematics 1 Performance Standards	PLAN Mathematics College Readiness Standards
	Apply number properties involving positive/negative numbers
	Apply rules of exponents
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
	Identify solutions to simple quadratic equations
	Add, subtract, and multiply polynomials
	Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
	Solve first-degree inequalities that do not require reversing the inequality sign
	Manipulate expressions and equations
	Write expressions, equations, and inequalities for common algebra settings
	Solve linear inequalities that require reversing the inequality sign
	Solve absolute value equations
	Solve quadratic equations
	Find solutions to systems of linear equations
	Graphical Representations:
	Identify the location of a point with a positive coordinate on the number line
	Locate points on the number line and in the first quadrant
	Locate points in the coordinate plane
	Comprehend the concept of length on the number line
	Exhibit knowledge of slope
	Identify the graph of a linear inequality on the number line
	Determine the slope of a line from points or equations

TABLE C

GEORGIA Mathematics 1 Performance Standards	PLAN Mathematics College Readiness Standards
	Match linear graphs with their equations Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Match number line graphs with solution sets of linear inequalities Use the distance formula Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point **Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem **Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
c. Apply and adapt a variety of appropriate strategies to solve problems.	
d. Monitor and reflect on the process of mathematical problem solving.	

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GEORGIA Mathematics 1 Performance Standards	PLAN Mathematics College Readiness Standards
MM1P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
MM1P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
MM1P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	
MM1P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs

TABLE C

GEORGIA Mathematics 1 Performance Standards	PLAN Mathematics College Readiness Standards
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE D

GEORGIA Mathematics 2 Performance Standards	PLAN Mathematics College Readiness Standards
NUMBER AND OPERATIONS	
Students will use the complex number system.	
MM2N1. Students will represent and operate with complex numbers.	
a. Write square roots of negative numbers in imaginary form.	
b. Write complex numbers in the form $a + bi$.	
c. Add, subtract, multiply, and divide complex numbers.	
d. Simplify expressions involving complex numbers.	
ALGEBRA	
Students will investigate piecewise, exponential, and quadratic functions, using numerical, analytical, and graphical approaches, focusing on the use of these functions in problem-solving situations. Students will solve equations and inequalities and explore inverses of functions.	
MM2A1. Students will investigate step and piecewise functions, including greatest integer and absolute value functions.	
a. Write absolute value functions as piecewise functions.	
b. Investigate and explain characteristics of a variety of piecewise functions including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, points of discontinuity, intervals over which the function is constant, intervals of increase and decrease, and rates of change.	
c. Solve absolute value equations and inequalities analytically, graphically, and by using appropriate technology.	**Expressions, Equations, & Inequalities:** Solve absolute value equations
MM2A2. Students will explore exponential functions.	
a. Extend properties of exponents to include all integer exponents.	**Numbers: Concepts & Properties:** Apply rules of exponents
b. Investigate and explain characteristics of exponential functions, including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, rates of change, and end behavior.	
c. Graph functions as transformations of $f(x) = a^x$.	
d. Solve simple exponential equations and inequalities analytically, graphically, and by using appropriate technology.	
e. Understand and use basic exponential functions as models of real phenomena.	
f. Understand and recognize geometric sequences as exponential functions with domains that are whole numbers.	
g. Interpret the constant ratio in a geometric sequence as the base of the associated exponential function.	

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GEORGIA Mathematics 2 Performance Standards	PLAN Mathematics College Readiness Standards
MM2A3. Students will analyze quadratic functions in the forms $f(x) = ax^2 + bx + c$	
and $f(x) = a(x - h)^2 + k$.	
a. Convert between standard and vertex form.	
b. Graph quadratic functions as transformations of the function $f(x) = x^2$.	
c. Investigate and explain characteristics of quadratic functions, including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, intervals of increase and decrease, and rates of change.	
d. Explore arithmetic series and various ways of computing their sums.	
e. Explore sequences of partial sums of arithmetic series as examples of quadratic functions.	
MM2A4. Students will solve quadratic equations and inequalities in one variable.	
a. Solve equations graphically using appropriate technology.	**Graphical Representations:** Interpret and use information from graphs in the coordinate plane
b. Find real and complex solutions of equations by factoring, taking square roots, and applying the quadratic formula.	**Expressions, Equations, & Inequalities:** Solve quadratic equations
c. Analyze the nature of roots using technology and using the discriminant.	
d. Solve quadratic inequalities both graphically and algebraically, and describe the solutions using linear inequalities.	
MM2A5. Students will explore inverses of functions.	
a. Discuss the characteristics of functions and their inverses, including one-to-oneness, domain, and range.	
b. Determine inverses of linear, quadratic, and power functions and functions of the form $f(x) = \frac{a}{x}$, including the use of restricted domains.	
c. Explore the graphs of functions and their inverses.	
d. Use composition to verify that functions are inverses of each other.	
GEOMETRY	
Students will explore right triangles and right-triangle trigonometry. They will understand and apply properties of circles and spheres, and use them in determining related measures.	
MM2G1. Students will identify and use special right triangles.	
a. Determine the lengths of sides of 30°-60°-90° triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles

TABLE D

GEORGIA Mathematics 2 Performance Standards	PLAN Mathematics College Readiness Standards
b. Determine the lengths of sides of 45°-45°-90° triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
MM2G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.	
a. Discover the relationship of the trigonometric ratios for similar triangles.	
b. Explain the relationship between the trigonometric ratios of complementary angles.	
c. Solve application problems using the trigonometric ratios.	
MM2G3. Students will understand the properties of circles.	
a. Understand and use properties of chords, tangents, and secants as an application of triangle similarity.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
b. Understand and use properties of central, inscribed, and related angles.	
c. Use the properties of circles to solve problems involving the length of an arc and the area of a sector.	**Measurement:** Compute the area and circumference of circles after identifying necessary information
d. Justify measurements and relationships in circles using geometric and algebraic properties.	
MM2G4. Students will find and compare the measures of spheres.	
a. Use and apply surface area and volume of a sphere.	
b. Determine the effect on surface area and volume of changing the radius or diameter of a sphere.	
DATA ANALYSIS AND PROBABILITY	
Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will organize, represent, investigate, interpret, and make inferences from data. They will use regression to analyze data and to make inferences.	
MM2D1. Using sample data, students will make informal inferences about population means and standard deviations.	
a. Pose a question and collect sample data from at least two different populations.	
b. Understand and calculate the means and standard deviations of sets of data.	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Perform computations on data from tables and graphs Calculate the average, given the frequency counts of all the data values

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GEORGIA Mathematics 2 Performance Standards	PLAN Mathematics College Readiness Standards
c. Use means and standard deviations to compare data sets.	
d. Compare the means and standard deviations of random samples with the corresponding population parameters, including those population parameters for normal distributions. Observe that the different sample means vary from one sample to the next. Observe that the distribution of the sample means has less variability than the population distribution.	
MM2D2. Students will determine an algebraic model to quantify the association between two quantitative variables.	
a. Gather and plot data that can be modeled with linear and quadratic functions.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) **Graphical Representations:** Locate points in the coordinate plane
b. Examine the issues of curve fitting by finding good linear fits to data using simple methods such as the median-median line and "eyeballing."	**Probability, Statistics, & Data Analysis:** Perform computations on data from tables and graphs Interpret and use information from figures, tables, and graphs **Graphical Representations:** Interpret and use information from graphs in the coordinate plane
c. Understand and apply the processes of linear and quadratic regression for curve fitting using appropriate technology.	
d. Investigate issues that arise when using data to explore the relationship between two variables, including confusion between correlation and causation.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MM2P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems

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GEORGIA Mathematics 2 Performance Standards	PLAN Mathematics College Readiness Standards
	Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
	Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
	Solve word problems containing several rates, proportions, or percentages
	Probability, Statistics, & Data Analysis:
	Calculate the average of a list of positive whole numbers
	Perform a single computation using information from a table or chart
	Calculate the average of a list of numbers
	Calculate the average, given the number of data values and the sum of the data values
	Read tables and graphs
	Perform computations on data from tables and graphs
	Use the relationship between the probability of an event and the probability of its complement
	Calculate the missing data value, given the average and all data values but one
	Translate from one representation of data to another (e.g., a bar graph to a circle graph)
	Determine the probability of a simple event
	Exhibit knowledge of simple counting techniques
	Calculate the average, given the frequency counts of all the data values
	Manipulate data from tables and graphs
	Compute straightforward probabilities for common situations
	Use Venn diagrams in counting
	Calculate or use a weighted average
	Interpret and use information from figures, tables, and graphs
	Apply counting techniques
	Compute a probability when the event and/or sample space are not given or obvious
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions

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GEORGIA Mathematics 2 Performance Standards	PLAN Mathematics College Readiness Standards
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Work problems involving positive integer exponents
	Work with cubes and cube roots of numbers
	Determine when an expression is undefined
	Apply number properties involving prime factorization
	Apply number properties involving even/odd numbers and factors/multiples
	Apply number properties involving positive/negative numbers
	Apply rules of exponents
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
	Identify solutions to simple quadratic equations
	Add, subtract, and multiply polynomials
	Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
	Solve first-degree inequalities that do not require reversing the inequality sign
	Manipulate expressions and equations
	Write expressions, equations, and inequalities for common algebra settings
	Solve linear inequalities that require reversing the inequality sign
	Solve absolute value equations
	Solve quadratic equations
	Find solutions to systems of linear equations

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GEORGIA Mathematics 2 Performance Standards	PLAN Mathematics College Readiness Standards
	Graphical Representations: Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant Locate points in the coordinate plane Comprehend the concept of length on the number line Exhibit knowledge of slope Identify the graph of a linear inequality on the number line Determine the slope of a line from points or equations Match linear graphs with their equations Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Match number line graphs with solution sets of linear inequalities Use the distance formula Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point **Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem **Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information

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GEORGIA Mathematics 2 Performance Standards	PLAN Mathematics College Readiness Standards
	Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
c. Apply and adapt a variety of appropriate strategies to solve problems.	
d. Monitor and reflect on the process of mathematical problem solving.	
MM2P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
MM2P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
MM2P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	
MM2P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs

TABLE D

GEORGIA Mathematics 2 Performance Standards	PLAN Mathematics College Readiness Standards
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
NUMBER AND OPERATIONS	
Students will use the complex number system.	
MM2N1. Students will represent and operate with complex numbers.	
a. Write square roots of negative numbers in imaginary form.	**Numbers: Concepts & Properties:** Exhibit some knowledge of the complex numbers
b. Write complex numbers in the form $a + bi$.	**Numbers: Concepts & Properties:** Exhibit some knowledge of the complex numbers
c. Add, subtract, multiply, and divide complex numbers.	**Numbers: Concepts & Properties:** Exhibit some knowledge of the complex numbers Multiply two complex numbers Apply properties of complex numbers
d. Simplify expressions involving complex numbers.	**Numbers: Concepts & Properties:** Exhibit some knowledge of the complex numbers Multiply two complex numbers Apply properties of complex numbers
ALGEBRA	
Students will investigate piecewise, exponential, and quadratic functions, using numerical, analytical, and graphical approaches, focusing on the use of these functions in problem-solving situations. Students will solve equations and inequalities and explore inverses of functions.	
MM2A1. Students will investigate step and piecewise functions, including greatest integer and absolute value functions.	
a. Write absolute value functions as piecewise functions.	**Expressions, Equations, & Inequalities:** Write expressions, equations, and inequalities for common algebra settings
b. Investigate and explain characteristics of a variety of piecewise functions including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, points of discontinuity, intervals over which the function is constant, intervals of increase and decrease, and rates of change.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Solve absolute value equations and inequalities analytically, graphically, and by using appropriate technology.	**Expressions, Equations, & Inequalities:** Solve absolute value equations Solve simple absolute value inequalities
MM2A2. Students will explore exponential functions.	
a. Extend properties of exponents to include all integer exponents.	**Numbers: Concepts & Properties:** Apply rules of exponents
b. Investigate and explain characteristics of exponential functions, including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, rates of change, and end behavior.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
c. Graph functions as transformations of $f(x) = a^x$.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
d. Solve simple exponential equations and inequalities analytically, graphically, and by using appropriate technology.	
e. Understand and use basic exponential functions as models of real phenomena.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation
f. Understand and recognize geometric sequences as exponential functions with domains that are whole numbers.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
g. Interpret the constant ratio in a geometric sequence as the base of the associated exponential function.	**Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
MM2A3. Students will analyze quadratic functions in the forms $f(x) = ax^2 + bx + c$ and $f(x) = a(x - h)^2 + k$.	
a. Convert between standard and vertex form.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
b. Graph quadratic functions as transformations of the function $f(x) = x^2$.	**Graphical Representations:** Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Investigate and explain characteristics of quadratic functions, including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, intervals of increase and decrease, and rates of change.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
d. Explore arithmetic series and various ways of computing their sums.	
e. Explore sequences of partial sums of arithmetic series as examples of quadratic functions.	
MM2A4. Students will solve quadratic equations and inequalities in one variable.	
a. Solve equations graphically using appropriate technology.	**Graphical Representations:** Interpret and use information from graphs in the coordinate plane
b. Find real and complex solutions of equations by factoring, taking square roots, and applying the quadratic formula.	**Expressions, Equations, & Inequalities:** Solve quadratic equations
c. Analyze the nature of roots using technology and using the discriminant.	
d. Solve quadratic inequalities both graphically and algebraically, and describe the solutions using linear inequalities.	**Graphical Representations:** Match number line graphs with solution sets of simple quadratic inequalities

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
MM2A5. Students will explore inverses of functions.	
a. Discuss the characteristics of functions and their inverses, including one-to-oneness, domain, and range.	
b. Determine inverses of linear, quadratic, and power functions and functions of the form $f(x) = \frac{a}{x}$, including the use of restricted domains.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
c. Explore the graphs of functions and their inverses.	
d. Use composition to verify that functions are inverses of each other.	**Functions:** Write an expression for the composite of two simple functions
GEOMETRY	
Students will explore right triangles and right-triangle trigonometry. They will understand and apply properties of circles and spheres, and use them in determining related measures.	
MM2G1. Students will identify and use special right triangles.	
a. Determine the lengths of sides of 30°-60°-90° triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
b. Determine the lengths of sides of 45°-45°-90° triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
MM2G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.	
a. Discover the relationship of the trigonometric ratios for similar triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles **Functions:** Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths
b. Explain the relationship between the trigonometric ratios of complementary angles.	**Functions:** Use trigonometric concepts and basic identities to solve problems
c. Solve application problems using the trigonometric ratios.	**Functions:** Apply basic trigonometric ratios to solve right-triangle problems
MM2G3. Students will understand the properties of circles.	
a. Understand and use properties of chords, tangents, and secants as an application of triangle similarity.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use relationships among angles, arcs, and distances in a circle
b. Understand and use properties of central, inscribed, and related angles.	**Properties of Plane Figures:** Use relationships among angles, arcs, and distances in a circle

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
c. Use the properties of circles to solve problems involving the length of an arc and the area of a sector.	**Properties of Plane Figures:** Use relationships among angles, arcs, and distances in a circle **Measurement:** Compute the area and circumference of circles after identifying necessary information
d. Justify measurements and relationships in circles using geometric and algebraic properties.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
MM2G4. Students will find and compare the measures of spheres.	
a. Use and apply surface area and volume of a sphere.	**Measurement:** Use geometric formulas when all necessary information is given
b. Determine the effect on surface area and volume of changing the radius or diameter of a sphere.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
DATA ANALYSIS AND PROBABILITY	
Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will organize, represent, investigate, interpret, and make inferences from data. They will use regression to analyze data and to make inferences.	
MM2D1. Using sample data, students will make informal inferences about population means and standard deviations.	
a. Pose a question and collect sample data from at least two different populations.	
b. Understand and calculate the means and standard deviations of sets of data.	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Perform computations on data from tables and graphs Calculate the average, given the frequency counts of all the data values
c. Use means and standard deviations to compare data sets.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs
d. Compare the means and standard deviations of random samples with the corresponding population parameters, including those population parameters for normal distributions. Observe that the different sample means vary from one sample to the next. Observe that the distribution of the sample means has less variability than the population distribution.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
MM2D2. Students will determine an algebraic model to quantify the association between two quantitative variables.	
a. Gather and plot data that can be modeled with linear and quadratic functions.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) **Graphical Representations:** Locate points in the coordinate plane
b. Examine the issues of curve fitting by finding good linear fits to data using simple methods such as the median-median line and "eyeballing."	**Probability, Statistics, & Data Analysis:** Perform computations on data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation **Graphical Representations:** Interpret and use information from graphs in the coordinate plane
c. Understand and apply the processes of linear and quadratic regression for curve fitting using appropriate technology.	
d. Investigate issues that arise when using data to explore the relationship between two variables, including confusion between correlation and causation.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MM2P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
	Solve word problems containing several rates, proportions, or percentages
	Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
	Probability, Statistics, & Data Analysis:
	Calculate the average of a list of positive whole numbers
	Perform a single computation using information from a table or chart
	Calculate the average of a list of numbers
	Calculate the average, given the number of data values and the sum of the data values
	Read tables and graphs
	Perform computations on data from tables and graphs
	Use the relationship between the probability of an event and the probability of its complement
	Calculate the missing data value, given the average and all data values but one
	Translate from one representation of data to another (e.g., a bar graph to a circle graph)
	Determine the probability of a simple event
	Exhibit knowledge of simple counting techniques
	Calculate the average, given the frequency counts of all the data values
	Manipulate data from tables and graphs
	Compute straightforward probabilities for common situations
	Use Venn diagrams in counting
	Calculate or use a weighted average
	Interpret and use information from figures, tables, and graphs
	Apply counting techniques
	Compute a probability when the event and/or sample space are not given or obvious
	Distinguish between mean, median, and mode for a list of numbers
	Analyze and draw conclusions based on information from figures, tables, and graphs
	Exhibit knowledge of conditional and joint probability
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number
	Identify a digit's place value

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Work problems involving positive integer exponents
	Work with cubes and cube roots of numbers
	Determine when an expression is undefined
	Exhibit some knowledge of the complex numbers
	Apply number properties involving prime factorization
	Apply number properties involving even/odd numbers and factors/multiples
	Apply number properties involving positive/negative numbers
	Apply rules of exponents
	Multiply two complex numbers
	Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
	Exhibit knowledge of logarithms and geometric sequences
	Apply properties of complex numbers
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
	Identify solutions to simple quadratic equations

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
	Add, subtract, and multiply polynomials
	Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
	Solve first-degree inequalities that do not require reversing the inequality sign
	Manipulate expressions and equations
	Write expressions, equations, and inequalities for common algebra settings
	Solve linear inequalities that require reversing the inequality sign
	Solve absolute value equations
	Solve quadratic equations
	Find solutions to systems of linear equations
	Write expressions that require planning and/or manipulating to accurately model a situation
	Write equations and inequalities that require planning, manipulating, and/or solving
	Solve simple absolute value inequalities
	Graphical Representations:
	Identify the location of a point with a positive coordinate on the number line
	Locate points on the number line and in the first quadrant
	Locate points in the coordinate plane
	Comprehend the concept of length on the number line
	Exhibit knowledge of slope
	Identify the graph of a linear inequality on the number line
	Determine the slope of a line from points or equations
	Match linear graphs with their equations
	Find the midpoint of a line segment
	Interpret and use information from graphs in the coordinate plane
	Match number line graphs with solution sets of linear inequalities
	Use the distance formula
	Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point
	Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle)
	Match number line graphs with solution sets of simple quadratic inequalities
	Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
	Solve problems integrating multiple algebraic and/or geometric concepts
	Analyze and draw conclusions based on information from graphs in the coordinate plane

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
	Properties of Plane Figures: Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle **Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Use scale factors to determine the magnitude of a size change Compute the area of composite geometric figures when planning or visualization is required **Functions:** Evaluate quadratic functions, expressed in function notation, at integer values Evaluate polynomial functions, expressed in function notation, at integer values

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
	Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths Evaluate composite functions at integer values Apply basic trigonometric ratios to solve right-triangle problems Write an expression for the composite of two simple functions Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of unit circle trigonometry Match graphs of basic trigonometric functions with their equations
c. Apply and adapt a variety of appropriate strategies to solve problems.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
d. Monitor and reflect on the process of mathematical problem solving.	
MM2P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
c. Develop and evaluate mathematical arguments and proofs.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
d. Select and use various types of reasoning and methods of proof.	**Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
MM2P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
MM2P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
MM2P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Basic Operations & Applications:** Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane

TABLE E

GEORGIA Mathematics 2 Performance Standards	ACT Mathematics College Readiness Standards
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE F

GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
ALGEBRA	
Students will investigate exponential, logarithmic and polynomial functions of degree higher than 2. Students will understand matrices and use them to solve problems.	
MM3A1. Students will analyze graphs of polynomial functions of higher degree.	
a. Graph simple polynomial functions as translations of the function $f(x) = ax^n$.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
b. Understand the effects of the following on the graph of a polynomial function: degree, lead coefficient, and multiplicity of real zeros.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Determine whether a polynomial function has symmetry and whether it is even, odd, or neither.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
d. Investigate and explain characteristics of polynomial functions, including domain and range, intercepts, zeros, relative and absolute extrema, intervals of increase and decrease, and end behavior.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
MM3A2. Students will explore logarithmic functions as inverses of exponential functions.	
a. Define and understand the properties of n^{th} roots.	**Numbers: Concepts & Properties:** Work with squares and square roots of numbers Work with cubes and cube roots of numbers Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
b. Extend properties of exponents to include rational exponents.	**Numbers: Concepts & Properties:** Apply rules of exponents
c. Define logarithmic functions as inverses of exponential functions.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
d. Understand and use properties of logarithms by extending laws of exponents.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
e. Investigate and explain characteristics of exponential and logarithmic functions including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, and rate of change.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences **Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
f. Graph functions as transformations of $f(x) = a^x$, $f(x) = \log_a x$, $f(x) = e^x$, $f(x) = \ln x$.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$

TABLE F

GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
g. Explore real phenomena related to exponential and logarithmic functions including half-life and doubling time.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
MM3A3. Students will solve a variety of equations and inequalities.	
a. Find real and complex roots of higher degree polynomial equations using the factor theorem, remainder theorem, rational root theorem, and fundamental theorem of algebra, incorporating complex and radical conjugates.	
b. Solve polynomial, exponential, and logarithmic equations analytically, graphically, and using appropriate technology.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
c. Solve polynomial, exponential, and logarithmic inequalities analytically, graphically, and using appropriate technology. Represent solution sets of inequalities using interval notation.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
d. Solve a variety of types of equations by appropriate means choosing among mental calculation, pencil and paper, or appropriate technology.	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve absolute value equations Solve quadratic equations
MM3A4. Students will perform basic operations with matrices.	
a. Add, subtract, multiply, and invert matrices, when possible, choosing appropriate methods, including technology.	
b. Find the inverses of two-by-two matrices using pencil and paper, and find inverses of larger matrices using technology.	
c. Examine the properties of matrices, contrasting them with properties of real numbers.	
MM3A5. Students will use matrices to formulate and solve problems.	
a. Represent a system of linear equations as a matrix equation.	
b. Solve matrix equations using inverse matrices.	

TABLE F

GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
c. Represent and solve realistic problems using systems of linear equations.	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
MM3A6. Students will solve linear programming problems in two variables.	
a. Solve systems of inequalities in two variables, showing the solutions graphically.	
b. Represent and solve realistic problems using linear programming.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
MM3A7. Students will understand and apply matrix representations of vertex-edge graphs.	
a. Use graphs to represent realistic situations.	
b. Use matrices to represent graphs, and solve problems that can be represented by graphs.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
GEOMETRY	
Students will understand and use the analytic geometry of conic sections and of planes and spheres in space.	
MM3G1. Students will investigate the relationships between lines and circles.	
a. Find equations of circles.	**Graphical Representations:** Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle)
b. Graph a circle given an equation in general form.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Find the equation of a tangent line to a circle at a given point.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
d. Solve a system of equations involving a circle and a line.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
e. Solve a system of equations involving two circles.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts

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GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
MM3G2. Students will recognize, analyze, and graph the equations of the conic sections (parabolas, circles, ellipses, and hyperbolas).	**Graphical Representations:** Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
a. Convert equations of conics by completing the square.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
b. Graph conic sections, identifying fundamental characteristics.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Write equations of conic sections given appropriate information.	**Expressions, Equations, & Inequalities:** Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle)
MM3G3. Students will investigate planes and spheres.	
a. Plot the point (x, y, z) and understand it as a vertex of a rectangular prism.	
b. Apply the distance formula in 3-space.	**Graphical Representations:** Use the distance formula
c. Recognize and understand equations of planes and spheres.	
DATA ANALYSIS AND PROBABILITY	
Students will use a normal distribution to calculate probabilities. They will organize, represent, investigate, interpret, and make inferences using data from both observational studies and experiments.	
MM3D1. Students will create probability histograms of discrete random variables, using both experimental and theoretical probabilities.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
MM3D2. Students will solve problems involving probabilities by interpreting a normal distribution as a probability histogram for a continuous random variable (z-scores are used for a general normal distribution).	
a. Determine intervals about the mean that include a given percent of data.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs
b. Determine the probability that a given value falls within a specified interval.	**Probability, Statistics, & Data Analysis:** Compute a probability when the event and/or sample space are not given or obvious

TABLE F

GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
c. Estimate how many items in a population fall within a specified interval.	**Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs
MM3D3. Students will understand the differences between experimental and observational studies by posing questions and collecting, analyzing, and interpreting data.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MM3P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Perform computations on data from tables and graphs Use the relationship between the probability of an event and the probability of its complement

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GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
	Calculate the missing data value, given the average and all data values but one
	Translate from one representation of data to another (e.g., a bar graph to a circle graph)
	Determine the probability of a simple event
	Exhibit knowledge of simple counting techniques
	Calculate the average, given the frequency counts of all the data values
	Manipulate data from tables and graphs
	Compute straightforward probabilities for common situations
	Use Venn diagrams in counting
	Calculate or use a weighted average
	Interpret and use information from figures, tables, and graphs
	Apply counting techniques
	Compute a probability when the event and/or sample space are not given or obvious
	Distinguish between mean, median, and mode for a list of numbers
	Analyze and draw conclusions based on information from figures, tables, and graphs
	Exhibit knowledge of conditional and joint probability
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Work problems involving positive integer exponents
	Work with cubes and cube roots of numbers
	Determine when an expression is undefined
	Exhibit some knowledge of the complex numbers
	Apply number properties involving prime factorization
	Apply number properties involving even/odd numbers and factors/multiples
	Apply number properties involving positive/negative numbers
	Apply rules of exponents

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GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
	Multiply two complex numbers
	Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
	Exhibit knowledge of logarithms and geometric sequences
	Apply properties of complex numbers
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
	Identify solutions to simple quadratic equations
	Add, subtract, and multiply polynomials
	Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
	Solve first-degree inequalities that do not require reversing the inequality sign
	Manipulate expressions and equations
	Write expressions, equations, and inequalities for common algebra settings
	Solve linear inequalities that require reversing the inequality sign
	Solve absolute value equations
	Solve quadratic equations
	Find solutions to systems of linear equations
	Write expressions that require planning and/or manipulating to accurately model a situation
	Write equations and inequalities that require planning, manipulating, and/or solving
	Solve simple absolute value inequalities

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GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
	Graphical Representations: Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant Locate points in the coordinate plane Comprehend the concept of length on the number line Exhibit knowledge of slope Identify the graph of a linear inequality on the number line Determine the slope of a line from points or equations Match linear graphs with their equations Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Match number line graphs with solution sets of linear inequalities Use the distance formula Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Match number line graphs with solution sets of simple quadratic inequalities Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas

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GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
	Use relationships among angles, arcs, and distances in a circle
	Measurement:
	Estimate or calculate the length of a line segment based on other lengths given on a geometric figure
	Compute the perimeter of polygons when all side lengths are given
	Compute the area of rectangles when whole number dimensions are given
	Compute the area and perimeter of triangles and rectangles in simple problems
	Use geometric formulas when all necessary information is given
	Compute the area of triangles and rectangles when one or more additional simple steps are required
	Compute the area and circumference of circles after identifying necessary information
	Compute the perimeter of simple composite geometric figures with unknown side lengths
	Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
	Use scale factors to determine the magnitude of a size change
	Compute the area of composite geometric figures when planning or visualization is required
	Functions:
	Evaluate quadratic functions, expressed in function notation, at integer values
	Evaluate polynomial functions, expressed in function notation, at integer values
	Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths
	Evaluate composite functions at integer values
	Apply basic trigonometric ratios to solve right-triangle problems
	Write an expression for the composite of two simple functions
	Use trigonometric concepts and basic identities to solve problems
	Exhibit knowledge of unit circle trigonometry
	Match graphs of basic trigonometric functions with their equations

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GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
c. Apply and adapt a variety of appropriate strategies to solve problems.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
d. Monitor and reflect on the process of mathematical problem solving.	
MM3P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
c. Develop and evaluate mathematical arguments and proofs.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions

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GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
d. Select and use various types of reasoning and methods of proof.	**Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
MM3P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
MM3P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	
MM3P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Basic Operations & Applications:** Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs

TABLE F

GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
	Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	

TABLE F

GEORGIA Mathematics 3 Performance Standards	ACT Mathematics College Readiness Standards
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

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GEORGIA Mathematics 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
ALGEBRA	
Students will investigate exponential, logarithmic and polynomial functions of degree higher than 2. Students will understand matrices and use them to solve problems.	
MM3A1. Students will analyze graphs of polynomial functions of higher degree.	
a. Graph simple polynomial functions as translations of the function $f(x) = ax^n$.	
b. Understand the effects of the following on the graph of a polynomial function: degree, lead coefficient, and multiplicity of real zeros.	
c. Determine whether a polynomial function has symmetry and whether it is even, odd, or neither.	
d. Investigate and explain characteristics of polynomial functions, including domain and range, intercepts, zeros, relative and absolute extrema, intervals of increase and decrease, and end behavior.	
MM3A2. Students will explore logarithmic functions as inverses of exponential functions.	
a. Define and understand the properties of n^{th} roots.	
b. Extend properties of exponents to include rational exponents.	
c. Define logarithmic functions as inverses of exponential functions.	
d. Understand and use properties of logarithms by extending laws of exponents.	
e. Investigate and explain characteristics of exponential and logarithmic functions including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, and rate of change.	
f. Graph functions as transformations of $f(x) = a^x$, $f(x) = \log_a x$, $f(x) = e^x$, $f(x) = \ln x$.	
g. Explore real phenomena related to exponential and logarithmic functions including half-life and doubling time.	Calculate perimeters and areas of basic shapes (rectangles and circles) Rearrange a formula before solving a problem Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple areas and volumes of spheres, cylinders, or cones
MM3A3. Students will solve a variety of equations and inequalities.	
a. Find real and complex roots of higher degree polynomial equations using the factor theorem, remainder theorem, rational root theorem, and fundamental theorem of algebra, incorporating complex and radical conjugates.	

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GEORGIA Mathematics 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
b. Solve polynomial, exponential, and logarithmic equations analytically, graphically, and using appropriate technology.	
c. Solve polynomial, exponential, and logarithmic inequalities analytically, graphically, and using appropriate technology. Represent solution sets of inequalities using interval notation.	
d. Solve a variety of types of equations by appropriate means choosing among mental calculation, pencil and paper, or appropriate technology.	Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Rearrange a formula before solving a problem Solve problems that include nonlinear functions and/or that involve more than one unknown Set up and manipulate complex ratios or proportions
MM3A4. Students will perform basic operations with matrices.	
a. Add, subtract, multiply, and invert matrices, when possible, choosing appropriate methods, including technology.	
b. Find the inverses of two-by-two matrices using pencil and paper, and find inverses of larger matrices using technology.	
c. Examine the properties of matrices, contrasting them with properties of real numbers.	
MM3A5. Students will use matrices to formulate and solve problems.	
a. Represent a system of linear equations as a matrix equation.	
b. Solve matrix equations using inverse matrices.	
c. Represent and solve realistic problems using systems of linear equations.	
MM3A6. Students will solve linear programming problems in two variables.	
a. Solve systems of inequalities in two variables, showing the solutions graphically.	
b. Represent and solve realistic problems using linear programming.	
MM3A7. Students will understand and apply matrix representations of vertex-edge graphs.	
a. Use graphs to represent realistic situations.	
b. Use matrices to represent graphs, and solve problems that can be represented by graphs.	
GEOMETRY	
Students will understand and use the analytic geometry of conic sections and of planes and spheres in space.	

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GEORGIA Mathematics 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
MM3G1. Students will investigate the relationships between lines and circles.	
a. Find equations of circles.	
b. Graph a circle given an equation in general form.	
c. Find the equation of a tangent line to a circle at a given point.	
d. Solve a system of equations involving a circle and a line.	
e. Solve a system of equations involving two circles.	
MM3G2. Students will recognize, analyze, and graph the equations of the conic sections (parabolas, circles, ellipses, and hyperbolas).	
a. Convert equations of conics by completing the square.	
b. Graph conic sections, identifying fundamental characteristics.	
c. Write equations of conic sections given appropriate information.	
MM3G3. Students will investigate planes and spheres.	
a. Plot the point (x, y, z) and understand it as a vertex of a rectangular prism.	
b. Apply the distance formula in 3-space.	
c. Recognize and understand equations of planes and spheres.	
DATA ANALYSIS AND PROBABILITY	
Students will use a normal distribution to calculate probabilities. They will organize, represent, investigate, interpret, and make inferences using data from both observational studies and experiments.	
MM3D1. Students will create probability histograms of discrete random variables, using both experimental and theoretical probabilities.	
MM3D2. Students will solve problems involving probabilities by interpreting a normal distribution as a probability histogram for a continuous random variable (z-scores are used for a general normal distribution).	
a. Determine intervals about the mean that include a given percent of data.	
b. Determine the probability that a given value falls within a specified interval.	
c. Estimate how many items in a population fall within a specified interval.	
MM3D3. Students will understand the differences between experimental and observational studies by posing questions and collecting, analyzing, and interpreting data.	

TABLE G

GEORGIA Mathematics 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MM3P1. Students will solve problems (using appropriate technology).	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
a. Build new mathematical knowledge through problem solving.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and

TABLE G

GEORGIA Mathematics 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
b. Solve problems that arise in mathematics and in other contexts.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids

TABLE G

GEORGIA Mathematics 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
c. Apply and adapt a variety of appropriate strategies to solve problems.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
d. Monitor and reflect on the process of mathematical problem solving.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items
MM3P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	

TABLE G

GEORGIA Mathematics 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
b. Make and investigate mathematical conjectures.	Rearrange a formula before solving a problem Solve problems that include nonlinear functions and/or that involve more than one unknown Set up and manipulate complex ratios or proportions
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
MM3P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items Find the best deal when there are several choices
d. Use the language of mathematics to express mathematical ideas precisely.	
MM3P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	Decide what information, calculations, or unit conversions to use to solve the problem
MM3P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	
b. Select, apply, and translate among mathematical representations to solve problems.	Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem
c. Use representations to model and interpret physical, social, and mathematical phenomena.	
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	

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GEORGIA Mathematics 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE H

GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
ALGEBRA	
Students will analyze rational and trigonometric functions. Students will investigate and apply sequences and series and will understand and use vectors.	
MM4A1. Students will explore rational functions.	
a. Investigate and explain characteristics of rational functions, including domain, range, zeros, points of discontinuity, intervals of increase and decrease, rates of change, local and absolute extrema, symmetry, asymptotes, and end behavior.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
b. Find inverses of rational functions, discussing domain and range, symmetry, and function composition.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
c. Solve rational equations and inequalities analytically, graphically, and by using appropriate technology.	
MM4A2. Students will use the circle to define the trigonometric functions.	
a. Define and understand angles measured in degrees and radians, including but not limited to 0°, 30°, 45°, 60°, 90°, their multiples, and equivalences.	**Functions:** Exhibit knowledge of unit circle trigonometry
b. Understand and apply the six trigonometric functions as functions of general angles in standard position.	**Functions:** Exhibit knowledge of unit circle trigonometry
c. Find values of trigonometric functions using points on the terminal sides of angles in the standard position.	**Functions:** Exhibit knowledge of unit circle trigonometry
d. Understand and apply the six trigonometric functions as functions of arc length on the unit circle.	**Functions:** Exhibit knowledge of unit circle trigonometry
e. Find values of trigonometric functions using the unit circle.	**Functions:** Exhibit knowledge of unit circle trigonometry
MM4A3. Students will investigate and use the graphs of the six trigonometric functions.	
a. Understand and apply the six basic trigonometric functions as functions of real numbers.	
b. Determine the characteristics of the graphs of the six basic trigonometric functions.	**Functions:** Match graphs of basic trigonometric functions with their equations
c. Graph transformations of trigonometric functions including changing period, amplitude, phase shift, and vertical shift.	
d. Apply graphs of trigonometric functions in realistic contexts involving periodic phenomena.	

TABLE H

GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
MM4A4. Students will investigate functions.	
a. Compare and contrast properties of functions within and across the following types: linear, quadratic, polynomial, power, rational, exponential, logarithmic, trigonometric, and piecewise.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences **Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ **Functions:** Match graphs of basic trigonometric functions with their equations
b. Investigate transformations of functions.	
c. Investigate characteristics of functions built through sum, difference, product, quotient, and composition.	
MM4A5. Students will establish the identities below and use them to simplify trigonometric expressions and verify equivalence statements. $\tan\theta = \frac{\sin\theta}{\cos\theta}$ $\cot\theta = \frac{\cos\theta}{\sin\theta}$ $\sec\theta = \frac{1}{\cos\theta}$ $\csc\theta = \frac{1}{\sin\theta}$ $\sin^2\theta + \cos^2\theta = 1$ $1 + \tan^2\theta = \sec^2\theta$ $1 + \cot^2\theta = \csc^2\theta$ $\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$ $\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \pm \sin\alpha\sin\beta$ $\sin(2\theta) = 2\sin\theta\cos\theta$ $\cos(2\theta) = \cos^2\theta - \sin^2\theta$	**Functions:** Use trigonometric concepts and basic identities to solve problems
MM4A6. Students will solve trigonometric equations both graphically and algebraically.	
a. Solve trigonometric equations over a variety of domains, using technology as appropriate.	**Functions:** Use trigonometric concepts and basic identities to solve problems
b. Use the coordinates of a point on the terminal side of an angle to express x as $r\cos\theta$ and y as $r\sin\theta$.	**Functions:** Exhibit knowledge of unit circle trigonometry
c. Apply the law of sines and the law of cosines.	**Functions:** Use trigonometric concepts and basic identities to solve problems
MM4A7. Students will verify and apply $A = \frac{1}{2}ab\sin C$ to find the area of a triangle.	**Functions:** Use trigonometric concepts and basic identities to solve problems
MM4A8. Students will investigate and use inverse sine, inverse cosine, and inverse tangent functions.	
a. Find values of the above functions using technology as appropriate.	**Functions:** Apply basic trigonometric ratios to solve right-triangle problems Use trigonometric concepts and basic identities to solve problems

TABLE H

GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
b. Determine characteristics of the above functions and their graphs.	**Functions:** Match graphs of basic trigonometric functions with their equations
MM4A9. Students will use sequences and series.	
a. Use and find recursive and explicit formulas for the terms of sequences.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences **Expressions, Equations, & Inequalities:** Write expressions, equations, and inequalities for common algebra settings
b. Recognize and use simple arithmetic and geometric sequences.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
c. Find and apply the sums of finite and, where appropriate, infinite arithmetic and geometric series.	
d. Use summation notation to explore finite series.	
MM4A10. Students will understand and use vectors.	
a. Represent vectors algebraically and geometrically.	
b. Convert between vectors expressed using rectangular coordinates and vectors expressed using magnitude and direction.	**Graphical Representations:** Use the distance formula **Functions:** Apply basic trigonometric ratios to solve right-triangle problems Use trigonometric concepts and basic identities to solve problems
c. Add, subtract, and compute scalar multiples of vectors.	
d. Use vectors to solve realistic problems.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
DATA ANALYSIS AND PROBABILITY	
Students will organize, represent, investigate, interpret, and make inferences from data, using the central limit theorem and the standard normal distribution. Students will apply the Central Limit Theorem to calculate confidence intervals for a population mean using data from large samples. Students will use sample data and confidence intervals to draw conclusions about populations.	
MM4D1. Using simulation, students will develop the idea of the central limit theorem.	
MM4D2. Using student-generated data from random samples of at least 30 members, students will determine the margin of error and confidence interval for a specified level of confidence.	

TABLE H

GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
MM4D3. Students will use confidence intervals and margins of error to make inferences from data about a population. Technology is used to evaluate confidence intervals, but students will be aware of the ideas involved.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MM4P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Perform computations on data from tables and graphs Use the relationship between the probability of an event and the probability of its complement Calculate the missing data value, given the average and all data values but one

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GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
	Translate from one representation of data to another (e.g., a bar graph to a circle graph) Determine the probability of a simple event Exhibit knowledge of simple counting techniques Calculate the average, given the frequency counts of all the data values Manipulate data from tables and graphs Compute straightforward probabilities for common situations Use Venn diagrams in counting Calculate or use a weighted average Interpret and use information from figures, tables, and graphs Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious Distinguish between mean, median, and mode for a list of numbers Analyze and draw conclusions based on information from figures, tables, and graphs Exhibit knowledge of conditional and joint probability **Numbers: Concepts & Properties:** Recognize equivalent fractions and fractions in lowest terms Recognize one-digit factors of a number Identify a digit's place value Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Determine when an expression is undefined Exhibit some knowledge of the complex numbers Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents Multiply two complex numbers

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GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
	Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
	Exhibit knowledge of logarithms and geometric sequences
	Apply properties of complex numbers
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
	Identify solutions to simple quadratic equations
	Add, subtract, and multiply polynomials
	Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
	Solve first-degree inequalities that do not require reversing the inequality sign
	Manipulate expressions and equations
	Write expressions, equations, and inequalities for common algebra settings
	Solve linear inequalities that require reversing the inequality sign
	Solve absolute value equations
	Solve quadratic equations
	Find solutions to systems of linear equations
	Write expressions that require planning and/or manipulating to accurately model a situation
	Write equations and inequalities that require planning, manipulating, and/or solving
	Solve simple absolute value inequalities
	Graphical Representations:
	Identify the location of a point with a positive coordinate on the number line

TABLE H

GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
	Locate points on the number line and in the first quadrant Locate points in the coordinate plane Comprehend the concept of length on the number line Exhibit knowledge of slope Identify the graph of a linear inequality on the number line Determine the slope of a line from points or equations Match linear graphs with their equations Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Match number line graphs with solution sets of linear inequalities Use the distance formula Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Match number line graphs with solution sets of simple quadratic inequalities Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle

TABLE H

GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
	Measurement: Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Use scale factors to determine the magnitude of a size change Compute the area of composite geometric figures when planning or visualization is required **Functions:** Evaluate quadratic functions, expressed in function notation, at integer values Evaluate polynomial functions, expressed in function notation, at integer values Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths Evaluate composite functions at integer values Apply basic trigonometric ratios to solve right-triangle problems Write an expression for the composite of two simple functions Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of unit circle trigonometry Match graphs of basic trigonometric functions with their equations
c. Apply and adapt a variety of appropriate strategies to solve problems.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts

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GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
	Properties of Plane Figures: Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
d. Monitor and reflect on the process of mathematical problem solving.	
MM4P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
c. Develop and evaluate mathematical arguments and proofs.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
d. Select and use various types of reasoning and methods of proof.	**Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
MM4P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	

TABLE H

GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
MM4P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	
MM4P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Basic Operations & Applications:** Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas

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GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	

TABLE H

GEORGIA Mathematics 4 Performance Standards	ACT Mathematics College Readiness Standards
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE I

GEORGIA Mathematics 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
ALGEBRA	
Students will analyze rational and trigonometric functions. Students will investigate and apply sequences and series and will understand and use vectors.	
MM4A1. Students will explore rational functions.	
a. Investigate and explain characteristics of rational functions, including domain, range, zeros, points of discontinuity, intervals of increase and decrease, rates of change, local and absolute extrema, symmetry, asymptotes, and end behavior.	
b. Find inverses of rational functions, discussing domain and range, symmetry, and function composition.	
c. Solve rational equations and inequalities analytically, graphically, and by using appropriate technology.	Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Decide what information, calculations, or unit conversions to use to solve the problem Use fractions, negative numbers, ratios, percentages, or mixed numbers Calculate multiple rates Solve problems that include nonlinear functions and/or that involve more than one unknown Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Set up and manipulate complex ratios or proportions
MM4A2. Students will use the circle to define the trigonometric functions.	
a. Define and understand angles measured in degrees and radians, including but not limited to 0°, 30°, 45°, 60°, 90°, their multiples, and equivalences.	
b. Understand and apply the six trigonometric functions as functions of general angles in standard position.	
c. Find values of trigonometric functions using points on the terminal sides of angles in the standard position.	
d. Understand and apply the six trigonometric functions as functions of arc length on the unit circle.	
e. Find values of trigonometric functions using the unit circle.	
MM4A3. Students will investigate and use the graphs of the six trigonometric functions.	
a. Understand and apply the six basic trigonometric functions as functions of real numbers.	
b. Determine the characteristics of the graphs of the six basic trigonometric functions.	
c. Graph transformations of trigonometric functions including changing period, amplitude, phase shift, and vertical shift.	
d. Apply graphs of trigonometric functions in realistic contexts involving periodic phenomena.	

TABLE I

GEORGIA Mathematics 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
MM4A4. Students will investigate functions.	
a. Compare and contrast properties of functions within and across the following types: linear, quadratic, polynomial, power, rational, exponential, logarithmic, trigonometric, and piecewise.	
b. Investigate transformations of functions.	
c. Investigate characteristics of functions built through sum, difference, product, quotient, and composition.	Solve problems that require a single type of mathematics operation (addition, subtraction, multiplication, and division) using whole numbers Add or subtract negative numbers Solve problems that require one or two operations Multiply negative numbers Divide negative numbers Put the information in the right order before performing calculations
MM4A5. Students will establish the identities below and use them to simplify trigonometric expressions and verify equivalence statements. $\tan\theta = \frac{\sin\theta}{\cos\theta}$ $\cot\theta = \frac{\cos\theta}{\sin\theta}$ $\sec\theta = \frac{1}{\cos\theta}$ $\csc\theta = \frac{1}{\sin\theta}$ $\sin^2\theta + \cos^2\theta = 1$ $\cot^2\theta + 1 = \csc^2\theta$ $\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$ $\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \pm \sin\alpha\sin\beta$ $\sin(2\theta) = 2\sin\theta\cos\theta$ $\cos(2\theta) = \cos^2\theta - \sin^2\theta$	
MM4A6. Students will solve trigonometric equations both graphically and algebraically.	
a. Solve trigonometric equations over a variety of domains, using technology as appropriate.	
b. Use the coordinates of a point on the terminal side of an angle to express *x* as *r*cosθ and *y* as *r*sinθ.	
c. Apply the law of sines and the law of cosines.	
MM4A7. Students will verify and apply $A = \frac{1}{2}ab\sin C$ to find the area of a triangle.	
MM4A8. Students will investigate and use inverse sine, inverse cosine, and inverse tangent functions.	
a. Find values of the above functions using technology as appropriate.	
b. Determine characteristics of the above functions and their graphs.	
MM4A9. Students will use sequences and series.	
a. Use and find recursive and explicit formulas for the	

TABLE I

GEORGIA Mathematics 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
terms of sequences.	
b. Recognize and use simple arithmetic and geometric sequences.	
c. Find and apply the sums of finite and, where appropriate, infinite arithmetic and geometric series.	
d. Use summation notation to explore finite series.	
MM4A10. Students will understand and use vectors.	
a. Represent vectors algebraically and geometrically.	
b. Convert between vectors expressed using rectangular coordinates and vectors expressed using magnitude and direction.	
c. Add, subtract, and compute scalar multiples of vectors.	
d. Use vectors to solve realistic problems.	
DATA ANALYSIS AND PROBABILITY	
Students will organize, represent, investigate, interpret, and make inferences from data, using the central limit theorem and the standard normal distribution. Students will apply the Central Limit Theorem to calculate confidence intervals for a population mean using data from large samples. Students will use sample data and confidence intervals to draw conclusions about populations.	
MM4D1. Using simulation, students will develop the idea of the central limit theorem.	
MM4D2. Using student-generated data from random samples of at least 30 members, students will determine the margin of error and confidence interval for a specified level of confidence.	
MM4D3. Students will use confidence intervals and margins of error to make inferences from data about a population. Technology is used to evaluate confidence intervals, but students will be aware of the ideas involved.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MM4P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement

TABLE I

GEORGIA Mathematics 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
b. Solve problems that arise in mathematics and in other contexts.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations

TABLE I

GEORGIA Mathematics 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
c. Apply and adapt a variety of appropriate strategies to solve problems.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
d. Monitor and reflect on the process of mathematical problem solving.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items
MM4P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	Rearrange a formula before solving a problem

TABLE I

GEORGIA Mathematics 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	Solve problems that include nonlinear functions and/or that involve more than one unknown Set up and manipulate complex ratios or proportions
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
MM4P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items Find the best deal when there are several choices
d. Use the language of mathematics to express mathematical ideas precisely.	
MM4P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	Decide what information, calculations, or unit conversions to use to solve the problem
MM4P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	
b. Select, apply, and translate among mathematical representations to solve problems.	Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem
c. Use representations to model and interpret physical, social, and mathematical phenomena.	
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	

TABLE I

GEORGIA Mathematics 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE J

GEORGIA Core Math 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
ALGEBRA	
Students will explore and interpret the characteristics of functions.	
MC1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.	
a. Represent functions using function notation.	
b. Graph the basic functions $f(x) = x^n$, where n = 1 to 3, $f(x) = \sqrt{x}$, $f(x) = \|x\|$, and $f(x) = \frac{1}{x}$.	
c. Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the *x*- and *y*-axes.	
d. Investigate and explain the characteristics of a function: domain, range, zeros, intercepts, intervals of increase and decrease, maximum and minimum values, and end behavior.	
e. Relate to a given context the characteristics of a function, and use graphs and tables to investigate its behavior.	
f. Recognize sequences as functions with domains that are whole numbers.	
g. Explore rates of change, comparing constant rates of change (i.e., slope) versus variable rates of change. Compare rates of change of linear, quadratic, square root, and other function families.	
h. Determine graphically and algebraically whether a function has symmetry and whether it is even, odd, or neither.	
i. Understand that any equation in *x* can be interpreted as the equation $f(x) = g(x)$, and interpret the solutions of the equation as the *x*-value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$.	
GEOMETRY	
The student will apply properties of polygons and determine distances.	
MC1G1. Students will investigate properties of geometric figures in the coordinate plane.	
a. Determine the distance between two points.	
b. Determine the distance between a point and a line.	
c. Determine the midpoint of a segment.	
d. Understand the distance formula as an application of the Pythagorean theorem.	
e. Use the coordinate plane to investigate properties of and verify conjectures related to triangles and quadrilaterals.	

TABLE J

GEORGIA Core Math 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
DATA ANALYSIS AND PROBABILITY	
Students will use counting techniques and determine probability.	
MC1D1. Students will determine the number of outcomes related to a given event	
a. Apply addition and multiplication principles of counting.	
b. Calculate and use simple permutations and combinations.	
MC1D2. Students will use the basic laws of probability	
a. Find the probabilities of mutually exclusive events.	**Probability, Statistics, & Data Analysis:** Determine the probability of a simple event Compute straightforward probabilities for common situations
b. Find the probabilities of dependent events.	**Probability, Statistics, & Data Analysis:** Compute straightforward probabilities for common situations
c. Calculate conditional probabilities.	
d. Use expected value to predict outcomes.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MC1P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) **Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart

TABLE J

GEORGIA Core Math 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
	Calculate the average of a list of numbers
	Calculate the average, given the number of data values and the sum of the data values
	Read tables and graphs
	Perform computations on data from tables and graphs
	Use the relationship between the probability of an event and the probability of its complement
	Calculate the missing data value, given the average and all data values but one
	Translate from one representation of data to another (e.g., a bar graph to a circle graph)
	Determine the probability of a simple event
	Calculate the average, given the frequency counts of all the data values
	Manipulate data from tables and graphs
	Compute straightforward probabilities for common situations
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Solve real-world problems using first-degree equations

TABLE J

GEORGIA Core Math 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Identify solutions to simple quadratic equations **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant Locate points in the coordinate plane **Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure **Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information
c. Apply and adapt a variety of appropriate strategies to solve problems.	
d. Monitor and reflect on the process of mathematical problem solving.	
MC1P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	

TABLE J

GEORGIA Core Math 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
MC1P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
MC1P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	
MC1P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)

TABLE J

GEORGIA Core Math 1 Performance Standards	EXPLORE Mathematics College Readiness Standards
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE K

GEORGIA Core Math 1 Performance Standards	PLAN Mathematics College Readiness Standards
ALGEBRA	
Students will explore and interpret the characteristics of functions.	
MC1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.	
a. Represent functions using function notation.	
b. Graph the basic functions $f(x) = x^n$, where n = 1 to 3, $f(x) = \sqrt{x}$, $f(x) = \|x\|$, and $f(x) = \frac{1}{x}$.	
c. Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the x- and y-axes.	
d. Investigate and explain the characteristics of a function: domain, range, zeros, intercepts, intervals of increase and decrease, maximum and minimum values, and end behavior.	
e. Relate to a given context the characteristics of a function, and use graphs and tables to investigate its behavior.	
f. Recognize sequences as functions with domains that are whole numbers.	
g. Explore rates of change, comparing constant rates of change (i.e., slope) versus variable rates of change. Compare rates of change of linear, quadratic, square root, and other function families.	**Graphical Representations:** Exhibit knowledge of slope Determine the slope of a line from points or equations
h. Determine graphically and algebraically whether a function has symmetry and whether it is even, odd, or neither.	
i. Understand that any equation in x can be interpreted as the equation $f(x) = g(x)$, and interpret the solutions of the equation as the x-value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$.	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations
GEOMETRY	
The student will apply properties of polygons and determine distances.	
MC1G1. Students will investigate properties of geometric figures in the coordinate plane.	
a. Determine the distance between two points.	**Graphical Representations:** Use the distance formula
b. Determine the distance between a point and a line.	**Graphical Representations:** Use the distance formula
c. Determine the midpoint of a segment.	**Graphical Representations:** Find the midpoint of a line segment
d. Understand the distance formula as an application of the Pythagorean theorem.	**Properties of Plane Figures:** Use the Pythagorean theorem

TABLE K

GEORGIA Core Math 1 Performance Standards	PLAN Mathematics College Readiness Standards
e. Use the coordinate plane to investigate properties of and verify conjectures related to triangles and quadrilaterals.	
DATA ANALYSIS AND PROBABILITY	
Students will use counting techniques and determine probability.	
MC1D1. Students will determine the number of outcomes related to a given event	
a. Apply addition and multiplication principles of counting.	**Probability, Statistics, & Data Analysis:** Exhibit knowledge of simple counting techniques Use Venn diagrams in counting Apply counting techniques
b. Calculate and use simple permutations and combinations.	
MC1D2. Students will use the basic laws of probability	
a. Find the probabilities of mutually exclusive events.	**Probability, Statistics, & Data Analysis:** Determine the probability of a simple event Compute straightforward probabilities for common situations
b. Find the probabilities of dependent events.	**Probability, Statistics, & Data Analysis:** Compute straightforward probabilities for common situations
c. Calculate conditional probabilities.	
d. Use expected value to predict outcomes.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MC1P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

TABLE K

GEORGIA Core Math 1 Performance Standards	PLAN Mathematics College Readiness Standards
	Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
	Solve word problems containing several rates, proportions, or percentages
	Probability, Statistics, & Data Analysis:
	Calculate the average of a list of positive whole numbers
	Perform a single computation using information from a table or chart
	Calculate the average of a list of numbers
	Calculate the average, given the number of data values and the sum of the data values
	Read tables and graphs
	Perform computations on data from tables and graphs
	Use the relationship between the probability of an event and the probability of its complement
	Calculate the missing data value, given the average and all data values but one
	Translate from one representation of data to another (e.g., a bar graph to a circle graph)
	Determine the probability of a simple event
	Exhibit knowledge of simple counting techniques
	Calculate the average, given the frequency counts of all the data values
	Manipulate data from tables and graphs
	Compute straightforward probabilities for common situations
	Use Venn diagrams in counting
	Calculate or use a weighted average
	Interpret and use information from figures, tables, and graphs
	Apply counting techniques
	Compute a probability when the event and/or sample space are not given or obvious
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers

TABLE K

GEORGIA Core Math 1 Performance Standards	PLAN Mathematics College Readiness Standards
	Work problems involving positive integer exponents
	Work with cubes and cube roots of numbers
	Determine when an expression is undefined
	Apply number properties involving prime factorization
	Apply number properties involving even/odd numbers and factors/multiples
	Apply number properties involving positive/negative numbers
	Apply rules of exponents
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
	Identify solutions to simple quadratic equations
	Add, subtract, and multiply polynomials
	Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
	Solve first-degree inequalities that do not require reversing the inequality sign
	Manipulate expressions and equations
	Write expressions, equations, and inequalities for common algebra settings
	Solve linear inequalities that require reversing the inequality sign
	Solve absolute value equations
	Solve quadratic equations
	Find solutions to systems of linear equations
	Graphical Representations:
	Identify the location of a point with a positive coordinate on the number line

TABLE K

GEORGIA Core Math 1 Performance Standards	PLAN Mathematics College Readiness Standards
	Locate points on the number line and in the first quadrant Locate points in the coordinate plane Comprehend the concept of length on the number line Exhibit knowledge of slope Identify the graph of a linear inequality on the number line Determine the slope of a line from points or equations Match linear graphs with their equations Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Match number line graphs with solution sets of linear inequalities Use the distance formula Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point **Properties of Plane Figures:** Exhibit some knowledge of the angles associated with parallel lines Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem **Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure

TABLE K

GEORGIA Core Math 1 Performance Standards	PLAN Mathematics College Readiness Standards
c. Apply and adapt a variety of appropriate strategies to solve problems.	
d. Monitor and reflect on the process of mathematical problem solving.	
MC1P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
MC1P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
MC1P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	
MC1P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs

TABLE K

GEORGIA Core Math 1 Performance Standards	PLAN Mathematics College Readiness Standards
	Expressions, Equations, & Inequalities: Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE L

GEORGIA Core Math 2 Performance Standards	PLAN Mathematics College Readiness Standards
ALGEBRA	
Students will simplify and operate with radical expressions, polynomials, and rational expressions. Students will solve simple equations.	
MC2A1. Students will simplify and operate with radical expressions, polynomials, and rational expressions.	
a. Simplify algebraic and numeric expressions involving square root.	**Numbers: Concepts & Properties:** Work with squares and square roots of numbers **Expressions, Equations, & Inequalities:** Manipulate expressions and equations
b. Perform operations with square roots.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
c. Add, subtract, multiply, and divide polynomials.	**Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials
d. Add, subtract, multiply, and divide rational expressions.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
e. Factor expressions by greatest common factor, grouping, trial and error, and special products limited to the formulas below. $(x + y)^2 = x^2 + 2xy + y^2$ $(x – y)^2 = x^2 – 2xy + y^2$ $(x + y)(x – y) = x^2 – y^2$ $(x + a)(x + b) = x^2 + (a + b)x + ab$ $(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$ $(x – y)^3 = x^3 – 3x^2y + 3xy^2 – y^3$.	**Expressions, Equations, & Inequalities:** Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
f. Use area and volume models for polynomial arithmetic	**Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
MC2A2. Students will solve simple equations.	
a. Solve quadratic equations in the form $ax^2 + bx + c = 0$, where $a = 1$, by using factorization and finding square roots where applicable.	**Expressions, Equations, & Inequalities:** Solve quadratic equations
b. Solve equations involving radicals such as $\sqrt{x} + b = c$, using algebraic techniques.	
c. Use a variety of techniques, including technology, tables, and graphs to solve equations resulting from the investigation of $x^2 + bx + c = 0$.	**Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs
d. Solve simple rational equations that result in linear equations or quadratic equations with leading coefficient of 1.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations

TABLE L

GEORGIA Core Math 2 Performance Standards	PLAN Mathematics College Readiness Standards
GEOMETRY	
Students will explore, understand and use the formal language of reasoning and justification. Students will apply properties of polygons.	
MC2G1. Students will understand and use the language of mathematical argument and justification.	
a. Use conjecture, inductive reasoning, deductive reasoning, counterexamples, and indirect proof as appropriate.	
b. Understand and use the relationships among a statement and its converse, inverse, and contrapositive.	
MC2G2. Students will discover, prove, and apply properties of triangles, quadrilaterals, and other polygons.	
a. Determine the sum of interior and exterior angles in a polygon.	**Properties of Plane Figures:** Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles
b. Understand and use the triangle inequality, the side-angle inequality, and the exterior-angle inequality.	
c. Understand and use congruence postulates and theorems for triangles (SSS, SAS, ASA, AAS, HL).	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
d. Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.	**Properties of Plane Figures:** Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure
e. Find and use points of concurrency in triangles: incenter, orthocenter, circumcenter, and centroid.	
DATA ANALYSIS AND PROBABILITY	
Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will organize, represent, investigate, interpret, and make inferences from data.	
MC2D1. Students will relate samples to a population.	
a. Compare summary statistics (mean, median, quartiles, and interquartile range) from one sample data distribution to another sample data distribution in describing center and variability of the data distributions.	**Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs
b. Compare the averages of the summary statistics from a large number of samples to the corresponding population parameters.	
c. Understand that a random sample is used to improve the chance of selecting a representative sample.	

TABLE L

GEORGIA Core Math 2 Performance Standards	PLAN Mathematics College Readiness Standards
MC2D2. Students will explore variability of data by determining the mean absolute deviation (the average of the absolute values of the deviations).	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MC2P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages **Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Perform computations on data from tables and graphs Use the relationship between the probability of an event and the probability of its complement Calculate the missing data value, given the average and all data values but one Translate from one representation of data to another (e.g., a bar graph to a circle graph) Determine the probability of a simple event Exhibit knowledge of simple counting techniques

TABLE L

GEORGIA Core Math 2 Performance Standards	PLAN Mathematics College Readiness Standards
	Calculate the average, given the frequency counts of all the data values
	Manipulate data from tables and graphs
	Compute straightforward probabilities for common situations
	Use Venn diagrams in counting
	Calculate or use a weighted average
	Interpret and use information from figures, tables, and graphs
	Apply counting techniques
	Compute a probability when the event and/or sample space are not given or obvious
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Work problems involving positive integer exponents
	Work with cubes and cube roots of numbers
	Determine when an expression is undefined
	Apply number properties involving prime factorization
	Apply number properties involving even/odd numbers and factors/multiples
	Apply number properties involving positive/negative numbers
	Apply rules of exponents
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities

TABLE L

GEORGIA Core Math 2 Performance Standards	PLAN Mathematics College Readiness Standards
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
	Identify solutions to simple quadratic equations
	Add, subtract, and multiply polynomials
	Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
	Solve first-degree inequalities that do not require reversing the inequality sign
	Manipulate expressions and equations
	Write expressions, equations, and inequalities for common algebra settings
	Solve linear inequalities that require reversing the inequality sign
	Solve absolute value equations
	Solve quadratic equations
	Find solutions to systems of linear equations
	Graphical Representations:
	Identify the location of a point with a positive coordinate on the number line
	Locate points on the number line and in the first quadrant
	Locate points in the coordinate plane
	Comprehend the concept of length on the number line
	Exhibit knowledge of slope
	Identify the graph of a linear inequality on the number line
	Determine the slope of a line from points or equations
	Match linear graphs with their equations
	Find the midpoint of a line segment
	Interpret and use information from graphs in the coordinate plane
	Match number line graphs with solution sets of linear inequalities
	Use the distance formula
	Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point
	Properties of Plane Figures:
	Exhibit some knowledge of the angles associated with parallel lines
	Find the measure of an angle using properties of parallel lines

TABLE L

GEORGIA Core Math 2 Performance Standards	PLAN Mathematics College Readiness Standards
	Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem **Measurement:** Estimate or calculate the length of a line segment based on other lengths given on a geometric figure Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
c. Apply and adapt a variety of appropriate strategies to solve problems.	
d. Monitor and reflect on the process of mathematical problem solving.	
MC2P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
MC2P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	

TABLE L

GEORGIA Core Math 2 Performance Standards	PLAN Mathematics College Readiness Standards
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
MC2P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	
MC2P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	

TABLE L

GEORGIA Core Math 2 Performance Standards	PLAN Mathematics College Readiness Standards
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE M

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
ALGEBRA	
Students will investigate piecewise and exponential functions from numerical, analytical and graphical approaches, focusing on the use of these functions in problem-solving situations.	
MC3A1. Students will investigate step and piecewise functions, including greatest integer and absolute value functions.	
a. Write absolute value functions as piecewise functions.	**Expressions, Equations, & Inequalities:** Write expressions, equations, and inequalities for common algebra settings
b. Investigate and explain characteristics of a variety of piecewise functions including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, points of discontinuity, intervals over which the function is constant, intervals of increase and decrease, and rates of change.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Solve absolute value equations and inequalities analytically, graphically, and by using appropriate technology.	**Expressions, Equations, & Inequalities:** Solve absolute value equations Solve simple absolute value inequalities
MC3A2. Students will explore exponential functions.	
a. Extend properties of exponents to include all integer exponents.	**Numbers: Concepts & Properties:** Apply rules of exponents
b. Investigate and explain characteristics of exponential functions, including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, rates of change, and end behavior.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Graph functions as transformations of $f(x) = a^x$.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
d. Solve simple exponential equations and inequalities analytically, graphically, and by using appropriate technology.	
e. Understand and use basic exponential functions as models of real phenomena.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation
f. Understand and recognize geometric sequences as exponential functions with domains that are sets of whole numbers.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
g. Interpret the constant ratio in a geometric sequence as the base of the associated exponential function.	**Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers

TABLE M

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
GEOMETRY	
Students will explore right triangles and right triangular trigonometry.	
MC3G1. Students will identify and use special right triangles.	
a. Determine the lengths of sides of 30°-60°-90° triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
b. Determine the lengths of sides of 45°-45°-90° triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
MC3G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.	
a. Discover the relationship of the trigonometric ratios for similar triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles **Functions:** Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths
b. Explain the relationship between the trigonometric ratios of complementary angles.	**Functions:** Use trigonometric concepts and basic identities to solve problems
c. Solve application problems using the trigonometric ratios.	**Functions:** Apply basic trigonometric ratios to solve right-triangle problems
DATA ANALYSIS AND PROBABILITY	
Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will organize, represent, investigate, interpret, and make inferences from data. Students will use regression to analyze data, and to make inferences.	
MC3D1. Using sample data, students will make informal inferences about population means and standard deviations.	
a. Pose a question and collect sample data from at least two different populations.	
b. Understand and calculate the means and standard deviations of sets of data.	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Perform computations on data from tables and graphs Calculate the average, given the frequency counts of all the data values
c. Use means and standard deviations to compare data sets.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs

TABLE M

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
d. Compare the means and standard deviations of random samples with the corresponding population parameters. Observe that the different sample means vary from one sample to the next. Observe that the distribution of the sample means has less variability than the population distribution.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs
MC3D2. Students will determine an algebraic model to quantify the association between two quantitative variables.	
a. Gather and plot data that can be modeled with linear functions.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) **Graphical Representations:** Locate points in the coordinate plane
b. Examine the issues of curve fitting by finding good linear fits to data using simple methods such as the median-median line and "eyeballing."	**Probability, Statistics, & Data Analysis:** Perform computations on data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation **Graphical Representations:** Interpret and use information from graphs in the coordinate plane
c. Understand and apply the processes of linear regression for curve fitting using appropriate technology.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MC3P1. Students will solve problems (using appropriate technology)	
a. Build new mathematical knowledge through problem solving	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

TABLE M

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
	Solve word problems containing several rates, proportions, or percentages
	Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
	Probability, Statistics, & Data Analysis:
	Calculate the average of a list of positive whole numbers
	Perform a single computation using information from a table or chart
	Calculate the average of a list of numbers
	Calculate the average, given the number of data values and the sum of the data values
	Read tables and graphs
	Perform computations on data from tables and graphs
	Use the relationship between the probability of an event and the probability of its complement
	Calculate the missing data value, given the average and all data values but one
	Translate from one representation of data to another (e.g., a bar graph to a circle graph)
	Determine the probability of a simple event
	Exhibit knowledge of simple counting techniques
	Calculate the average, given the frequency counts of all the data values
	Manipulate data from tables and graphs
	Compute straightforward probabilities for common situations
	Use Venn diagrams in counting
	Calculate or use a weighted average
	Interpret and use information from figures, tables, and graphs
	Apply counting techniques
	Compute a probability when the event and/or sample space are not given or obvious
	Distinguish between mean, median, and mode for a list of numbers
	Analyze and draw conclusions based on information from figures, tables, and graphs
	Exhibit knowledge of conditional and joint probability
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number

TABLE M

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Work problems involving positive integer exponents
	Work with cubes and cube roots of numbers
	Determine when an expression is undefined
	Exhibit some knowledge of the complex numbers
	Apply number properties involving prime factorization
	Apply number properties involving even/odd numbers and factors/multiples
	Apply number properties involving positive/negative numbers
	Apply rules of exponents
	Multiply two complex numbers
	Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
	Exhibit knowledge of logarithms and geometric sequences
	Apply properties of complex numbers
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)

TABLE M

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Identify solutions to simple quadratic equations Add, subtract, and multiply polynomials Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations Find solutions to systems of linear equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving Solve simple absolute value inequalities **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant Locate points in the coordinate plane Comprehend the concept of length on the number line Exhibit knowledge of slope Identify the graph of a linear inequality on the number line Determine the slope of a line from points or equations Match linear graphs with their equations Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Match number line graphs with solution sets of linear inequalities Use the distance formula Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Match number line graphs with solution sets of simple quadratic inequalities Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Analyze and draw conclusions based on information from graphs in the coordinate plane
	Properties of Plane Figures:
	Exhibit some knowledge of the angles associated with parallel lines
	Find the measure of an angle using properties of parallel lines
	Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°)
	Use several angle properties to find an unknown angle measure
	Recognize Pythagorean triples
	Use properties of isosceles triangles
	Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
	Use the Pythagorean theorem
	Draw conclusions based on a set of conditions
	Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
	Use relationships among angles, arcs, and distances in a circle
	Measurement:
	Estimate or calculate the length of a line segment based on other lengths given on a geometric figure
	Compute the perimeter of polygons when all side lengths are given
	Compute the area of rectangles when whole number dimensions are given
	Compute the area and perimeter of triangles and rectangles in simple problems
	Use geometric formulas when all necessary information is given
	Compute the area of triangles and rectangles when one or more additional simple steps are required
	Compute the area and circumference of circles after identifying necessary information
	Compute the perimeter of simple composite geometric figures with unknown side lengths
	Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
	Use scale factors to determine the magnitude of a size change
	Compute the area of composite geometric figures when planning or visualization is required
	Functions:
	Evaluate quadratic functions, expressed in function notation, at integer values

TABLE M

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Evaluate polynomial functions, expressed in function notation, at integer values Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths Evaluate composite functions at integer values Apply basic trigonometric ratios to solve right-triangle problems Write an expression for the composite of two simple functions Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of unit circle trigonometry Match graphs of basic trigonometric functions with their equations
c. Apply and adapt a variety of appropriate strategies to solve problems.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
d. Monitor and reflect on the process of mathematical problem solving.	
MC3P2. Students will reason and evaluate mathematical arguments	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
c. Develop and evaluate mathematical arguments and proofs.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs

TABLE M

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Numbers: Concepts & Properties: Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
d. Select and use various types of reasoning and methods of proof.	**Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
MC3P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
MC3P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole	
c. Recognize and apply mathematics in contexts outside of mathematics.	

TABLE M

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
MC3P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Basic Operations & Applications:** Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane

TABLE M

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
MATH READING CONTENT	
Students will enhance reading in all curriculum areas:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words	

TABLE N

GEORGIA Core Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
ALGEBRA	
Students will investigate piecewise and exponential functions from numerical, analytical and graphical approaches, focusing on the use of these functions in problem-solving situations.	
MC3A1. Students will investigate step and piecewise functions, including greatest integer and absolute value functions.	
a. Write absolute value functions as piecewise functions.	
b. Investigate and explain characteristics of a variety of piecewise functions including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, points of discontinuity, intervals over which the function is constant, intervals of increase and decrease, and rates of change.	
c. Solve absolute value equations and inequalities analytically, graphically, and by using appropriate technology.	
MC3A2. Students will explore exponential functions.	
a. Extend properties of exponents to include all integer exponents.	
b. Investigate and explain characteristics of exponential functions, including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, rates of change, and end behavior.	
c. Graph functions as transformations of $f(x) = a^x$.	
d. Solve simple exponential equations and inequalities analytically, graphically, and by using appropriate technology.	Calculate perimeters and areas of basic shapes (rectangles and circles) Rearrange a formula before solving a problem Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple areas and volumes of spheres, cylinders, or cones
e. Understand and use basic exponential functions as models of real phenomena.	Decide what information, calculations, or unit conversions to use to solve the problem
f. Understand and recognize geometric sequences as exponential functions with domains that are sets of whole numbers.	
g. Interpret the constant ratio in a geometric sequence as the base of the associated exponential function.	
GEOMETRY	
Students will explore right triangles and right triangular trigonometry.	
MC3G1. Students will identify and use special right triangles.	
a. Determine the lengths of sides of 30°-60°-90° triangles.	
b. Determine the lengths of sides of 45°-45°-90° triangles.	

TABLE N

GEORGIA Core Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
MC3G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.	
a. Discover the relationship of the trigonometric ratios for similar triangles.	
b. Explain the relationship between the trigonometric ratios of complementary angles.	
c. Solve application problems using the trigonometric ratios.	
DATA ANALYSIS AND PROBABILITY	
Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will organize, represent, investigate, interpret, and make inferences from data. Students will use regression to analyze data, and to make inferences.	
MC3D1. Using sample data, students will make informal inferences about population means and standard deviations.	
a. Pose a question and collect sample data from at least two different populations.	
b. Understand and calculate the means and standard deviations of sets of data.	
c. Use means and standard deviations to compare data sets.	
d. Compare the means and standard deviations of random samples with the corresponding population parameters. Observe that the different sample means vary from one sample to the next. Observe that the distribution of the sample means has less variability than the population distribution.	
MC3D2. Students will determine an algebraic model to quantify the association between two quantitative variables.	
a. Gather and plot data that can be modeled with linear functions.	
b. Examine the issues of curve fitting by finding good linear fits to data using simple methods such as the median-median line and "eyeballing."	
c. Understand and apply the processes of linear regression for curve fitting using appropriate technology.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MC3P1. Students will solve problems (using appropriate technology)	
a. Build new mathematical knowledge through problem solving	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages

TABLE N

GEORGIA Core Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
b. Solve problems that arise in mathematics and in other contexts.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem

TABLE N

GEORGIA Core Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
c. Apply and adapt a variety of appropriate strategies to solve problems.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions

TABLE N

GEORGIA Core Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	Find the best deal when there are several choices
d. Monitor and reflect on the process of mathematical problem solving.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items
MC3P2. Students will reason and evaluate mathematical arguments	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	Rearrange a formula before solving a problem Solve problems that include nonlinear functions and/or that involve more than one unknown Set up and manipulate complex ratios or proportions
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
MC3P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items Find the best deal when there are several choices
d. Use the language of mathematics to express mathematical ideas precisely.	
MC3P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole	
c. Recognize and apply mathematics in contexts outside of mathematics.	Decide what information, calculations, or unit conversions to use to solve the problem
MC3P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	
b. Select, apply, and translate among mathematical representations to solve problems.	Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem
c. Use representations to model and interpret physical, social, and mathematical phenomena.	

TABLE N

GEORGIA Core Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words	

TABLE O

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
ALGEBRA	
Students will investigate piecewise and exponential functions from numerical, analytical and graphical approaches, focusing on the use of these functions in problem-solving situations.	
MC3A1. Students will investigate step and piecewise functions, including greatest integer and absolute value functions.	
a. Write absolute value functions as piecewise functions.	**Expressions, Equations, & Inequalities:** Write expressions, equations, and inequalities for common algebra settings
b. Investigate and explain characteristics of a variety of piecewise functions including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, points of discontinuity, intervals over which the function is constant, intervals of increase and decrease, and rates of change.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Solve absolute value equations and inequalities analytically, graphically, and by using appropriate technology.	**Expressions, Equations, & Inequalities:** Solve absolute value equations Solve simple absolute value inequalities
MC3A2. Students will explore exponential functions.	
a. Extend properties of exponents to include all integer exponents.	**Numbers: Concepts & Properties:** Apply rules of exponents
b. Investigate and explain characteristics of exponential functions, including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, rates of change, and end behavior.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Graph functions as transformations of $f(x) = a^x$.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
d. Solve simple exponential equations and inequalities analytically, graphically, and by using appropriate technology.	
e. Understand and use basic exponential functions as models of real phenomena.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation
f. Understand and recognize geometric sequences as exponential functions with domains that are sets of whole numbers.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
g. Interpret the constant ratio in a geometric sequence as the base of the associated exponential function.	**Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers

TABLE O

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
GEOMETRY	
Students will explore right triangles and right triangular trigonometry.	
MC3G1. Students will identify and use special right triangles.	
a. Determine the lengths of sides of 30°-60°-90° triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
b. Determine the lengths of sides of 45°-45°-90° triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
MC3G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.	
a. Discover the relationship of the trigonometric ratios for similar triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles **Functions:** Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths
b. Explain the relationship between the trigonometric ratios of complementary angles.	**Functions:** Use trigonometric concepts and basic identities to solve problems
c. Solve application problems using the trigonometric ratios.	**Functions:** Apply basic trigonometric ratios to solve right-triangle problems
DATA ANALYSIS AND PROBABILITY	
Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will organize, represent, investigate, interpret, and make inferences from data. Students will use regression to analyze data, and to make inferences.	
MC3D1. Using sample data, students will make informal inferences about population means and standard deviations.	
a. Pose a question and collect sample data from at least two different populations.	
b. Understand and calculate the means and standard deviations of sets of data.	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Perform computations on data from tables and graphs Calculate the average, given the frequency counts of all the data values
c. Use means and standard deviations to compare data sets.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs

TABLE O

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
d. Compare the means and standard deviations of random samples with the corresponding population parameters. Observe that the different sample means vary from one sample to the next. Observe that the distribution of the sample means has less variability than the population distribution.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs
MC3D2. Students will determine an algebraic model to quantify the association between two quantitative variables.	
a. Gather and plot data that can be modeled with linear functions.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) **Graphical Representations:** Locate points in the coordinate plane
b. Examine the issues of curve fitting by finding good linear fits to data using simple methods such as the median-median line and "eyeballing."	**Probability, Statistics, & Data Analysis:** Perform computations on data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation **Graphical Representations:** Interpret and use information from graphs in the coordinate plane
c. Understand and apply the processes of linear regression for curve fitting using appropriate technology.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MC3P1. Students will solve problems (using appropriate technology)	
a. Build new mathematical knowledge through problem solving	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

TABLE O

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
	Solve word problems containing several rates, proportions, or percentages
	Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
	Probability, Statistics, & Data Analysis:
	Calculate the average of a list of positive whole numbers
	Perform a single computation using information from a table or chart
	Calculate the average of a list of numbers
	Calculate the average, given the number of data values and the sum of the data values
	Read tables and graphs
	Perform computations on data from tables and graphs
	Use the relationship between the probability of an event and the probability of its complement
	Calculate the missing data value, given the average and all data values but one
	Translate from one representation of data to another (e.g., a bar graph to a circle graph)
	Determine the probability of a simple event
	Exhibit knowledge of simple counting techniques
	Calculate the average, given the frequency counts of all the data values
	Manipulate data from tables and graphs
	Compute straightforward probabilities for common situations
	Use Venn diagrams in counting
	Calculate or use a weighted average
	Interpret and use information from figures, tables, and graphs
	Apply counting techniques
	Compute a probability when the event and/or sample space are not given or obvious
	Distinguish between mean, median, and mode for a list of numbers
	Analyze and draw conclusions based on information from figures, tables, and graphs
	Exhibit knowledge of conditional and joint probability
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number

TABLE O

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Work problems involving positive integer exponents
	Work with cubes and cube roots of numbers
	Determine when an expression is undefined
	Exhibit some knowledge of the complex numbers
	Apply number properties involving prime factorization
	Apply number properties involving even/odd numbers and factors/multiples
	Apply number properties involving positive/negative numbers
	Apply rules of exponents
	Multiply two complex numbers
	Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
	Exhibit knowledge of logarithms and geometric sequences
	Apply properties of complex numbers
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)

TABLE O

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Identify solutions to simple quadratic equations Add, subtract, and multiply polynomials Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Solve first-degree inequalities that do not require reversing the inequality sign Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations Find solutions to systems of linear equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving Solve simple absolute value inequalities **Graphical Representations:** Identify the location of a point with a positive coordinate on the number line Locate points on the number line and in the first quadrant Locate points in the coordinate plane Comprehend the concept of length on the number line Exhibit knowledge of slope Identify the graph of a linear inequality on the number line Determine the slope of a line from points or equations Match linear graphs with their equations Find the midpoint of a line segment Interpret and use information from graphs in the coordinate plane Match number line graphs with solution sets of linear inequalities Use the distance formula Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Match number line graphs with solution sets of simple quadratic inequalities Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts

TABLE O

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Analyze and draw conclusions based on information from graphs in the coordinate plane
	Properties of Plane Figures:
	Exhibit some knowledge of the angles associated with parallel lines
	Find the measure of an angle using properties of parallel lines
	Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°)
	Use several angle properties to find an unknown angle measure
	Recognize Pythagorean triples
	Use properties of isosceles triangles
	Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
	Use the Pythagorean theorem
	Draw conclusions based on a set of conditions
	Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
	Use relationships among angles, arcs, and distances in a circle
	Measurement:
	Estimate or calculate the length of a line segment based on other lengths given on a geometric figure
	Compute the perimeter of polygons when all side lengths are given
	Compute the area of rectangles when whole number dimensions are given
	Compute the area and perimeter of triangles and rectangles in simple problems
	Use geometric formulas when all necessary information is given
	Compute the area of triangles and rectangles when one or more additional simple steps are required
	Compute the area and circumference of circles after identifying necessary information
	Compute the perimeter of simple composite geometric figures with unknown side lengths
	Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
	Use scale factors to determine the magnitude of a size change
	Compute the area of composite geometric figures when planning or visualization is required
	Functions:
	Evaluate quadratic functions, expressed in function notation, at integer values

TABLE O

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Evaluate polynomial functions, expressed in function notation, at integer values Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths Evaluate composite functions at integer values Apply basic trigonometric ratios to solve right-triangle problems Write an expression for the composite of two simple functions Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of unit circle trigonometry Match graphs of basic trigonometric functions with their equations
c. Apply and adapt a variety of appropriate strategies to solve problems.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
d. Monitor and reflect on the process of mathematical problem solving.	
MC3P2. Students will reason and evaluate mathematical arguments	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions

TABLE O

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
c. Develop and evaluate mathematical arguments and proofs.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
d. Select and use various types of reasoning and methods of proof.	**Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
MC3P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
MC3P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole	
c. Recognize and apply mathematics in contexts outside of mathematics.	

TABLE O

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
MC3P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Basic Operations & Applications:** Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane

TABLE O

GEORGIA Core Math 3 Performance Standards	ACT Mathematics College Readiness Standards
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words	

TABLE P

GEORGIA Core Math 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
NUMBER AND OPERATIONS	
Students will use the complex number system.	
MC4N1. Students will represent and operate with complex numbers.	
a. Write square roots of negative numbers in imaginary form.	
b. Write complex numbers in the form $a + bi$.	
c. Add, subtract, multiply, and divide complex numbers.	
d. Simplify expressions involving complex numbers.	
ALGEBRA	
Students will investigate quadratic functions from numerical, analytical and graphical approaches, focusing on the use of these functions in problem-solving situations. Students will solve quadratic equations and inequalities and explore inverses of functions.	
MC4A1. Students will analyze quadratic functions in the forms $f(x) = ax^2 + bx + c$ and $f(x) = a(x - h)^2 + k$.	
a. Convert between standard and vertex form.	
b. Graph quadratic functions as transformations of the function $f(x) = x^2$.	
c. Investigate and explain characteristics of quadratic functions, including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, intervals of increase and decrease, and rates of change.	
d. Explore arithmetic series and various ways of computing their sums.	
e. Explore sequences of partial sums of arithmetic series as examples of quadratic functions.	
MC4A2. Students will solve quadratic equations and inequalities in one variable.	
a. Solve equations graphically using appropriate technology.	
b. Find real and complex solutions of equations by factoring, taking square roots, and applying the quadratic formula.	
c. Analyze the nature of roots using technology and using the discriminant.	
d. Solve quadratic inequalities both graphically and algebraically, and describe the solutions using linear inequalities.	
MC4A3. Students will explore inverses of functions.	
a. Discuss the characteristics of functions and their inverses, including one-to-oneness, domain, and range.	
b. Determine inverses of linear, quadratic, and power functions and functions of the form $f(x) = \frac{a}{x}$, including the use of restricted domains.	
c. Explore the graphs of functions and their inverses.	

TABLE P

GEORGIA Core Math 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
d. Use composition to verify that functions are inverses of each other.	
GEOMETRY	
Students will understand and apply properties of circles and spheres and use them in determining related measures.	
MC4G1. Students will understand the properties of circles.	
a. Understand and use properties of chords, tangents, and secants as an application of triangle similarity.	
b. Understand and use properties of central, inscribed, and related angles.	
c. Use the properties of circles to solve problems involving the length of an arc and the area of a sector.	Decide what information, calculations, or unit conversions to use to solve the problem Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Set up and manipulate complex ratios or proportions
d. Justify measurements and relationships in circles using geometric and algebraic properties.	
MC4G2. Students will find and compare the measures of spheres.	
a. Use and apply surface area and volume of a sphere.	Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Calculate multiple areas and volumes of spheres, cylinders, or cones
b. Determine the effect on surface area and volume of changing the radius or diameter of a sphere.	Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions
DATA ANALYSIS AND PROBABILITY	
Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will use regression to analyze data, and to make inferences.	
MC4D1. Students will determine an algebraic model to quantify the association between two quantitative variables.	
a. Gather and plot data that can be modeled with quadratic functions.	
b. Understand and apply the processes of quadratic regression for curve fitting using appropriate technology.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	

TABLE P

GEORGIA Core Math 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
MC4P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
b. Solve problems that arise in mathematics and in other contexts.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles)

TABLE P

GEORGIA Core Math 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
c. Apply and adapt a variety of appropriate strategies to solve problems.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates

TABLE P

GEORGIA Core Math 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
d. Monitor and reflect on the process of mathematical problem solving.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items
MC4P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	Rearrange a formula before solving a problem Solve problems that include nonlinear functions and/or that involve more than one unknown Set up and manipulate complex ratios or proportions
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
MC4P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items Find the best deal when there are several choices
d. Use the language of mathematics to express mathematical ideas precisely.	
MC4P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	Decide what information, calculations, or unit conversions to use to solve the problem
MC4P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	
b. Select, apply, and translate among mathematical representations to solve problems.	Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem
c. Use representations to model and interpret physical, social, and mathematical phenomena.	

TABLE P

GEORGIA Core Math 4 Standards	ACT's WorkKeys Applied Mathematics Level Skills
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Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
NUMBER AND OPERATIONS	
Students will use the complex number system.	
MA1N1. Students will represent and operate with complex numbers.	
a. Write square roots of negative numbers in imaginary form.	**Numbers: Concepts & Properties:** Exhibit some knowledge of the complex numbers
b. Write complex numbers in the form $a + bi$.	**Numbers: Concepts & Properties:** Exhibit some knowledge of the complex numbers
c. Add, subtract, multiply, and divide complex numbers.	**Numbers: Concepts & Properties:** Exhibit some knowledge of the complex numbers Multiply two complex numbers Apply properties of complex numbers
d. Simplify expressions involving complex numbers.	**Numbers: Concepts & Properties:** Exhibit some knowledge of the complex numbers Multiply two complex numbers Apply properties of complex numbers
ALGEBRA	
Students will explore functions, solve equations and operate with radical, polynomial and rational expressions.	
MA1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.	
a. Represent functions using function notation.	
b. Graph the basic functions $f(x) = x^n$, where n = 1 to 3, $f(x) = \sqrt{x}$, $f(x) = \lvert x \rvert$, and $f(x) = \frac{1}{x}$.	
c. Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the x- and y-axes.	
d. Investigate and explain the characteristics of a function: domain, range, zeros, intercepts, intervals of increase and decrease, maximum and minimum values, and end behavior.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
e. Relate to a given context the characteristics of a function, and use graphs and tables to investigate its behavior.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
f. Recognize sequences as functions with domains that are sets of whole numbers.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
g. Explore rates of change, comparing constant rates of change (i.e., slope) versus variable rates of change. Compare rates of change of linear, quadratic, square root, and other function families.	**Graphical Representations:** Exhibit knowledge of slope Determine the slope of a line from points or equations Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
h. Determine graphically and algebraically whether a function has symmetry and whether it is even, odd, or neither.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Analyze and draw conclusions based on information from graphs in the coordinate plane
i. Understand that any equation in x can be interpreted as the equation $f(x) = g(x)$, and interpret the solutions of the equation as the x-value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$.	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane
MA1A2. Students will simplify and operate with radical expressions, polynomials, and rational expressions.	
a. Simplify algebraic and numeric expressions involving square root.	**Numbers: Concepts & Properties:** Work with squares and square roots of numbers **Expressions, Equations, & Inequalities:** Manipulate expressions and equations
b. Perform operations with square roots.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
c. Add, subtract, multiply, and divide polynomials.	**Expressions, Equations, & Inequalities:** Combine like terms (e.g., $2x + 5x$) Add and subtract simple algebraic expressions Multiply two binomials Add, subtract, and multiply polynomials
d. Add, subtract, multiply, and divide rational expressions.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
e. Factor expressions by greatest common factor, grouping, trial and error, and special products limited to the formulas below. $(x + y)^2 = x^2 + 2xy + y^2$ $(x – y)^2 = x^2 – 2xy + y^2$ $(x + y)(x – y) = x^2 – y^2$ $(x + a)(x + b) = x^2 + (a + b)x + ab$ $(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$ $(x – y)^3 = x^3 – 3x^2y + 3xy^2 – y^3$	**Expressions, Equations, & Inequalities:** Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
f. Use area and volume models for polynomial arithmetic.	**Expressions, Equations, & Inequalities:** Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
MA1A3. Students will analyze quadratic functions in the forms $f(x) = ax^2 + bx + c$ and $f(x) = a(x – h)^2 + k$.	
a. Convert between standard and vertex form.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
b. Graph quadratic functions as transformations of the function $f(x) = x^2$.	**Graphical Representations:** Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Investigate and explain characteristics of quadratic functions, including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, intervals of increase and decrease, and rates of change.	**Graphical Representations:** Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
d. Explore arithmetic series and various ways of computing their sums.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
e. Explore sequences of partial sums of arithmetic series as examples of quadratic functions.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
MA1A4. Students will solve quadratic equations and inequalities in one variable.	
a. Solve equations graphically using appropriate technology.	**Expressions, Equations, & Inequalities:** Solve quadratic equations
b. Find real and complex solutions of equations by factoring, taking square roots, and applying the quadratic formula.	**Expressions, Equations, & Inequalities:** Solve quadratic equations
c. Analyze the nature of roots using technology and using the discriminant.	
d. Solve quadratic inequalities both graphically and algebraically, and describe the solutions using linear inequalities.	**Graphical Representations:** Match number line graphs with solution sets of simple quadratic inequalities
MA1A5. Students will investigate step and piecewise functions, including greatest integer and absolute value functions.	
a. Write absolute value functions as piecewise functions.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
b. Investigate and explain characteristics of a variety of piecewise functions including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, points of discontinuity, intervals over which the function is constant, intervals of increase and decrease, and rates of change.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Solve absolute value equations and inequalities analytically, graphically, and by using appropriate technology.	**Expressions, Equations, & Inequalities:** Solve absolute value equations Solve simple absolute value inequalities
GEOMETRY	
Students will explore, understand and use the formal language of reasoning and justification. Students will apply properties of polygons, circles and spheres, and determine distances and points of concurrence.	

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
MA1G1. Students will investigate properties of geometric figures in the coordinate plane.	
a. Determine the distance between two points.	**Graphical Representations:** Use the distance formula
b. Determine the distance between a point and a line.	**Graphical Representations:** Use the distance formula
c. Determine the midpoint of a segment.	**Graphical Representations:** Find the midpoint of a line segment
d. Understand the distance formula as an application of the Pythagorean theorem.	**Properties of Plane Figures:** Use the Pythagorean theorem
e. Use the coordinate plane to investigate properties of and verify conjectures related to triangles and quadrilaterals.	**Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane
MA1G2. Students will understand and use the language of mathematical argument and justification.	
a. Use conjecture, inductive reasoning, deductive reasoning, counterexamples, and indirect proof as appropriate.	**Properties of Plane Figures:** Draw conclusions based on a set of conditions
b. Understand and use the relationships among a statement and its converse, inverse, and contrapositive.	
MA1G3. Students will discover, prove, and apply properties of triangles, quadrilaterals, and other polygons.	
a. Determine the sum of interior and exterior angles in a polygon.	**Properties of Plane Figures:** Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure Use properties of isosceles triangles
b. Understand and use the triangle inequality, the side-angle inequality, and the exterior-angle inequality.	
c. Understand and use congruence postulates and theorems for triangles (SSS, SAS, ASA, AAS, HL).	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
d. Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.	**Properties of Plane Figures:** Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Use several angle properties to find an unknown angle measure
e. Find and use points of concurrency in triangles: incenter, orthocenter, circumcenter, and centroid.	
MA1G4. Students will understand the properties of circles.	
a. Understand and use properties of chords, tangents, and secants as an application of triangle similarity.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use relationships among angles, arcs, and distances in a circle

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
b. Understand and use properties of central, inscribed, and related angles.	**Properties of Plane Figures:** Use relationships among angles, arcs, and distances in a circle
c. Use the properties of circles to solve problems involving the length of an arc and the area of a sector.	**Properties of Plane Figures:** Use relationships among angles, arcs, and distances in a circle **Measurement:** Compute the area and circumference of circles after identifying necessary information
d. Justify measurements and relationships in circles using geometric and algebraic properties.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
MA1G5. Students will find and compare the measures of spheres.	
a. Use and apply surface area and volume of a sphere.	**Measurement:** Use geometric formulas when all necessary information is given
b. Determine the effect on surface area and volume of changing the radius or diameter of a sphere.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
DATA ANALYSIS AND PROBABILITY	
Students will use counting techniques and determine probability. Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will organize, represent, investigate, interpret, and make inferences from data. Students will determine algebraic models from data.	
MA1D1. Students will determine the number of outcomes related to a given event.	
a. Apply the addition and multiplication principles of counting.	**Probability, Statistics, & Data Analysis:** Exhibit knowledge of simple counting techniques Use Venn diagrams in counting Apply counting techniques
b. Calculate and use simple permutations and combinations.	**Probability, Statistics, & Data Analysis:** Apply counting techniques
MA1D2. Students will use the basic laws of probability.	
a. Find the probabilities of mutually exclusive events.	**Probability, Statistics, & Data Analysis:** Determine the probability of a simple event Compute straightforward probabilities for common situations
b. Find the probabilities of dependent events.	**Probability, Statistics, & Data Analysis:** Compute straightforward probabilities for common situations
c. Calculate conditional probabilities.	**Probability, Statistics, & Data Analysis:** Exhibit knowledge of conditional and joint probability

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
d. Use expected value to predict outcomes.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs
MA1D3. Students will relate samples to a population.	
a. Compare summary statistics (mean, median, quartiles, and interquartile range) from one sample data distribution to another sample data distribution in describing center and variability of the data distributions.	**Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs
b. Compare the averages of the summary statistics from a large number of samples to the corresponding population parameters.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs
c. Understand that a random sample is used to improve the chance of selecting a representative sample.	
MA1D4. Students will explore variability of data by determining the mean absolute deviation (the average of the absolute values of the deviations).	
MA1D5. Students will determine an algebraic model to quantify the association between two quantitative variables.	
a. Gather and plot data that can be modeled with linear and quadratic functions.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) **Graphical Representations:** Locate points in the coordinate plane
b. Examine the issues of curve fitting by finding good linear fits to data using simple methods such as the median-median line and "eyeballing."	**Probability, Statistics, & Data Analysis:** Perform computations on data from tables and graphs Interpret and use information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation **Graphical Representations:** Interpret and use information from graphs in the coordinate plane
c. Understand and apply the processes of linear and quadratic regression for curve fitting using appropriate technology.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MA1P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Perform computations on data from tables and graphs Use the relationship between the probability of an event and the probability of its complement Calculate the missing data value, given the average and all data values but one Translate from one representation of data to another (e.g., a bar graph to a circle graph) Determine the probability of a simple event Exhibit knowledge of simple counting techniques Calculate the average, given the frequency counts of all the data values Manipulate data from tables and graphs Compute straightforward probabilities for common situations Use Venn diagrams in counting Calculate or use a weighted average Interpret and use information from figures, tables, and graphs

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
	Apply counting techniques
	Compute a probability when the event and/or sample space are not given or obvious
	Distinguish between mean, median, and mode for a list of numbers
	Analyze and draw conclusions based on information from figures, tables, and graphs
	Exhibit knowledge of conditional and joint probability
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Work problems involving positive integer exponents
	Work with cubes and cube roots of numbers
	Determine when an expression is undefined
	Exhibit some knowledge of the complex numbers
	Apply number properties involving prime factorization
	Apply number properties involving even/odd numbers and factors/multiples
	Apply number properties involving positive/negative numbers
	Apply rules of exponents
	Multiply two complex numbers
	Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
	Exhibit knowledge of logarithms and geometric sequences
	Apply properties of complex numbers
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
	Identify solutions to simple quadratic equations
	Add, subtract, and multiply polynomials
	Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
	Solve first-degree inequalities that do not require reversing the inequality sign
	Manipulate expressions and equations
	Write expressions, equations, and inequalities for common algebra settings
	Solve linear inequalities that require reversing the inequality sign
	Solve absolute value equations
	Solve quadratic equations
	Find solutions to systems of linear equations
	Write expressions that require planning and/or manipulating to accurately model a situation
	Write equations and inequalities that require planning, manipulating, and/or solving
	Solve simple absolute value inequalities
	Graphical Representations:
	Identify the location of a point with a positive coordinate on the number line
	Locate points on the number line and in the first quadrant
	Locate points in the coordinate plane
	Comprehend the concept of length on the number line
	Exhibit knowledge of slope
	Identify the graph of a linear inequality on the number line
	Determine the slope of a line from points or equations
	Match linear graphs with their equations
	Find the midpoint of a line segment
	Interpret and use information from graphs in the coordinate plane
	Match number line graphs with solution sets of linear inequalities
	Use the distance formula

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
	Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point
	Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle)
	Match number line graphs with solution sets of simple quadratic inequalities
	Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
	Solve problems integrating multiple algebraic and/or geometric concepts
	Analyze and draw conclusions based on information from graphs in the coordinate plane
	Properties of Plane Figures:
	Exhibit some knowledge of the angles associated with parallel lines
	Find the measure of an angle using properties of parallel lines
	Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°)
	Use several angle properties to find an unknown angle measure
	Recognize Pythagorean triples
	Use properties of isosceles triangles
	Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
	Use the Pythagorean theorem
	Draw conclusions based on a set of conditions
	Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
	Use relationships among angles, arcs, and distances in a circle
	Measurement:
	Estimate or calculate the length of a line segment based on other lengths given on a geometric figure
	Compute the perimeter of polygons when all side lengths are given
	Compute the area of rectangles when whole number dimensions are given
	Compute the area and perimeter of triangles and rectangles in simple problems
	Use geometric formulas when all necessary information is given
	Compute the area of triangles and rectangles when one or more additional simple steps are required
	Compute the area and circumference of circles after identifying necessary information

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
	Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Use scale factors to determine the magnitude of a size change Compute the area of composite geometric figures when planning or visualization is required **Functions:** Evaluate quadratic functions, expressed in function notation, at integer values Evaluate polynomial functions, expressed in function notation, at integer values Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths Evaluate composite functions at integer values Apply basic trigonometric ratios to solve right-triangle problems Write an expression for the composite of two simple functions Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of unit circle trigonometry Match graphs of basic trigonometric functions with their equations
c. Apply and adapt a variety of appropriate strategies to solve problems.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
d. Monitor and reflect on the process of mathematical problem solving.	
MA1P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
b. Make and investigate mathematical conjectures.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
c. Develop and evaluate mathematical arguments and proofs.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
d. Select and use various types of reasoning and methods of proof.	**Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
MA1P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
MA1P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	
MA1P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Basic Operations & Applications:** Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	

TABLE Q

GEORGIA Accelerated Math 1 Performance Standards	ACT Mathematics College Readiness Standards
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE R

GEORGIA Accelerated Math 1 Standards	ACT's WorkKeys Applied Mathematics Level Skills
NUMBER AND OPERATIONS	
Students will use the complex number system.	
MA1N1. Students will represent and operate with complex numbers.	
a. Write square roots of negative numbers in imaginary form.	
b. Write complex numbers in the form a + bi.	
c. Add, subtract, multiply, and divide complex numbers.	
d. Simplify expressions involving complex numbers.	
ALGEBRA	
Students will explore functions, solve equations and operate with radical, polynomial and rational expressions.	
MA1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.	
a. Represent functions using function notation.	
b. Graph the basic functions $f(x) = xn$, where n = 1 to 3, $f(x) = \sqrt{x}$, $f(x) = \|x\|$, and $f(x) = \frac{1}{x}$.	
c. Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the x- and y-axes.	
d. Investigate and explain the characteristics of a function: domain, range, zeros, intercepts, intervals of increase and decrease, maximum and minimum values, and end behavior.	
e. Relate to a given context the characteristics of a function, and use graphs and tables to investigate its behavior.	
f. Recognize sequences as functions with domains that are sets of whole numbers.	
g. Explore rates of change, comparing constant rates of change (i.e., slope) versus variable rates of change. Compare rates of change of linear, quadratic, square root, and other function families.	
h. Determine graphically and algebraically whether a function has symmetry and whether it is even, odd, or neither.	
i. Understand that any equation in x can be interpreted as the equation $f(x) = g(x)$, and interpret the solutions of the equation as the x-value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$.	
MA1A2. Students will simplify and operate with radical expressions, polynomials, and rational expressions.	
a. Simplify algebraic and numeric expressions involving square root.	
b. Perform operations with square roots.	
c. Add, subtract, multiply, and divide polynomials.	

TABLE R

GEORGIA Accelerated Math 1 Standards	ACT's WorkKeys Applied Mathematics Level Skills
d. Add, subtract, multiply, and divide rational expressions.	Solve problems that require one or two operations Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Use fractions, negative numbers, ratios, percentages, or mixed numbers Set up and manipulate complex ratios or proportions
e. Factor expressions by greatest common factor, grouping, trial and error, and special products limited to the formulas below. $(x + y)^2 = x^2 + 2xy + y^2$ $(x – y)^2 = x^2 – 2xy + y^2$ $(x + y)(x – y) = x^2 – y^2$ $(x + a)(x + b) = x^2 + (a + b)x + ab$ $(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$ $(x – y)^3 = x^3 – 3x^2y + 3xy^2 – y^3$	
f. Use area and volume models for polynomial arithmetic.	
MA1A3. Students will analyze quadratic functions in the forms $f(x) = ax^2 + bx + c$ and $f(x) = a(x – h)^2 + k$.	
a. Convert between standard and vertex form.	
b. Graph quadratic functions as transformations of the function $f(x) = x^2$.	
c. Investigate and explain characteristics of quadratic functions, including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, intervals of increase and decrease, and rates of change.	
d. Explore arithmetic series and various ways of computing their sums.	
e. Explore sequences of partial sums of arithmetic series as examples of quadratic functions.	
MA1A4. Students will solve quadratic equations and inequalities in one variable.	
a. Solve equations graphically using appropriate technology.	
b. Find real and complex solutions of equations by factoring, taking square roots, and applying the quadratic formula.	
c. Analyze the nature of roots using technology and using the discriminant.	
d. Solve quadratic inequalities both graphically and algebraically, and describe the solutions using linear inequalities.	
MA1A5. Students will investigate step and piecewise functions, including greatest integer and absolute value functions.	
a. Write absolute value functions as piecewise functions.	
b. Investigate and explain characteristics of a variety of piecewise functions including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, points of discontinuity, intervals over which the function is constant, intervals of increase and decrease, and rates of change.	

TABLE R

GEORGIA Accelerated Math 1 Standards	ACT's WorkKeys Applied Mathematics Level Skills
c. Solve absolute value equations and inequalities analytically, graphically, and by using appropriate technology.	
GEOMETRY	
Students will explore, understand and use the formal language of reasoning and justification. Students will apply properties of polygons, circles and spheres, and determine distances and points of concurrence.	
MA1G1. Students will investigate properties of geometric figures in the coordinate plane.	
a. Determine the distance between two points.	
b. Determine the distance between a point and a line.	
c. Determine the midpoint of a segment.	
d. Understand the distance formula as an application of the Pythagorean theorem.	
e. Use the coordinate plane to investigate properties of and verify conjectures related to triangles and quadrilaterals.	
MA1G2. Students will understand and use the language of mathematical argument and justification.	
a. Use conjecture, inductive reasoning, deductive reasoning, counterexamples, and indirect proof as appropriate.	
b. Understand and use the relationships among a statement and its converse, inverse, and contrapositive.	
MA1G3. Students will discover, prove, and apply properties of triangles, quadrilaterals, and other polygons.	
a. Determine the sum of interior and exterior angles in a polygon.	
b. Understand and use the triangle inequality, the side-angle inequality, and the exterior-angle inequality.	
c. Understand and use congruence postulates and theorems for triangles (SSS, SAS, ASA, AAS, HL).	
d. Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.	
e. Find and use points of concurrency in triangles: incenter, orthocenter, circumcenter, and centroid.	
MA1G4. Students will understand the properties of circles.	
a. Understand and use properties of chords, tangents, and secants as an application of triangle similarity.	
b. Understand and use properties of central, inscribed, and related angles.	

TABLE R

GEORGIA Accelerated Math 1 Standards	ACT's WorkKeys Applied Mathematics Level Skills
c. Use the properties of circles to solve problems involving the length of an arc and the area of a sector.	Decide what information, calculations, or unit conversions to use to solve the problem Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Set up and manipulate complex ratios or proportions
d. Justify measurements and relationships in circles using geometric and algebraic properties.	
MA1G5. Students will find and compare the measures of spheres.	
a. Use and apply surface area and volume of a sphere.	Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Calculate multiple areas and volumes of spheres, cylinders, or cones
b. Determine the effect on surface area and volume of changing the radius or diameter of a sphere.	Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions
DATA ANALYSIS AND PROBABILITY	
Students will use counting techniques and determine probability. Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. Students will organize, represent, investigate, interpret, and make inferences from data. Students will determine algebraic models from data.	
MA1D1. Students will determine the number of outcomes related to a given event.	
a. Apply the addition and multiplication principles of counting.	
b. Calculate and use simple permutations and combinations.	
MA1D2. Students will use the basic laws of probability.	
a. Find the probabilities of mutually exclusive events.	
b. Find the probabilities of dependent events.	
c. Calculate conditional probabilities.	
d. Use expected value to predict outcomes.	
MA1D3. Students will relate samples to a population.	
a. Compare summary statistics (mean, median, quartiles, and interquartile range) from one sample data distribution to another sample data distribution in describing center and variability of the data distributions.	
b. Compare the averages of the summary statistics from a large number of samples to the corresponding population parameters.	

TABLE R

GEORGIA Accelerated Math 1 Standards	ACT's WorkKeys Applied Mathematics Level Skills
c. Understand that a random sample is used to improve the chance of selecting a representative sample.	
MA1D4. Students will explore variability of data by determining the mean absolute deviation (the average of the absolute values of the deviations).	
MA1D5. Students will determine an algebraic model to quantify the association between two quantitative variables.	
a. Gather and plot data that can be modeled with linear and quadratic functions.	
b. Examine the issues of curve fitting by finding good linear fits to data using simple methods such as the median-median line and "eyeballing."	
c. Understand and apply the processes of linear and quadratic regression for curve fitting using appropriate technology.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MM3P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	
c. Apply and adapt a variety of appropriate strategies to solve problems.	
d. Monitor and reflect on the process of mathematical problem solving.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items
MA1P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	Rearrange a formula before solving a problem Solve problems that include nonlinear functions and/or that involve more than one unknown Set up and manipulate complex ratios or proportions
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
MA1P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	

TABLE R

GEORGIA Accelerated Math 1 Standards	ACT's WorkKeys Applied Mathematics Level Skills
c. Analyze and evaluate the mathematical thinking and strategies of others.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items Find the best deal when there are several choices
d. Use the language of mathematics to express mathematical ideas precisely.	
MA1P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	Decide what information, calculations, or unit conversions to use to solve the problem
MA1P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	
b. Select, apply, and translate among mathematical representations to solve problems.	Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem
c. Use representations to model and interpret physical, social, and mathematical phenomena.	
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum area • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	

TABLE R

GEORGIA Accelerated Math 1 Standards	ACT's WorkKeys Applied Mathematics Level Skills
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
ALGEBRA	
Students will investigate exponential, logarithmic, and polynomial functions of higher degree; understand matrices and use them to solve problems; and solve linear programming problems in two variables.	
MA2A1. Students will explore exponential functions.	
a. Extend properties of exponents to include all integer exponents.	**Numbers: Concepts & Properties:** Apply rules of exponents
b. Investigate and explain characteristics of exponential functions, including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, rates of change, and end behavior.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Graph functions as transformations of $f(x) = a^x$.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
d. Solve simple exponential equations and inequalities analytically, graphically, and by using appropriate technology.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
e. Understand and use basic exponential functions as models of real phenomena.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation
f. Understand and recognize geometric sequences as exponential functions with domains that are sets of whole numbers.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
g. Interpret the constant ratio in a geometric sequence as the base of the associated exponential function.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
MA2A2. Students will explore inverses of functions.	
a. Discuss the characteristics of functions and their inverses, including one-to-oneness, domain, and range.	**Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane
b. Determine inverses of linear, quadratic, and power functions and functions of the form $f(x) = \frac{a}{x}$, including the use of restricted domains.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
c. Explore the graphs of functions and their inverses.	**Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane
d. Use composition to verify that functions are inverses of each other.	**Functions:** Write an expression for the composite of two simple functions
MA2A3. Students will analyze graphs of polynomial functions of higher degree.	
a. Graph simple polynomial functions as translations of the function $f(x) = ax^n$.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
b. Understand the effects of the following on the graph of a polynomial function: degree, lead coefficient, and multiplicity of real zeros.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
c. Determine whether a polynomial function has symmetry and whether it is even, odd, or neither.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
d. Investigate and explain characteristics of polynomial functions, including domain and range, intercepts, zeros, relative and absolute extrema, intervals of increase and decrease, and end behavior.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
MA2A4. Students will explore logarithmic functions as inverses of exponential functions.	
a. Define and understand the properties of n^{th} roots.	**Numbers: Concepts & Properties:** Work with squares and square roots of numbers Work with cubes and cube roots of numbers Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
b. Extend properties of exponents to include rational exponents.	**Numbers: Concepts & Properties:** Apply rules of exponents
c. Define logarithmic functions as inverses of exponential functions.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
d. Understand and use properties of logarithms by extending laws of exponents.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
e. Investigate and explain characteristics of exponential and logarithmic functions including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, and rate of change.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences **Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
f. Graph functions as transformations of $f(x) = a^x$, $f(x) = \log_a x$, $f(x) = e^x$, $f(x) = \ln x$.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
g. Explore real phenomena related to exponential and logarithmic functions including half-life and doubling time.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
MA2A5. Students will solve a variety of equations and inequalities.	
a. Find real and complex roots of higher degree polynomial equations using the factor theorem, remainder theorem, rational root theorem, and fundamental theorem of algebra, incorporating complex and radical conjugates.	
b. Solve polynomial, exponential, and logarithmic equations analytically, graphically, and using appropriate technology.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
c. Solve polynomial, exponential, and logarithmic inequalities analytically, graphically, and using appropriate technology. Represent solution sets of inequalities using interval notation.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
d. Solve a variety of types of equations by appropriate means choosing among mental calculation, pencil and paper, or appropriate technology.	**Expressions, Equations, & Inequalities:** Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals Solve one-step equations having integer or decimal answers Solve routine first-degree equations Solve real-world problems using first-degree equations Solve absolute value equations Solve quadratic equations
MA2A6. Students will perform basic operations with matrices.	
a. Add, subtract, multiply, and invert matrices, when possible, choosing appropriate methods, including technology.	
b. Find the inverses of two-by-two matrices using pencil and paper, and find inverses of larger matrices using technology.	
c. Examine the properties of matrices, contrasting them with properties of real numbers.	
MA2A7. Students will use matrices to formulate and solve problems.	
a. Represent a system of linear equations as a matrix equation.	
b. Solve matrix equations using inverse matrices.	
c. Represent and solve realistic problems using systems of linear equations.	**Expressions, Equations, & Inequalities:** Find solutions to systems of linear equations Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
MA2A8. Students will solve linear programming problems in two variables.	
a. Solve systems of inequalities in two variables, showing the solutions graphically.	
b. Represent and solve realistic problems using linear programming.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
MA2A9. Students will understand and apply matrix representations of vertex-edge graphs.	
a. Use graphs to represent realistic situations.	
b. Use matrices to represent graphs, and solve problems that can be represented by graphs.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
GEOMETRY	
Students will explore right triangles and right triangular trigonometry. They will understand and apply properties of conic sections, planes, and spheres.	
MA2G1. Students will identify and use special right triangles.	
a. Determine the lengths of sides of 30°-60°-90° triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
b. Determine the lengths of sides of 45°-45°-90° triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
MA2G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.	
a. Discover the relationship of the trigonometric ratios for similar triangles.	**Properties of Plane Figures:** Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles **Functions:** Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths
b. Explain the relationship between the trigonometric ratios of complementary angles.	**Functions:** Use trigonometric concepts and basic identities to solve problems
c. Solve application problems using the trigonometric ratios.	**Functions:** Apply basic trigonometric ratios to solve right-triangle problems
MA2G3. Students will investigate the relationships between lines and circles.	
a. Find equations of circles.	**Graphical Representations:** Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle)
b. Graph a circle given an equation in general form.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Find the equation of a tangent line to a circle at a given point.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
d. Solve a system of equations involving a circle and a line.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
e. Solve a system of equations involving two circles.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
MA2G4. Students will recognize, analyze, and graph the equations of the conic sections (parabolas, circles, ellipses, and hyperbolas).	
a. Convert equations of conics by completing the square.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts
b. Graph conic sections, identifying fundamental characteristics.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
c. Write equations of conic sections given appropriate information.	**Expressions, Equations, & Inequalities:** Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle)
MA2G5. Students will investigate planes and spheres.	
a. Plot the point (x, y, z) and understand it as a vertex of a rectangular prism.	
b. Apply the distance formula in 3-space.	**Graphical Representations:** Use the distance formula
c. Recognize and understand equations of planes and spheres.	
DATA ANALYSIS AND PROBABILITY	
Students will make informal inferences about means and standard deviations. Students will use a normal distribution to calculate probabilities. Students will organize, represent, investigate, interpret, and make inferences from both observational studies and experiments.	
MA2D1. Using sample data, students will make informal inferences about population means and standard deviations.	
a. Pose a question and collect sample data from at least two different populations.	
b. Understand and calculate the means and standard deviations of sets of data.	**Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Perform computations on data from tables and graphs Calculate the average, given the frequency counts of all the data values
c. Use means and standard deviations to compare data sets.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
d. Compare the means and standard deviations of random samples with the corresponding population parameters. Observe that the different sample means vary from one sample to the next. Observe that the distribution of the sample means has less variability than the population distribution.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs
MA2D2. Students will create probability histograms of discrete random variables, using both experimental and theoretical probabilities.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
MA2D3. Students will solve problems involving probabilities by interpreting a normal distribution as a probability histogram for a continuous random variable (*z*-scores are used for a general normal distribution).	
a. Determine intervals about the mean that include a given percent of data.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs
b. Determine the probability that a given value falls within a specified interval.	**Probability, Statistics, & Data Analysis:** Compute a probability when the event and/or sample space are not given or obvious
c. Estimate how many items in a population fall within a specified interval.	**Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs
MA2D4. Students will understand the differences between experimental and observational studies by posing questions and collecting, analyzing, and interpreting data.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MA2P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes) Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Perform computations on data from tables and graphs Use the relationship between the probability of an event and the probability of its complement Calculate the missing data value, given the average and all data values but one Translate from one representation of data to another (e.g., a bar graph to a circle graph) Determine the probability of a simple event Exhibit knowledge of simple counting techniques Calculate the average, given the frequency counts of all the data values Manipulate data from tables and graphs Compute straightforward probabilities for common situations Use Venn diagrams in counting Calculate or use a weighted average Interpret and use information from figures, tables, and graphs

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
	Apply counting techniques
	Compute a probability when the event and/or sample space are not given or obvious
	Distinguish between mean, median, and mode for a list of numbers
	Analyze and draw conclusions based on information from figures, tables, and graphs
	Exhibit knowledge of conditional and joint probability
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Work problems involving positive integer exponents
	Work with cubes and cube roots of numbers
	Determine when an expression is undefined
	Exhibit some knowledge of the complex numbers
	Apply number properties involving prime factorization
	Apply number properties involving even/odd numbers and factors/multiples
	Apply number properties involving positive/negative numbers
	Apply rules of exponents
	Multiply two complex numbers
	Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
	Exhibit knowledge of logarithms and geometric sequences
	Apply properties of complex numbers
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
	Identify solutions to simple quadratic equations
	Add, subtract, and multiply polynomials
	Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
	Solve first-degree inequalities that do not require reversing the inequality sign
	Manipulate expressions and equations
	Write expressions, equations, and inequalities for common algebra settings
	Solve linear inequalities that require reversing the inequality sign
	Solve absolute value equations
	Solve quadratic equations
	Find solutions to systems of linear equations
	Write expressions that require planning and/or manipulating to accurately model a situation
	Write equations and inequalities that require planning, manipulating, and/or solving
	Solve simple absolute value inequalities
	Graphical Representations:
	Identify the location of a point with a positive coordinate on the number line
	Locate points on the number line and in the first quadrant
	Locate points in the coordinate plane
	Comprehend the concept of length on the number line
	Exhibit knowledge of slope
	Identify the graph of a linear inequality on the number line
	Determine the slope of a line from points or equations
	Match linear graphs with their equations
	Find the midpoint of a line segment
	Interpret and use information from graphs in the coordinate plane

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
	Match number line graphs with solution sets of linear inequalities
	Use the distance formula
	Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point
	Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle)
	Match number line graphs with solution sets of simple quadratic inequalities
	Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
	Solve problems integrating multiple algebraic and/or geometric concepts
	Analyze and draw conclusions based on information from graphs in the coordinate plane
	Properties of Plane Figures:
	Exhibit some knowledge of the angles associated with parallel lines
	Find the measure of an angle using properties of parallel lines
	Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°)
	Use several angle properties to find an unknown angle measure
	Recognize Pythagorean triples
	Use properties of isosceles triangles
	Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
	Use the Pythagorean theorem
	Draw conclusions based on a set of conditions
	Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
	Use relationships among angles, arcs, and distances in a circle
	Measurement:
	Estimate or calculate the length of a line segment based on other lengths given on a geometric figure
	Compute the perimeter of polygons when all side lengths are given
	Compute the area of rectangles when whole number dimensions are given
	Compute the area and perimeter of triangles and rectangles in simple problems
	Use geometric formulas when all necessary information is given
	Compute the area of triangles and rectangles when one or more additional simple steps are required

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
	Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths Use relationships involving area, perimeter, and volume of geometric figures to compute another measure Use scale factors to determine the magnitude of a size change Compute the area of composite geometric figures when planning or visualization is required **Functions:** Evaluate quadratic functions, expressed in function notation, at integer values Evaluate polynomial functions, expressed in function notation, at integer values Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths Evaluate composite functions at integer values Apply basic trigonometric ratios to solve right-triangle problems Write an expression for the composite of two simple functions Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of unit circle trigonometry Match graphs of basic trigonometric functions with their equations
c. Apply and adapt a variety of appropriate strategies to solve problems.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
d. Monitor and reflect on the process of mathematical problem solving.	
MA2P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
b. Make and investigate mathematical conjectures.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
c. Develop and evaluate mathematical arguments and proofs.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
d. Select and use various types of reasoning and methods of proof.	**Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
MA2P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
MA2P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	
MA2P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Basic Operations & Applications:** Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations

TABLE S

GEORGIA Accelerated Math 2 Performance Standards	ACT Mathematics College Readiness Standards
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE T

GEORGIA Accelerated Math 2 Standards	ACT's WorkKeys Applied Mathematics Level Skills
ALGEBRA	
Students will investigate exponential, logarithmic, and polynomial functions of higher degree; understand matrices and use them to solve problems; and solve linear programming problems in two variables.	
MA2A1. Students will explore exponential functions.	
a. Extend properties of exponents to include all integer exponents.	
b. Investigate and explain characteristics of exponential functions, including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, rates of change, and end behavior.	
c. Graph functions as transformations of $f(x) = a^x$.	
d. Solve simple exponential equations and inequalities analytically, graphically, and by using appropriate technology.	Calculate perimeters and areas of basic shapes (rectangles and circles) Rearrange a formula before solving a problem Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple areas and volumes of spheres, cylinders, or cones
e. Understand and use basic exponential functions as models of real phenomena.	Decide what information, calculations, or unit conversions to use to solve the problem
f. Understand and recognize geometric sequences as exponential functions with domains that are sets of whole numbers.	
g. Interpret the constant ratio in a geometric sequence as the base of the associated exponential function.	
MA2A2. Students will explore inverses of functions.	
a. Discuss the characteristics of functions and their inverses, including one-to-oneness, domain, and range.	
b. Determine inverses of linear, quadratic, and power functions and functions of the form $f(x) = \frac{a}{x}$, including the use of restricted domains.	
c. Explore the graphs of functions and their inverses.	
d. Use composition to verify that functions are inverses of each other.	
MA2A3. Students will analyze graphs of polynomial functions of higher degree.	
a. Graph simple polynomial functions as translations of the function $f(x) = ax^n$.	
b. Understand the effects of the following on the graph of a polynomial function: degree, lead coefficient, and multiplicity of real zeros.	
c. Determine whether a polynomial function has symmetry and whether it is even, odd, or neither.	

TABLE T

GEORGIA Accelerated Math 2 Standards	ACT's WorkKeys Applied Mathematics Level Skills
d. Investigate and explain characteristics of polynomial functions, including domain and range, intercepts, zeros, relative and absolute extrema, intervals of increase and decrease, and end behavior.	
MA2A4. Students will explore logarithmic functions as inverses of exponential functions.	
a. Define and understand the properties of n^{th} roots.	
b. Extend properties of exponents to include rational exponents.	
c. Define logarithmic functions as inverses of exponential functions.	
d. Understand and use properties of logarithms by extending laws of exponents.	
e. Investigate and explain characteristics of exponential and logarithmic functions including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, and rate of change.	
f. Graph functions as transformations of $f(x) = a^x$, $f(x) = \log_a x$, $f(x) = e^x$, $f(x) = \ln x$.	
g. Explore real phenomena related to exponential and logarithmic functions including half-life and doubling time.	Calculate perimeters and areas of basic shapes (rectangles and circles) Rearrange a formula before solving a problem Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple areas and volumes of spheres, cylinders, or cones
MA2A5. Students will solve a variety of equations and inequalities.	
a. Find real and complex roots of higher degree polynomial equations using the factor theorem, remainder theorem, rational root theorem, and fundamental theorem of algebra, incorporating complex and radical conjugates.	
b. Solve polynomial, exponential, and logarithmic equations analytically, graphically, and using appropriate technology.	
c. Solve polynomial, exponential, and logarithmic inequalities analytically, graphically, and using appropriate technology. Represent solution sets of inequalities using interval notation.	

TABLE T

GEORGIA Accelerated Math 2 Standards	ACT's WorkKeys Applied Mathematics Level Skills
d. Solve a variety of types of equations by appropriate means choosing among mental calculation, pencil and paper, or appropriate technology.	Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Rearrange a formula before solving a problem Solve problems that include nonlinear functions and/or that involve more than one unknown Set up and manipulate complex ratios or proportions
MA2A6. Students will perform basic operations with matrices.	
a. Add, subtract, multiply, and invert matrices, when possible, choosing appropriate methods, including technology.	
b. Find the inverses of two-by-two matrices using pencil and paper, and find inverses of larger matrices using technology.	
c. Examine the properties of matrices, contrasting them with properties of real numbers.	
MA2A7. Students will use matrices to formulate and solve problems.	
a. Represent a system of linear equations as a matrix equation.	
b. Solve matrix equations using inverse matrices.	
c. Represent and solve realistic problems using systems of linear equations.	
MA2A8. Students will solve linear programming problems in two variables.	
a. Solve systems of inequalities in two variables, showing the solutions graphically.	
b. Represent and solve realistic problems using linear programming.	
MA2A9. Students will understand and apply matrix representations of vertex-edge graphs.	
a. Use graphs to represent realistic situations.	
b. Use matrices to represent graphs, and solve problems that can be represented by graphs.	
GEOMETRY	
Students will explore right triangles and right triangular trigonometry. They will understand and apply properties of conic sections, planes, and spheres.	
MA2G1. Students will identify and use special right triangles.	
a. Determine the lengths of sides of 30°-60°-90° triangles.	
b. Determine the lengths of sides of 45°-45°-90° triangles.	

TABLE T

GEORGIA Accelerated Math 2 Standards	ACT's WorkKeys Applied Mathematics Level Skills
MA2G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.	
a. Discover the relationship of the trigonometric ratios for similar triangles.	
b. Explain the relationship between the trigonometric ratios of complementary angles.	
c. Solve application problems using the trigonometric ratios.	
MA2G3. Students will investigate the relationships between lines and circles.	
a. Find equations of circles.	
b. Graph a circle given an equation in general form.	
c. Find the equation of a tangent line to a circle at a given point.	
d. Solve a system of equations involving a circle and a line.	
e. Solve a system of equations involving two circles.	
MA2G4. Students will recognize, analyze, and graph the equations of the conic sections (parabolas, circles, ellipses, and hyperbolas).	
a. Convert equations of conics by completing the square.	
b. Graph conic sections, identifying fundamental characteristics.	
c. Write equations of conic sections given appropriate information.	
MA2G5. Students will investigate planes and spheres.	
a. Plot the point (x, y, z) and understand it as a vertex of a rectangular prism.	
b. Apply the distance formula in 3-space.	
c. Recognize and understand equations of planes and spheres.	
DATA ANALYSIS AND PROBABILITY	
Students will make informal inferences about means and standard deviations. Students will use a normal distribution to calculate probabilities. Students will organize, represent, investigate, interpret, and make inferences from both observational studies and experiments.	
MA2D1. Using sample data, students will make informal inferences about population means and standard deviations.	
a. Pose a question and collect sample data from at least two different populations.	
b. Understand and calculate the means and standard deviations of sets of data.	
c. Use means and standard deviations to compare data sets.	

TABLE T

GEORGIA Accelerated Math 2 Standards	ACT's WorkKeys Applied Mathematics Level Skills
d. Compare the means and standard deviations of random samples with the corresponding population parameters. Observe that the different sample means vary from one sample to the next. Observe that the distribution of the sample means has less variability than the population distribution.	
MA2D2. Students will create probability histograms of discrete random variables, using both experimental and theoretical probabilities.	
MA2D3. Students will solve problems involving probabilities by interpreting a normal distribution as a probability histogram for a continuous random variable (z-scores are used for a general normal distribution).	
a. Determine intervals about the mean that include a given percent of data.	
b. Determine the probability that a given value falls within a specified interval.	
c. Estimate how many items in a population fall within a specified interval.	
MA2D4. Students will understand the differences between experimental and observational studies by posing questions and collecting, analyzing, and interpreting data.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MA2P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement

TABLE T

GEORGIA Accelerated Math 2 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
b. Solve problems that arise in mathematics and in other contexts.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices

TABLE T

GEORGIA Accelerated Math 2 Standards	ACT's WorkKeys Applied Mathematics Level Skills
c. Apply and adapt a variety of appropriate strategies to solve problems.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
d. Monitor and reflect on the process of mathematical problem solving.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items
MA2P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	Rearrange a formula before solving a problem Solve problems that include nonlinear functions and/or that involve more than one unknown Set up and manipulate complex ratios or proportions
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	

TABLE T

GEORGIA Accelerated Math 2 Standards	ACT's WorkKeys Applied Mathematics Level Skills
MA2P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items Find the best deal when there are several choices
d. Use the language of mathematics to express mathematical ideas precisely.	
MA2P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	Decide what information, calculations, or unit conversions to use to solve the problem
MA2P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	
b. Select, apply, and translate among mathematical representations to solve problems.	Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem
c. Use representations to model and interpret physical, social, and mathematical phenomena.	
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	

TABLE T

GEORGIA Accelerated Math 2 Standards	ACT's WorkKeys Applied Mathematics Level Skills
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

TABLE U

GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
ALGEBRA	
Students will explore characteristics of various functions, understand and use concepts of trigonometric functions, investigate and apply sequences and series, and use parametric and polar equations to represent functions and curves.	
MA3A1. Students will explore rational functions.	
a. Investigate and explain characteristics of rational functions, including domain, range, zeros, points of discontinuity, intervals of increase and decrease, rates of change, local and absolute extrema, symmetry, asymptotes, and end behavior.	**Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
b. Find inverses of rational functions, discussing domain and range, symmetry, and function composition.	**Expressions, Equations, & Inequalities:** Manipulate expressions and equations
c. Solve rational equations and inequalities analytically, graphically, and by using appropriate technology.	
MA3A2. Students will use the circle to define the trigonometric functions.	
a. Define and understand angles measured in degrees and radians, including but not limited to 0°, 30°, 45°, 60°, 90°, their multiples, and equivalences.	**Functions:** Exhibit knowledge of unit circle trigonometry
b. Understand and apply the six trigonometric functions as functions of general angles in standard position.	**Functions:** Exhibit knowledge of unit circle trigonometry
c. Find values of trigonometric functions using points on the terminal sides of angles in the standard position.	**Functions:** Exhibit knowledge of unit circle trigonometry
d. Understand and apply the six trigonometric functions as functions of arc length on the unit circle.	**Functions:** Exhibit knowledge of unit circle trigonometry
e. Find values of trigonometric functions using the unit circle.	**Functions:** Exhibit knowledge of unit circle trigonometry
MA3A3. Students will investigate and use the graphs of the six trigonometric functions.	
a. Understand and apply the six basic trigonometric functions as functions of real numbers.	
b. Determine the characteristics of the graphs of the six basic trigonometric functions.	**Functions:** Match graphs of basic trigonometric functions with their equations
c. Graph transformations of trigonometric functions including changing period, amplitude, phase shift, and vertical shift.	
d. Apply graphs of trigonometric functions in realistic contexts involving periodic phenomena.	
MA3A4. Students will investigate functions.	
a. Compare and contrast properties of functions within and across the following types: linear, quadratic, polynomial, power, rational, exponential, logarithmic, trigonometric, and piecewise.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences **Graphical Representations:** Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$

TABLE U

GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Functions: Match graphs of basic trigonometric functions with their equations
b. Investigate transformations of functions.	
c. Investigate characteristics of functions built through sum, difference, product, quotient, and composition.	
MA3A5. Students will establish the identities below and use them to simplify trigonometric expressions and verify equivalence statements. $\tan\theta = \frac{\sin\theta}{\cos\theta}$ $\cot\theta = \frac{\cos\theta}{\sin\theta}$ $\sec\theta = \frac{1}{\cos\theta}$ $\csc\theta = \frac{1}{\sin\theta}$ $\sin^2\theta + \cos^2\theta = 1$ $\cot^2\theta + 1 = \csc^2\theta$ $\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$ $\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \pm \sin\alpha\sin\beta$ $\sin(2\theta) = 2\sin\theta\cos\theta$ $\cos(2\theta) = \cos^2\theta - \sin^2\theta$	**Functions:** Use trigonometric concepts and basic identities to solve problems
MA3A6. Students will solve trigonometric equations both graphically and algebraically.	
a. Solve trigonometric equations over a variety of domains, using technology as appropriate.	**Functions:** Use trigonometric concepts and basic identities to solve problems
b. Use the coordinates of a point on the terminal side of an angle to express *x* as *r* cosθ and *y* as *r* sinθ.	**Functions:** Exhibit knowledge of unit circle trigonometry
d. Apply the law of sines and the law of cosines.	**Functions:** Use trigonometric concepts and basic identities to solve problems
MA3A7. Students will verify and apply $\frac{1}{2}ab\sin C$ to find the area of a triangle.	**Functions:** Use trigonometric concepts and basic identities to solve problems
MA3A8. Students will investigate and use inverse sine, inverse cosine, and inverse tangent functions.	
a. Find values of the above functions using technology as appropriate.	**Functions:** Apply basic trigonometric ratios to solve right-triangle problems Use trigonometric concepts and basic identities to solve problems
b. Determine characteristics of the above functions and their graphs.	**Functions:** Match graphs of basic trigonometric functions with their equations

TABLE U

GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
MA3A9. Students will use sequences and series	
a. Use and find recursive and explicit formulae for the terms of sequences.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences **Expressions, Equations, & Inequalities:** Write expressions, equations, and inequalities for common algebra settings
b. Recognize and use simple arithmetic and geometric sequences.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
c. Investigate limits of sequences.	**Numbers: Concepts & Properties:** Exhibit knowledge of logarithms and geometric sequences
d. Use mathematical induction to find and prove formulae for sums of finite series.	
e. Find and apply the sums of finite and, where appropriate, infinite arithmetic and geometric series.	
f. Use summation notation to explore series.	
g. Determine geometric series and their limits.	
MA3A10. Students will understand and use vectors.	
a. Represent vectors algebraically and geometrically.	
b. Convert between vectors expressed using rectangular coordinates and vectors expressed using magnitude and direction.	**Graphical Representations:** Use the distance formula **Functions:** Apply basic trigonometric ratios to solve right-triangle problems Use trigonometric concepts and basic identities to solve problems
c. Add and subtract vectors and compute scalar multiples of vectors.	
d. Use vectors to solve realistic problems.	**Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Use the Pythagorean theorem Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas **Functions:** Apply basic trigonometric ratios to solve right-triangle problems Use trigonometric concepts and basic identities to solve problems
MA3A11. Students will use complex numbers in trigonometric form.	
a. Represent complex numbers in trigonometric form.	
b. Find products, quotients, powers, and roots of complex numbers in trigonometric form.	

TABLE U

GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
MA3A12. Students will explore parametric representations of plane curves.	
a. Convert between Cartesian and parametric form.	
b. Graph equations in parametric form showing direction and beginning and ending points where appropriate.	
MA3A13. Students will explore polar equations.	
a. Express coordinates of points in rectangular and polar form.	**Graphical Representations:** Locate points in the coordinate plane **Functions:** Exhibit knowledge of unit circle trigonometry
b. Graph and identify characteristics of simple polar equations including lines, circles, cardioids, limaçons, and roses.	
DATA ANALYSIS AND PROBABILITY	
Students will organize, represent, investigate, interpret, and make inferences from data, using the central limit theorem and the standard normal distribution. Students will apply the Central Limit Theorem to calculate confidence intervals for a population mean using data from large samples. Students will use sample data and confidence intervals to draw conclusions about populations.	
MA3D1. Using simulation, students will develop the idea of the central limit theorem.	
MA3D2. Using student-generated data from random samples of at least 30 members, students will determine the margin of error and confidence interval for a specified level of confidence.	
MA3D3. Students will use confidence intervals and margins of error to make inferences from data about a population. Technology is used to evaluate confidence intervals, but students will be aware of the ideas involved.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MA3P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	
b. Solve problems that arise in mathematics and in other contexts.	**Basic Operations & Applications:** Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes)

TABLE U

GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent
	Solve some routine two-step arithmetic problems
	Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average
	Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)
	Solve word problems containing several rates, proportions, or percentages
	Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)
	Probability, Statistics, & Data Analysis:
	Calculate the average of a list of positive whole numbers
	Perform a single computation using information from a table or chart
	Calculate the average of a list of numbers
	Calculate the average, given the number of data values and the sum of the data values
	Read tables and graphs
	Perform computations on data from tables and graphs
	Use the relationship between the probability of an event and the probability of its complement
	Calculate the missing data value, given the average and all data values but one
	Translate from one representation of data to another (e.g., a bar graph to a circle graph)
	Determine the probability of a simple event
	Exhibit knowledge of simple counting techniques
	Calculate the average, given the frequency counts of all the data values
	Manipulate data from tables and graphs
	Compute straightforward probabilities for common situations
	Use Venn diagrams in counting
	Calculate or use a weighted average
	Interpret and use information from figures, tables, and graphs
	Apply counting techniques
	Compute a probability when the event and/or sample space are not given or obvious
	Distinguish between mean, median, and mode for a list of numbers

TABLE U

GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Analyze and draw conclusions based on information from figures, tables, and graphs
	Exhibit knowledge of conditional and joint probability
	Numbers: Concepts & Properties:
	Recognize equivalent fractions and fractions in lowest terms
	Recognize one-digit factors of a number
	Identify a digit's place value
	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
	Find and use the least common multiple
	Order fractions
	Work with numerical factors
	Work with scientific notation
	Work with squares and square roots of numbers
	Work problems involving positive integer exponents
	Work with cubes and cube roots of numbers
	Determine when an expression is undefined
	Exhibit some knowledge of the complex numbers
	Apply number properties involving prime factorization
	Apply number properties involving even/odd numbers and factors/multiples
	Apply number properties involving positive/negative numbers
	Apply rules of exponents
	Multiply two complex numbers
	Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers
	Exhibit knowledge of logarithms and geometric sequences
	Apply properties of complex numbers
	Expressions, Equations, & Inequalities:
	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)
	Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
	Substitute whole numbers for unknown quantities to evaluate expressions
	Solve one-step equations having integer or decimal answers
	Combine like terms (e.g., $2x + 5x$)
	Evaluate algebraic expressions by substituting integers for unknown quantities
	Add and subtract simple algebraic expressions
	Solve routine first-degree equations

TABLE U

GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Perform straightforward word-to-symbol translations
	Multiply two binomials
	Solve real-world problems using first-degree equations
	Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)
	Identify solutions to simple quadratic equations
	Add, subtract, and multiply polynomials
	Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)
	Solve first-degree inequalities that do not require reversing the inequality sign
	Manipulate expressions and equations
	Write expressions, equations, and inequalities for common algebra settings
	Solve linear inequalities that require reversing the inequality sign
	Solve absolute value equations
	Solve quadratic equations
	Find solutions to systems of linear equations
	Write expressions that require planning and/or manipulating to accurately model a situation
	Write equations and inequalities that require planning, manipulating, and/or solving
	Solve simple absolute value inequalities
	Graphical Representations:
	Identify the location of a point with a positive coordinate on the number line
	Locate points on the number line and in the first quadrant
	Locate points in the coordinate plane
	Comprehend the concept of length on the number line
	Exhibit knowledge of slope
	Identify the graph of a linear inequality on the number line
	Determine the slope of a line from points or equations
	Match linear graphs with their equations
	Find the midpoint of a line segment
	Interpret and use information from graphs in the coordinate plane
	Match number line graphs with solution sets of linear inequalities
	Use the distance formula
	Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point
	Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle)

TABLE U

GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Match number line graphs with solution sets of simple quadratic inequalities
	Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$
	Solve problems integrating multiple algebraic and/or geometric concepts
	Analyze and draw conclusions based on information from graphs in the coordinate plane
	Properties of Plane Figures:
	Exhibit some knowledge of the angles associated with parallel lines
	Find the measure of an angle using properties of parallel lines
	Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°)
	Use several angle properties to find an unknown angle measure
	Recognize Pythagorean triples
	Use properties of isosceles triangles
	Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles
	Use the Pythagorean theorem
	Draw conclusions based on a set of conditions
	Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
	Use relationships among angles, arcs, and distances in a circle
	Measurement:
	Estimate or calculate the length of a line segment based on other lengths given on a geometric figure
	Compute the perimeter of polygons when all side lengths are given
	Compute the area of rectangles when whole number dimensions are given
	Compute the area and perimeter of triangles and rectangles in simple problems
	Use geometric formulas when all necessary information is given
	Compute the area of triangles and rectangles when one or more additional simple steps are required
	Compute the area and circumference of circles after identifying necessary information
	Compute the perimeter of simple composite geometric figures with unknown side lengths
	Use relationships involving area, perimeter, and volume of geometric figures to compute another measure
	Use scale factors to determine the magnitude of a size change

TABLE U

GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Compute the area of composite geometric figures when planning or visualization is required **Functions:** Evaluate quadratic functions, expressed in function notation, at integer values Evaluate polynomial functions, expressed in function notation, at integer values Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths Evaluate composite functions at integer values Apply basic trigonometric ratios to solve right-triangle problems Write an expression for the composite of two simple functions Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of unit circle trigonometry Match graphs of basic trigonometric functions with their equations
c. Apply and adapt a variety of appropriate strategies to solve problems.	**Expressions, Equations, & Inequalities:** Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
d. Monitor and reflect on the process of mathematical problem solving.	
MA3P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane

TABLE U

GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Properties of Plane Figures: Draw conclusions based on a set of conditions
c. Develop and evaluate mathematical arguments and proofs.	**Probability, Statistics, & Data Analysis:** Analyze and draw conclusions based on information from figures, tables, and graphs **Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Graphical Representations:** Analyze and draw conclusions based on information from graphs in the coordinate plane **Properties of Plane Figures:** Draw conclusions based on a set of conditions
d. Select and use various types of reasoning and methods of proof.	**Numbers: Concepts & Properties:** Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
MA3P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	
d. Use the language of mathematics to express mathematical ideas precisely.	**Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving
MA3P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	**Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	

TABLE U

GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
c. Recognize and apply mathematics in contexts outside of mathematics.	
MA3P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph)
b. Select, apply, and translate among mathematical representations to solve problems.	**Basic Operations & Applications:** Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) **Probability, Statistics, & Data Analysis:** Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Write equations and inequalities that require planning, manipulating, and/or solving **Graphical Representations:** Solve problems integrating multiple algebraic and/or geometric concepts **Properties of Plane Figures:** Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas
c. Use representations to model and interpret physical, social, and mathematical phenomena.	**Probability, Statistics, & Data Analysis:** Translate from one representation of data to another (e.g., a bar graph to a circle graph) Manipulate data from tables and graphs Interpret and use information from figures, tables, and graphs Analyze and draw conclusions based on information from figures, tables, and graphs **Expressions, Equations, & Inequalities:** Perform straightforward word-to-symbol translations Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) Write expressions, equations, and inequalities for common algebra settings Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving

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GEORGIA Accelerated Math 3 Performance Standards	ACT Mathematics College Readiness Standards
	Graphical Representations: Analyze and draw conclusions based on information from graphs in the coordinate plane
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	

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GEORGIA Accelerated Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
ALGEBRA	
Students will explore characteristics of various functions, understand and use concepts of trigonometric functions, investigate and apply sequences and series, and use parametric and polar equations to represent functions and curves.	
MA3A1. Students will explore rational functions.	
a. Investigate and explain characteristics of rational functions, including domain, range, zeros, points of discontinuity, intervals of increase and decrease, rates of change, local and absolute extrema, symmetry, asymptotes, and end behavior.	
b. Find inverses of rational functions, discussing domain and range, symmetry, and function composition.	
c. Solve rational equations and inequalities analytically, graphically, and by using appropriate technology.	Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Decide what information, calculations, or unit conversions to use to solve the problem Use fractions, negative numbers, ratios, percentages, or mixed numbers Calculate multiple rates Solve problems that include nonlinear functions and/or that involve more than one unknown Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Set up and manipulate complex ratios or proportions
MA3A2. Students will use the circle to define the trigonometric functions.	
a. Define and understand angles measured in degrees and radians, including but not limited to 0°, 30°, 45°, 60°, 90°, their multiples, and equivalences.	
b. Understand and apply the six trigonometric functions as functions of general angles in standard position.	
c. Find values of trigonometric functions using points on the terminal sides of angles in the standard position.	
d. Understand and apply the six trigonometric functions as functions of arc length on the unit circle.	
e. Find values of trigonometric functions using the unit circle.	
MA3A3. Students will investigate and use the graphs of the six trigonometric functions.	
a. Understand and apply the six basic trigonometric functions as functions of real numbers.	
b. Determine the characteristics of the graphs of the six basic trigonometric functions.	
c. Graph transformations of trigonometric functions including changing period, amplitude, phase shift, and vertical shift.	

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GEORGIA Accelerated Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
d. Apply graphs of trigonometric functions in realistic contexts involving periodic phenomena.	
MA3A4. Students will investigate functions.	
a. Compare and contrast properties of functions within and across the following types: linear, quadratic, polynomial, power, rational, exponential, logarithmic, trigonometric, and piecewise.	
b. Investigate transformations of functions.	
c. Investigate characteristics of functions built through sum, difference, product, quotient, and composition.	Solve problems that require a single type of mathematics operation (addition, subtraction, multiplication, and division) using whole numbers Add or subtract negative numbers Solve problems that require one or two operations Multiply negative numbers Divide negative numbers Put the information in the right order before performing calculations
MA3A5. Students will establish the identities below and use them to simplify trigonometric expressions and verify equivalence statements. $\tan\theta = \frac{\sin\theta}{\cos\theta}$ $\cot\theta = \frac{\cos\theta}{\sin\theta}$ $\sec\theta = \frac{1}{\cos\theta}$ $\csc\theta = \frac{1}{\sin\theta}$ $\sin^2\theta + \cos^2\theta = 1$ $\cot^2\theta + 1 = \csc^2\theta$ $\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$ $\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \pm \sin\alpha\sin\beta$ $\sin(2\theta) = 2\sin\theta\cos\theta$ $\cos(2\theta) = \cos^2\theta - \sin^2\theta$	
MA3A6. Students will solve trigonometric equations both graphically and algebraically.	
a. Solve trigonometric equations over a variety of domains, using technology as appropriate.	
b. Use the coordinates of a point on the terminal side of an angle to express x as $r\cos\theta$ and y as $r\sin\theta$.	
d. Apply the law of sines and the law of cosines.	
MA3A7. Students will verify and apply $\frac{1}{2}ab\sin C$ to find the area of a triangle.	
MA3A8. Students will investigate and use inverse sine, inverse cosine, and inverse tangent functions.	
a. Find values of the above functions using technology as appropriate.	
b. Determine characteristics of the above functions and their graphs.	

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GEORGIA Accelerated Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
MA3A9. Students will use sequences and series	
a. Use and find recursive and explicit formulae for the terms of sequences.	
b. Recognize and use simple arithmetic and geometric sequences.	
c. Investigate limits of sequences.	
d. Use mathematical induction to find and prove formulae for sums of finite series.	
e. Find and apply the sums of finite and, where appropriate, infinite arithmetic and geometric series.	
f. Use summation notation to explore series.	
g. Determine geometric series and their limits.	
MA3A10. Students will understand and use vectors.	
a. Represent vectors algebraically and geometrically.	
b. Convert between vectors expressed using rectangular coordinates and vectors expressed using magnitude and direction.	
c. Add and subtract vectors and compute scalar multiples of vectors.	
d. Use vectors to solve realistic problems.	
MA3A11. Students will use complex numbers in trigonometric form.	
a. Represent complex numbers in trigonometric form.	
b. Find products, quotients, powers, and roots of complex numbers in trigonometric form.	
MA3A12. Students will explore parametric representations of plane curves.	
a. Convert between Cartesian and parametric form.	
b. Graph equations in parametric form showing direction and beginning and ending points where appropriate.	
MA3A13. Students will explore polar equations.	
a. Express coordinates of points in rectangular and polar form.	
b. Graph and identify characteristics of simple polar equations including lines, circles, cardioids, limaçons, and roses.	
DATA ANALYSIS AND PROBABILITY	
Students will organize, represent, investigate, interpret, and make inferences from data, using the central limit theorem and the standard normal distribution. Students will apply the Central Limit Theorem to calculate confidence intervals for a population mean using data from large samples. Students will use sample data and confidence intervals to draw conclusions about populations.	

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GEORGIA Accelerated Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
MA3D1. Using simulation, students will develop the idea of the central limit theorem.	
MA3D2. Using student-generated data from random samples of at least 30 members, students will determine the margin of error and confidence interval for a specified level of confidence.	
MA3D3. Students will use confidence intervals and margins of error to make inferences from data about a population. Technology is used to evaluate confidence intervals, but students will be aware of the ideas involved.	
PROCESS STANDARDS	
The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.	
MA3P1. Students will solve problems (using appropriate technology).	
a. Build new mathematical knowledge through problem solving.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones

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GEORGIA Accelerated Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
b. Solve problems that arise in mathematics and in other contexts.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
c. Apply and adapt a variety of appropriate strategies to solve problems.	Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles

TABLE V

GEORGIA Accelerated Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
	and circles) Calculate percentage discounts or markups Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices
d. Monitor and reflect on the process of mathematical problem solving.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items
MA3P2. Students will reason and evaluate mathematical arguments.	
a. Recognize reasoning and proof as fundamental aspects of mathematics.	
b. Make and investigate mathematical conjectures.	Rearrange a formula before solving a problem Solve problems that include nonlinear functions and/or that involve more than one unknown Set up and manipulate complex ratios or proportions
c. Develop and evaluate mathematical arguments and proofs.	
d. Select and use various types of reasoning and methods of proof.	
MA3P3. Students will communicate mathematically.	
a. Organize and consolidate their mathematical thinking through communication.	
b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	
c. Analyze and evaluate the mathematical thinking and strategies of others.	Find mistakes in items that belong at Levels 3, 4, and 5 Find mistakes in Level 6 items Find the best deal when there are several choices
d. Use the language of mathematics to express mathematical ideas precisely.	

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GEORGIA Accelerated Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
MA3P4. Students will make connections among mathematical ideas and to other disciplines.	
a. Recognize and use connections among mathematical ideas.	
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	
c. Recognize and apply mathematics in contexts outside of mathematics.	Decide what information, calculations, or unit conversions to use to solve the problem
MA3P5. Students will represent mathematics in multiple ways.	
a. Create and use representations to organize, record, and communicate mathematical ideas.	
b. Select, apply, and translate among mathematical representations to solve problems.	Put the information in the right order before performing calculations Decide what information, calculations, or unit conversions to use to solve the problem
c. Use representations to model and interpret physical, social, and mathematical phenomena.	
MATH READING CONTENT	
Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas • Read both informational and fictional texts in a variety of genres and modes of discourse • Read technical texts related to various subject areas	
b. Discussing books • Discuss messages and themes from books in all subject areas. • Respond to a variety of texts in multiple modes of discourse. • Relate messages and themes from one subject area to messages and themes in another area. • Evaluate the merit of texts in every subject discipline. • Examine author's purpose in writing. • Recognize the features of disciplinary texts.	
c. Building vocabulary knowledge • Demonstrate an understanding of contextual vocabulary in various subjects. • Use content vocabulary in writing and speaking. • Explore understanding of new words found in subject area texts.	

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GEORGIA Accelerated Math 3 Standards	ACT's WorkKeys Applied Mathematics Level Skills
d. Establishing context • Explore life experiences related to subject area content. • Discuss in both writing and speaking how certain words are subject area related. • Determine strategies for finding content and contextual meaning for unknown words.	