Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

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

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

K.NR.1 **Demonstrate and explain the relationship between numbers and quantities up to 20; connect counting to cardinality (the last number counted represents the total quantity in a set)**

- K.NR.1.1 Count up to 20 objects in a variety of structured arrangements and up to 10 objects in a scattered arrangement.
- K.NR.1.2 When counting objects, explain that the last number counted represents the total quantity in a set (cardinality), regardless of the arrangement and order.
- K.NR.1.3 Given a number from 1-20, identify the number that is one more or one less
- K.NR.1.4 Identify pennies, nickels, and dimes and know their name and value.
- K.NR.1.5 Identify dollars and count up to 20 dollars.

K.NR.2 Use count sequences within 100 to count forward and backward in sequence.

K.NR.2.1 Count forward to 100 by tens and ones and backward from 20 by ones.

K.NR.2.2 Count forward beginning from any number within 100 and count backward from any number within 20.

K.NR.3 Use place value understanding to compose and decompose numbers from 11–19.

K.NR.3.1 Describe numbers from 11 to 19 by composing (putting together) and decomposing (breaking apart) the numbers into ten ones and some more ones.

K.NR.4 Identify, write, represent, and compare numbers up to 20.

K.NR.4.1 Identify written numerals 0-20 and represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).

K.NR.4.2 Compare two sets of up to 10 objects and identify whether the number of objects in one group is more or less than the other group, using the words “greater than,” “less than,” or “the same as”.

K.NR.5 Explain the concepts of addition, subtraction, and equality and use these concepts to solve real-life problems within 10.

K.NR.5.1 Compose (put together) and decompose (break apart) numbers up to 10 using objects and drawings.

K.NR.5.2 Represent addition and subtraction within 10 from a given authentic situation using a variety of representations and strategies.

K.NR.5.3 Use a variety of strategies to solve addition and subtraction problems within 10.

K.NR.5.4 Fluently add and subtract within 5 using a variety of strategies to solve practical, mathematical problems.

K.NR.5.5 By the end of kindergarten, know from memory all sums to five, i.e. 0 + 5, 1 + 4, 2 + 3, 3 + 2, 4 + 1, and 5 + 0.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

K.PAR.6 Explain, extend, and create repeating patterns with a repetition, not exceeding 4 and describe patterns involving the passage of time.

K.PAR.6.1 Create, extend, and describe repeating patterns with numbers and shapes, and explain the rationale for the pattern.

K.PAR.6.1 Describe patterns involving the passage of time using words and phrases related to actual events.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

K.GSR.8 **Identify, describe, and compare basic shapes encountered in the environment, and form two-dimensional shapes and three-dimensional figures**

K.GSR.8.1 Identify, sort, classify, analyze, and compare two dimensional shapes and three-dimensional figures, in different sizes and orientations, using informal language to describe their similarities, differences, number of sides and vertices, and other attributes.

K.GSR.8.2 Describe the relative location of an object using positional words.

K.GSR.8.3 Use basic shapes to represent specific shapes found in the environment by creating models and drawings.

K.GSR.8.4 Use two or more basic shapes to form larger shapes.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

K.MDR.7 **Observe, describe, and compare the physical and measurable attributes of objects and analyze graphical displays of data.**

K.MDR.7.1 Directly compare, describe, and order common objects, using measurable attributes (length, height, width, or weight) and describe the difference.

K.MDR.7.2 Classify and sort up to ten objects into categories by an attribute; count the number of objects in each category and sort the categories by count.

K.MDR.7.3 Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to solve problems relevant to everyday life.

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HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

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

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

1.NR.1 **Extend the count sequence to 120. Read, write, and represent numerical values to 120 and compare numerical values to 100.**

- 1.NR.1.1 Count within 120, forward and backward, starting at any number. In this range, read and write numerals and represent a number of objects with a written numeral.
- 1.NR.1.2 Explain that the two digits of a 2-digit number represent the amounts of tens and ones.
- 1.NR.1.3 Compare and order whole numbers up to 100 using concrete models, drawings, and the symbols >, =, and <.

1.NR.2 **Explain the relationship between addition and subtraction and apply the properties of operations to solve real-life addition and subtraction problems within 20.**

1.NR.2.1 Use a variety of strategies to solve addition and subtraction problems within 20.

1.NR.2.2 Use pictures, drawings, and equations to develop strategies for addition and subtraction within 20 by exploring strings of related problems.

1.NR.2.3 Recognize the inverse relationship between subtraction and addition within 20 and use this inverse relationship to solve authentic problems.

1.NR.2.4 Fluently add and subtract within 10 using a variety of strategies.

1.NR.2.5 Use the meaning of the equal sign to determine whether equations involving addition and subtraction are true or false.

1.NR.2.6 Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers.

1.NR.2.6.1 Determine the result, change, and start unknown.

1.NR.2.7 Apply properties of operations as strategies to solve addition and subtraction problem situations within 20.

1.NR.2.7.1 Explore, understand, and apply the commutative and associative properties as strategies for solving problems.

1.NR.2.8 By the end of first grade, know from memory all sums to 10, i.e. 0 + 10, 1 + 9, 2 + 8, 3 + 7, etc.

1.NR.5 Use concrete models, the base ten structure, and properties of operations to add and subtract within 100.

1.NR.5.1 Use a variety of strategies to solve applicable, mathematical addition and subtraction problems with one- and two-digit whole numbers.

1.NR.5.2 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.

1.NR.5.3 Add and subtract multiples of 10 within 100.

1.NR.5.4 Estimate sums and differences within 100 to determine reasonableness.

GA Standard Code

1.PAR.3 **Identify, describe, extend, and create repeating patterns, growing patterns, and shrinking patterns found in real-life situations.**

1.PAR.3.1 Investigate, create, and make predictions about repeating patterns with a core of up to 3 elements resulting from repeating an operation, as a series of shapes, or a number string.

1.PAR.3.2 Identify, describe, and create growing, shrinking, and repeating patterns based on the repeated addition or subtraction of 1s, 2s, 5s, and 10s.

HCS Graduate Learner Outcome ***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

1.GSR.4 **Compose shapes, analyze the attributes of shapes, and relate their parts to the whole.**

1.GSR.4.1 Identify common two dimensional shapes and three dimensional figures, sort and classify them by their attributes and build and draw shapes that possess defining attributes.

1.GSR.4.2 Compose two-dimensional shapes (rectangles, squares, triangles, half-circles, and quarter-circles) and three dimensional figures (cubes, rectangular prisms, cones, and cylinders) to create a shape formed of two or more common shapes and compose new shapes from the composite shape.

1.GSR.4.3 Partition circles and rectangles into two and four equal shares.

1.GSR.4.3.1 Describe the shares using words halves, fourths and quarters, and use the phrases half of, fourth of, and quarter of and describe the whole as two of, or four of the shares.

1.GSR.4.3.2 Understand for these examples that decomposing into more equal shares creates smaller shares.

HCS Graduate Learner Outcome ***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

1.MDR.6 **Use appropriate tools to measure, order, and compare intervals of length and time, as well as denominations of money to solve real-life, mathematical problems and analyze graphical displays of data to answer relevant questions.**

1.MDR.6.1 Estimate, measure, and record lengths of objects using non-standard units, and compare and order up to three objects using the recorded measurements. Describe the objects compared.

1.MDR.6.2 Tell and write time in hours and half-hours using analog and digital clocks, and measure elapsed time to the hour on the hour using a predetermined number line.

1.MDR.6.3 Identify the value of quarters and compare the values of pennies, nickels, dimes, and quarters.

1.MDR.6.4 Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to compare and order whole numbers.

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HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

2.MP.1 Make sense of problems and persevere in solving them.

2.MP.2 Reason abstractly and quantitatively.

2.MP.3 Construct viable arguments and critique the reasoning of others.

2.MP.4 Model with mathematics.

2.MP.5 Use appropriate tools strategically.

2.MP.6 Attend to precision.

2.MP.7 Look for and make use of structure.

2.MP.8 Look for and express regularity in repeated reasoning.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

2.NR.1 **Using the place value structure explores the count sequences to represent, read, write and compare numerical values to 1000 and describe basic place-value relationships and structures.**

2. NR.1.1 Explain the value of a three-digit number using hundreds, tens, and ones in a variety of ways.

2.NR.1.1.1 Put together (compose) and break apart (decompose) three-digit numbers.

2. NR.1.2 Count forward and backward by ones from any number within 1000. Count forward by fives from multiples of 5 within 1000. Count forward and backward by 10s and 100s from any number within 1000. Count forward by 25s from 0.

2. NR.1.3 Represent, compare, and order whole numbers to 1000 with an emphasis on place value and equality. Use >, =, and < symbols to record the results of comparisons.

2.NR.2 **Apply multiple part-whole strategies, properties of operations, and place value understanding to solve real-life, mathematical problems involving addition and subtraction within 1,000.**

2. NR.2.1 Fluently add and subtract within 20 using a variety of mental, part-whole strategies.

2.NR.2.1.1 By the end of Grade 2, know from memory all sums of two one-digit numbers.

2.NR2.2 Find 10 more or 10 less than a given three-digit number and find 100 more or 100 less than a given three-digit number.

2. NR.2.3 Solve problems involving the addition and subtraction of two-digit numbers using part-whole strategies

2. NR.2.4 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

2.NR.2.5 Estimate sums and differences within 1,000 to determine reasonableness.

2. NR.3 **Work with equal to gain foundations for multiplication through real-life, mathematical problems.**

2.NR.3.1 Determine whether a group (up to 20) has an odd or even number of objects. Write an equation to express an even number as a sum of two equal addends.

2.NR.3.2 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

2.NR.3.2.1 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problem***

GA Standard Code

2.PAR.4 **2.PAR.4: Identify, describe, extend, and create repeating patterns, growing patterns, and shrinking patterns.**

2.PAR.4.1 Identify, describe, and create a numerical pattern resulting from repeating an operation such as addition and subtraction.

2.PAR.4.2 Identify, describe, and create growing patterns and shrinking patterns involving addition and subtraction up to 20.

2.PAR.4.2.1 Extend patterns to explore intervals of 1s, 2s, 5s, and 10s, to also include intervals of 25s and 100s.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

2.GSR.7 **Draw and partition shapes and other objects with specific attributes and conduct observations of everyday items and structures to identify how shapes exist in the world.**

2.GSR.7.1 Describe, compare and sort 2-D shapes including polygons, triangles, quadrilaterals, pentagons, hexagons, and 3-D shapes including rectangular prisms and cones, given a set of attributes.

2.GSR.7.2 Identify at least one line of symmetry in everyday objects to describe each object as a whole.

2.GSR.7.3 Partition circles and rectangles into two, three, or four equal shares. Identify and describe equal-sized parts of the whole using fractional names ("halves," "thirds," "fourths", "half of," "third of," "quarter of," etc.)

2.GSR.7.4 Recognize that equal shares of identical wholes may be different shapes within the same whole.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

2.MDR.5 **Estimate and measure the lengths of objects and distance to solve problems found in real-life using standard units of measurement including inches, feet, and yards.**

2.MDR.5.1 Construct simple measuring instruments using unit models. Compare unit models to rulers.

2.MDR.5.2 Estimate and measure the length of an object or distance to the nearest whole unit using appropriate units and standard measuring tools

2.MDR5.3 Measure to determine how much longer one object is than another and express the length difference in terms of a standard-length unit.

2.MDR5.4 Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to solve problems relevant to everyday life.

2.MDR5.5 Represent whole-number sums and differences within a standard unit of measurement on a number line diagram.

2.MDR.6 Solve real-life problems involving time and money.

2.MDR.6.1 Tell and write time from analog and digital clocks to the nearest five minutes, and estimate and measure elapsed time using a timeline, to the hour or half-hour on the hour or half-hour.

2.MDR6.2 Find the value of a group of coins and determine combinations of coins that equal a given amount that is less than one hundred cents, and solve problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately.

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HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

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

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

3.NR.1: Use place value reasoning to represent, read, write, and compare numerical values up to 10,000 and round whole numbers up to 1,000.

- 3.NR.1.1 Read and write multi-digit whole numbers up to 10,000 using base-ten numerals and expanded form.
- 3.NR.1.2 Use place value reasoning to compare multi-digit numbers up to 10,000, using >, =, and < symbols to record the results of comparisons.
- 3.NR.1.3 Use place value understanding to round whole numbers up to 1000 to the nearest 10 or 100.
- 3.NR.1.4 Utilize number lines to round by locating numbers on a number line to determine the nearest multiple of 10 or 100.

3.PAR.2: Use part-whole strategies to represent and solve real-life problems involving addition and subtraction with whole numbers within 10,000.

- 3.PAR.2.1 Fluently add and subtract within 1000 to solve problems.

3.PAR.2.2 Apply part-whole strategies, properties of operations and place value understanding, to solve problems involving addition and subtraction within 10,000. Represent these problems using equations with a letter standing for the unknown quantity. Justify solutions.

3.PAR.2.3 Estimate sums and differences within 10,000 to determine reasonableness.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

3.PAR.3: Use part-whole strategies to solve real-life, mathematical problems involving multiplication and division with whole numbers within 100.

3.PAR.3.1 Describe, extend, and create numeric patterns related to multiplication. Make predictions related to the patterns.

3.PAR.3.2 Represent single digit multiplication and division facts using a variety of strategies. Explain the relationship between multiplication and division.

3.PAR.3.2.1 Solve multiplication problems including single-digit factors, and division problems including single-digit divisors and quotients.

3.PAR.3.3 Apply properties of operations (i.e., commutative property, associative property, distributive property) to multiply and divide within 100.

3.PAR.3.4 Use the meaning of the equal sign to determine whether expressions involving addition, subtraction, and multiplication are equivalent.

3.PAR.3.5 Use place value reasoning and properties of operations to multiply one-digit whole numbers by multiples of 10, in the range 10-90.

3.PAR.3.6 Solve practical, relevant problems involving multiplication and division within 100 using part-whole strategies, visual representations, and/or concrete models.

3.PAR.3.6.1 Solve practical, realistic division problems including “how many in each group” and “how many groups” using efficient and flexible strategies.

3.PAR.3.7 By the end of Grade 3, know from memory all products of two one-digit numbers.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***

GA Standard Code

3.NR.4: Represent fractions with denominators of 2, 3, 4, 6 and 8 in multiple ways within a framework using visual models.

3.NR.4.1 Describe a unit fraction and explain how multiple copies of a unit fraction form a non-unit fraction. Use parts of a whole, parts of a set, points on a number line, distances on a number line and area models.

3.NR.4.2 Compare two unit fractions by flexibly using a variety of tools and strategies.

3.NR.4.3 Represent fractions, including fractions greater than one, in multiple ways.

3.NR.4.4 Recognize and generate simple equivalent fractions.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

3.MDR.5: Solve real-life, mathematical problems involving length, liquid volume, mass, and time.

3.MDR.5.1 Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to solve problems relevant to everyday life.

3.MDR.5.2 Tell and write time to the nearest minute and estimate time to the nearest fifteen minutes (quarter hour) from the analysis of an analog clock.

3.MDR.5.3 Solve meaningful problems involving elapsed time, including intervals of time to the hour, half hour, and quarter hour where the times presented are only on the hour, half hour, or quarter hour within a.m. or p.m. only.

3.MDR.5.4 Use rulers to measure lengths in halves and fourths (quarters) of an inch and a whole inch.

3.MDR.5.5 Estimate and measure liquid volumes, lengths and masses of objects using customary units. Solve problems involving mass, length, and volume given in the same unit, and reason about the relative sizes of measurement units within the customary system.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

3.GSR.6 Identify the attributes of polygons, including parallel segments, perpendicular segments, right angles, and symmetry.

3.GSR.6.1 Identify perpendicular line segments, parallel line segments, and right angles, identify these in polygons, and solve problems involving parallel line segments, perpendicular line segments, and right angles.

3.GSR.6.2 Classify, compare, and contrast polygons, with a focus on quadrilaterals, based on properties. Analyze specific 3-dimensional figures to identify and describe quadrilaterals as faces of these figures.

3.GSR.6.3 Identify lines of symmetry in polygons.

3.GSR.7: Identify area as a measurable attribute of rectangles and determine the area of a rectangle presented in real-life, mathematical problems.

3.GSR.7.1 Investigate area by covering the space of rectangles presented in realistic situations using multiple copies of the same unit, with no gaps or overlaps, and determine the total area (total number of units that covered the space).

3.GSR.7.2 Determine the area of rectangles (or shapes composed of rectangles) presented in relevant problems by tiling and counting.

3.GSR.7.3 Discover and explain how area can be found by multiplying the dimensions of a rectangle.

3.GSR.8: Determine the perimeter of a polygon presented in real-life, mathematical problems.

3.GSR.8.1 Determine the perimeter of a polygon and explain that the perimeter represents the distance around a polygon. Solve problems involving perimeters of polygons.

3.GSR.8.2 Investigate and describe how rectangles with the same perimeter can have different areas or how rectangles with the same area can have different perimeters.

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HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

4.MP.1 Make sense of problems and persevere in solving them.

4.MP.2 Reason abstractly and quantitatively.

4.MP.3 Construct viable arguments and critique the reasoning of others.

4.MP.4 Model with mathematics.

4.MP.5 Use appropriate tools strategically.

4.MP.6 Attend to precision.

4.MP.7 Look for and make use of structure.

4.MP.8 Look for and express regularity in repeated reasoning.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

4.NR.1 **Recognize patterns within the base ten place value system with quantities presented in real-life situations to compare and round multi-digit whole numbers through the hundred-thousands place.**

4.NR.1.1 Read and write multi-digit whole numbers to the hundred-thousands place using base-ten numerals and expanded form.

4.NR.1.2 Recognize and show that a digit in one place has a value ten times greater than what it represents in the place to its right and extend this understanding to determine the value of a digit when it is shifted to the left or right, based on the relationship between multiplication and division

4.NR.1.2.1 Represent and explain the relationship among the numbers 1, 10, 100, and 1,000 using numerical reasoning and manipulatives. Extend the pattern to the hundred thousands place.

4.NR.1.3 Use place value reasoning to represent, compare, and order multi-digit numbers, using >, =, and < symbols to record the results of comparisons.

4.NR.1.4 Use place value understanding to round multi-digit whole numbers.

4.NR.1.5 Utilize number lines to round by locating numbers on a number line to determine the nearest multiple of 10, 100, 1,000, 10,000 or 100,000

4.NR.2 Using part-whole strategies, solve problems involving addition and subtraction through the hundred-thousands place, as well as multiplication and division of multi-digit whole numbers presented in real-life, mathematical situations.

4.NR.2.1 Fluently add and subtract multi-digit numbers to solve practical, mathematical problems using place value understanding, properties of operations, and relationships between operations.

4.NR.2.2 Interpret, model, and solve problems involving multiplicative comparison.

4.NR.2.3 Solve relevant problems involving multiplication of a number with up to four digits by a 1-digit whole number or involving multiplication of two two-digit numbers using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

4.NR.2.4 Solve authentic division problems involving up to 4-digit dividends and 1- digit divisors (including whole number quotients with remainders) using strategies based on place-value understanding, properties of operations, and the relationships between operations.

4.NR.2.5 Solve multi-step problems using addition, subtraction, multiplication, and division involving whole numbers. Use mental computation and estimation strategies to justify the reasonableness of solutions.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

4.PAR.3 Generate and analyze patterns, including those involving shapes, input/output diagrams, factors, multiples, prime numbers, and composite numbers.

4.PAR.3.1 Generate both number and shape patterns that follow a provided rule.

4.PAR.3.2 Use input-output rules, tables, and charts to represent and describe patterns, find relationships, and solve problems.

4.PAR.3.3 Find factor pairs in the range 1–100 and find multiples of single-digit numbers up to 100.

4.PAR.3.4 Identify composite numbers and prime numbers and explain the relationship with the factor pairs.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***

GA Standard Code

4.NR.4 Solve real-life problems involving addition, subtraction, equivalence, and comparison of fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100 using part-whole strategies and visual models.

4.NR.4.1 Using concrete materials,drawings, and number lines, demonstrate and explain the relationship between equivalent fractions, including fractions greater than one, and explain the identity property of multiplication as it relates to equivalent fractions. Generate equivalent fractions using these relationships.

4.NR.4.2 Compare two fractions with the same numerator or the same denominator by reasoning about their size and recognize that comparisons are valid only when the two fractions refer to the same whole.

4.NR.4.3 Compare two fractions with different numerators and/or different denominators by flexibly using a variety of tools and strategies and recognize that comparisons are valid only when the two fractions refer to the same whole.

4.NR.4.4 Represent whole numbers and fractions as the sum of unit fractions.

4.NR.4.5 Represent a fraction as a sum of fractions with the same denominator in more than one way, recording with an equation.

4.NR.4.6 Add and subtract fractions and mixed numbers with like denominators using a variety of tools.

4.NR.5 Solve real-life problems involving addition, equivalence, comparison of fractions with denominators of 10 and 100, and comparison of decimal numbers as tenths and hundredths using part-whole strategies and visual models.

4.NR.5.1 Demonstrate and explain the concept of equivalent fractions with denominators of 10 and 100, using concrete materials and visual models. Add two fractions with denominators of 10 and 100.

4.NR.5.1.2 Express fractions such as 3/10 as 30/100, and add fractions such as 3/10 + 4/100 = 34/100.

4.NR.5.2 Represent, read, and write fractions with denominators of 10 or 100 using decimal notation, and decimal numbers to the hundredths place as fractions, using concrete materials and drawings.

4.NR.5.3 Compare two decimal numbers to the hundredths place by reasoning about their size. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

4.GSR.7 Investigate the concepts of angles and angle measurement to estimate and measure angles.

4.GSR.7.1 Recognize angles as geometric shapes formed when two rays share a common endpoint. Draw right, acute, and obtuse angles based on the relationship of the angle measure to 90 degrees.

4.GSR.7.2 Measure angles in reference to a circle with the center at the common endpoint of two rays. Determine an angle's measure in relation to the 360 degrees in a circle through division or as a missing factor problem.

4.GSR.8 Identify and draw geometric objects, classify polygons based on properties, and solve problems involving area and perimeter of rectangular figures.

4.GSR.8.1 Explore, investigate, and draw points, lines, line segments, rays, angles (right, acute, obtuse), perpendicular lines, parallel lines, and lines of symmetry. Identify these in two dimensional figures.

4.GSR.8.2 Classify, compare, and contrast polygons based on lines of symmetry, the presence or absence of parallel or perpendicular line segments, or the presence or absence of angles of a specified size and based on side lengths.

4.GSR.8.3 Solve problems involving area and perimeter of composite rectangles involving whole numbers with known side lengths.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

4.MDR.6 Measure time and objects that exist in the world to solve real-life, mathematical problems and analyze graphical displays of data to answer relevant questions.

4.MDR.6.1 Use the four operations to solve problems involving elapsed time to the nearest minute, intervals of time, metric measurements of liquid volumes, lengths, distances, and masses of objects, including problems involving fractions with like denominators, and also problems that require expressing measurements given in a larger unit in terms of a smaller unit, and expressing a smaller unit in terms of a larger unit based on the idea of equivalence.

4.MDR.6.1.2 Accurately record measurement equivalents in a two-column table.

4.MDR.6.2 Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to solve problems relevant to everyday life.

4.MDR.6.3 Create dot plots to display a distribution of numerical (quantitative) measurement data.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

- Accel4.MP.1 Make sense of problems and persevere in solving them.
- Accel4.MP.2 Reason abstractly and quantitatively.
- Accel4.MP.3 Construct viable arguments and critique the reasoning of others.
- Accel4.MP.4 Model with mathematics.
- Accel4.MP.5 Use appropriate tools strategically.
- Accel4.MP.6 Attend to precision.
- Accel4.MP.7 Look for and make use of structure.
- Accel4.MP.8 Look for and express regularity in repeated reasoning.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

4.NR.1 **Recognize patterns within the base ten place value system with quantities presented in real-life situations to compare and round multi-digit whole numbers through the hundred-thousands place.**

- 4.NR.1.1 Read and write multi-digit whole numbers to the hundred-thousands place using base-ten numerals and expanded form.
- 4.NR.1.2 Recognize and show that a digit in one place has a value ten times greater than what it represents in the place to its right and extend this understanding to determine the value of a digit when it is shifted to the left or right, based on the relationship between multiplication and division.

  4.NR.1.2.1 Represent and explain the relationship among the numbers 1, 10, 100, and 1,000 using numerical reasoning and manipulatives. Extend the pattern to the hundred thousands place.

- 4.NR.1.3 Use place value reasoning to represent, compare, and order multi-digit numbers, using >, =, and < symbols to record the results of comparisons.

4.NR.1.4 Use place value understanding to round multi-digit whole numbers.

4.NR.1.5 Utilize number lines to round by locating numbers on a number line to determine the nearest multiple of 10, 100, 1,000, 10,000 or 100,000

5.NR.1 Use place value understanding to solve real-life, mathematical problems.

5.NR.1.1 Explain that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1 10 of what it represents in the place to its left.

5.NR.1.2 Explain patterns in the placement of digits when multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10, up to 103 .

4.NR.2 Using part-whole strategies, solve problems involving addition and subtraction through the hundred-thousands place, as well as multiplication and division of multi-digit whole numbers presented in real-life, mathematical situations.

4.NR.2.1 Fluently add and subtract multi-digit numbers to solve practical, mathematical problems using place value understanding, properties of operations, and relationships between operations

4.NR.2.2 Interpret, model, and solve problems involving multiplicative comparison.

4.NR.2.3 Solve relevant problems involving multiplication of a number with up to four digits by a 1-digit whole number or involving multiplication of two two-digit numbers using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

4.NR.2.4 Solve authentic division problems involving up to 4-digit dividends and 1- digit divisors (including whole number quotients with remainders) using strategies based on place-value understanding, properties of operations, and the relationships between operations.

4.NR.2.5 Solve multi-step problems using addition, subtraction, multiplication, and division involving whole numbers. Use mental computation and estimation strategies to justify the reasonableness of solutions.

5.NR.2 Multiply and divide multi-digit whole numbers to solve relevant, mathematical problems.

5.NR.2.1 Fluently multiply multi-digit (up to 3- digit by 2-digit) whole numbers to solve authentic problems.

5.NR.2.2 Fluently divide multi-digit whole numbers (up to 4-digit dividends and 2-digit divisors no greater than 25) to solve practical problems.

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5.NR.3 Describe fractions and perform operations with fractions to solve relevant, mathematical problems using part-whole strategies and visual models.

5.NR.3.1 Explain the meaning of a fraction as division of the numerator by the denominator ($a\ b$ = a ÷ b). Solve problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers.

5.NR.3.2 Compare and order up to three fractions with different numerators and/or different denominators by flexibly using a variety of tools and strategies.

5.NR.3.3 Model and solve problems involving addition and subtraction of fractions and mixed numbers with unlike denominators.

5.NR.3.4 Model and solve problems involving multiplication of a fraction and a whole number.

5.NR.3.5 Explain why multiplying a whole number by a fraction greater than one results in a product greater than the whole number, and why multiplying a whole number by a fraction less than one results in a product less than the whole number and multiplying a whole number by a fraction equal to one results in a product equal to the whole number.

5.NR.3.6 Model and solve problems involving division of a unit fraction by a whole number and a whole number by a unit fraction.

4.NR.4 Solve real-life problems involving addition, subtraction, equivalence, and comparison of fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100 using part-whole strategies and visual models.

4.NR.4.1 Using concrete materials, drawings, and number lines, demonstrate and explain the relationship between equivalent fractions, including fractions greater than one, and explain the identity property of multiplication as it relates to equivalent fractions. Generate equivalent fractions using these relationships.

4.NR.4.2 Compare two fractions with the same numerator or the same denominator by reasoning about their size and recognize that comparisons are valid only when the two fractions refer to the same whole.

4.NR.4.3 Compare two fractions with different numerators and/or different denominators by flexibly using a variety of tools and strategies and recognize that comparisons are valid only when the two fractions refer to the same whole

4.NR.4.4 Represent whole numbers and fractions as the sum of unit fractions.

4.NR.4.5 Represent a fraction as a sum of fractions with the same denominator in more than one way, recording with an equation.

4.NR.4.6 Add and subtract fractions and mixed numbers with like denominators using a variety of tools

4.NR.5 Solve real-life problems involving addition, equivalence, comparison of fractions with denominators of 10 and 100, and comparison of decimal numbers as tenths and hundredths using part-whole strategies and visual models.

4.NR.5.1 Demonstrate and explain the concept of equivalent fractions with denominators of 10 and 100, using concrete materials and visual models. Add two fractions with denominators of 10 and 100.

4.NR.5.1.2 Express fractions such as 3/10 as 30/100 , and add fractions such as 3/10 + 4/100 = 34/100.

4.NR.5.2 Represent, read, and write fractions with denominators of 10 or 100 using decimal notation, and decimal numbers to the hundredths place as fractions, using concrete materials and drawings.

4.NR.5.3 Compare two decimal numbers to the hundredths place by reasoning about their size. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions.

5.NR.5 Write, interpret, and evaluate numerical expressions within authentic problems.

5.NR.5.1 Write, interpret, and evaluate simple numerical expressions involving whole numbers with or without grouping symbols to represent actual situations

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

4.PAR.3 Generate and analyze patterns, including those involving shapes, input/output diagrams, factors, multiples, prime numbers, and composite numbers

4.PAR.3.1 Generate both number and shape patterns that follow a provided rule

4.PAR.3.2 Use input-output rules, tables, and charts to represent and describe patterns, find relationships, and solve problems

4.PAR.3.3 Find factor pairs in the range 1–100 and find multiples of single-digit numbers up to 100.

4.PAR.3.4 Identify composite numbers and prime numbers and explain the relationship with the factor pairs.

5.PAR.6 Solve relevant problems by creating and analyzing numerical patterns using the given rule(s).

5.PAR.6.1 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms by completing a table.

5.PAR.6.2 Represent problems by plotting ordered pairs and explain coordinate values of points in the first quadrant of the coordinate plane.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

4.GSR.7 Investigate the concepts of angles and angle measurement to estimate and measure angles.

4.GSR.7.1 Recognize angles as geometric shapes formed when two rays share a common endpoint. Draw right, acute, and obtuse angles based on the relationship of the angle measure to 90 degrees.

4.GSR.7.2 Measure angles in reference to a circle with the center at the common endpoint of two rays. Determine an angle's measure in relation to the 360 degrees in a circle through division or as a missing factor problem.

4.GSR.8 Identify and draw geometric objects, classify polygons based on properties, and solve problems involving area and perimeter of rectangular figures

4.GSR.8.1 Explore, investigate, and draw points, lines, line segments, rays, angles (right, acute, obtuse), perpendicular lines, parallel lines, and lines of symmetry. Identify these in two dimensional figures.

4.GSR.8.2 Classify, compare, and contrast polygons based on lines of symmetry, the presence or absence of parallel or perpendicular line segments, or the presence or absence of angles of a specified size and based on side lengths

4.GSR.8.3 Solve problems involving area and perimeter of composite rectangles involving whole numbers with known side lengths.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

4.MDR.6 Measure time and objects that exist in the world to solve real-life, mathematical problems and analyze graphical displays of data to answer relevant questions.

4.MDR.6.1 Use the four operations to solve problems involving elapsed time to the nearest minute, intervals of time, metric measurements of liquid volumes, lengths, distances, and masses of objects, including problems involving fractions with like denominators, and also problems that require expressing measurements given in a larger unit in terms of a smaller unit, and expressing a smaller unit in terms of a larger unit based on the idea of equivalence.

4.MDR.6.1.2 Accurately record measurement equivalents in a two-column table.

4.MDR.6.2 Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to solve problems relevant to everyday life.

4.MDR.6.3 Create dot plots to display a distribution of numerical (quantitative) measurement data.

5.MDR.7 Solve problems involving customary measurements, metric measurements, and time and analyze graphical displays of data to answer relevant questions.

5.MDR.7.1 Explore realistic problems involving different units of measurement, including distance, mass, weight, volume, and time.

5.MDR.7.2 Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to solve problems relevant to everyday life

5.MDR.7.3 Convert among units within the metric system and then apply these conversions to solve multistep, practical problems.

5.MDR.7.4 Convert among units within relative sizes of measurement units within the customary measurement system.

5.MDR.7.5 Record conversions in a two column table

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

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

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

5.NR.1 **Use place value understanding to solve real-life, mathematical problems.**

- 5.NR.1.1 Explain that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
- 5.NR.1.2 Explain patterns in the placement of digits when multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10, up to 10^3.

5.NR.2 **Multiply and divide multi-digit whole numbers to solve relevant, mathematical problems.**

- 5.NR.2.1 Fluently multiply multi-digit (up to 3- digit by 2-digit) whole numbers to solve authentic problems.

5.NR.2.2 Fluently divide multi-digit whole numbers (up to 4-digit dividends and 2-digit divisors no greater than 25) to solve practical problems.

5.NR.3 Describe fractions and perform operations with fractions to solve relevant, mathematical problems using part-whole strategies and visual models.

5.NR.3.1 Explain the meaning of a fraction as division of the numerator by the denominator ($a\ b$ = a ÷ b). Solve problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers.

5.NR.3.2 Compare and order up to three fractions with different numerators and/or different denominators by flexibly using a variety of tools and strategies.

5.NR.3.3 Model and solve problems involving addition and subtraction of fractions and mixed numbers with unlike denominators.

5.NR.3.4 Model and solve problems involving multiplication of a fraction and a whole number.

5.NR.3.5 Explain why multiplying a whole number by a fraction greater than one results in a product greater than the whole number, and why multiplying a whole number by a fraction less than one results in a product less than the whole number and multiplying a whole number by a fraction equal to one results in a product equal to the whole number.

5.NR.3.6 Model and solve problems involving division of a unit fraction by a whole number and a whole number by a unit fraction.

5.NR.4 Read, write, and compare decimal numbers to the thousandths place, and round and perform operations with decimal numbers to the hundredths place to solve relevant, mathematical problems.

5.NR.4.1 Read and write decimal numbers to the thousandths place using base ten numerals written in standard form and expanded form.

5.NR.4.2 Represent, compare, and order decimal numbers to the thousandths place based on the meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

5.NR.4.3 Use place value understanding to round decimal numbers to the hundredths place.

5.NR.4.4 Solve problems involving addition and subtraction of decimal numbers to the hundredths place using a variety of strategies.

5.NR.4.5 Utilize number lines to round by locating decimals on a number line to determine the nearest multiple of base ten decimal of 0.1, or 0.01.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

5.NR.5 **Write, interpret, and evaluate numerical expressions within authentic problems.**

5.NR.5.1 Write, interpret, and evaluate simple numerical expressions involving whole numbers with or without grouping symbols to represent actual situations.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***

GA Standard Code

5.PAR.6 **Solve relevant problems by creating and analyzing numerical patterns using the given rule(s).**

5.PAR.6.1 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms by completing a table. .

5.PAR.6.2 Represent problems by plotting ordered pairs and explain coordinate values of points in the first quadrant of the coordinate plane.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

5.GSR.8 **Examine properties of polygons and rectangular prisms, classify polygons by their properties, and discover volume of right rectangular prisms.**

5.GSR.8.1 Classify, compare, and contrast polygons based on properties.

5.GSR.8.2 Determine, through exploration and investigation, that attributes belonging to a category of two dimensional figures also belong to all subcategories of that category.

5.GSR.8.3 Investigate volume of right rectangular prisms by packing them with unit cubes without gaps or overlaps. Then, determine the total volume to solve problems.

5.GSR.8.4 Discover and explain how the volume of a right rectangular prism can be found by multiplying the area of the base times the height to solve authentic, mathematical problems.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

5.MDR.7 **Solve problems involving customary measurements, metric measurements, and time and analyze graphical displays of data to answer relevant questions.**

5.MDR.7.1 Explore realistic problems involving different units of measurement, including distance, mass, weight, volume, and time.

5.MDR.7.2 Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to solve problems relevant to everyday life.

5.MDR.7.3 Convert among units within the metric system and then apply these conversions to solve multistep, practical problems.

5.MDR.7.4 Convert among units within relative sizes of measurement units within the customary measurement system.

5.MDR.7.5 Record conversions in a two column table.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

Accel5.MP.1 Make sense of problems and persevere in solving them.

Accel5.MP.2 Reason abstractly and quantitatively.

Accel5.MP.3 Construct viable arguments and critique the reasoning of others.

Accel5.MP.4 Model with mathematics.

Accel5.MP.5 Use appropriate tools strategically.

Accel5.MP.6 Attend to precision.

Accel5.MP.7 Look for and make use of structure.

Accel5.MP.8 Look for and express regularity in repeated reasoning.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

5.NR.3 **Describe fractions and perform operations with fractions to solve relevant, mathematical problems using part-whole strategies and visual models.**

5.NR.3.5 Explain why multiplying a whole number by a fraction greater than one results in a product greater than the whole number, and why multiplying a whole number by a fraction less than one results in a product less than the whole number and multiplying a whole number by a fraction equal to one results in a product equal to the whole number.

5.NR.3.6 Model and solve problems involving division of a unit fraction by a whole number and a whole number by a unit fraction.

5.NR.4 Read, write, and compare decimal numbers to the thousandths place, and round and perform operations with decimal numbers to the hundredths place to solve relevant, mathematical problems.

5.NR.4.1 Read and write decimal numbers to the thousandths place using base ten numerals written in standard form and expanded form.

5.NR.4.2 Represent, compare, and order decimal numbers to the thousandths place based on the meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

5.NR.4.2.1 Explain comparisons using a variety of tools such as concrete materials, drawings, number lines, other visual representations, and strategies.

5.NR.4.3 Use place value understanding to round decimal numbers to the hundredths place.

5.NR.4.4 Solve problems involving addition and subtraction of decimal numbers to the hundredths place using a variety of strategies.

5.NR.4.4.1 Add and subtract decimal numbers to hundredths, using concrete models, drawings, strategies based on place value, properties of operations, and the relationship between addition and subtraction.

5.NR.4.4.2 Money may be used as a tool to aid in the student's understanding of adding and subtracting decimal numbers to the hundredths place. Solve problems involving addition and subtraction of decimal numbers to the hundredths place using a variety of strategies.

5.NR.4.5 Utilize number lines to round by locating decimals on a number line to determine the nearest multiple of base ten decimal of 0.1, or 0.01.

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GA Standard Code

5.MDR.7 Solve problems involving customary measurements, metric measurements, and time and analyze graphical displays of data to answer relevant questions.

5.MDR.7.1 Explore realistic problems involving different units of measurement, including distance, mass, weight, volume, and time.

5.MDR.7.2 Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to solve problems relevant to everyday life.

5.MDR.7.3 Convert among units within the metric system and then apply these conversions to solve multistep, practical problems.

5.MDR.7.4 Convert among units within relative sizes of measurement units within the customary measurement system.

5.MDR.7.5 Record conversions in a two column table.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

5.GSR.8 Examine properties of polygons and rectangular prisms, classify polygons by their properties, and discover volume of right rectangular prisms.

5.GSR.8.1 Classify, compare, and contrast polygons based on properties.

5.GSR.8.2 Determine, through exploration and investigation, that attributes belonging to a category of two dimensional figures also belong to all subcategories of that category.

5.GSR.8.3 Investigate volume of right rectangular prisms by packing them with unit cubes without gaps or overlaps. Then, determine the total volume to solve problems.

5.GSR.8.4 Discover and explain how the volume of a right rectangular prism can be found by multiplying the area of the base times the height to solve authentic, mathematical problems.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

6.NR.1 Solve relevant, mathematical problems involving operations with whole numbers, fractions, and decimal numbers.

6.NR.1.1 Fluently add and subtract any combination of fractions to solve problems.

6.NR.1.2 Multiply and divide any combination of whole numbers, fractions, and mixed numbers using a student-selected strategy. Interpret products and quotients of fractions and solve word problems.

6.NR.1.3 Perform operations with multi-digit decimal numbers fluently using models and student-selected strategies.

6.NR.2 Apply operations with whole numbers, fractions and decimals within relevant applications.

6.NR.2.1 Describe and interpret the center of the distribution by the equal share value (mean).

6.NR2.2 Summarize categorical and quantitative (numerical) data sets in relation to the context: display the distributions of quantitative (numerical) data in plots on a number line, including dot plots, histograms, and box plots and display the distribution of categorical data using bar graphs.

6.NR.2.3 Interpret numerical data to answer a statistical investigative question created. Describe the distribution of a quantitative (numerical) variable collected, including its center, variability, and overall shape.

6.NR.2.4 Design simple experiments and collect data. Use data gathered from realistic scenarios and simulations to determine quantitative measures of center (median and/or mean) and variability (interquartile range and range). Use these quantities to draw conclusions about the data, compare different numerical data sets, and make predictions

6.NR.2.5 Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

6.NR.2.6 Describe the impact that inserting or deleting a data point has on the mean and the median of a data set. Create data displays using a dot plot or box plot to examine this impact.

6.NR.2.7 Recognize, create and ask statistical questions that anticipate variability in the data.

6.NR.3 Solve a variety of problems involving whole numbers and their opposites; model rational numbers on a number line to describe problems presented in relevant, mathematical situations

6.NR.3.1 Identify and compare integers and explain the meaning of zero based on multiple authentic situations

6.NR.3.2 Order and plot integers on a number line and use distance from zero to discover the connection between integers and their opposites.

6.NR.3.3 Recognize and explain that opposite signs of integers indicate locations on opposite sides of zero on the number line; recognize and explain that the opposite of the opposite of a number is the number itself.

6.NR.3.4 Write, interpret, and explain statements of order for rational numbers in authentic, mathematical situations. Compare rational numbers, including integers, using equality and inequality symbols.

6.NR.3.5 Explain the absolute value of a rational number as its distance from zero on the number line; interpret absolute value as distance for a positive or negative quantity in a relevant situation.

6.NR.3.6 Distinguish comparisons of absolute value from statements about order.

6.NR.4 Solve a variety of contextual problems involving ratios, unit rates, equivalent ratios, percentages, and conversions within measurement systems using proportional reasoning.

6.NR.4.1 Explain the concept of a ratio, represent ratios, and use ratio language to describe a relationship between two quantities.

6.NR.4.2 Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

6.NR.4.3 Solve problems involving proportions using a variety of student-selected strategies.

6.NR.4.4 Describe the concept of rates and unit rate in the context of a ratio relationship.

6.NR.4.5 Solve unit rate problems including those involving unit pricing and constant speed.

6.NR.4.6 Calculate a percent of a quantity as a rate per 100 and solve everyday problems given a percent.

6.NR.4.7 Use ratios to convert within measurement systems (customary and metric) to solve authentic problems that exist in everyday life.

6.NR.4.8 Solve problems involving ratios found in everyday situations.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

6.GSR.5 Solve relevant problems involving area, surface area, and volume.

6.GSR.5.1 Explore area as a measurable attribute of triangles, quadrilaterals, and other polygons conceptually by composing or decomposing into rectangles, triangles, and other shapes. Find the area of these geometric figures to solve problems.

6.GSR.5.2 Given the net of three-dimensional figures with rectangular and triangular faces, determine the surface area of these figures.

6.GSR.5.3 Calculate the volume of right rectangular prisms with fractional edge lengths by applying the formula, V = (area of base) x (height).

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

6.PAR.6 Identify, write, evaluate, and interpret numerical and algebraic expressions as mathematical models to explain authentic situations

6.PAR.6.1 Write and evaluate numerical expressions involving rational bases and whole-number exponents.

6.PAR.6.2 Determine greatest common factors and least common multiples using a variety of strategies to make sense of applicable problems.

6.PAR.6.3 Write and read expressions that represent operations with numbers and variables in realistic situations.

6.PAR.6.4 Evaluate expressions when given values for the variables, including expressions that arise in everyday situations.

6.PAR.6.5 Apply the properties of operations to identify and generate equivalent expressions.

6.PAR.7 Write and solve one-step equations and inequalities as mathematical models to explain authentic, realistic situations.

6.PAR.7.1 Solve one-step equations and inequalities involving variables when values for the variables are given. Determine whether an equation and inequality involving a variable is true or false for a given value of the variable.

6.PAR.7.2 Write one-step equations and inequalities to represent and solve problems; explain that a variable can represent an unknown number or any number in a specified set.

6.PAR.7.3 Solve problems by writing and solving equations of the form x + p = q, px = q and x/p=q for cases in which p, q and x are all nonnegative rational numbers.

6.PAR.7.4 Recognize and generate inequalities of the form x > c, x > c, x < c, or x < c to explain situations that have infinitely many solutions; represent solutions of such inequalities on a number line.

6.PAR.8 Graph rational numbers as points on the coordinate plane to represent and solve contextual, mathematical problems; draw polygons using the coordinates for their vertices and find the length of a side of a polygon.

6.PAR.8.1 Locate and position rational numbers on a horizontal or vertical number line; find and position pairs of integers and other rational numbers on a coordinate plane.

6.PAR.8.2 Show and explain that signs of numbers in ordered pairs indicate locations in quadrants of the coordinate plane and determine how two ordered pairs may differ based only on the signs.

6.PAR.8.3 Solve problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same x-coordinate or the same y-coordinate.

6.PAR.8.4 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same x-coordinate or the same y-coordinate.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

6.MP.1 Make sense of problems and persevere in solving them.

6.MP.2 Reason abstractly and quantitatively.

6.MP.3 Construct viable arguments and critique the reasoning of others.

6.MP.4 Model with mathematics.

6.MP.5 Use appropriate tools strategically.

6.MP.6 Attend to precision.

6.MP.7 Look for and make use of structure.

6.MP.8 Look for and express regularity in repeated reasoning.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

6.NR.1. Solve relevant, mathematical problems involving operations with whole numbers, fractions, and decimal numbers.

6.NR.1.1 Fluently add and subtract any combination of fractions to solve problems.

6.NR.1.2 Multiply and divide any combination of whole numbers, fractions, and mixed numbers using a student-selected strategy. Interpret products and quotients of fractions and solve word problems.

6.NR.1.3 Perform operations with multi-digit decimal numbers fluently using models and student-selected strategies.

6.NR.3: Solve a variety of problems involving whole numbers and their opposites; model rational numbers on a number line to describe problems presented in relevant, mathematical situations.

6.NR.3.1 Identify and compare integers and explain the meaning of zero based on multiple authentic situations.

6.NR.3.2 Order and plot integers on a number line and use distance from zero to discover the connection between integers and their opposites.

6.NR.3.3 Recognize and explain that opposite signs of integers indicate locations on opposite sides of zero on the number line; recognize and explain that the opposite of the opposite of a number is the number itself.

6.NR.3.4 Write, interpret, and explain statements of order for rational numbers in authentic, mathematical situations. Compare rational numbers, including integers, using equality and inequality symbols.

6.NR.3.5 Explain the absolute value of a rational number as its distance from zero on the number line; interpret absolute value as distance for a positive or negative quantity in a relevant situation.

6.NR.3.6 Distinguish comparisons of absolute value from statements about order.

6.NR.4 Solve a variety of contextual problems involving ratios, unit rates, equivalent ratios, percentages, and conversions within measurement systems using proportional reasoning.

6.NR.4.1 Explain the concept of a ratio, represent ratios, and use ratio language to describe a relationship between two quantities.

6.NR.4.2 Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

6.NR.4.3 Solve problems involving proportions using a variety of student-selected strategies.

6.NR.4.4 Describe the concept of rates and unit rate in the context of a ratio relationship.

6.NR.4.5 Solve unit rate problems including those involving unit pricing and constant speed.

6.NR.4.6 Calculate a percent of a quantity as a rate per 100 and solve everyday problems given a percent.

6.NR.4.7 Use ratios to convert within measurement systems (customary and metric) to solve authentic problems that exist in everyday life.

6.NR.4.8 Solve problems involving ratios found in everyday situations.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

6.PAR.6 Identify, write, evaluate, and interpret numerical and algebraic expressions as mathematical models to explain authentic situations

6.PAR.6.1 Write and evaluate numerical expressions involving rational bases and whole-number exponents.

6.PAR.6.2 Determine greatest common factors and least common multiples using a variety of strategies to make sense of applicable problems.

6.PAR.6.3 Write and read expressions that represent operations with numbers and variables in realistic situations.

6.PAR.6.4 Evaluate expressions when given values for the variables, including expressions that arise in everyday situations.

6.PAR.6.5 Apply the properties of operations to identify and generate equivalent expressions.

6.PAR.7 Write and solve one-step equations and inequalities as mathematical models to explain authentic, realistic situations.

6.PAR.7.1 Solve one-step equations and inequalities involving variables when values for the variables are given. Determine whether an equation and inequality involving a variable is true or false for a given value of the variable.

6.PAR.7.2 Write one-step equations and inequalities to represent and solve problems; explain that a variable can represent an unknown number or any number in a specified set.

6.PAR.7.3 Solve problems by writing and solving equations of the form x + p = q, px = q and x/p=q for cases in which p, q and x are all nonnegative rational numbers.

6.PAR.7.4 Recognize and generate inequalities of the form x > c, x > c, x < c, or x < c to explain situations that have infinitely many solutions; represent solutions of such inequalities on a number line.

6.PAR.8 Graph rational numbers as points on the coordinate plane to represent and solve contextual, mathematical problems; draw polygons using the coordinates for their vertices and find the length of a side of a polygon.

6.PAR.8.1 Locate and position rational numbers on a horizontal or vertical number line; find and position pairs of integers and other rational numbers on a coordinate plane.

6.PAR.8.2 Show and explain that signs of numbers in ordered pairs indicate locations in quadrants of the coordinate plane and determine how two ordered pairs may differ based only on the signs.

6.PAR.8.3 Solve problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same x-coordinate or the same y-coordinate.

6.PAR.8.4 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same x-coordinate or the same y-coordinate.

HCS Graduate Learner Outcome ***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

6.GSR.5 Solve relevant problems involving area, surface area, and volume.

6.GSR.5.1 Explore area as a measurable attribute of triangles, quadrilaterals, and other polygons conceptually by composing or decomposing into rectangles, triangles, and other shapes. Find the area of these geometric figures to solve problems.

6.GSR.5.2 Given the net of three-dimensional figures with rectangular and triangular faces, determine the surface area of these figures.

6.GSR.5.3 Calculate the volume of right rectangular prisms with fractional edge lengths by applying the formula, V = (area of base) x (height).

HCS Graduate Learner Outcome ***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

6.NR.2 Apply operations with whole numbers, fractions and decimals within relevant applications.

6.NR.2.1 Describe and interpret the center of the distribution by the equal share value (mean).

6.NR.2.2 Summarize categorical and quantitative (numerical) data sets in relation to the context: display the distributions of quantitative (numerical) data in plots on a number line, including dot plots, histograms, and box plots and display the distribution of categorical data using bar graphs.

6.NR.2.3 Interpret numerical data to answer a statistical investigative question created. Describe the distribution of a quantitative (numerical) variable collected, including its center, variability, and overall shape.

6.NR.2.4 Design simple experiments and collect data. Use data gathered from realistic scenarios and simulations to determine quantitative measures of center (median and/or mean) and variability (interquartile range and range). Use these quantities to draw conclusions about the data, compare different numerical data sets, and make predictions.

6.NR.2.5 Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

6.NR.2.6 Describe the impact that inserting or deleting a data point has on the mean and the median of a data set. Create data displays using a dot plot or box plot to examine this impact.

6.NR.2.7 Recognize, create and ask statistical questions that anticipate variability in the data.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***
GA Standard Code	
7.MP	**Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.**
7.MP.1	Make sense of problems and persevere in solving them.
7.MP.2	Reason abstractly and quantitatively.
7.MP.3	Construct viable arguments and critique the reasoning of others.
7.MP.4	Model with mathematics.
7.MP.5	Use appropriate tools strategically.
7.MP.6	Attend to precision.
7.MP.7	Look for and make use of structure.
7.MP.8	Look for and express regularity in repeated reasoning.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***
GA Standard Code	
7.NR.1	**Solve relevant, mathematical problems, including multi-step problems, involving the four operations with rational numbers and quantities in any form (integers, percentages, fractions, and decimal numbers).**
7.NR.1.1	Show that a number and its opposite have a sum of 0 (are additive inverses). Describe situations in which opposite quantities combine to make 0.
7.NR.1.2	Show and explain p + q as the number located a distance |q| from p, in the positive or negative direction, depending on whether q is positive or negative. Interpret sums of rational numbers by describing applicable situations.
7.NR.1.3	Represent addition and subtraction with rational numbers on a horizontal or a vertical number line diagram to solve authentic problems.

7.NR.1.4	Show and explain subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in contextual situations
7.NR.1.5	Apply properties of operations, including part-whole reasoning, as strategies to add and subtract rational numbers.
7.NR.1.6	Make sense of multiplication of rational numbers using realistic applications.
7.NR.1.7	Show and explain that integers can be divided, assuming the divisor is not zero, and every quotient of integers is a rational number.
7.NR.1.8	Represent the multiplication and division of integers using a variety of strategies and interpret products and quotients of rational numbers by describing them based on the relevant situation.
7.NR.1.9	Apply properties of operations as strategies to solve multiplication and division problems involving rational numbers represented in an applicable scenario.
7.NR.1.10	Convert rational numbers between forms to include fractions, decimal numbers and percentages, using understanding of the part divided by the whole. Know that the decimal form of a rational number terminates in 0s or eventually repeats.
7.NR.1.11	Solve multi-step, contextual problems involving rational numbers, converting between forms as appropriate, and assessing the reasonableness of answers using mental computation and estimation strategies.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

7.PAR.2 Use properties of operations, generate equivalent expressions and interpret the expressions to explain relevant situations.

7.PAR.2.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
7.PAR.2.2	Rewrite an expression in different forms from a contextual problem to clarify the problem and show how the quantities in it are related.

7.PAR.3 Represent authentic situations using equations and inequalities with variables; solve equations and inequalities symbolically, using the properties of equality.

7.PAR.3.1 Construct algebraic equations to solve practical problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Interpret the solution based on the situation.
7.PAR.3.1a. Compare an algebraic solution to an arithmetic solution to interpret a problem.

7.PAR.3.2 Construct algebraic inequalities to solve problems, leading to inequalities of the form $px + q > r$, $px + q < r$, $px + q \leq r$, or $px + q \geq r$, where p, q, and r are specific rational numbers. Graph and interpret the solution based on the realistic situation that the inequalities represent.

7.PAR.3.3 Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

7.PAR.4 Recognize proportional relationships in relevant, mathematical problems; represent, solve, and explain these relationships with tables, graphs, and equations.

7.PAR.4.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units presented in realistic problems.

7.PAR.4.2 Determine the unit rate (constant of proportionality) in tables, graphs (1, r), equations, diagrams, and verbal descriptions of proportional relationships to solve realistic problems.

7.PAR.4.3 Determine whether two quantities presented in authentic problems are in a proportional relationship.

7.PAR.4.4 Identify, represent, and use proportional relationships.

7.PAR.4.5 Use context to explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.

7.PAR.4.6 Solve everyday problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

7.PAR.4.7	Use similar triangles to explain why the slope, m, is the same between any two distinct points on a nonvertical line in the coordinate plane.
7.PAR.4.7.1	Derive the equation y = mx for a line through the origin.
7.PAR.4.8	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
7.PAR.4.9	Use proportional relationships to solve multi-step ratio and percent problems presented in applicable situations.
7.PAR.4.10	Predict characteristics of a population by examining the characteristics of a representative sample. Recognize the potential limitations and scope of the sample to the population.
7.PAR.4.11	Analyze sampling methods and conclude that random sampling produces and supports valid inferences.
7.PAR.4.12	Use data from repeated random samples to evaluate how much a sample mean is expected to vary from a population mean. Simulate multiple samples of the same size.
7.PAR.13	Represent proportional relationships using equations.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

7.GSR.5 **Solve practical problems involving angle measurement, circles, area of circles, surface area of prisms and cylinders, and volume of cylinders and prisms composed of cubes and right prisms.**

7.GSR.5.1	Measure angles in whole nonstandard units.
7.GSR.5.2	Measure angles in whole number degrees using a protractor. 7.GSR.5.2a. Measure angles using nonstandard tools.
7.GSR.5.3	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve equations for an unknown angle in a figure.
7.GSR.5.4	Explore and describe the relationship between pi, radius, diameter, circumference, and area of a circle to derive the formulas for the circumference and area of a circle.

7.GSR.5.5 Given the formula for the area and circumference of a circle, solve problems that exist in everyday life.

7.GSR.5.6 Solve realistic problems involving surface area of right prisms and cylinders.

7.GSR.5.7 Describe the two-dimensional figures (cross sections) that result from slicing three-dimensional figures, as in the plane sections of right rectangular prisms, right rectangular pyramids, cones, cylinders, and spheres.

7.GSR.5.8 Explore volume as a measurable attribute of cylinders and right prisms. Find the volume of these geometric figures using concrete problems.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

7.PR.6 Using mathematical reasoning, investigate chance processes and develop, evaluate, and use probability models to find probabilities of simple events presented in authentic situations.

7.PR.6.1 Represent the probability of a chance event as a number between 0 and 1 that expresses the likelihood of the event occurring. Describe that a probability near 0 indicates an unlikely event, a probability around 1 2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

7.PR.6.2 Approximate the probability of a chance event by collecting data on an event and observing its long-run relative frequency will approach the theoretical probability.

7.PR.6.3 Develop a probability model and use it to find probabilities of simple events. Compare experimental and theoretical probabilities of events. If the probabilities are not close, explain possible sources of the discrepancy.

7.PR.6.4 Develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of events

7.PR.6.5 Develop a probability model (may not be uniform) by observing frequencies in data generated from a chance process.

7.PR.6.6 Use appropriate graphical displays and numerical summaries from data distributions with categorical or quantitative (numerical) variables as probability models to draw informal inferences about two samples or populations.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***
GA Standard Code	
7.MP	**Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.**
7.MP.1	Make sense of problems and persevere in solving them.
7.MP.2	Reason abstractly and quantitatively.
7.MP.3	Construct viable arguments and critique the reasoning of others.
7.MP.4	Model with mathematics.
7.MP.5	Use appropriate tools strategically.
7.MP.6	Attend to precision.
7.MP.7	Look for and make use of structure.
7.MP.8	Look for and express regularity in repeated reasoning.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***
GA Standard Code	
7.NR.1	**Solve relevant, mathematical problems, including multi-step problems, involving the four operations with rational numbers and quantities in any form (integers, percentages, fractions, and decimal numbers).**
7.NR.1.1	Show that a number and its opposite have a sum of 0 (additive inverses). Describe situations in which opposite quantities combine to make 0.
7.NR.1.2	Show and explain p + q as the number located a distance |q| from p, in the positive or negative direction, depending on whether q is positive or negative. Interpret sums of rational numbers by describing applicable situations.
7.NR.1.3	Represent addition and subtraction with rational numbers on a horizontal or a vertical number line diagram to solve authentic problems.

7.NR.1.4 Show and explain subtraction of rational numbers as adding the additive inverse, $p – q = p + (–q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in contextual situations.

7.NR.1.5 Apply properties of operations, including part-whole reasoning, as strategies to add and subtract rational numbers.

7.NR.1.6 Make sense of multiplication of rational numbers using realistic applications.

7.NR.1.7 Show and explain that integers can be divided, assuming the divisor is not zero, and every quotient of integers is a rational number.

7.NR.1.8 Represent the multiplication and division of integers using a variety of strategies and interpret products and quotients of rational numbers by describing them based on the relevant situation.

7.NR.1.9 Apply properties of operations as strategies to solve multiplication and division problems involving rational numbers represented in an applicable scenario.

7.NR.1.10 Convert rational numbers between forms to include fractions, decimal numbers and percentages, using understanding of the part divided by the whole. Know that the decimal form of a rational number terminates in 0s or eventually repeats.

7.NR.1.11 Solve multi-step, contextual problems involving rational numbers, converting between forms as appropriate, and assessing the reasonableness of answers using mental computation and estimation strategies.

Optional Accelerated Standards

8.NR.1 Solve problems involving irrational numbers and rational approximations of irrational numbers to explain realistic applications.

8.NR.1.1 Distinguish between rational and irrational numbers using decimal expansion. Convert a decimal expansion which repeats eventually into a rational number.

8.NR.1.2 Approximate irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions.

8.NR.2 Solve problems involving radicals and integer exponents including relevant application situations; apply place value understanding with scientific notation and use scientific notation to explain real phenomena.

8.NR.2.2 Use square root and cube root symbols to represent solutions to equations. Recognize that $x2 = p$ (where p is a positive rational number and $|x| \leq 25$) has two solutions and $x3 = p$ (where p is a negative or positive rational number and $|x| \leq 10$) has one solution. Evaluate square roots of perfect squares ≤ 625 and cube roots of perfect cubes ≥ -1000 and ≤ 1000.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

7.PAR.2 Use properties of operations, generate equivalent expressions and interpret the expressions to explain relevant situations.

7.PAR.2.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients

7.PAR.2.2 Rewrite an expression in different forms from a contextual problem to clarify the problem and show how the quantities in it are related.

7.PAR.3 Represent authentic situations using equations and inequalities with variables; solve equations and inequalities

7.PAR.3.1 Construct algebraic equations to solve practical problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Interpret the solution based on the situation.

7.PAR.3.2 Construct algebraic inequalities to solve problems, leading to inequalities of the form $px + q > r$, $px + q < r$, $px + q \leq r$, or $px + q \geq r$, where p, q, and r are specific rational numbers. Graph and interpret the solution based on the realistic situation that the inequalities represent.

7.PAR.3.3 Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

7.PAR.4 Recognize proportional relationships in relevant, mathematical problems; represent, solve, and explain these relationships with tables, graphs, and equations.

7.PAR.4.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units presented in realistic problems.

7.PAR.4.2 Determine the unit rate (constant of proportionality) in tables, graphs (1, r), equations, diagrams, and verbal descriptions of proportional relationships to solve realistic problems.

7.PAR.4.3 Determine whether two quantities presented in authentic problems are in a proportional relationship.

7.PAR.4.4 Identify, represent, and use proportional relationships.

7.PAR.4.5 Use context to explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.

7.PAR.4.6 Solve everyday problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

7.PAR.4.7 Use similar triangles to explain why the slope, m, is the same between any two distinct points on a nonvertical line in the coordinate plane.

7.PAR.4.7.1 Derive the equation y = mx for a line through the origin.

7.PAR.4.8 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

7.PAR.4.9 Use proportional relationships to solve multi-step ratio and percent problems presented in applicable situations.

7.PAR.4.10 Predict characteristics of a population by examining the characteristics of a representative sample. Recognize the potential limitations and scope of the sample to the population.

7.PAR.4.11 Analyze sampling methods and conclude that random sampling produces and supports valid inferences.

7.PAR.4.12 Use data from repeated random samples to evaluate how much a sample mean is expected to vary from a population mean. Simulate multiple samples of the same size.

7.PAR.13 Represent proportional relationships using equations.

Optional Accelerated Standards

8.PAR.3 Create and interpret expressions within relevant situations. Create, interpret, and solve linear equations and linear inequalities in one variable to model and explain real phenomena.

8.PAR.3.1 Interpret expressions and parts of an expression, in context, by utilizing formulas or expressions with multiple terms and/or factors.

8.PAR.3.2 Describe and solve linear equations in one variable with one solution (x = a), infinitely many solutions (a = a), or no solutions (a = b). Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).

8.PAR.4 Show and explain the connections between proportional and non-proportional relationships, lines, and linear equations; create and interpret graphical mathematical models and use the graphical, mathematical model to explain real phenomena represented in the graph.

8.PAR.4.1 Use the equation y = mx (proportional) for a line through the origin to derive the equation y = mx + b (non-proportional) for a line intersecting the vertical axis at b.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***
GA Standard Code	

Optional Accelerated Standards

8.FGR.5 Describe the properties of functions to define, evaluate, and compare relationships, and use functions and graphs of functions to model and explain real phenomena.

8.FGR.5.1 Show and explain that a function is a rule that assigns to each input exactly one output.

8.FGR.5.2 Within realistic situations, identify and describe examples of functions that are linear or nonlinear. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***
GA Standard Code	

7.GSR.5 Solve practical problems involving angle measurement, circles, area of circles, surface area of prisms and cylinders, and volume of cylinders and prisms composed of cubes and right prisms.

7.GSR.5.1 Measure angles in whole nonstandard units.

7.GSR.5.2 Measure angles in whole number degrees using a protractor.

7.GSR.5.3 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve equations for an unknown angle in a figure.

7.GSR.5.4 Explore and describe the relationship between pi, radius, diameter, circumference, and area of a circle to derive the formulas for the circumference and area of a circle.

7.GSR.5.5 Given the formula for the area and circumference of a circle, solve problems that exist in everyday life.

7.GSR.5.6 Solve realistic problems involving surface area of right prisms and cylinders.

7.GSR.5.7 Describe the two-dimensional figures (cross sections) that result from slicing three-dimensional figures, as in the plane sections of right rectangular prisms, right rectangular pyramids, cones, cylinders, and spheres.

7.GSR.5.8 Explore volume as a measurable attribute of cylinders and right prisms. Find the volume of these geometric figures using concrete problems.

Optional Accelerated Standards

8.GSR.8 Solve geometric problems involving the Pythagorean Theorem and the volume of geometric figures to explain real phenomena

8.GSR.8.4 Apply the formulas for the volume of cones, cylinders, and spheres and use them to solve relevant problems.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

7.PR.6 Using mathematical reasoning, investigate chance processes and develop, evaluate, and use probability models to find probabilities of simple events presented in authentic situations.

7.PR.6.1 Represent the probability of a chance event as a number between 0 and 1 that expresses the likelihood of the event occurring. Describe that a probability near 0 indicates an unlikely event, a probability around 1 2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

7.PR.6.2 Approximate the probability of a chance event by collecting data on an event and observing its long-run relative frequency will approach the theoretical probability.

7.PR.6.3 Develop a probability model and use it to find probabilities of simple events. Compare experimental and theoretical probabilities of events. If the probabilities are not close, explain possible sources of the discrepancy

7.PR.6.4 Develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of events

7.PR.6.5 Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.

7.PR.6.6 Use appropriate graphical displays and numerical summaries from data distributions with categorical or quantitative (numerical) variables as probability models to draw informal inferences about two samples or populations.

No Optional Accelerated Standards for Probability

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

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

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

8.PAR.3 **Create and interpret expressions within relevant situations. Create, interpret, and solve linear equations and linear inequalities in one variable to model and explain real phenomena.**

- 8.PAR.3.1 Interpret expressions and parts of an expression, in context, by utilizing formulas or expressions with multiple terms and/or factors.
- 8.PAR.3.2 Describe and solve linear equations in one variable with one solution (x = a), infinitely many solutions (a = a) or no solutions (a = b).
- 8.PAR.3.3 Create and solve linear equations and inequalities in one variable within a relevant application.

8.PAR.3.4 Using algebraic properties and the properties of real numbers to justify the steps of a one-solution equation or inequality.

8.PAR.3.5 Solve linear equations and inequalities in one variable with coefficients represented by letters and explain the solution based on the contextual, mathematical situation.

8.PAR.3.6 Use algebraic reasoning to fluently manipulate linear and literal equations expressed in various forms to solve relevant mathematical problems.

8.PAR.4 Show and explain the connections between proportional and non-proportional relationships, lines, and linear equations; create and interpret graphical mathematical models and use the graphical, mathematical model to explain real phenomena represented in the graph.

8.PAR.4.1 Use the equation y = mx (proportional) for a line through the origin to derive the equation y = mx + b (non-propotional) for a line intersecting the vertical axis (y-axis) at b.

8.PAR.4.2 Show and explain that the graph of an equation representing an applicable situation in two variables is the set of all its solutions plotted in the coordinate plane.

8.PAR.4.3 Explore translations of the equation y = mx and generalize that two lines with the same slope but different intercepts are translations of each other.

HCS Graduate Learner Outcome ***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***

GA Standard Code

8.FGR.5 Describe the properties of functions to define, evaluate, and compare relationships, and use functions and graphs of functions to model and explain real phenomena.

8.FGR.5.1 Show and explain that a function is a rule that assigns to each input exactly one output.

8.FGR.5.2 Within realistic situations, identify and describe examples of functions that are linear and nonlinear. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

8.FGR.5.3 Relate the domain of a linear function to its graph and where applicable to the quantitative relationship it describes.

8.FGR.5.4 Compare properties (rate of change and initial value) of two functions used to model an authentic situation each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

8.FGR.5.5 Write and explain the equations $y = mx + b$ (slope-intercept form), $Ax + By = C$ (standard form), and $(y - y_1) = m(x - x_1)$ (point-slope form) as defining a linear function whose graph is a straight line to reveal and explain different properties of the function.

8.FGR.5.6 Write a linear function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

8.FGR.5.7 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two values (x,y), including reading these from a table or from a graph.

8.FGR.5.8 Explain the meaning of the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

8.FGR.5.9 Graph and analyze linear functions expressed in various algebraic forms and show key characteristics of the graph to describe applicable situations.

8.FGR.7 Justify and use various strategies to solve systems of linear equations to model and explain realistic phenomena.

8.FGR.7.1 Interpret and solve relevant-mathematical problems leading to two linear equations in two variables.

8.FGR.7.2 Show and explain that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because the points of intersection satisfy both equations simultaneously.

8.FGR.7.3 Approximate solutions of two linear equations in two variables by graphing the equations and solving simple cases by inspection.

8.FGR.7.4 Analyze and solve systems of two linear equations in two variables algebraically to find exact solutions.

8.FGR.7.4.1 Use substitution and elimination to solve systems of linear equations.

8.FGR.7.5 Create and compare the equations of two lines that are either parallel to each other, perpendicular to each other, or neither parallel nor perpendicular.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

8.GSR.8 **Solve geometric problems involving the Pythagorean Theorem and the volume of geometric figures to explain real phenomena.**

8.GSR.8.1 Explain a proof of the Pythagorean Theorem and its converse using visual models.

8.GSR.8.2 Apply the Pythagorean Theorem to determine unknown side length in right triangles within authentic, mathematical problems in two and three dimensions.

8.GSR.8.3 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system in practical mathematical problems.

8.GSR.8.4 Apply the formulas for the volume of cones, cylinders, and spheres and use them to solve relevant problems.

8.GSR.8.5 Use knowledge of cube roots to solve for unknown dimensions of geometric figures.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

8.FGR.6 **Solve practical, linear problems involving situations using bivariate quantitative data.**

8.FGR.6.1 Show that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, visually fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line of best fit.

8.FGR.6.2 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercepts.

8.FGR.6.3 Explain the meaning of the predicted slope (rate of change) and the predicted intercept (constant term) of a linear model in the context of the data.

8.FGR.6.4 Use appropriate graphical displays from data distributions involving lines of best fit to draw informal inferences and answer the statistical investigative question posed in an unbiased statistical study.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

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GA Standard Code	
8.MP	**Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.**
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	8.MP.4 Model with mathematics.
	8.MP.5 Use appropriate tools strategically.
	8.MP.6 Attend to precision.
	8.MP.7 Look for and make use of structure.
	8.MP.8 Look for and express regularity in repeated reasoning.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***
GA Standard Code	
8.PAR.3	**Create and interpret expressions within relevant situations. Create, interpret, and solve linear equations and linear inequalities in one variable to model and explain real phenomena.**
	8.PAR.3.1 Interpret expressions and parts of an expression, in context, by utilizing formulas or expressions with multiple terms and/or factors.
	8.PAR.3.2 Describe and solve linear equations in one variable with one solution (x = a), infinitely many solutions (a = a) or no solutions (a = b).
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GA Standard Code

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

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

A.MM.1 **Apply mathematics to real-life situations; model real-life phenomena using mathematics.**

- A.MM.1.1 Explain applicable, mathematical problems using a mathematical model.
- A.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities domains.
- A.MM.1.3 Use units of measure (linear, area, capacity, rates, and time) as a way to make sense of conceptual problems; identify, use, and record appropriate units of measure within the given framework, within data displays, and on graphs; convert units and rates using proportional reasoning given a conversion factor; use units within multi-step problems and formulas; interpret units of input and resulting units of output.
- A.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.
- A.MM.1.5 Define appropriate quantities for the purpose of descriptive modeling.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

A.NR.5 **Investigate rational and irrational numbers and rewrite expressions involving square roots and cube roots.**

A.NR.5.1 Rewrite algebraic and numeric expressions involving radicals.

A.NR.5.2 Using numerical reasoning, show and explain that the sum or product of rational numbers is rational, the sum of a rational number and an irrational number is irrational, and the product of a nonzero rational number and an irrational number is irrational.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

A.PAR.4 **Create, analyze, and solve linear inequalities in two variables and systems of linear inequalities to model real-life phenomena.**

A.PAR.4.1 Create and solve linear inequalities in two variables to represent relationships between quantities including mathematically applicable situations; graph inequalities on coordinate axes with labels and scales.

A.PAR.4.2 Represent constraints of linear inequalities and interpret data points as possible or not possible.

A.PAR.4.3 Solve systems of linear inequalities by graphing, including systems representing a mathematically applicable situation.

A.PAR.6 **Build quadratic expressions and equations to represent and model real-life phenomena; solve quadratic equations in mathematically applicable situations.**

A.PAR.6.1 Interpret quadratic expressions and parts of a quadratic expression that represent a quantity in terms of its context.

A.PAR.6.2 Fluently choose and produce an equivalent form of a quadratic expression to reveal and explain properties of the quantity represented by the expression.

A.PAR.6.3 Create and solve quadratic equations in one variable and explain the solution in the framework of applicable phenomena.

A.PAR.6.4 Represent constraints by quadratic equations and interpret data points as possible or not possible in a modeling framework.

A.PAR.6.5 Perform polynomial operations with monomials and binomials (addition, subtraction, and multiplication) with a maximum degree of 2.

A.PAR.8 Create and analyze exponential expressions and equations to represent and model real-life phenomena; solve exponential equations in mathematically applicable situations.

A.PAR.8.1 Interpret exponential expressions and parts of an exponential expression that represent a quantity in terms of its framework.

A.PAR.8.2 Create exponential equations in one variable and use them to solve problems, including mathematically applicable situations.

A.PAR.8.3 Create exponential equations in two variables to represent relationships between quantities, including in mathematically applicable situations; graph equations on coordinate axes with labels and scales.

A.PAR.8.4 Represent constraints by exponential equations and interpret data points as possible or not possible in a modeling environment.

HCS Graduate Learner Outcome ***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***

GA Standard Code

A.FGR.2 Construct and interpret arithmetic sequences as functions, algebraically and graphically, to model and explain real-life phenomena. Use formal notation to represent linear functions and the key characteristics of graphs of linear functions, and informally compare linear and non-linear functions using parent graphs.

A.FGR.2.1 Use mathematically applicable situations algebraically and graphically to build and interpret arithmetic sequences as functions whose domain is a subset of the integers.

A.FGR.2.2 Construct and interpret the graph of a linear function that models real-life phenomena and represent key characteristics of the graph using formal notation.

A.FGR.2.3 Relate the domain and range of a linear function to its graph and, where applicable, to the quantitative relationship it describes. Use formal interval and set notation to describe the domain and range of linear functions.

A.FGR.2.4 Use function notation to build and evaluate linear functions for inputs in their domains and interpret statements that use function notation in terms of a mathematical framework.

A.FGR.2.5 Analyze the difference between linear functions and nonlinear functions by informally analyzing the graphs of various parent functions (linear, quadratic, exponential, absolute value, square root, and cube root parent curves).

A.FGR.7 Construct and interpret quadratic functions from data points to model and explain real-life phenomena; describe key characteristics of the graph of a quadratic function to explain a mathematically applicable situation for which the graph serves as a model.

A.FGR.7.1 Use function notation to build and evaluate quadratic functions for inputs in their domains and interpret statements that use function notation in terms of a given framework.

A.FGR.7.2 Identify the effect on the graph generated by a quadratic function when replacing f(x) with f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs.

A.FGR.7.3 Graph and analyze the key characteristics of quadratic functions.

A.FGR.7.4 Relate the domain and range of a quadratic function to its graph and, where applicable, to the quantitative relationship it describes.

A.FGR.7.5 Rewrite a quadratic function representing a mathematically applicable situation to reveal the maximum or minimum value of the function it defines. Explain what the value describes in context.

A.FGR.7.6 Create quadratic functions in two variables to represent relationships between quantities; graph quadratic functions on the coordinate axes with labels and scales.

A.FGR.7.7 Estimate, calculate, and interpret the average rate of change of a quadratic function and make comparisons to the average rate of change of linear functions.

A.FGR.7.8 Write a function defined by a quadratic expression in different but equivalent forms to reveal and explain different properties of the function.

A.FGR.7.9 Compare characteristics of two functions each represented in a different way.

A.FGR.9 Construct and analyze the graph of an exponential function to explain a mathematically applicable situation for which the graph serves as a model; compare exponential with linear and quadratic functions

A.FGR.9.1 Use function notation to build and evaluate exponential functions for inputs in their domains and interpret statements that use function notation in terms of a context.

A.FGR.9.2 Graph and analyze the key characteristics of simple exponential functions based on mathematically applicable situations.

A.FGR.9.3 Identify the effect on the graph generated by an exponential function when replacing f(x) with f(x) + k, and k f(x), for specific values of k (both positive and negative); find the value of k given the graphs.

A.FGR.9.4 Use mathematically applicable situations algebraically and graphically to build and interpret geometric sequences as functions whose domain is a subset of the integers.

A.FGR.9.5 Compare characteristics of two functions each represented in a different way.

HCS Graduate Learner Outcome ***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

A.GSR.3 **Solve problems involving distance, midpoint, slope, area, and perimeter to model and explain real-life phenomena.**

A.GSR.3.1 Solve real-life problems involving slope, parallel lines, perpendicular lines, area, and perimeter.

A.GSR.3.2 Apply the distance formula, midpoint formula, and slope of line segments to solve real-world problems.

HCS Graduate Learner Outcome ***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

A.DSR.10 **Collect, analyze, and interpret univariate quantitative data to answer statistical investigative questions that compare groups to solve real-life problems; Represent bivariate data on a scatter plot and fit a function to the data to answer statistical questions and solve real-life problems.**

A.DSR.10.1 Use statistics appropriate to the shape of the data distribution to compare and represent center (median and mean) and variability (interquartile range, standard deviation) of two or more distributions by hand and using technology.

A.DSR.10.2 Interpret differences in shape, center, and variability of the distributions based on the investigation, accounting for possible effects of extreme data points (outliers).

A.DSR.10.2.1 Use the 1.5 IQR rule to determine the outliers and analyze their effects on the data set

A.DSR.10.3 Represent data on two quantitative variables on a scatter plot and describe how the variables are related.

A.DSR.10.4 Interpret the slope (predicted rate of change) and the intercept (constant term) of a linear model based on the investigation of the data.

A.DSR.10.5 Calculate the line of best fit and interpret the correlation coefficient, r, of a linear fit using technology. Use r to describe the strength of the goodness of fit of the regression. Use the linear function to make predictions and assess how reasonable the prediction is in context.

A.DSR.10.6 Decide which type of function is most appropriate by observing graphed data.

A.DSR.10.7 Distinguish between correlation and causation.

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GA Standard Code

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

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

G.MM.1 **Apply mathematics to real-life situations; model real-life phenomena using mathematics.**

- G.MM.1.1 Explain applicable, mathematical problems using a mathematical model.
- G.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities domains.
- G.MM.1.3 Use units of measure (linear, area, capacity, rates, and time) as a way to make sense of conceptual problems; identify, use, and record appropriate units of measure within the given framework, within data displays, and on graphs; convert units and rates using proportional reasoning given a conversion factor; use units within multi-step problems and formulas; interpret units of input and resulting units of output.
- G.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.
- G.MM.1.5 Define appropriate quantities for the purpose of descriptive modeling.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

G.PAR.2 **Interpret the structure of polynomial expressions and perform operations with polynomials within a geometric framework.**

G.PAR.2.1 Interpret polynomial expressions of varying degrees that represent a quantity in terms of its given geometric framework.

G.PAR.2.2 Perform operations with polynomials and prove that polynomials form a system analogous to the integers in that they are closed under these operations.

G.PAR.2.1 Perform operations with binomial, trinomials, and other polynomials.

G.PAR.2.3 Using algebraic reasoning, add, subtract, and multiply single variable polynomials.

G.PAR.2.3.2 Perform operations with first, second, third, fourth, and fifth degree polynomials.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

G.GSR.3 **Experiment with transformations in the plane to develop precise definitions for translations, rotations, and reflections and use these to describe symmetries and congruence to model and explain real-life phenomena.**

G.GSR.3.1 Use geometric reasoning and symmetries of regular polygons to develop definitions of rotations, reflections, and translations.

G.GSR.3.2 Verify experimentally the congruence properties of rotations, reflections, and translations: lines are taken to lines and line segments to line segments of the same length; angles are taken to angles of the same measure; parallel lines are taken to parallel lines.

G.GSR.3.2.1 Reflections over the x and y axes, horizontal and vertical lines, and $y = x$.

G.GSR.3.2.2 Rotations centered about the origin and in increments of 90 degrees, clockwise, and counterclockwise.

G.GSR.3.3 Use geometric descriptions of rigid motions to draw the transformed figures and to predict the effect on a given figure. Describe a sequence of transformations from one figure to another and use transformation properties to determine congruence.

G.GSR.3.3.1 Use function notation to represent transformations in the coordinate plane.

G.GSR.3.4 Explain how the criteria for triangle congruence follow from the definition of congruence in terms of rigid motions. Use congruence criteria for triangles to solve problems and to prove relationships in geometric figures.

G.GSR.4 Establish facts between angle relations and generate valid arguments to defend facts established. Prove theorems and solve geometric problems involving lines and angles to model and explain real-life phenomena.

G.GSR.4.1 Use the undefined notions of point, line, line segment, plane, distance along a line segment, and distance around a circular arc to develop and use precise definitions and symbolic notations to prove theorems and solve geometric problems.

G.GSR.4.2 Classify quadrilaterals in the coordinate plane by proving simple geometric theorems algebraically.

G.GSR.4.3 Make formal geometric constructions with a variety of tools and methods.

G.GSR.4.3.1 Students should be able to: copy a segment and angle, bisect a segment and angle, construct perpendicular lines, including the perpendicular bisector of a line segment, and construct a line parallel to a given line through a point not on the line.

G.GSR.4.4 Prove and apply theorems about lines and angles to solve problems.

G.GSR.4.4.1 Prove vertical angles, alternate interior angles, and corresponding angles are each congruent.

G.GSR.4.4.2 Prove that points on the perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.

G.GSR.4.5 Use geometric reasoning to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.

G.GSR.5 Describe dilations in terms of center and scale factor and use these terms to describe properties of dilations; use the precise definition of a dilation to describe similarity and establish the criterion for triangles to be similar; use these terms, definitions, and criterion to prove similarity, model, and explain real-life phenomena.

G.GSR.5.1 Verify experimentally the properties of dilations.

G.GSR.5.1.1 Identify and draw dilations centered around the origin.

G.GSR.5.2 Given two figures, use and apply the definition of similarity in terms of similarity transformations.

G.GSR.5.3 Use the properties of similarity transformations to establish criterion for two triangles to be similar. Use similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

G.GSR.5.4 Construct formal proofs to justify and apply theorems about triangles.

G.GSR.6 Examine side ratios of similar triangles; use the relationship between right triangles to develop an understanding of sine and cosine to solve geometric problems and to model and explain real-life phenomena.

G.GSR.6.1 Explain that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

G.GSR.6.2 Explain and use the relationship between the sine and cosine of complementary angles.

G.GSR.6.3 Use trigonometric ratios and the Pythagorean Theorem to solve for sides and angles of right triangles in applied problems.

G.GSR.7 Explore the concept of a radian measure and special right triangles.

G.GSR.7.1 Explore and interpret a radian as the ratio of the arc length to the radius of a circle.

G.GSR.7.2 Explore and explain the relationship between radian measures and degree measures and convert fluently between degree and radian measures.

G.GSR.7.3 Use special right triangles on the unit circle to determine the values of sine, cosine, and tangent for 30° (π/ 6), 45° (π/ 4) and 60° (π/ 3) angle measures. Use reflections of triangles to determine reference angles and identify coordinate values in all four quadrants of the coordinate plane.

G.GSR.8 Examine and apply theorems involving circles; describe and derive arc length and area of a sector; and model and explain real-life situations involving circles.

G.GSR.8.1 Identify and apply angle relationships formed by chords, tangents, secants and radii with circles.

G.GSR.8.2 Using similarity, derive the fact that the length of the arc (arc length) intercepted by an angle is proportional to the radius; derive the formula for the area of a sector. Solve mathematically applicable problems involving applications of arc length and area of sector.

G.GSR.8.3 Write and graph the equation of circles in standard form.

G.GSR.9 **Establish facts between angle relations and generate valid arguments to defend facts established. Prove theorems and solve geometric problems involving lines and angles to model and explain real-life phenomena.Develop informal arguments for geometric formulas using dissection arguments, limit arguments, and Cavalieri's principle; solve realistic problems involving volume; explore and visualize relationships between two-dimensional and three-dimensional objects to model and explain real-life phenomena.**

G.GSR.9.1 Use volume formulas for prisms, cylinders, pyramids, cones, and spheres to solve problems including right and oblique solids.

G.GSR.9.2 Use geometric shapes, their measures, and their properties to describe objects and approximate volumes.

G.GSR.9.3 Apply concepts of density based on area and volume in modeling situations.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

G.PR.10 **Solve problems involving the probability of compound events to make informed decisions; interpret expected value and measures of variability to analyze probability distributions.**

G.PR.10.1 Describe categories of events as subsets of a sample space using unions, intersections, or complements of other events. Apply the Addition Rule conceptually, P(A or B)= P(A) + P(B)-P(A and B), and interpret the answers in context.

G.PR.10.2 Apply and interpret the general Multiplication Rule conceptually to independent events of a sample space, P(A and B) = [P(A)]x[P(B|A)] =[P(B)]x[P(A|B)] using contingency tables or tree diagrams.

G.PR.10.3 Use conditional probability to interpret risk in terms of decision-making and investigate questions such as those involving false positives or false negatives from screening tests.

G.PR.10.4 Define permutations and combinations and apply this understanding to compute probabilities of compound events and solve meaningful problems.

G.PR.10.5 Interpret the probability distribution for a given random variable and interpret the expected value.

G.PR.10.6 Develop a probability distribution for variables of interest using theoretical and empirical (observed) probabilities and calculate and interpret the expected value.

G.PR.10.7 Calculate the expected value of a random variable and interpret it as the mean of a given probability distribution.

G.PR.10.8 Compare the payoff values associated with the probability distribution for a random variable and make informed decisions based on expected value and measures of variability.

G.DSR.11 Examine real-life situations presented in a two-way frequency table to calculate probabilities, to model categorical data, and to explain real-life phenomena.

G.DSR.11.1 Construct and summarize categorical data for two categories in two-way frequency tables.

G.DSR.11.2 Use categorical data in two-way frequency tables to calculate and interpret probabilities based on the investigation.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***
GA Standard Code	
AA.MP	**Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.**
AA.MP.1	Make sense of problems and persevere in solving them.
AA.MP.2	Reason abstractly and quantitatively.
AA.MP.3	Construct viable arguments and critique the reasoning of others.
AA.MP.4	Model with mathematics.
AA.MP.5	Use appropriate tools strategically.
AA.MP.6	Attend to precision.
AA.MP.7	Look for and make use of structure.
AA.MP.8	Look for and express regularity in repeated reasoning.
AA.MM.1	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
AA.MM.1.1	Explain applicable, mathematical problems using a mathematical model.
AA.MM.1.2	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
AA.MM.1.3	Using abstract and quantitative reasoning, make decisions about information and data from a mathematical, applicable situation.
AA.MM.1.4	Use various mathematical representations and structures to represent and solve real-life problems.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

AA.DSR.2 Communicate descriptive and inferential statistics by collecting, critiquing, analyzing, and interpreting real world data.

AA.DSR.2.1 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. Distinguish between primary and secondary data and how it affects the types of conclusions that can be drawn.

AA.DSR.2.2 When collecting and considering data, critically evaluate ethics, privacy, potential bias, and confounding variables along with their implications for interpretation in answering a statistical investigative question. Implement strategies for organizing and preparing big data sets.

AA.DSR.2.3 Distinguish between population distributions, sample data distributions, and sampling distributions. Use sample statistics to make inferences about population parameters based on a random sample from that population and to communicate conclusions using appropriate statistical language.

AA.DSR.2.4 Calculate and interpret z-scores as a measure of relative standing and as a method of standardizing units.

AA.DSR.2.4.1. Calculate z-score given a value, mean, and standard deviation.

AA.DSR.2.4b2 Calculate standard deviation given z-score, value, and mean.

AA.DSR.2.5 Given a normally distributed population, estimate percentages using the Empirical Rule, z-scores, and technology.

AA.DSR.2.6 Model sample-to-sample variability in sampling distributions of a statistic using simulations taken from a given population.

AA.DSR.2.7 Given a margin of error, develop and compare confidence intervals of different models to make conclusions about reliability.

AA.DSR.2.8 Summarize and evaluate reports based on data for appropriateness of study design, analysis methods, and statistical measures used.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***

GA Standard Code

AA.FGR.3 **Explore and analyze structures and patterns for exponential and logarithmic functions and use exponential and logarithmic expressions, equations, and functions to model real-life phenomena.**

AA.FGR.3.2 Analyze, graph, and compare exponential and logarithmic functions.

AA.FGR.3.2.1 Graph exponential and logarithmic functions and identify key features, including domain, range, x- and y-intercepts, asymptotes, positive/negative intervals, and end behavior.

AA.FGR.3.2.2 Calculate the average rate of change for a given interval.

AA.FGR.3.3 Use the definition of a logarithm, logarithmic properties, and the inverse relationship between exponential and logarithmic functions to solve problems in context.

AA.FGR.3.4 Create exponential equations and use logarithms to solve mathematical, applicable problems for which only one variable is unknown.

AA.FGR.3.4.1 Solve and interpret equations that have one unknown variable, such as: exponential growth/decay, compound interest, half-life, and Newton's Law of Cooling.

AA.FGR.3.5 Create and interpret logarithmic equations in one variable and use them to solve problems.

AA.FGR.3.6 Create, interpret, and solve exponential equations to represent relationships between quantities and analyze the relationships numerically with tables, algebraically, and graphically.

AA.FGR.3.6.1 Discuss the characteristics of exponential functions in context, including domain, range, zeros, intercepts, average rate of change, asymptote, and other key features.

AA.FGR.3.6.2 Create, interpret and solve equations that have two unknown variables, such as: half-Life, exponential growth, exponential decay, compound interest, and Newton's Law of Cooling.

AA.FGR.3.7 Create, interpret, and solve logarithmic equations in two or more variables to represent relationships between quantities.

AA.FGR.3.6.1 Discuss the characteristics of logarithmic functions in context, including domain, range, zeros, intercepts, average rate of change, asymptote, and other key features..

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***

GA Standard Code

AA.FGR.4 **Explore and analyze structures and patterns for radical functions and use radical expressions, equations, and functions to model real-life phenomena.**

AA.FGR.4.1 Rewrite radical expressions as expressions with rational exponents. Extend the properties of integer exponents to rational exponents.

AA.FGR.4.1.1 Convert back and forth between radicals and rational exponents.

AA.FGR.4.1.2 Utilize the product rule, quotient rule, and power rule to work with expressions with rational exponents.

AA.FGR.4.2 Solve radical equations in one variable, and give examples showing how extraneous solutions may arise.

AA.FGR.4.3 Analyze and graph radical functions.

AA.FGR.4.3.1 Graph radical functions and identify key features, including domain, range, x- and y-intercepts, asymptotes, positive/negative intervals, and end behavior.

AA.FGR.4.2.2 Calculate the average rate of change for a given interval.

AA.FGR.4.4 Create, interpret and solve radical equations with one unknown value and use them to solve problems that model real-world situations.

AA.FGR.4.5 Create, interpret, and solve radical equations in two or more variables to represent relationships between quantities.

HCS Graduate Learner Outcome	*As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.*

GA Standard Code

AA.FGR.5 **AA.FGR.5: Extend exploration of quadratic solutions to include real and non-real numbers and explore how these numbers behave under familiar operations and within real-world situations; create polynomial expressions, solve polynomial equations, graph polynomial functions, and model real-world phenomena.**

AA.FGR.5.1 Graph and analyze quadratic functions in contextual situations and include analysis of data sets with regressions.

AA.FGR.5.1.1 Use quadratic functions in standard, factored, and vertex forms to graph and identify key features.

AA.FGR.5.1.3 Calculate the average rate of change for a given interval.

AA.FGR.5.2 Define complex numbers i such that $i^2 = -1$ and show that every complex number has the form a + bi where a and b are real numbers and that the complex conjugate is a - bi.

AA.FGR.5.2.1 Simplify powers of i and recognize the pattern that emerges.

AA.FGR.5.3 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

AA.FGR.5.4 Use the structure of an expression to factor quadratics.

AA.FGR.5.4.1 Factoring should include special-case quadratics such as perfect-square trinomials and the difference of two perfect squares.

AA.FGR.5.5 Write and solve quadratic equations and inequalities with real coefficients and use the solution to explain a mathematical, applicable situation.

AA.FGR.5.6 Solve systems of quadratic and linear functions to determine points of intersection.

AA.FGR.5.6.1 Solve systems using algebraic techniques or graphically.

AA.FGR.5.7 Create and analyze quadratic equations to represent relationships between quantities as a model for contextual situations.

AA.FGR.5.8	Identify the number of zeros that exist for any polynomial based upon the greatest degree of the polynomial and the end behavior of the polynomial by observing the sign of the leading coefficient.
	AA.FGR.5.8.2 Identify the end behavior of a polynomial based on the sign of the lead coefficient and the degree of the polynomial.
AA.FGR.5.9	Identify zeros of polynomial functions using technology or pre-factored polynomials and use the zeros to construct a graph of the function defined by the polynomial function. Identify key features of these polynomial functions.
	AA.FGR.5.9.1 Graph and identify key features of polynomial functions to include intercepts, roots of multiplicity, zeros, and solutions; domain, range, and intervals where the function is increasing, decreasing, positive, and/or negative, extreme value, and end behavior, using technology where appropriate.
AA.FGR.5.10	Use the structure of an expression to factor polynomials, including the sum of cubes, the difference of cubes, and higher-order polynomials that may be expressed as a quadratic within a quadratic.
AA.FGR.5.11	Using all the zeros of a polynomial function, list all the factors and multiply to write a multiple of the polynomial function in standard form.
	AA.FGR.5.11.1 Analyze a graph of a polynomial to identify where multiplicity exists.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***
GA Standard Code	
AA.PAR.6	**AA.PAR.6: Represent data with matrices, perform mathematical operations, and solve systems of linear equations leading to real-world linear programming applications.**
AA.PAR.6.1	Use matrices to represent data, and perform mathematical operations with matrices and scalars, demonstrating that some properties of real numbers hold for matrices, but that others do not.
	AA.PAR.6.1.1 Add, subtract, multiply matrices, including the identity and zero matrix.
AA.PAR.6.2	Rewrite a system of linear equations using a matrix representation.
AA.PAR.6.3	Use the inverse of an invertible matrix to solve systems of linear equations.

AA.PAR.6.4 Utilize linear programming to represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret data points as solutions or non-solutions under the established constraints in real-world problems.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

AA.GSR.7 **Develop an introductory understanding of the unit circle; solve trigonometric equations using the unit circle.**

AA.GSR.7.1 Define the three basic trigonometric ratios in terms of x, y, and r using the unit circle centered at the origin of the coordinate plane.

AA.GSR.7.1.1 Explore, interpret, and use degree and radian measures.

AA.GSR.7.2.2 Limit to angle measures of 30, 45, and 60 degrees and their associated reflected angles within one counterclockwise revolution of the unit circle.

AA.GSR.7.2 Apply understanding of the angle measures and coordinates of the unit circle to solve practical, real-life problems involving trigonometric equations

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

AA.FGR.8 **AA.FGR.8: Analyze the behaviors of rational functions to model applicable, mathematical problems**

AA.FGR.8.1 Rewrite simple rational expressions in equivalent forms.

AA.FGR.8.2 Add, subtract, multiply and divide rational expressions, including problems in context and express rational expressions in irreducible form.

AA.FGR.8.3 Graph rational functions, identifying key characteristics.

AA.FGR.8.3.1 Graph, or use technology to generate graphs, to identify key features of rational functions including; intercepts, domain, asymptotes,and holes.

AA.FGR.8.4 Solve simple rational equations in one variable, and give examples showing how extraneous solutions may arise.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***
GA Standard Code	
PC.MP	**Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.**
PC.MP.1	Make sense of problems and persevere in solving them.
PC.MP.2	Reason abstractly and quantitatively.
PC.MP.3	Construct viable arguments and critique the reasoning of others.
PC.MP.4	Model with mathematics.
PC.MP.5	Use appropriate tools strategically.
PC.MP.6	Attend to precision.
PC.MP.7	Look for and make use of structure.
PC.MP.8	Look for and express regularity in repeated reasoning.
PC.MM.1	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
PC.MM.1.1	Explain contextual, mathematical problems using a mathematical model.
PC.MM.1.2	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities domains.
PC.MM.1.3	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
PC.MM.1.4	Use various mathematical representations and structures with this information to represent and solve real-life problems.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

PC.PAR.7 Demonstrate how sequences and series apply to mathematical models in real-life situations.

PC.PAR.7.1 Demonstrate that sequences are functions whose domain is the set of natural numbers.

PC.PAR.7.2 Represent sequences graphically, numerically, and symbolically.

PC.PAR.7.3 Determine the limit of a sequence if it exists.

PC.PAR.7.4 Demonstrate that a series is the sum of the sequence and represent series graphically, numerically, and symbolically.

PC.PAR.7.5 Describe the behavior of a series in terms of the limit of its partial sums.

PC.PAR.7.6 Derive and use the sum formula of a finite geometric series to solve contextual problems to model real-life situations.

PC.PAR.7.7 Derive and use the sum formula of an infinite geometric series to solve contextual problems to model real-life situations.

PC.AGR.4 Manipulate, prove, and apply trigonometric identities and equations to solve contextual mathematical problems.

PC.AGR.4.1 Apply the fundamental trigonometric identities to simplify expressions and verify other identities.

PC.AGR.4.1.1 Use quotient, reciprocal and Pythagorean identities.

PC.AGR.4.2 Use sum, difference, double-angle, and half-angle formulas for sine, cosine, and tangent to establish other identities and apply them to solve problems.

PC.AGR.4.3 Solve trigonometric equations arising in modeling contexts.

PC.AGR.4.3.1 Represent solutions using a general solutions, on a given interval, exact values from the unit circle and ones obtained with technology.

PC.AGR.4.3.2 Solve trigonometric equations using algebraic techniques such as factoring and root methods.

PC.AGR.4.4 Prove and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles.

PC.AGR.4.5 Determine the area of an oblique triangle.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***

GA Standard Code

PC.FGR.2 Analyze the behaviors of rational and piecewise functions to model contextual mathematical problems.

PC.FGR.2.1 Graph piecewise-defined functions, including step functions and absolute value functions.

PC.FGR.2.1.1 Piecewise-defined functions should include linear, polynomial, logarithmic, exponential, and radical functions.

PC.FGR.2.2 Describe characteristics by interpreting the algebraic form and graph of a piecewise-defined function.

PC.FGR.2.2.1 Characteristics include: domain, range, continuity, end behavior, intercepts, and intervals of increase and decrease.

PC.FGR.2.3 Represent the limit of a function using both the informal definition and the graphical interpretation in the context of piecewise-defined functions; interpret limits expressed in analytic notation.

PC.FGR.2.4 Divide polynomials using various methods.

PC.FGR.2.4.1 Divide polynomials using factoring and simplification, long division, and synthetic division.

PC.FGR.2.5 Graph rational functions and identify key characteristics.

PC.FGR.2.5.1 Characteristics include: domain, range, zeros, asymptotes, relative extrema, discontinuities, end behavior, intercepts, and intervals of increase and decrease, and symmetries.

PC.FGR.2.6 Represent the behavior of a rational function using limit notation for vertical and horizontal asymptotes and end behavior.

PC.FGR.2.7 Represent the limit of a function using both the informal definition and the graphical interpretation in the context of rational functions; interpret limits expressed in analytic notation.

PC.FGR.2.8 Solve simple rational equations in one variable, and give examples showing how extraneous solutions may arise.

PC.FGR.2.9 Perform partial fraction decomposition of rational functions using non-repeated linear factors.

PC.FGR.3 Utilize trigonometric expressions to solve problems and model periodic phenomena with trigonometric functions.

PC.FGR.3.1 Use the concept of a radian as the ratio of the arc length to the radius of a circle to establish the existence of 2π radians in one revolution.

PC.FGR.3.1.1 Work with radian measures that are in terms of π and those not in terms of π

PC.FGR.3.2 Utilize right triangles on the unit circle to determine the values of the six trigonometric ratios for $\frac{\pi}{6}$, $\frac{\pi}{4}$, and $\frac{\pi}{3}$. Use reflections of the triangles as reference angles to establish known values in all four quadrants of the coordinate plane.

PC.FGR.3.2.1 Connect the radian angle names on the 17-point unit circle to portions of 2π.

PC.FGR.3.3 Define the six trigonometric ratios in terms of x, y, and r using the unit circle centered at the origin of the coordinate plane. Interpret radian measures of angles as a rotation both counterclockwise and clockwise around the unit circle.

PC.FGR.3.4 Derive the fundamental trigonometric identities.

PC.FGR.3.4.1 Derive the fundamental trigonometric identities, including the quotient, reciprocal, and Pythagorean identities.

PC.FGR.3.5 Determine the value(s) of trigonometric functions for a set of given conditions.

PC.FGR.3.5.1 Given one trigonometric ratio and the quadrant for the terminal side of an angle, find the other five trigonometric functions.

PC.FGR.3.5.2 Given two trigonometric rations, find the other four trigonometric ratios.

PC.FGR.3.6 Graph and write equations of trigonometric functions using period, phase shift, and amplitude in modeling contexts.

PC.FGR.3.7 Classify the six trigonometric functions as even or odd and describe the symmetry.

PC.FGR.3.8 Restrict the domain of a trigonometric function to create an invertible function and graph the inverse function. Evaluate inverse trigonometric expressions.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

PC.GSR.5 Analyze the behaviors of conic sections and polar equations to model contextual mathematical problems.

PC.GSR.5.1 Identify and graph different conic sections given the equations in standard form.

PC.GSR.5.1.1 Explore circles, parabolas, ellipses, and hyperbolas.

PC.GSR.5.2 Identify different conic sections in general form and complete the square to convert the equation of a conic section into standard form.

PC.GSR.5.2.1 Explore contexts such as orbital paths, whispering galleries, satellite dish, nuclear cooling tower, parabolic hot dog cooker, etc.

PC.GSR.5.3 Define polar coordinates and relate polar coordinates to Cartesian coordinates.

PC.GSR.5.3.1 Connect trigonometric functions in the coordinate plane to the corresponding polar function in the polar

plane.

PC.GSR.5.4 Classify special polar equations and apply to contextual situations.

PC.GSR.5.4.1 Investigate circles, cardioids, limacons, and rose curves.

PC.GSR.5.5 Graph equations in the polar coordinate plane with and without the use of technology.

PC.AGR.6 Represent and model vector quantities to solve problems in contextual situations.

PC.AGR.6.1 Represent vector quantities as directed line segments; represent magnitude and direction of vectors in component form using appropriate mathematical notation.

PC.AGR.6.2 Add and subtract vectors and multiply vectors by a scalar to find the resultant vector.

PC.AGR.6.3 Add and subtract vectors on a coordinate plane using different methods.

PC.AGR.6.4 Solve contextual vector problems, such as those involving velocity, force, and other quantities.

PC.AGR.6.5 Sketch the graph of a curve represented parametrically, indicating the direction of motion.

PC.AGR.6.6 Apply parametric equations to contextual problems.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***
GA Standard Code	
CRM.MP	**Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.**
CRM.MP.1	Make sense of problems and persevere in solving them.
CRM.MP.2	Reason abstractly and quantitatively.
CRM.MP.3	Construct viable arguments and critique the reasoning of others.
CRM.MP.4	Model with mathematics.
CRM.MP.5	Use appropriate tools strategically.
CRM.MP.6	Attend to precision.
CRM.MP.7	Look for and make use of structure.
CRM.MP.8	Look for and express regularity in repeated reasoning.
CRM.MM.1	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
CRM.MM.1.1	Explain contextual, mathematical problems using a mathematical model.
CRM.MM.1.2	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
CRM.MM.1.3	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
CRM.MM.1.4	Use various mathematical representations and structures with this information to represent and solve real-life problems.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***

GA Standard Code

CRM.NR.2 **Utilize exact and approximate calculations to quantify real-world phenomena and solve problems**

- CRM.NR.2.1 Through multi-step/multi-operational problems, perform mathematical operations on real numbers demonstrating fluency using the order of operations.
- CRM.NR.2.2 Represent and solve problems using proportional reasoning with ratios, rates, proportions, and scaling.
- CRM.NR.2.3 Apply the rules of exponents to simplify numerical expressions, extending the properties of exponents to rational exponents.
- CRM.NR.2.4 Perform mathematical operations on real numbers to include numerical radical expressions and complex fractions.
- CRM.NR.2.5 Estimate solutions to problems with real numbers and use the estimates to assess the reasonableness of results in the context of the problem.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

CRM.PAR.3 **Construct expressions, equations, and inequalities, and use them to represent and solve problems by choosing appropriate procedures and interpreting solutions in context.**

- CRM.PAR.3.1 Create equations in one variable and use them to solve problems.
- CRM.PAR.3.2 Create inequalities in one variable and use them to solve problems.
- CRM.PAR.3.3 Using multiple representations, solve equations and inequalities and use the solutions to draw reasonable conclusions about a situation being modeled, including possible constraints.
- CRM.PAR.3.4 Solve quadratic equations using a variety of methods.
- CRM.PAR.3.5 Rearrange literal equations to highlight a specified variable using the same reasoning as in solving equations.
- CRM.PAR.3.6 Solve inequalities in one variable graphically and algebraically.
- CRM.PAR.3.7 Using multiple methods, create and solve systems of linear equations and inequalities.

CRM.PAR.3.8 Solve a simple system of equations consisting of a linear and a quadratic equation in two variables. algebraically and graphically.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***

GA Standard Code

CRM.FGR.4 **Define, build and interpret functions that arise in various contexts by applying knowledge of the characteristics of the different families of functions, and analyze the effects of parameters.**

CRM.FGR.4.1 Define a function through maps, sets, equations and graphs using function notation.

CRM.FGR.4.2 Identify and sketch by hand the parent graph of functions expressed algebraically and show key characteristics of the graph using technology.

CRM.FGR.4.3 Using tables, graphs, and verbal descriptions, interpret the key characteristics of a function.

CRM.FGR.4.4 Calculate and interpret the average rate of change of a function over a specified interval. Estimate the rate of change from a graph.

CRM.FGR.4.5 Compare characteristics of two functions each represented in a different way.

CRM.FGR.4.6 Construct linear and exponential functions, given a graph, a description of a relationship, or two input-output pairs.

CRM.FGR.4.7 Construct arithmetic and geometric sequences recursively and explicitly, use them to model situations, and translate between the two forms. Connect linear functions to arithmetic sequences and exponential functions to geometric sequences.

CRM.FGR.4.8 Identify the effect on the parent graph of replacing f(x) by f(x) + k, kf(x), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

CRM.GR.5 **Reason deductively and inductively about figures and their properties and make sense of geometric situations using measurements in real-world contexts**

CRM.GSR.5.1 Use the distance formula, midpoint formula or slope to verify simple geometric properties.

CRM.GSR.5.2 Use coordinates to compute perimeters of polygons, circumference of circles and areas of triangles, rectangles and circles.

CRM.GSR.5.3 Informally derive the formulas for the volume and surface area of a cylinder, sphere, prism, pyramid, and cone.

CRM.GSR.5.4 Use formulas for finding the volume and surface area of spheres, right and oblique prisms, cylinders, pyramids, and

cones.

CRM.GSR.5.5 Apply the Pythagorean Theorem and trigonometric ratios to solve problems involving right triangles.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

CRM.DSR.6 **Make sense of and reason about variation in data using graphs, tables and probability models to solve problems and draw appropriate conclusions from solutions.**

CRM.DSR.6.1 Represent univariate data on the real number line.

CRM.DSR.6.2 Calculate, compare, and interpret shape, center, and spread of two or more univariate data sets, accounting for possible effects of extreme data points.

CRM.DSR.6.3 Summarize categorical data for two categories in two-way frequency tables using relative frequencies in the context of the data.

CRM.DSR.6.4 Represent bivariate data on a scatter plot and describe how the variables are related in terms of strength and direction.

CRM.DSR.6.5 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

CRM.DSR.6.6 Compute using technology and interpret the correlation coefficient “r” of a linear fit.

CRM.DSR.6.7 Distinguish between correlation and causation, and interpolation and extrapolation.

CRM.DSR.6.8 Describe categories of events as subsets of a sample space using unions, intersections, or complements of other events.

CRM.DSR.6.9 Use the two-way frequency table to calculate conditional probabilities.

CRM.DSR.6.10 Calculate the conditional probability of A given B.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***
GA Standard Code	
AMDM.MP	**Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.**
AMDM.MP.1	Make sense of problems and persevere in solving them.
AMDM.MP.2	Reason abstractly and quantitatively.
AMDM.MP.3	Construct viable arguments and critique the reasoning of others.
AMDM.MP.4	Model with mathematics.
AMDM.MP.5	Use appropriate tools strategically.
AMDM.MP.6	Attend to precision.
AMDM.MP.7	Look for and make use of structure.
AMDM.MP.8	Look for and express regularity in repeated reasoning.
AMDM.MM.1	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
AMDM.MM.1.1	Explain contextual, mathematical problems using a mathematical model.
AMDM.MM.1.2	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities domains.
AMDM.MM.1.3	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
AMDM.MM.1.4	Use relevant information to create various mathematical representations and structures to solve real-life problem.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***
GA Standard Code	
AMDM.QPR.2	**Make decisions and solve problems using ratios, rates, and percents in a variety of real-world applications**
AMDM..QPR.2.1	Apply proportions, ratios, rates, and percentages to various settings, including business, media, and consumerism.
AMDM.QPR.2.2	Solve problems involving ratios in mechanical and agricultural contexts.
AMDM.QPR.2.3	Use proportions to solve problems involving large quantities that are not easily measured.
AMDM.QPR.3	**Make predictions by analyzing averages and indices of large data sets through investigations of real-world contexts.**
AMDM.QPR.3.1	Use averages and weighted averages to make decisions.
AMDM.QPR.3.2	Calculate and interpret indices.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***
GA Standard Code	
AMDM.PAR.4	**Develop methods or algorithms to analyze discrete situations.**
AMDM.PAR.4.1	Create and verify identification numbers.
AMDM.PAR.4.2	Analyze and evaluate the mathematics behind various methods of voting and selection.
AMDM.PAR.4.3	Evaluate various voting and selection processes to determine an appropriate method for a given situation.
AMDM.PAR.4.4	Apply various ranking algorithms to determine an appropriate method for a given situation.
AMDM.PAR.8	**Create and analyze mathematical models to make decisions related to earning, investing, spending, and borrowing money.**
AMDM.PAR.8.1	Use exponential functions to model change in a variety of financial situations
AMDM.PAR.8.2	Determine, represent, and analyze mathematical models for income, expenditures, and various types of loans and investments.

AMDM.PAR.11 **Use functions to model problem situations in both discrete and continuous relationships.**

AMDM.PAR.11.1 Represent situations and solve problems using vectors. in areas such as transportation, computer graphics, and the physics of force and motion.

AMDM.PAR.11.2 Represent geometric transformations and solve problems using matrices.

AMDM.PAR.12 **Make informed decisions and solve problems with a variety of network models in quantitative situations.**

AMDM.PAR.12.1 Solve problems represented by a vertex-edge graphs.

AMDM.PAR.12.2 Construct, analyze, and interpret flow charts to develop an algorithm to describe processes such as quality control procedures.

AMDM.PAR.12.3 Investigate the scheduling of projects using Program Evaluation Review Technique (PERT).

AMDM.PAR.12.4 Consider problems that can be resolved by coloring graphs.

HCS Graduate Learner Outcome ***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***

GA Standard Code

AMDM.FGR.9: **Use functions to model problem situations in both discrete and continuous relationships**

AMDM.FGR.9.1 Determine whether a problem situation involving two quantities is best modeled by a discrete or continuous relationship.

AMDM.FGR.9.2 Use linear, exponential, logistic, and piecewise functions to construct a model.

HCS Graduate Learner Outcome ***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

AMDM.GSR.10 **Use functions to model problem situations in both discrete and continuous relationships.**

AMDM.GSR.10.1 Create and use two-dimensional and three-dimensional representations to model authentic situations.

AMDM.GSR.10.2 Solve problems involving inaccessible distances using basic trigonometric principles including extensions of right triangle trigonometry.

Mathematics	HCS Teaching & Learning Standards	Advanced Mathematical Decision Making

HCS Graduate Learner Outcome	*As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.*

GA Standard Code		
AMDM.PR.5	**Analyze the chances for success or failure in order to make decisions**	
	AMDM.PR.5.1	Determine conditional probabilities and probabilities of compound events to make decisions in problem situations.
	AMDM.PR.5.2	Use probabilities to make and justify decisions about risks in everyday life.
AMDM.PR.6	**Model strategic interaction among rational decision-makers.**	
	AMDM.PR.6.1	Calculate expected value to analyze mathematical fairness, payoff, and risk.
	AMDM.PR.6.2	Analyze real-life situations involving strategic interactions using the mathematics of zero-sum games
	AMDM.PR.6.3	Construct a mathematical model of probabilistic situations to make mathematical assumptions
AMDM.DSR.7	**Conduct investigative research to solve real-life problems and answer statistical investigative questions involved in business and financial decision-making.**	
	AMDM.DSR.7.1	Apply statistical methods to design, conduct, and analyze statistical studies. Identify a contextual, real-life problem that can be answered using investigative research.
	AMDM.DSR.7.2	Build the skills and vocabulary necessary to analyze and critique reported statistical information, summaries, and graphical displays. Develop statistical investigative questions that can help solve a real-life problem involved in business and financial decision-making.
	AMDM.DSR.7.3	Create a statistical study using sound methodology to answer statistical investigative questions and to solve the real-life problem.
	AMDM.DSR.7.4	4 Explain how the sample size impacts the precision with which estimates of the population parameters can be made (i.e., the larger the sample size the more precision).
	AMDM.DSR.75	Recognize that random selection from a population plays a different role than random assignment in an experiment.
	AMDM.DSR.7.6	Incorporate random designs in data collection.
	AMDM.DSR.7.7	Describe ways in which big data can be used to make decisions in various business enterprises and in the context of business and financial decision making.
	AMDM.DSR.7.8	Use distributions to identify the key features of the data collected.
	AMDM.DSR.7.9	Interpret results and make connections to the original research question.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

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

AFA.MM.1 **Apply mathematics to real-life situations; model real-life phenomena using mathematics.**

- AFA.MM.1.1 Explain applicable, mathematical problems using a mathematical model.
- AFA.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities domains.
- AFA.MM.1.3 Use units of measure (linear, area, capacity, rates, and time) as a way to make sense of conceptual problems; identify, use, and record appropriate units of measure within the given framework, within data displays, and on graphs; convert units and rates using proportional reasoning given a conversion factor; use units within multi-step problems and formulas; interpret units of input and resulting units of output.
- AFA.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.
- AFA.MM.1.5 Define appropriate quantities for the purpose of descriptive modeling.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to reason, describe, and analyze quantitatively using units and number systems to make sense of and solve problems.***
GA Standard Code	
AFA.MM.1	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
AFA.MM.1.1	Explain contextual, mathematical problems using a mathematical model.
AFA.MM.1.2	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
AFA.MM.1.3	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
AFA.MM.1.4	Use various mathematical representations and structures with this information to represent and solve real-life problems.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***
GA Standard Code	
AFA.NR.2	**Utilize fractions, decimals, percents, and ratios to write and solve a variety of financial problems.**
AFA.NR.2.1	TUse fractions, decimals, percents, and ratios to solve problems related to budgets, income tax rates, payroll deductions, pie charts, percent yield, sales tax, percent populations, rent increase, cost savings, debt-to-income ratios, stock splits, floor plans and scale models, trigonometric calculations, banking services, and other business and financial applications.
AFA.NR.2.2	Convert numerical quantities of one form (fractions, decimals, percents) to another within financial applications.
AFA.NR.2.3	Calculate and interpret percent of increase and decrease.
AFA.NR.2.4	Construct, solve, and interpret algebraic ratios and proportions.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***
GA Standard Code	
AFA.FGR.3	**Explore and apply functions to model and explain real-life phenomena and to solve complex problems in business and financial contexts.**
AFA.FGR.3.1	Examine and identify the key characteristics of functions that model financial situations given the parameters of the context.
AFA.FGR.3.2	Solve financial problems given the parameters of the applicable context using a variety of functions.

AFA.FGR.3.3	Describe the meaning of functions and how to determine if a relation is a function or not.
AFA.FGR.3.4	Utilize function notation to represent a functional relation and to evaluate functions.
AFA.FGR.3.5	Create, apply, and interpret linear functions to model real-world financial problems.
AFA.FGR.3.6	Create, apply, and interpret exponential functions of the form y= ab^x and classify them as exponential decay (when 0 < b < 1) or as exponential growth (when b > 1).
AFA.FGR.3.7	Create, apply, and interpret quadratic functions to model real-world financial applications.
AFA.FGR.3.8	Create, apply, and interpret the greatest integer function in real-world financial applications.
AFA.FGR.3.9	Create, apply, and interpret piecewise functions in real-world financial applications.
AFA.FGR.3.10	Recognize real-world situations where square root, cubic, or rational functions apply.
AFA.FGR.3.11	Create and use inequalities to define domains when creating algebraic expressions and functions.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

AFA.PAR.4 **Explore, evaluate, and rearrange formulas applicable to business and financial contexts.**

AFA.PAR.4.1	Type learning expectation/objective here. Insert more rows as needed.
AFA.PAR.4.2	Investigate the impact of changing the value of the different variables in financial formulas to compare the resulting financial outcomes.
AFA.PAR.4.3	Write algebraic formulas for use in spreadsheets and utilize technology to perform both iterate and formulaic calculations.
AFA.PAR.4.4	Use the simple interest formula, I = Prt, and inverse operations to solve for specified variables in banking services applications and other interest problems.
AFA.PAR.4.5	Demonstrate by iteration (both with technology and without) that the compounding process pays “interest on your interest.”

AFA.PAR.4.6	Derive the compound interest formula, A = P(1 +rt)^nt, by using patterns and inductive reasoning, then compute compound interest with and without the formula.
AFA.PAR.4.7	Explore the concept of limits of rational functions in discovering the compound continuous formula. Use technology to investigate and verify what happens as the number of compounds approaches infinity.
AFA.PAR.4.8	Apply the natural base e in the continuous compounding formula, A = Pert
AFA.PAR.4.9	Use the monthly payment formula to calculate payment amounts in a variety of circumstances.
AFA.PAR.4.10	Utilize the monthly payment formula to assist in calculating the total interest paid (finance charge) when using credit. Compare the total of monthly payments to the original (cash) price.
AFA.PAR.4.11	Interpret and use sigma notation.
AFA.PAR.4.12	Explore and identify how the elements of the present value of a single deposit formula and the periodic deposit investment formula relates to the compound interest formula.
AFA.PAR.4.13	Utilize the present and future value of a periodic investment formulas to make calculations regarding long-term investments and retirement planning.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

AFA.GSR.6 **AFA.GSR.6: Apply properties of polygons, circles, and trigonometry to model and explore real-world applications.**

AFA.GSR.6.1.	Apply concepts of area, volume, and scale factors to a variety of real-world financial applications.
AFA.GSR.6.2	Use factors of dilations to draw to scale in contextual situations.
AFA.GSR.6.3	Use sectors and central angles of a circle to depict proportional categories on a pie chart when given categorical information.
AFA.GSR.6.4	Solve problems using the Pythagorean Theorem and trigonometric functions and their inverses in context.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

AFA.DSR.7 **Collect, analyze, interpret, summarize, and construct displays of data to make predictions within real-world applications.**

- AFA.DSR.7.1 Interpret measures of central tendency (mean, median, mode) and spread (range, interquartile range, variance, standard deviation) to analyze contextualized data sets.
- AFA.DSR.7.2 Construct and interpret common data displays (bar graphs, line graphs, stock bar charts, candlestick charts, box and whisker plots, stem and leaf plots, and circle graphs) to recognize and interpret trends.
- AFA.DSR.7.3 Construct and interpret scatterplots to recognize and interpret trends.
- AFA.DSR.7.4 Use technology to find, interpret, and graph linear, quadratic, and exponential regression equations to make predictions about the corresponding context.
- AFA.DSR.7.5 Use technology to determine the correlation coefficient of linear, quadratic, and exponential regression curves.
- AFA.DSR.7.6 Distinguish between causation and correlation for bivariate data.
- AFA.DSR.7.7 Create and analyze discrete probability distributions.
- AFA.DSR.7.8 Apply the Arithmetic Average Formula to calculate and interpret a d-day simple moving average given a set of n data points, p1, p2, p3, ..., pn -1, pn.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

AFA.DSR.8 **Conduct investigative research to solve real-life problems and answer statistical questions involved in business and financial decision-making.**

- AFA.DSR.8.1 Identify a contextual, real-life problem that can be answered using investigative research.
- AFA.DSR.8.2 Develop statistical questions that can help solve a real-life problem involved in business and financial decision-making.
- AFA.DSR.8.3 Create a statistical study using sound methodology to answer statistical questions and to solve the real-life problem.
- AFA.DSR.8.4 Explain how the sample size impacts the precision with which estimates of the population parameters can be made.
- AFA.DSR.8.5 Recognize that random selection from a population plays a different role than random assignment in an experiment.

AFA.DSR.8.6	Incorporate random designs in data collection.
AFA.DSR.8.7	Describe ways in which “big data” can be used to make decisions in various business enterprises and in the context of business and financial decision-making.
AFA.DSR.8.8	Use distributions to identify the key features of the data collected.
AFA.DSR.8.9	Interpret results and make connections to the original research question.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

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

A.MM.1 **Apply mathematics to real-life situations; model real-life phenomena using mathematics.**

- SR.MM.1.1 Explain contextual, mathematical problems using a mathematical model.
- SR.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities domains.
- SR.MM.1.3 Using abstract and quantitative reasoning, make decisions about information and data from a real-life situation.
- SR.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use a variety of data analysis and statistics strategies to analyze, develop, and evaluate inferences based on data.***

GA Standard Code

SR.DSR.2 **Formulate statistical investigative questions of interest to students that can be answered with data.**

- SR.DSR.2.1 Formulate statistical investigative questions about a population using samples taken from the population.
- SR.DSR.2.2 Formulate comparative and associative statistical investigative questions for surveys, observational studies, and experiments to compare two or more groups or to investigate the association of two or more variables.
- SR.DSR.2.3 Formulate multivariable statistical investigative questions.
- SR.DSR.2.4 Formulate inferential statistical investigative questions regarding association and prediction

SR.DSR.3 Collect data by designing and implementing a plan to address the formulated statistical investigative question.

- SR.DSR.3.1 Apply an appropriate data-collection plan when collecting primary or secondary data for the statistical investigative question of interest.
- SR.DSR.3.2 Distinguish between surveys, observational studies, and experiments.
- SR.DSR.3.3 Design sample surveys, experiments, and observational studies using accepted practices.
- SR.DSR.3.4 Distinguish between random selection and random assignment and identify their impact on conclusions.
- SR.DSR.3.5 Describe potential sources and effects of bias and confounding variables.
- SR.DSR.3.6 Describe and adhere to the ethical use of data (e.g., sensitive information, privacy, and living subjects).
- SR.DSR.3.7 Identify when data can be generalized to a target population.

SR.DSR.4 Analyze data by selecting and using appropriate graphical and numerical methods.

- SR.DSR.4.1 Summarize quantitative or categorical data using tables, graphical displays, and numerical summary statistics.
- SR.DSR.4.2 Summarize and describe relationships among multiple variables.
- SR.DSR.4.3 Use sampling distributions developed through simulation to describe the sample-to-sample variability of sample statistics.
- SR.DSR.4.4 Use sampling distributions to compute simulated p-values
- SR.DSR.4.5 Describe the relationship between two quantitative variables by interpreting correlation (r) and a least-square regression line (using technology).
- SR.DSR.4.6 Use simulations to investigate associations between two categorical variables and to compare groups.

SR.DSR.5 Interpret the results of the analysis, making connections to the formulated statistical investigative question.

SR.DSR.5.1 SR.DSR.5.1 Use statistical evidence from analyses to answer the formulated statistical investigative questions.

SR.DSR.5.2 Interpret the impact of outliers, missing values, or erroneous values on the results

SR.DSR.5.3 Use and interpret the p-value to determine whether the estimate for a population characteristic is plausible

SR.DSR.5.4 Interpret a given margin of error associated with an estimate of a population characteristic.

SR.DSR.5.5 Explain the impact of multiple variables on one another.

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use mathematical practices to help make sense of the real world.***

GA Standard Code

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

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

C.MM.1 **Apply mathematics to real-life situations; model real-life phenomena using mathematics.**

- C.MM.1.1 Explain contextual, mathematical problems using a mathematical model.
- C.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
- C.MM.1.3 Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
- C.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to create, interpret, use, and analyze patterns of algebraic structures to make sense of problems.***

GA Standard Code

C.PAR.6 **Apply the definite integral and indefinite integral to contextual situations.**

- CPAR.6.1 Find a particular curve in a family of antiderivatives using an initial condition.
- CPAR.6.2 Solve separable differential equations and use them to model real-world problems.
- CPAR.6.3 Apply definite integrals to find the area between two curves.
- CPAR.6.4 Apply definite integrals to find the average value of a function over a closed interval.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to use functions to interpret and analyze a variety of contexts.***

GA Standard Code

C.FGR.2 **Apply limit notation and characteristics of continuity to analyze behaviors of functions.**

- C.FGR.2.1 Estimate limits from graphs and table values.
- C.FGR.2.2 Find limits of sums, differences, products, and quotients using substitution.
- C.FGR.2.3 Represent asymptotic behavior using limits.
- C.FGR.2.4 Find limits of rational functions using algebraic techniques.
- C.FGR.2.5 Demonstrate continuity at a point using the definition and limit notation.
- C.FGR.2.6 Apply the Intermediate Value Theorem to a function over a closed interval.

C.FGR.3 **Relate limits and continuity to the derivative as a rate of change and apply it to a variety of situations including modeling contexts.**

- C.FGR.3.1 Interpret the derivative as an instantaneous rate of change that is a two-sided limit of an average rate of change.
- C.FGR.3.2 Demonstrate and apply the relationship between differentiability and continuity.
- C.FGR.3.3 Apply the concept of derivative geometrically, numerically, and analytically.
- C.FGR.3.4 Find the derivatives of sums, products, quotients, and composite functions.
- C.FGR.3.5 Find the derivatives of a variety of relations.
- C.FGR.3.6 Calculate higher order derivatives.

C.FGR.4 Apply derivatives to situations in order to draw conclusions including curve analysis and modeling rates of change in applications.

C.FGR.4.1 Calculate the slope of a curve at a point.q

C.FGR.4.2 Write the equation of the tangent line to a curve at a point and use it to obtain a local linear approximation of a value near the point of tangency.

C.FGR.4.3 Identify intervals where functions are increasing, decreasing, and constant by using the relationship between the function and the sign of its first derivative.

C.FGR.4.4 Identify points of inflection and intervals of concavity of a function by using the second derivative of a function.

C.FGR.4.5 Compare characteristics of f, f', and f'' graphically, numerically, analytically, and with technology.

C.FGR.4.6 Apply Mean Value Theorem.

C.FGR.4.7 Apply Extreme Value Theorem.

C.FGR.4.8 Apply the derivative to real-world problems to find both local and absolute extrema, with and without technology.

C.FGR.4.9 Model rates of change in applied situations.

HCS Graduate Learner Outcome	***As a Henry County graduate, I will be able to prove, understand, and model geometric concepts using appropriate tools, theorems, and constructions to solve problems and apply logical reasoning.***

GA Standard Code

C.GSR.5 Analyze the relationship between the derivative and the integral using the Fundamental Theorem of Calculus.

C.GSR.5.1 Use Riemann sums to approximate values of definite integrals.

C.GSR.5.2 Interpret a definite integral as a limit of Riemann sums.

C.GSR.5.3 Find the exact value of a definite integral using geometric formulas on a coordinate plane.

C.GSR.5.4 Demonstrate the use of properties of definite integrals.

C.GSR.5.5 Apply the Fundamental Theorem of Calculus as an interpretation of the accumulation in the rate of change of a function as equivalent to the change in the antiderivative over the interval.

C.GSR.5.6 Apply Fundamental Theorem of Calculus to indefinite integrals to represent the family of antiderivatives.

C.GSR.5.7 Apply integration by substitution to definite and indefinite integrals.

Learning and Performance Division

Instruction and Learning Department: Mathematics HTLS

MATHEMATICS HENRY DEVELOPED HTLS | Enhancements Beyond Georgia State Standards

Henry County schools has the opportunity while embedding Georgia standards into the Henry Teaching and Learning Standards, to also add enhanced standards or elements. These additions provide clarity to teachers, students and families or they are skills or concepts determined to be critical to a student's current and future success. The following is the enhancements to the HTLS for the new math standards set for implementation SY24.

Course	Henry Developed HTLS | Enhancements beyond Georgia State Standards	Count
K	K.NR.1.5 Identify dollars and count up to 20 dollars.	1
1st	1.NR.2.6.1 Determine the result, change, and start unknown. 1.NR.2.7.1 Explore, understand, and apply the commutative and associative properties as strategies for solving problems. 1.NR.5.4 Estimate sums and differences within 100 to determine reasonableness. 1.GSR.4.3.1 Describe the shares using words halves, fourths and quarters, and use the phrases half of, fourth of, and quarter of and describe the whole as two of, or four of the shares. 1.GSR.4.3.2 Understand for these examples that decomposing into more equal shares creates smaller shares.	5
2nd	2.NR.1.1.1 Put together (compose) and break apart (decompose) three-digit numbers. 2.NR.2.5 Estimate sums and differences within 1,000 to determine reasonableness. 2.NR.3.2.1 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them. 2.PAR.4.2.1 Extend patterns to explore intervals of 1s, 2s, 5s, and 10s, to also include intervals of 25s and 100s.	4
3rd	3.NR.1.4 Utilize number lines to round by locating numbers on a number line to determine the nearest multiple of 10 or 100. 3.PAR.2.3 Estimate sums and differences within 10,000 to determine reasonableness. 3.PAR.3.2.1 Solve multiplication problems including single-digit factors, and division problems including single-digit divisors and quotients. 3.PAR.3.6.1 Solve practical, realistic division problems including "how many in each group" and "how many groups" using efficient and flexible strategies. 3.PAR.3.7 By the end of Grade 3, know from memory all products of two one-digit numbers.	5
4th	4.NR.1.2.1 Represent and explain the relationship among the numbers 1, 10, 100, and 1,000 using numerical reasoning and manipulatives. Extend the pattern to the hundred thousands place. 4.NR.1.5 Utilize number lines to round by locating numbers on a number line to determine the nearest multiple of 10, 100, 1,000, 10,000 or 100,000. 4.NR.5.1.2 Express fractions such as 3/10 as 30/100, and add fractions such as 3/10 + 4/100 = 34/100. 4.MDR.6.1.2 Accurately record measurement equivalents in a two-column table.	4
Accel 4	4.NR.1.2.1 Represent and explain the relationship among the numbers 1, 10, 100, and 1,000 using	5

	numerical reasoning and manipulatives. Extend the pattern to the hundred thousands place. 4.NR.1.5 Utilize number lines to round by locating numbers on a number line to determine the nearest multiple of 10, 100, 1,000, 10,000 or 100,000. 4.NR.5.1.2 Express fractions such as 3/10 as 30/100, and add fractions such as 3/10 + 4/100 = 34/100. 4.MDR.6.1.2 Accurately record measurement equivalents in a two-column table. 5.MDR.7.5 Record conversions in a two-column table.	
5th	5.NR.4.5 Utilize number lines to round by locating decimals on a number line to determine the nearest multiple of base ten decimal of 0.1, or 0.01. 5.MDR.7.5 Record conversions in a two-column table.	2
Accel 5	5.NR.4.5 Utilize number lines to round by locating decimals on a number line to determine the nearest multiple of base ten decimal of 0.1, or 0.01. 5.MDR.7.5 Record conversions in a two-column table. 6.NR.2.7 Recognize, create and ask statistical questions that anticipate variability in the data. 6.NR.4.8 Solve problems involving ratios found in everyday situations.	4
6th	6.NR.4.8 Solve problems involving ratios found in everyday situations. 6.NR.2.7 Recognize, create and ask statistical questions that anticipate variability in the data.	2
7th	7.PAR.3.3 Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. 7.PAR.4.7.1 Derive the equation y = mx for a line through the origin. 7.PAR.13 Represent proportional relationships using equations.	3
8th	8.PAR.4.3 Explore translations of the equation y = mx and generalize that two lines with the same slope but different intercepts are translations of each other. 8.FGR.7.4.1 Use substitution and elimination to solve systems of linear equations. 8.GSR.8.5 Use knowledge of cube roots to solve for unknown dimensions of geometric figures.	3
ALGCC	A.PAR.6.5 Perform polynomial operations with monomials and binomials (addition, subtraction, and multiplication) with a maximum degree of 2.	1