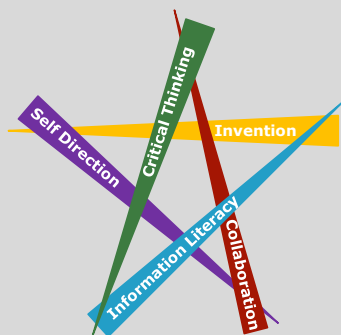


**Curriculum Development Course at a Glance
Planning for High School Mathematics**

Content Area	Mathematics	Grade Level	High School
Course Name/Course Code	Integrated Math 2		
Standard	Grade Level Expectations (GLE)	GLE Code	
1. Number Sense, Properties, and Operations	1. The complex number system includes real numbers and imaginary numbers	MA10-GR.HS-S.1-GLE.1	
	2. Quantitative reasoning is used to make sense of quantities and their relationships in problem situations	MA10-GR.HS-S.1-GLE.2	
2. Patterns, Functions, and Algebraic Structures	1. Functions model situations where one quantity determines another and can be represented algebraically, graphically, and using tables	MA10-GR.HS-S.2-GLE.1	
	2. Quantitative relationships in the real world can be modeled and solved using functions	MA10-GR.HS-S.2-GLE.2	
	3. Expressions can be represented in multiple, equivalent forms	MA10-GR.HS-S.2-GLE.3	
	4. Solutions to equations, inequalities and systems of equations are found using a variety of tools	MA10-GR.HS-S.2-GLE.4	
3. Data Analysis, Statistics, and Probability	1. Visual displays and summary statistics condense the information in data sets into usable knowledge	MA10-GR.HS-S.3-GLE.1	
	2. Statistical methods take variability into account supporting informed decisions making through quantitative studies designed to answer specific questions	MA10-GR.HS-S.3-GLE.2	
	3. Probability models outcomes for situations in which there is inherent randomness	MA10-GR.HS-S.3-GLE.3	
4. Shape, Dimension, and Geometric Relationships	1. Objects in the plane can be transformed, and those transformations can be described and analyzed mathematically	MA10-GR.HS-S.4-GLE.1	
	2. Concepts of similarity are foundational to geometry and its applications	MA10-GR.HS-S.4-GLE.2	
	3. Objects in the plane can be described and analyzed algebraically	MA10-GR.HS-S.4-GLE.3	
	4. Attributes of two- and three-dimensional objects are measurable and can be quantified	MA10-GR.HS-S.4-GLE.4	
	5. Objects in the real world can be modeled using geometric concepts	MA10-GR.HS-S.4-GLE.5	

**Curriculum Development Course at a Glance
Planning for High School Mathematics**

Colorado 21st Century Skills



Critical Thinking and Reasoning: *Thinking Deeply, Thinking Differently*

Information Literacy: *Untangling the Web*

Collaboration: *Working Together, Learning Together*

Self-Direction: *Own Your Learning*

Invention: *Creating Solutions*

Mathematical Practices:

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

Unit Titles	Length of Unit/Contact Hours	Unit Number/Sequence
Reproducing Bacterial Rabbits	6 weeks	1
What goes up must come down	6 weeks	2
Independently Lucky	4 weeks	3
Getting to the Root of the Problem	5 weeks	4
Duck, Duck, Goose	4 weeks	5
Geometric Fashion Week	3 weeks	6

Curriculum Development Overview
Unit Planning for High School Mathematics

Unit Title	Reproducing Bacterial Rabbits		Length of Unit	6 weeks
Focusing Lens(es)	Modeling Relationship	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.HS-S.1-GLE.1 MA10-GR.HS-S.2-GLE.1 MA10-GR.HS-S.2-GLE.3 MA10-GR.HS-S.2-GLE.4	
Inquiry Questions (Engaging- Debatable):	<ul style="list-style-type: none"> • What is the best way of paying of debt on multiple credit cards? • What financial phenomena can be modeled with exponential and linear functions? (MA10-GR.HS-S.2-GLE.2-IQ.3) 			
Unit Strands	Number and Quantity: The Real Number System Algebra: Seeing Structure in Expressions Algebra: Creating Equations Functions: Building Functions Functions: Interpreting Functions			
Concepts	sums, products, rational numbers, logarithms, inverse, exponential, functions, integer exponents, rational exponents, properties, transformations, expressions, average rate of change, classes of functions, translations, graph			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
The sums and products of rational numbers remain in the set of rational numbers. (MA10-GR.HS-S.1-GLE.1-EO.b)	What is product or sum of two irrational numbers?	Why is the sum or product of two rational numbers always rational? Why are the sum and products of irrational numbers with rational numbers always irrational?
The properties of integer exponents extend to rational exponents. (MA10-GR.HS-S.1-GLE.1-EO.a)	What are the properties of exponents? What is the relationship between rational exponents and radicals? How can properties of exponents be used to transform rational expressions into radical expressions or vice versa? How are radical expressions simplified?	Why do we need both radicals and rational exponents?
Properties of exponents and operations to transform expressions can functions to facilitate interpretation of the quantities represented by the expression. (MA10-GR.HS-S.2-GLE.1-EO.c.) and (MA10-GR.HS-S.2-GLE.3-EO.a.ii, b.i.3)	What is the impact on the graph of transforming an expression?	Why might it be necessary to transform an exponential expression to better interpret the context of situation?

Curriculum Development Overview
Unit Planning for High School Mathematics

<p>Mathematicians compare average rates of change over a specified interval to determine the increase or decrease of a function relative to another function. (MA10-GR.HS-S.2-GLE.1-EO.b.iii)</p>	<p>How are the starting population and the growth factor represented in an exponential function? How do you calculate average rate of change of an exponential function? How does the average rate of change impact the behavior of a function over the entire span of the function?</p>	<p>How is the average rate of change represented in the graph and table of a exponential function?</p>
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Key Knowledge and Skills: My students will...	<i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i>
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<ul style="list-style-type: none"> • Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. • Rewrite expressions involving radicals and rational exponents using the properties of exponents. (MA10-GR.HS-S.1-GLE.1-EO.a.ii) • Use the structure of an expression to identify ways to rewrite it. (MA10-GR.HS-S.2-GLE.3-EO.a.ii) • Interpret key features of graphs and table, for an exponential function, in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. (MA10-GR.HS-S.2-GLE.1-EO.b.i) • Calculate and interpret the average rate of change of an exponential function (presented symbolically or as a table) over a specified interval and estimate the rate of change from a graph. (MA10-GR.HS-S.2-GLE.1-EO.b.iii) • Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. (MA10-GR.HS-S.2-GLE.1-EO.c.iii) • Graph exponential and logarithmic functions, showing intercepts and end behavior. (MA10-GR.HS-S.2-GLE.1-EO.c.iv) • Use the properties of exponents to interpret expressions for exponential functions. (MA10-GR.HS-S.2-GLE.3-EO.b.i.3) • Compare properties of two exponential functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). (MA10-GR.HS-S.2-GLE.1-EO.c.v.3) • Use the properties of exponents to transform expressions for exponential functions. (MA10-GR.HS-S.2-GLE.1-EO.c.v.2) • Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. (MA10-GR.HS-S.1-GLE.1-EO.b) • Determine an explicit expression, a recursive process, or steps for calculation from an exponential context. (MA10-GR.HS-S.2-GLE.1-EO.d.i.1) • Create exponential equations and inequalities in one variable and use them to solve problems. (MA10-GR.HS-S.2-GLE.4-EO.a.i) • Analyze the impact of interest rates on a personal financial plans. (MA10-GR.HS-S.2-GLE.2-EO.d.i) * • Evaluate the costs and benefits of credit. (MA10-GR.HS-S.2-GLE.2-EO.d.ii) * • Analyze various lending sources, service and financial institutions. (MA10-GR.HS-S.2-GLE.2-EO.d.iii) *

*** Denotes connection to Personal Financial Literacy (PFL)**

**Curriculum Development Overview
Unit Planning for High School Mathematics**

<p>Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline. EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: <i>“Mark Twain exposes the hypocrisy of slavery through the use of satire.”</i></p>	
<p>A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):</p>	<p><i>I know can use properties of exponents to transform an exponential equation to a logarithm.</i></p>
<p>Academic Vocabulary:</p>	<p>rewrite, structure, identify, key features, graphs, tables, descriptions, relationships, calculate, interpret, compare, graphically, numerically, verbal descriptions, combine</p>
<p>Technical Vocabulary:</p>	<p>sums, products, rational numbers, logarithms, inverse, exponential, functions, integer exponents, rational exponents, properties, transformations, expressions, average rate of change, classes of functions, translations, radicals, rational, square root, cube root, piece-wise-defined functions, step functions, absolute value functions, explicit expression, recursive process, linear, quadratic</p>

Curriculum Development Overview
Unit Planning for High School Mathematics

Unit Title	What goes up must come down		Length of Unit	6 weeks
Focusing Lens(es)	Modeling Relationship	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.HS-S.2-GLE.1 MA10-GR.HS-S.2-GLE.4 MA10-GR.HS-S.3-GLE.1	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> How do symbolic transformations of a function affect the graph of the function? (MA10-GR.HS-S.2-GLE.1-IQ.8) 			
Unit Strands	Algebra: Reasoning with Equations and Inequalities Algebra: Creating Equations Functions: Building Functions Functions: Interpreting Functions Statistics and Probability: Interpreting Categorical and Quantitative Data			
Concepts	classes of functions, operations, functions, constants, translations, key features, graph, quadratic functions, model, projective motion, symmetry, extreme values, average rates of change, systems of non-linear functions, solutions, symmetry, extreme values			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
New classes of functions emerge by performing operations on a function with constants and/or another function and analyze the effects of these translations by interpreting key features of the graph. (MA10-GR.HS-S.2-GLE.1-EO.b.i, d.i.2, e.i)	What type of function is created when multiplying two linear functions? How can a table, graph, and function notation be used to explain how one function family is different or similar to another? (MA10-GR.HS-S.2-GLE.1-IQ.2) How do the graph of parent functions help explain the impact of performing operations on a function?	How is the effect on a graph different when operating on a function with a constant versus another function? How can you operate on linear functions to create other classes of functions?
Quadratic functions and their graphs model real-world applications by helping visualize symmetry and extreme values. (MA10-GR.HS-S.2-GLE.1-EO.b.ii, c.v) and (MA10-GR.HS-S.2-GLE.1-EO.d.i.1)	What do the zeros of a quadratic equation represent in terms of a model? How can you see the symmetry of a quadratic in its equation? How is quadratic symmetry expressed in a table or graph? What role do residuals play in determining the fit of a quadratic or linear model?	Why is a quadratic a good model for projectile motion and are there limits to its application? Why might you want to solve for the zeros of a quadratic? How does the context of the domain affect the interpretation of multiple representations of a quadratic function?

Curriculum Development Overview
Unit Planning for High School Mathematics

Mathematicians compare average rates of change over a specified interval to determine the increase or decrease of a function relative to another function. (MA10-GR.HS-S.2-GLE.1-EO.b.iii)	How do you calculate average rate of change of a quadratic function? How does the average rate of change impact the behavior of a function over the entire span of the function?	How is the average rate of change represented in the graph and table of a quadratic function?
Systems of non-linear functions create solutions set more complex than those of systems of linear functions. (MA10-GR.HS-S.2-GLE.4-EO.d)	What do the solutions of a system of nonlinear functions represent in a context? How many solutions could exist for a system involving a quadratic and linear function? How do you know if a given point is a solution of a given system?	Why are solving systems of nonlinear functions different than systems of linear functions? Why are systems of equations used to model a situation?

Key Knowledge and Skills: My students will...	<i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i>
<ul style="list-style-type: none"> • Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. (MA10-GR.HS-S.2-GLE.4-EO.d.iii) • Create quadratic equations and inequalities in one variable and use them to solve problems. (MA10-GR.HS-S.2-GLE.4-EO.a.i) • Create quadratic equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. (MA10-GR.HS-S.2-GLE.4-EO.a.ii) • Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (MA10-GR.HS-S.2-GLE.4-EO.a.iv) • Determine an explicit expression, a recursive process, or steps for calculation from a linear or quadratic context. (MA10-GR.HS-S.2-GLE.1-EO.d.i.1) • Fit a linear or quadratic function to the data; use functions fitted to data to solve problems in the context of the data. (MA10-GR.HS-S.3-GLE.1-EO.b.ii.1) • Informally assess the fit of a function by plotting and analyzing residuals. (MA10-GR.HS-S.2-GLE.1-EO.b.ii.2) • Combine standard function types using arithmetic operations. (MA10-GR.HS-S.2-GLE.1-EO.d.i.2) • Identify the effect of a linear or quadratic graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, 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 for linear, quadratic, exponential, square root, cube root, piece wise, step and absolute value. (MA10-GR.HS-S.2-GLE.1-EO.e.i) • Graph linear and quadratic functions and show intercepts, maxima, and minima. (MA10-GR.HS-S.2-GLE.1-EO.c.i) • Interpret key features of graphs and tables, for a quadratic function that models a relationship between two quantities, in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. (MA10-GR.HS-S.2-GLE.1-EO.b.i) • Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. (MA10-GR.HS-S.2-GLE.1-EO.c.v.1) • Relate the domain of a quadratic function to its graph and, where applicable, to the quantitative relationship it describes. (MA10-GR.HS-S.2-GLE.1-EO.b.ii) • Calculate and interpret the average rate of change of a quadratic function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph (MA10-GR.HS-S.2-GLE.1-EO.b.iii) • Compare properties of two quadratic functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). (MA10-GR.HS-S.2-GLE.1-EO.c.v.3) 	

Curriculum Development Overview
Unit Planning for High School Mathematics

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<p>A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):</p>	<p><i>I know when solving a system of equations involving a quadratic and a linear function there may be one, two or no solutions.</i></p>
<p>Academic Vocabulary:</p>	<p>solve, create, determine, informally, fit, combine, identify, experiment, illustrate, explanation, graph, key features, increasing, decreasing, positive, or negative, estimate</p>
<p>Technical Vocabulary:</p>	<p>classes of functions, operations, functions, constants, translations, graph, quadratic functions, model, projective motion, symmetry, extreme values, average rates of change, systems of non-linear functions, solutions, symmetry, extreme values, linear equations, explicit expression, intercepts, factoring, completing the square, zeros, residuals, relative maximums, relative minimums, end behavior, periodicity, domain</p>

Curriculum Development Overview
Unit Planning for High School Mathematics

Unit Title	Independently Lucky		Length of Unit	4 weeks
Focusing Lens(es)	Decision-making Classification	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.HS-S.3-GLE.3	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> How does probability relate to obtaining car insurance? (MA10-GR.HS-S.3-GLE.3-IQ.3) Why is it hard for humans to determine if a set of numbers was created randomly? 			
Unit Strands	Statistics and Probability: Conditional Probability and the Rules of Probability			
Concepts	two-way frequency tables, associations, conclusions, categorical variables, unions, intersections, complements, events, subsets, sample space, independence, probabilities, products, conditional probability, given			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
Two-way frequency tables provide the necessary structure to make conclusions about the association of categorical variables. (MA10-GR.HS-S.3-GLE.3-EO.a.iv)	<p>How is conditional probability represented in a two-way frequency table?</p> <p>How do you determine the conditional probability of A given B from a frequency table?</p> <p>How do you determine if two events are independent from a frequency table?</p>	Why are two-way frequency tables useful in probability?
Unions, intersections and complements of events describe subsets of a sample space. (MA10-GR.HS-S.3-GLE.3-EO.a.i)	<p>How do the word “and” and “or” relate to unions and intersections?</p> <p>How are intersections and complements related?</p> <p>When is it appropriate to use unions, intersections, or complements in determining probability?</p>	Why is the addition rule related to unions, intersections and complements?
Mathematicians determine the independence of events A and B by examining if the product of the probabilities of A and B equals the probability of A and B occurring together. (MA10-GR.HS-S.3-GLE.3-EO.a.iii)	How can you determine if two events are independent?	Why are events independent if the product of the probabilities of A and B equals the probability of A and B occurring together?
Mathematicians find the probability of an event given the occurrence of another event through conditional probability. (MA10-GR.HS-S.3-GLE.3-EO.a.iii)	When do we use conditional probability?	How are independence and conditional probability related?

**Curriculum Development Overview
Unit Planning for High School Mathematics**

Key Knowledge and Skills: My students will...	<i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i>
<ul style="list-style-type: none"> • Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”). (MA10-GR.HS-S.3-GLE.3-EO.a.i) • Understand two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. (MA10-GR.HS-S.3-GLE.3-EO.a.i) • Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. (MA10-GR.HS-S.3-GLE.3-EO.a.ii) • Determine if two events are independent by showing that if two events A and B are independent then the probability of A and B occurring together is the product of their probabilities. (MA10-GR.HS-S.3-GLE.3-EO.a.ii) • Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. (MA10-GR.HS-S.3-GLE.3-EO.a.iv) • Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. (MA10-GR.HS-S.3-GLE.3-EO.a.v) • Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. (MA10-GR.HS-S.3-GLE.3-EO.b.i) • Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model. (MA10-GR.HS-S.3-GLE.3-EO.b.ii) • Analyze the cost of insurance as a method to offset the risk of a situation. (MA10-GR.HS-S.3-GLE.3-EO.c) * 	

Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline. EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: <i>“Mark Twain exposes the hypocrisy of slavery through the use of satire.”</i>	
A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	<i>I can determine if two events A and B are independent by determining if conditional probability of A given B is the same as the probability of A.</i>
Academic Vocabulary:	outcomes, describe, determine, construct, interpret, recognize, explain, find, apply, model, classified, categories
Technical Vocabulary:	Addition Rule, two-way frequency tables, associations, conclusions, categorical variables, unions, intersections, complements, events, subsets, sample space, independence, probabilities, products, conditional probability, given, random, event

* Denotes connection to Personal Financial Literacy (PFL)

Curriculum Development Overview
Unit Planning for High School Mathematics

Unit Title	Getting to the Root of the Problem		Length of Unit	5 weeks
Focusing Lens(es)	Structure Transformation	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.HS-S.1-GLE.1 MA10-GR.HS-S.2-GLE.1 MA10-GR.HS-S.2-GLE.3 MA10-GR.HS-S.2-GLE.4	
Inquiry Questions (Engaging- Debatable):	<ul style="list-style-type: none"> How did the ancient Greeks multiply binomials and find roots of quadratic equations without algebraic notations? (MA10-GR.HS-S.2-GLE.3-IQ.2) What is the best way to model simple projectile motion? (MA10-GR.HS-S.2-GLE.1-EO.c.v.1) 			
Unit Strands	Number and Quantity: The Complex Number System Algebra: Seeing Structure in Expressions Algebra: Reasoning with Equations and Inequalities			
Concepts	quadratic, expressions, equations, solutions, complex numbers, discriminant			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
Mathematicians transform quadratic expressions and equations to reveal underlying structures and solutions. (MA10-GR.HS-S.2-GLE.3-EO.a, d, e)	What are the different ways to solve quadratic equations? How is factoring used to solve a polynomial with a degree greater than two? When is it appropriate to simplify expressions? (MA10-GR.HS-S.2-GLE.3-IQ.1) What does it mean if a function is not factorable?	How can polynomial identities be used to describe numerical relationships? Why is the remainder theorem useful?
Complex numbers provide solutions for quadratic equations where the discriminant is less than zero. (MA10-GR.HS-S.1-GLE.1-EO.c, d)	How do you perform operations on complex numbers? When does a quadratic equation have a complex solution? What is an imaginary number? Does every complex number have an imaginary component?	Why do the properties of operations for rational numbers hold for complex numbers? Why might imaginary numbers be useful outside of mathematics? Why are complex numbers important? (MA10-GR.HS-S.1-GLE.1-IQ.4) Why are there more complex numbers than real numbers? (MA10-GR.HS-S.1-GLE.1-IQ.2)
Parts of an expression, interpreted as a single entity, reveal the underlying structure of an expression and illuminate ways to rewrite it. (MA10-GR.HS-S.2-GLE.3-EO.a.i)	What are the benefits of simplifying complicated expressions? What patterns exist when factoring quadratic equations?	How do you know if rewriting an expression will provide the information needed to solve the contextual problem?

Curriculum Development Overview
Unit Planning for High School Mathematics

The choice of an appropriate way to rewrite a quadratic expression can aid efficiency and accuracy when solving quadratic equations. (MA10-GR.HS-S.2-GLE.3-EO.b.i)	What is the difference between the methods for solving a quadratic equation? What does it mean if a function is not factorable? What information does completing the square for a quadratic function reveal? How do you know when a quadratic has a maximum or minimum?	Why is it beneficial to write quadratics in different forms? Why would you use a particular method for solving a quadratic equation?
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Key Knowledge and Skills: My students will...	<i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i>
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- Interpret parts of an expression, such as terms, factors, and coefficients in terms of its context. (MA10-GR.HS-S.2-GLE.3-EO.a.i.1)
- Interpret complicated quadratic expressions by viewing one or more of their parts as a single entity. (MA10-GR.HS-S.2-GLE.3-EO.a.i.2)
- Factor a quadratic expression to reveal the zeros of the function it defines. (MA10-GR.HS-S.2-GLE.3-EO.b.i.1)
- Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. (MA10-GR.HS-S.2-GLE.3-EO.b.i.2)
- Explain each step in solving a simple quadratic equations as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution and construct a viable argument to justify a solution method. (MA10-GR.HS-S.2-GLE.4-EO.b.i)
- Solve quadratic equations in one variable using the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions and derive the quadratic formula from this form. (MA10-GR.HS-S.2-GLE.4-EO.c.ii.1)
- Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. (MA10-GR.HS-S.1-GLE.1-EO.c.i)
- Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. (MA10-GR.HS-S.1-GLE.1-EO.c.ii)
- Solve quadratic equations with real coefficients that have complex solutions. (MA10-GR.HS-S.1-GLE.1-EO.d.i)
- Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation; recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b . (MA10-GR.HS-S.2-GLE.4-EO.c.ii.2, 3)

Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline.
EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: *“Mark Twain exposes the hypocrisy of slavery through the use of satire.”*

A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	<i>I completed the square of the quadratic in order to find the vertex of the parabola. I also could find the line of symmetry from this. I factored this equation in order to solve for its roots.</i>
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Academic Vocabulary:	Identify, symmetry, reveal, interpret, justify, explain, structure, graph, model, solve, graph, prove
Technical Vocabulary:	equations, transformations, expressions, structures, solutions, complex numbers, quadratic, discriminant, zeros, functions, imaginary number, roots, i , factor, factorization, degree, derive, parabola, complete the square, square root, maximum, minimum, vertex, equivalent. functions, axis of symmetry

Curriculum Development Overview
Unit Planning for High School Mathematics

Unit Title	Duck, Duck, Goose		Length of Unit	4 weeks
Focusing Lens(es)	Relationship Justification	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.HS-S.4-GLE.2	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> How can you determine the measure of something that you cannot measure physically? (MA10-GR.HS-S.4-GLE.2-IQ.1) What does it mean for two things to be the same? Are there different degrees of sameness? (MA10-GR.HS-S.4-GLE.1-IQ.3) 			
Unit Strands	Geometry: Similarity, Right Triangles, and Trigonometry			
Concepts	ratio, corresponding sides, corresponding angles, scale factor, similar figures, dilations, center of dilation, trigonometric ratios, right triangles, trigonometric functions			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
The ratio created by corresponding sides equals the scale factor of two similar figures. (MA10-GR.HS-S.4-GLE2-EO.a.i)	How can you determine an unknown side length of a figure using a similar figure with known side lengths and the scale factor?	Why are the ratios created by corresponding sides equivalent to the scale factor of two similar figures?
Dilations create similar figures based on a scale factor and center of dilation. (MA10-GR.HS-S.4-GLE2-EO.a.i)	What happens to a point on a line passing through the center of dilation? What happens to a line not passing through the center of dilation? How can you predict if dilation will make a line segment longer or shorter?	Why do dilations create similar figures? Why are angle measures preserved in dilation? Why is it necessary to have three pieces of information to prove congruency of triangles but it is sufficient to use two pieces to prove similarity?
The relationship between the side ratios and angles of a right triangle define the trigonometric functions. (MA10-GR.HS-S.4-GLE.2-EO.c)	What are the trigonometric ratios? What is the relationship of the sine and cosine of complementary angles?	How does similarity explain that the side ratios in right triangles are a function of the angles of the triangle? How do we know that the sine of all 30 degree angles is the same?
Mathematicians use similar triangles to prove generalizable relationships. (MA10-GR.HS-S.4-GLE.2-EO.b.i)	How can you use right triangle similarity to prove the Pythagorean Theorem? How can similar triangles be used to prove that a line parallel to one side of a triangle divides the other two proportionally?	Why are similar triangles the foundation for mathematical proofs about side lengths of triangles?

**Curriculum Development Overview
Unit Planning for High School Mathematics**

Key Knowledge and Skills: My students will...	<i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i>
<ul style="list-style-type: none"> • Verify experimentally the properties of dilations given by a center and a scale factor. (MA10-GR.HS-S.4-GLE.2-EO.a.i) • Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. (MA10-GR.HS-S.4-GLE.2-EO.a.ii), iii • Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. (MA10-GR.HS-S.4-GLE.2-EO.a.iv) • Prove theorems about triangles. (MA10-GR.HS-S.4-GLE.2-EO.b.i) • Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. (MA10-GR.HS-S.4-GLE.2-EO.b.ii) • Explain and use the relationship between the sine and cosine of complementary angles. ((MA10-GR.HS-S.4-GLE.2-EO.c.ii) • Understand through similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles (MA10-GR.HS-S.4-GLE.2-EO.c.i) • Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. (MA10-GR.HS-S.4-GLE.2-EO.c.iii) 	

<p>Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline. EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: <i>“Mark Twain exposes the hypocrisy of slavery through the use of satire.”</i></p>	
A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	<i>I know the sine and cosine of the acute angles in a isosceles right triangle are the same.</i>
Academic Vocabulary:	prove, congruence, transformations, verify, experimentally, properties, definitions, explain, solve, sufficient, necessary, right triangles,
Technical Vocabulary:	ratio, corresponding sides, corresponding angles, scale factor, similar figures, dilations, center of dilation, trigonometric ratios, complementary angles, sine, cosine, tangent, reference angle, trigonometric functions, acute angles, triangle mid-segment theorem, Pythagorean theorem, proportionality

Curriculum Development Overview
Unit Planning for High School Mathematics

Unit Title	Geometric Fashion Week		Length of Unit	3 weeks
Focusing Lens(es)	Structure Modeling	Standards and Grade Level Expectations Addressed in this Unit	MA10-GR.HS-S.1-GLE.2 MA10-GR.HS-S.4-GLE.4 MA10-GR.HS-S.4-GLE.5	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> How might surface area and volume be used to explain biological differences in animals? (MA10-GR.HS-S.4-GLE.3-IQ.1) 			
Unit Strands	Number and Quantity: Quantities Geometry: Geometric Measurement and Dimension Geometry: Modeling with Geometry			
Concepts	perimeter, area, volume, patterns, models, measurements, decisions			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
Underlying and related structures of perimeter, area and volume can reveal patterns within complex objects. (MA10-GR.HS-S.4-GLE.4-EO.a, b)	How does the relationship between the volumes of a cone and its corresponding cylinder help us find the volume of a pyramid? How is the area of an irregular shape measured? (MA10-GR.HS-S.4-GLE.4-IQ.2) How can surface area be minimized while maximizing volume? (MA10-GR.HS-S.4-GLE.4-IQ.3)	Why is the formula for the circumference of a circle necessary for deriving the area of a circle? Why does increasing the radius by a constant increase the volume of a cylinder more than increasing the height by the same constant?
Geometric models, chosen and created with the use of appropriate measurements deepen understandings of empirical situations and improve decision-making. (MA10-GR.HS-S.4-GLE.5-EO.a)	How are mathematical objects different from the physical objects they model? (MA10-GR.HS-S.4-GLE.5-IQ.1) How can the geometric concepts of area and volume model density? What makes a good geometric model of a physical object or situation? (MA10-GR.HS-S.4-GLE.5-IQ.2)	Why are ratios an important component of geometric modeling?

**Curriculum Development Overview
Unit Planning for High School Mathematics**

Key Knowledge and Skills: My students will...	<i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i>
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- Define appropriate quantities for the purpose of descriptive modeling. (MA10-GR.HS-S.1-GLE.2-EO.a.ii)
- Use geometric shapes, their measures, and their properties to describe objects. (MA10-GR.HS-S.4-GLE.5-EO.a.i)
- Apply concepts of density based on area and volume in modeling situations. (MA10-GR.HS-S.4-GLE.5-EO.a.ii)
- Apply geometric methods to solve design problems. (MA10-GR.HS-S.4-GLE.5-EO.a.iii)
- Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. (MA10-GR.HS-S.4-GLE.4-EO.a.i)
- Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. (MA10-GR.HS-S.4-GLE.4-EO.a.ii)

Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline.
 EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: *“Mark Twain exposes the hypocrisy of slavery through the use of satire.”*

A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	<i>I know increasing the radius by a constant will increase the volume of a cylinder more than increasing the height by the same constant because the radius is squared in the formula.</i>
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Academic Vocabulary:	perimeter, area, volume, patterns, models, measurements, decisions, apply, design problems, informal arguments,
Technical Vocabulary:	geometric properties, density, formulas, cylinders, pyramids, cones, spheres, circumference