Common Core Georgia Performance Standards
High School Mathematics
CCGPS Analytic Geometry - At a Glance

Common Core Georgia Performance Standards: Curriculum Map							
1st Semester				2nd Semester			
Unit 1	**Unit 2**	**Unit 3**	**Unit 4a**	**Unit 4b**	**Unit 5**	**Unit 6**	**Unit 7**
Similarity, Congruence, and Proof	**Right Triangle Trigonometry**	**Circles and Volume**	**Extending the Number System**	**Operations with Complex Numbers**	**Quadratic Functions**	**Modeling Geometry**	**Applications of Probability**
7 weeks	**3 weeks**	**5 weeks**	**2 weeks**	**1 week**	**10 weeks**	**2 weeks**	**3 weeks**
MCC9-12.G.SRT.1 MCC9-12.G.SRT.2 MCC9-12.G.SRT.3 MCC9-12.G.SRT.4 MCC9-12.G.SRT.5 MCC9-12.G.CO.6 MCC9-12.G.CO.7 MCC9-12.G.CO.8 MCC9-12.G.CO.9 MCC9-12.G.CO.10 MCC9-12.G.CO.11 MCC9-12.G.CO.12 MCC9-12.G.CO.13	MCC9-12.G.SRT.6 MCC9-12.G.SRT.7 MCC9-12.G.SRT.8	MCC9-12.G.C.1 MCC9-12.G.C.2 MCC9-12.G.C.3 MCC9-12.G.C.4 MCC9-12.G.C.5 MCC9-12.G.GMD.1 MCC9-12.G.GMD.2 MCC9-12.G.GMD.3 Transition Standards (12-14 only) MCC8.G.9	MCC9-12.N.RN.1 MCC9-12.N.RN.2 MCC9-12.N.RN.3 MCC9-12.A.APR.1	MCC9-12.N.CN.1 MCC9-12.N.CN.2 MCC9-12.N.CN.3	MCC9-12.N.CN.7 MCC9-12.A.SSE.1a,b MCC9-12.A.SSE.2 MCC9-12.A.SSE.3a,b MCC9-12.A.CED.1 MCC9-12.A.CED.2 MCC9-12.A.CED.4 MCC9-12.A.REI.4a,b MCC9-12.A.REI.7 MCC9-12.F.IF.4 MCC9-12.F.IF.5 MCC9-12.F.IF.6 MCC9-12.F.IF.7a MCC9-12.F.IF.8a MCC9-12.F.IF.9 MCC9-12.F.BF.1a,b MCC9-12.F.BF.3 MCC9-12.F.LE.3 MCC9-12.S.ID.6a	MCC9-12.A.REI.7 MCC9-12.G.GPE.1 MCC9-12.G.GPE.2 MCC9-12.G.GPE.4	MCC9-12.S.CP.1 MCC9-12.S.CP.2 MCC9-12.S.CP.3 MCC9-12.S.CP.4 MCC9-12.S.CP.5 MCC9-12.S.CP.6 MCC9-12.S.CP.7
Power Standards are highlighted above and are linked to the Unwrapped Standard. ***2 Buffer days are included after each Unit for Remediation and Enrichment*** ★ ***Making Mathematical Models***							

Adapted from GA DOE by

FORSYTH COUNTY SCHOOLS

Standards for Mathematical Practice	
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.

1st Semester	
Unit 1: Similarity, Congruence, and Proof	
Understand similarity in terms of similarity transformations **MCC9-12.G.SRT.1** Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. **MCC9-12.G.SRT.2** 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. **MCC9-12.G.SRT.3** Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. **Prove theorems involving similarity** **MCC9-12.G.SRT.4** Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity. **MCC9-12.G.SRT.5** Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. **Understand congruence in terms of rigid motions** **MCC9-12.G.CO.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	**MCC9-12.G.CO.7** Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. **MCC9-12.G.CO.**8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. **Prove geometric theorems** **MCC9-12.G.CO.9** Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. **MCC9-12.G.CO.10** Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180 degrees; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. **MCC9-12.G.CO.11** Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals. **Make geometric constructions** **MCC9-12.G.CO.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. **MCC9-12.G.CO.13** Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

<table>
<tr><th colspan="2">Unit 2: Right Triangle Trigonometry</th></tr>
<tr><td><u>Define trigonometric ratios and solve problems involving right triangles</u>
MCC9-12.G.SRT.6 Understand 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.
MCC9-12.G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles.
MCC9-12.G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.</td><td></td></tr>
<tr><th colspan="2">Unit 3: Circles and Volume</th></tr>
<tr><td><u>Understand and apply theorems about circles</u>
MCC9-12.G.C.1 Prove that all circles are similar.
MCC9-12.G.C.2 Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.
MCC9-12.G.C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
MCC9-12.G.C.4 Construct a tangent line from a point outside a given circle to the circle.
<u>Find arc lengths and areas of sectors of circles</u>
MCC9-12.G.C.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.</td><td><u>Explain volume formulas and use them to solve problems</u>
MCC9-12.G.GMD.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri’s principle, and informal limit arguments.
MCC9-12.G.GMD.2 Give an informal argument using Cavalieri’s principle for the formulas for the volume of a sphere and other solid figures.
MCC9-12.G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★
Transition Standard (Teach 2012-2013 only)
MCC8.G.9 Know the formula for the volume of spheres and use it to solve real-world and mathematical problems.</td></tr>
<tr><th colspan="2">Unit 4a: Extending the Number System</th></tr>
<tr><td><u>Extend the properties of exponents to rational exponents.</u>
MCC9-12.N.RN.1 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.
MCC9-12.N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.</td><td><u>Use properties of rational and irrational numbers.</u>
MCC9-12.N.RN.3 Explain why the sum or product of 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.
<u>Perform arithmetic operations on polynomials</u>
MCC9-12.A.APR.1 Understand that polynomial form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. (Focus on polynomial expressions that simplify to forms that are linear or quadratic in a positive integer power of x.)</td></tr>
</table>

2nd Semester	
Unit 4b: Operations with Complex Numbers	
Perform arithmetic operations with complex numbers. **MCC9-12.N.CN.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. **MCC9-12.N.CN.2** Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	**MCC9-12.N.CN.3** Find the conjugate of a complex number; use conjugates to find ~~moduli and~~ quotients of complex numbers.
Unit 5: Quadratic Functions	
Use complex numbers in polynomial identities and equations. **MCC9-12.N.CN.7** Solve quadratic equations with real coefficients that have complex solutions. **Interpret the structure of expressions** **MCC9-12.A.SSE.1** Interpret expressions that represent a quantity in terms of its context.★ *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **MCC9-12.A.SSE.1a** Interpret parts of an expression, such as terms, factors, and coefficients.★ *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **MCC9-12.A.SSE.1b** Interpret complicated expressions by viewing one or more of their parts as a single entity.★ *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **MCC9-12.A.SSE.2** Use the structure of an expression to identify ways to rewrite it. *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **Write expressions in equivalent forms to solve problems** **MCC9-12.A.SSE.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **MCC9-12.A.SSE.3a** Factor a quadratic expression to reveal the zeros of the function it defines.★ **MCC9-12.A.SSE.3b** Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.★ **Create equations that describe numbers or relationships** **MCC9-12.A.CED.1** Create equations and inequalities in one variable and use them to	**MCC9-12.F.IF.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.★ *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **MCC9-12.F.IF.6** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.★ *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **Analyze functions using different representations** **MCC9-12.F.IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **MCC9-12.F.IF.7a** Graph ~~linear and~~ quadratic functions and show intercepts, maxima, and minima.★ **MCC9-12.F.IF.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **MCC9-12.F.IF.8a** 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. **MCC9-12.F.IF.9** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **Build a function that models a relationship between two quantities** **MCC9-12.F.BF.1** Write a function that describes a relationship between two quantities.★ *(Focus on quadratic functions; compare with linear and exponential functions studied in*

solve problems. Include equations arising from ~~linear and~~ quadratic functions, ~~and simple rational and exponential functions.~~★ **MCC9-12.A.CED.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.★ *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **MCC9-12.A.CED.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **<u>Solve equations and inequalities in one variable</u>** **MCC9-12.A.REI.4** Solve quadratic equations in one variable. **MCC9-12.A.REI.4a** Use 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. Derive the quadratic formula from this form. **MCC9-12.A.REI.4b** Solve quadratic equations by inspection (e.g., for x^2 = 49), 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 ± bi for real numbers a and b. **<u>Solve systems of equations</u>** **MCC9-12.A.REI.7** Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. **<u>Interpret functions that arise in applications in terms of the context</u>** **MCC9-12.F.IF.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; ~~and periodicity.~~★	*Coordinate Algebra.)* **MCC9-12.F.BF.1a** Determine an explicit expression, a recursive process, or steps for calculation from a context. *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **MCC9-12.F.BF.1b** Combine standard function types using arithmetic operations. *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **<u>Build new functions from existing functions</u>** **MCC9-12.F.BF.3** Identify the effect on the 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. Include recognizing even and odd functions from their graphs and algebraic expressions for them. *(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)* **<u>Construct and compare linear, quadratic, and exponential models and solve problems</u>** **MCC9-12.F.LE.3** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.★ **<u>Summarize, represent, and interpret data on two categorical and quantitative variables</u>** **MCC9-12.S.ID.6** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.★ **MCC9-12.S.ID.6a** Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or chooses a function suggested by the context. Emphasize ~~linear,~~ quadratic, ~~and exponential~~ models.★
Unit 6: Modeling Geometry	
<u>Solve systems of equations</u> **MCC9-12.A.REI.7** Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. **<u>Translate between the geometric description and the equation for a conic section</u>** **MCC9-12.G.GPE.1** Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	**MCC9-12.G.GPE.2** Derive the equation of a parabola given a focus and directrix. **<u>Use coordinates to prove simple geometric theorems algebraically</u>** **MCC9-12.G.GPE.4** Use coordinates to prove simple geometric theorems algebraically. *(Restrict to context of circles and parabolas).*

Unit 7: Applications of Probability	
Understand independence and conditional probability and use them to interpret data **MCC9-12.S.CP.1** 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").★ **MCC9-12.S.CP.2** Understand that 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.★ **MCC9-12.S.CP.3** Understand the conditional probability of A given B as P(A 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.★	**MCC9-12.S.CP.4** 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.★ **MCC9-12.S.CP.5** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.★ **Use the rules of probability to compute probabilities of compound events in a uniform probability model** **MCC9-12.S.CP.6** 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.★ **MCC9-12.S.CP.7** Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.

CCGPS Unwrapped Standard   Forsyth County Schools

Content Area	Mathematics
Grade/Course	10/Analytic Geometry
Unit of Study	Unit 5: Quadratic Function
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.A.REI.4a Use the <u>method of completing the square</u> to transform any quadratic equation in x into an equation of the form $(x – p)^2=q$ that has the same solutions. Derive the <u>quadratic formula</u> from this form.
MCC9-12.A.REI.4b Solve <u>quadratic equation</u> by inspection (e.g., for $x^2=49$), 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 <u>complex solutions</u> and write them as for real numbers a and b.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Derive the quadratic formula by completing the square **Complete the square to solve quadratics** **Use the quadratic formula to solve quadratics** **Use radicals to solve quadratics** **Factor to solve quadratics** **Recognize when quadratics have complex solutions**	**Completing the Square** **Quadratic Formula** **Radicals** **Complex Solutions** **Factoring**	**Application(3)** **Analysis (2)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)

Derive the quadratic formula by completing the square. **Solve quadratics using radicals, factoring, completing the square, and quadratic formula.**	**What is the process to complete the square?** **What is an example of a quadratic you would solve using radicals?** **What is an example of a quadratic you would solve using factoring?** **What is an example of a quadratic you would solve using completing the square?** **What is an example of a quadratic you would solve using the quadratic formula?** **What is the discriminant?** **What does the discriminant reveal about how many and what types of solutions a quadratic equation has?**

Explanations and Examples

Students should solve by factoring, completing the square, and using the quadratic formula. The zero product property is used to explain why the factors are set equal to zero. Students should relate the value of the discriminant to the type of root to expect. A natural extension would be to relate the type of solutions to $ax^2 + bx + c = 0$ to the behavior of the graph of $y = ax^2 + bx + c$.

Value of Discriminant	Nature of Roots	Nature of Graph
$b^2 - 4ac = 0$	1 real roots	intersects *x*-axis once
$b^2 - 4ac > 0$	2 real roots	intersects *x*-axis twice
$b^2 - 4ac < 0$	2 complex roots	does not intersect *x*-axis

- **Are the roots of $2x^2 + 5 = 2x$ real or complex? How many roots does it have? Find all solutions of the equation.**
- **What is the nature of the roots of $x^2 + 6x + 10 = 0$? Solve the equation using the quadratic formula and completing the square. How are the two methods related?**

Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard   Forsyth County Schools

Content Area	Mathematics
Grade/Course	10/Analytic Geometry
Unit of Study	Unit 5: Quadratic Function
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.A.SSE.2 Use the structure of an expression to identify ways to rewrite it.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Rewriting Special Products in Factored Form	**Factoring Special Products** • **Difference of Two Squares** • **Perfect Square Trinomials**	**Comprehension (2)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Factoring Difference of Two Squares **Factoring Perfect Square Trinomials**	**How do you factor the difference of two squares?** **How do you factor a perfect square trinomial?**

Explanations and Examples

Students should extract the greatest common factor (whether a constant, a variable, or a combination of each). If the remaining expression is quadratic, students should factor the expression further.

Example: Factor $x^3 - 2x^2 - 35x$

Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard Forsyth County Schools

Content Area	Mathematics
Grade/Course	10/Analytic Geometry
Unit of Study	Unit 1: Similarity, Congruence, and Proof
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.G.CO.10 Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180 degrees; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Prove Triangle Theorems	**Triangle Theorems**	**Comprehension (2)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Sum of Interior Angles of a Triangle **Relationships of Base Angles of an Isosceles Triangles** **Relationships of Midsegments of a Triangle** **Medians of a Triangle**	**What is the sum of the interior angles of a triangle?** **What do you know about the base angles of an isosceles triangle?** **What is a midsegment of a triangle?** **What are the relationships that exist between the midsegment and the triangle?** **What is a median of a triangle?** **What is the point of concurrency of the medians of the triangle?**

Explanations and Examples

Students may use geometric simulations (computer software or graphing calculator) to explore theorems about triangles.

Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard Forsyth County Schools

Content Area	Mathematics
Grade/Course	9/Coordinate Algebra – 10/Analytic Geometry
Unit of Study	Unit 1: Relationships Between Quantities (Coordinate Algebra), Unit 5: Quadratic Functions (Analytic Geometry)
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Coordinate Algebra – Unit 1 • Create linear equations. • Create exponential equations. **Analytic Geometry – Unit 5** • Create quadratic functions. • Compare quadratic functions to linear functions.	**Coordinate Algebra – Unit 1** • Linear Equations • Exponential Equations **Analytic Geometry – Unit 5** • Quadratic Equations	**Synthesis (2)** **Applications (2)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Equations in two or more variables can be used to represent relationships. **Represent equations graphically on a labeled and scaled coordinate axes.** **Manipulate formulas to solve for indicated variables.** **The relationship of two or more variables can be represented graphically.**	**How do you represent relationships between quantities?** **How do I create equations in two or more variables to represent relationships between quantities?** **What the different ways to graph equations on a coordinate axes?** **What is the difference in the equations of a horizontal, vertical, and diagonal line?**

Explanations and Examples
Students may collect data from water that is cooling using two thermometers, one measuring Celsius, the other Fahrenheit. From this they can identify the relationship and show that it can be modeled with a linear function. **Lava coming from the eruption of a volcano follows a parabolic path. The height *h* in feet of a piece of lava *t* seconds after it is ejected from the volcano is given by** $h(t) = -16t^2 + 64t + 936$ **.** **After how many seconds does the lava reach its maximum height of 1000 feet?** **Write and graph an equation that models the cost of buying and running an air conditioner with a purchase price of $250 which costs $0.38/hr to run.** **Jeanette can invest $2000 at 3% interest compounded annually or she can invest $1500 at 3.2% interest compounded annually. Which is the better investment and why?**
Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard Forsyth County Schools

Content Area	Mathematics
Grade/Course	9/Coordinate Algebra, 10/ Analytic Geometry
Unit of Study	Unit 1: Relationships Between Quantities, Unit 5: Quadratic Functions
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.A.SSE.1. Interpret expressions that represent a quantity in terms of its context.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Coordinate Algebra – Unit 1 • Recognize different parts of an expression • Interpret linear and exponential expressions with integer exponents **Analytic Geometry – Unit 5** • Interpret quadratic functions • Compare quadratic functions to linear functions	**Coordinate Algebra – Unit 1** • Linear Expressions • Exponential Expressions **Analytic Geometry – Unit 5** • Quadratic Functions	**Knowledge(1)** **Comprehension(1)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Quantities are represented by algebraic expressions. **Identify the different parts of the expression and explain their meaning within the context of a problem.**	**What are algebraic expressions?** **What is a coefficient?** **What are the terms of a polynomial?** **How can you classify a polynomial by number of terms?** **How can you classify a polynomial by degree?**

Explanations and Examples
Students should understand the vocabulary for the parts that make up the whole expression and be able to identify those parts and interpret there meaning in terms of a context. **For example in the expression $P(1+r)^n$, *r* may be the interest rate and 1 + *r* may be described as the "growth factor."** **Understanding the order of operations is essential to unpacking the meaning of a complex algebraic expression and to develop a strategy for solving an equation.** **Using the commutative, associative and distributive properties enables students to find equivalent expressions, which are helpful in solving equations.** **Consider the formula Surface Area=2B+Ph** • **What are the terms of this formula?** • **What are the coefficients?** **Interpret the expression: . Explain the output values possible.**
Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard   Forsyth County Schools

Content Area	Mathematics
Grade/Course	10/ Analytic Geometry
Unit of Study	Unit 5: Quadratic Functions
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★
(Focus on quadratic functions; compare with linear and exponential functions studied in Coordinate Algebra.)
MCC9-12.A.SSE.3a Factor a quadratic expression to reveal the zeros of the function it defines.★
MCC9-12.A.SSE.3b Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.★

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Choose **Product** **Factor** **Complete the square**	**Equivalent forms of expressions** **Properties of the quantity represented by the expression** **Quadratic Expression to reveal zeros** **Reveal the maximum or minimum values**	**Comprehension(1)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Write expressions in equivalent forms by factoring to find the zeros of a quadratic function and explain the meaning of the zeros. **Given a quadratic function explain the meaning of the zeros of the function. That is if $f(x) = (x – c) (x – a)$ then $f(a) = 0$ and $f(c) = 0$.** **Given a quadratic expression, explain the meaning of the zeros graphically. That is for an expression $(x – a) (x – c)$, a and c correspond to the x-intercepts (if a and c are real).**	**What is the significance of factoring a quadratic function?** **What do the zeros reveal in a quadratic function?**

Write expressions in equivalent forms by completing the square to convey the vertex form, to find the maximum or minimum value of a quadratic function, and to explain the meaning of the vertex. **Use properties of exponents (such as power of a power, product of powers, power of a product, and rational exponents, etc.) to write an equivalent form of an exponential function to reveal and explain specific information about its approximate rate of growth or decay.**	

Explanations and Examples

Students will use the properties of operations to create equivalent expressions.

Examples:

- **Express $2(x^3 - 3x^2 + x - 6) - (x - 3)(x + 4)$ in factored form and use your answer to say for what values of x the expression is zero.**
- **Write the expression below as a constant times a power of x and use your answer to decide whether the expression gets larger or smaller as x gets larger.**
  - $\frac{(2x^3)^2(3x^4)}{(x^2)^3}$

Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard Forsyth County Schools

Content Area	High School Math Functions
Grade/Course	9/Coordinate Algebra; 10/Analytic Geometry
Unit of Study	Unit 3: Linear and Exponential Function, Unit 5: Quadratic Functions
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Analyze one function **Compare** algebraically, graphically, numerically in table, or by verbal descriptions	Coordinate Algebra-Unit 3 **Linear Functions** **Exponential Functions** Analytic Geometry-Unit 5 **Quadratic Functions** Linear Functions (review) Exponential Functions (review)	**Strategic Thinking (3)** **Synthesis (4)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Functions can be represented in four ways—VNAG—verbally, numerically, algebraically, and graphically. **Students should be able to determine which method might be the best for which property.** **Strategies for interpreting key features of representations.**	**What function family is being described?** **How do I find the maximum/minimum, average rate of change, x/y intercepts, domain, range, and number of roots of my function?** **How do I compare the key features of two functions represented in different ways?**

Explanations and Examples

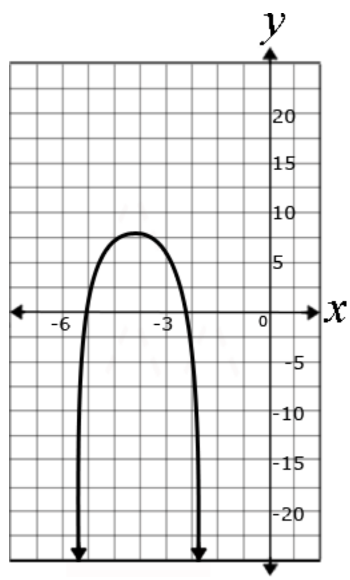
Example:

- **Examine the functions below. Which function has the larger maximum? How do you know?**

A.

$$f(x) = -2x^2 - 8x + 20$$

B.



Example:

Which has a greater slope, A or B?

A. **F(x) = 3x + 5 or**
B. **A function representing the number of bottle caps in a shoebox where 5 are added each time.**

Create a graphic organizer to highlight your understanding of functions and their properties by comparing two functions using at least two different representations.

Next step, create assessments and engaging learning experiences

Content Area	High School Math
Grade/Course	10/ Analytic Geometry
Unit of Study	Unit 3: Circles and Volume
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.G.C.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Derive the fact that the length of the arc intercepted by an angle is proportional to the radius **Define** radian measure of the angle as the constant of proportionality **Derive** formula for the area of a sector **Find** arc length of a circle **Find** area of a sector	**Intercepted arcs** **Formula for area and circumference of circle**	**Synthesis (4)** **Knowledge (1)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Similarity and proportionality can be used to derive and define the fact that the length of the arc intercepted by an angle is proportional to the radius and the radian measure of the angle as the constant of proportionality.	**How do you derive the fact that the length of the arc intercepted by an angle is proportional to the radius?** **How do you derive the formula for the area of a sector?** **Why are proportions a good way to derive area of a sector?**

Explanations and Examples
Students can use geometric simulation software to explore angle and radian measures and derive the formula for the area of a sector. **Begin by calculating lengths of arcs that are simple fractional parts of a circle (e.g. 1/6), and do this for circles of various radii so that students discover a proportionality relationship.** **Provide plenty of practice in assigning radian measure to angles that are simple fractional parts of a straight angle.** **Stress the definition of radian by considering a central angle whose intercepted arc has its length equal to the radius, making the constant of proportionality 1. Students who are having difficulty understanding radians may benefit from constructing cardboard sectors whose angles are one radian. Use a ruler and string to approximate such an angle.** **Compute areas of sectors by first considering them as fractional parts of a circle. Then, using proportionality, derive a formula for their area in terms of radius and central angle. Do this for angles that are measured both in degrees and radians and note that the formula is much simpler when the angels are measured in radians.** **Derive formulas that relate degrees and radians.** **Introduce arc measures that are equal to the) measures of the intercepted central angles in degrees or radians.** **Emphasize appropriate use of terms, such as, angle, arc, radian, degree, and sector.**
Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard   Forsyth County Schools

Content Area	Mathematics
Grade/Course	10/Analytic Geometry
Unit of Study	Unit 1: Similarity, Congruence, and Proofs
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.G.CO.9 Prove theorems about lines and angles.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Prove (line and angle theorems) **Prove vertical angles are congruent** **Prove when a transversal crosses a parallel lines, alternate interior angles and corresponding angles are congruent**	**Theorems (line and angle theorems)**	**Analysis(3)** **Synthesis(4)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
You can prove line and angle theorems in multiple ways by writing proofs. (including paragraph, flow charts, two-column format)	**How do you prove vertical angles are congruent?** **What angle relationships occur when a transversal crosses parallel lines?** **What relationship do the points on a perpendicular bisector have with the endpoints of the segment?**

Explanations and Examples

Students may use geometric simulations (computer software or graphing calculator) to explore theorems about lines and angles and then construct a formal proof.

Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard Forsyth County Schools

Content Area	Mathematics
Grade/Course	10/Analytic Geometry
Unit of Study	Unit 3: Circles and Volume
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

GMCC9-12. G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Use-(volume formulas)	**Volume Formulas- of cylinder, pyramids, cones, and spheres**	**Applications (2)**
Solve-(linear and exponential equations)	**Problems-apply formulas(solve for one variable)**	**Applications (2)**
Identify perpendicular height vs. slant height		

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Volume formulas can be used to solve problems.	**How do you use volume formulas to solve problems involving cylinders, pyramids, cones, and spheres?**

Explanations and Examples
Missing measures can include but are not limited to slant height, altitude, height, diagonal of a prism, edge length, and radius. **The formulas for volumes of cylinders, pyramids, cones and spheres can be applied to a wide variety of problems such as finding the capacity of a pipeline; comparing the amount of food in cans of various shapes; comparing capacities of cylindrical, conical and spherical storage tanks; using pyramids and cones in architecture; etc. Use a combination of concrete models and formal reasoning to develop conceptual understanding of the volume formulas.**
Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard　　　　Forsyth County Schools

Content Area	High School Math
Grade/Course	9/ Coordinate Algebra and 10/Analytic Geometry
Unit of Study	Unit 6: Connecting Algebra and Geometry through Coordinates, Unit 6: Modeling Geometry
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.G.GPE.4 Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, $\sqrt{3}$) lies on the circle centered at the origin and containing the point (0, 2).

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Use (coordinate formulas)	Coordinate Algebra: **distance formula , slope formula**	**Application (2)**
Prove (geometric theorems)	Analytic Geometry: **properties of circles and parabolas**	**Analysis (3)** **Synthesis (4)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Coordinates can be used to prove simple geometric theorems algebraically by applying the distance formula, slope formula, and midpoint formula.	**How do you prove geometric theorems using coordinates?**

Explanations and Examples
Students may use geometric simulation software to model figures and prove simple geometric theorems. **Example: Use slope and distance formula to verify the polygon formed by connecting the points (-3, -2), (5, 3), (9, 9), (1, 4) is a parallelogram.** **Prove or disprove that triangle ABC with coordinates A(-1,2), B(1,5), C(-2,7) is an isosceles right triangle.** **Take a picture or find a picture which includes a polygon. Overlay the picture on a coordinate plane (manually or electronically). Determine the coordinates of the vertices. Classify the polygon. Use the coordinates to justify the classification.**
Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard Forsyth County Schools

Content Area	High School Math
Grade/Course	10/Analytic Geometry
Unit of Study	Unit 1: Similarity, Congruence, and Proof
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Use (congruence and similarity criteria)	**Congruence criteria for triangles**	**Application (2)**
Solve (problems involving congruence and similarity)	**Similarity criteria for triangles**	**Application (3)**
Prove (relationships involving congruence and similarity		**Analysis (3) Synthesis (4)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Congruence and Similarity criteria can be used to solve problems and prove relationships in geometric figures.	**How do you solve problems using congruent and similar triangles?** **How do you prove congruent and similarity relationships in geometric figures?**

Explanation and Examples

Similarity postulates include SSS, SAS, and AA.

Congruence postulates include SSS, SAS, ASA, AAS, and H-L.

Students may use geometric simulation software to model transformations and demonstrate a sequence of transformations to show congruence or similarity of figures.

Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard Forsyth County Schools

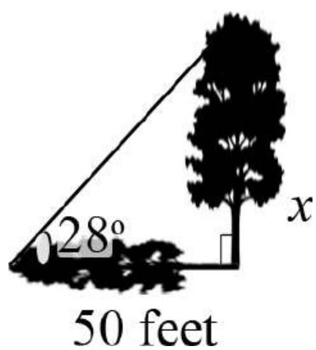
Content Area	High School Mathematics
Grade/Course	10/Analytic Geometry
Unit of Study	Unit 2: Right Triangle Trigonometry
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.G.SRT.8 – Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Apply (all methods listed) **Solve** (linear, exponential, polynomial, conic, radical, and rational equations	**Ratios** **Pythagorean Theorem** **Triangles** (right) **Problems** (applied, predictions, real-life)	**Application (2)** **Application (2)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Trigonometric ratios, inverses of trigonometric ratios, and the Pythagorean Theorem can be used to solve right triangles in applied problems by setting necessary equations equal to zero and isolating the variable. **The type of equation necessary to solve for a part of a right triangle can be determined by what parts in the triangle are given.** **Know the trigonometric ratios, Sine, Cosine, and Tangent.**	**How can you use the trigonometric ratios of cosine, sine, and tangent and the Pythagorean Theorem to solve right triangles in applied problems?** **How can you determine when to use "regular" trigonometric ratios, inverse trigonometric ratios, or the Pythagorean Theorem to solve for a part of a right triangle?**

Explanations and Examples
Have students make their own diagrams showing a right triangle with labels showing the trigonometric ratios. Although students like mnemonics such as SOHCAHTOA, these are not a substitute for conceptual understanding. Some students may investigate the reciprocals of sine, cosine, and tangent to discover the other three trigonometric functions. **Use the Pythagorean theorem to obtain exact trigonometric ratios for 30°, 45°, and 60° angles.** **Use cooperative learning in small groups for discovery activities and outdoor measurement projects.** **Have students work on applied problems and project, such as measuring the height of the school building or a flagpole, using clinometers and the trigonometric functions.** **Students may use graphing calculators or programs, tables, spreadsheets, or computer algebra systems to solve right triangle problems.** **Example:** • **Find the height of a tree to the nearest tenth if the angle of elevation of the sun is 28° and the shadow of the tree is 50 ft.** 
Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard   Forsyth County Schools

Content Area	Mathematics
Grade/Course	10th/Analytic Geometry
Unit of Study	Unit 5: Quadratic Functions
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.N.CN.7 Solve quadratic equations with real coefficients that have complex solutions.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Solve (quadratic equations with non-integer solutions)	**Quadratic Equations** (with real coefficients) **Solutions** (complex and solvable by quadratic formula)	**Application** (2)

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Quadratic formula can be used to solve quadratic equations with complex solutions. **Recognize the form of a complex number.**	**How do you solve quadratic equations with real coefficients that have solution of the form a + bi and a – bi?** **What is a complex solution?** **What mathematical process can be used to solve quadratic equations with non-integer solutions?**

Explanations and Examples

Examples:

- **Within which number system can $x^2 = -2$ be solved? Explain how you know.**
- **Solve $x^2 + 2x + 2 = 0$ over the complex numbers.**
- **Find all solutions of $2x^2 + 5 = 2x$ and express them in the form $a + bi$.**

Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard Forsyth County Schools

Content Area	Mathematics
Grade/Course	10 / Analytic Geometry
Unit of Study	Unit 4: Extending the Number System
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Use properties of exponents to rewrite radical and rational exponent expressions in multiple forms.	**Properties of Exponents** **Expressions** **Radicals** **Rational Exponents**	**Application (2)**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Properties of exponents can be applied to write radical and rational exponent expressions in various forms. **Convert from radical representation to using rational exponents and vice versa.** **Know equivalent expressions for real numbers to include radicals and numbers in exponential form.**	**How do you write radical expressions in exponential form?** **How do you determine when a rational exponential expression can be rewritten in its radical form?** **How do you write a rational exponential expression in its radical form?**

Explanations and Examples
Examples: • $\sqrt[3]{5^2} = 5^{\frac{2}{3}}$ **;** $5^{\frac{2}{3}} = \sqrt[3]{5^2}$ • **Rewrite using fractional exponents:** $\sqrt[5]{16} = \sqrt[5]{2^4} = 2^{\frac{4}{5}}$ • **Rewrite** $\frac{\sqrt{x}}{x^2}$ **in at least three alternate forms.** **Solution:** $x^{-\frac{3}{2}} = \frac{1}{x^{\frac{3}{2}}} = \frac{1}{\sqrt{x^3}} = \frac{1}{x\sqrt{x}}$ • **Rewrite** $\sqrt[4]{2^{-4}}$ **using only rational exponents.** • **Rewrite** $\sqrt[3]{x^3+3x^2+3x+1}$ **in simplest form.** **Stress the two rules of rational exponents: 1) the numerator of the exponent is the base's power and 2) the denominator of the exponent is the order of the root. When evaluating expressions involving rational exponents, it is often helpful to break an exponent into its parts – a power and a root – and then decide if it is easier to perform the root operation or the exponential operation first.** **Model the use of precise mathematics vocabulary (e.g., base, exponent, radical, root, cube root, square root etc.).**
Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard Forsyth County Schools

Content Area	Mathematics
Grade/Course	10/Analytic Geometry
Unit of Study	Unit 7: Applications of Probability
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.S.CP.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Conditional Probability **Independence**	**Recognize** **Explain**	**(2) Basic Application**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
How to describe a sample space and its related events using lists, tree diagrams, principle of counting, Venn Diagrams, and two-way tables. **How and when to use the multiplication rule to determine joint probability of independent events.** **How and when to use conditional probability formulas to fid joint probability of dependent events and conditional probabilities.** **How to use two-way tables to determine simple, joint, and conditional probabilities for a given situation.**	**How do I find the sample space of an everyday event?** **How do I calculate probabilities of independent events?** **What is an Independent Event?** **How do I calculate probabilities of dependent events?**

Explanations and Examples
Examples: • **What is the probability of drawing a heart from a standard deck of cards on a second draw, given that a heart was drawn on the first draw and not replaced? Are these events independent or dependent?** • **At Johnson Middle School, the probability that a student takes computer science and French is 0.062. The probability that a student takes computer science is 0.43. What is the probability that a student takes French given that the student is taking computer science?**
Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard Forsyth County Schools

Content Area	Mathematics
Grade/Course	10/Analytic Geometry
Unit of Study	Unit 7: Applications of Probability
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.S.CP.7 Apply the addition rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Apply **Interpret**	**Addition Rule**	**(2) Basic Application**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
How to use the addition rule appropriately. **Use scenarios that would require the addition rule and understand what the components of that rule mean in the given scenario.**	**When and how do I use the addition rule?**

Explanations and Examples

Students could use graphing calculators, simulations, or applets to model probability experiments and interpret the outcomes.

Example:

- **In a math class of 32 students, 18 are boys and 14 are girls. On a unit test, 5 boys and 7 girls made an A grade. If a student is chosen at random from the class, what is the probability of choosing a girl or an A student?**

Next step, create assessments and engaging learning experiences

CCGPS Unwrapped Standard   Forsyth County Schools

Content Area	Mathematics
Grade/Course	10/Analytic Geometry
Unit of Study	Unit 5: Quadratic Function
Duration of Unit	

Insert a CCGPS standard below (include code). **CIRCLE** the **SKILLS** that students need to be able to do and **UNDERLINE** the **CONCEPTS** that students need to know.

MCC9-12.S.ID.6 a Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize ~~linear~~, quadratic, and ~~exponential~~ models.

Skills (what students must be able to do)	**Concepts** (what students need to know)	**DOK Level / Bloom's**
Represent Data **Describe Relations** **Fit a Function** **Solve problems in context**	**Quantitative Variables** **Scatter Plot** **Quadratic Model**	**(1) Knowledge and Comprehension** **(2) Basic Application**

Step 5: Determine BIG Ideas (enduring understandings students will remember long after the unit of study)	**Step 6: Write Essential Questions** (these guide instruction and assessment for all tasks. The big ideas are answers to the essential questions)
Represent data using scatter plots **Fit quadratic functions to data** **Solve problems in context using fitted function**	**How can I represent two quantitative variables to see if they are related?** **How do I fit a function to a scatter plot?** **How can I use a fitted function to solve real world problems?**

Explanations and Examples

The residual in a regression model is the difference between the observed and the predicted y for some x(y the dependent variable and x the independent variable).
So if we have a model $y = ax + b$, and a data point (x_i, y_i) the residual is for this point is: $r_i = y_i - (ax_i + b)$.
Students may use spreadsheets, graphing calculators, and statistical software to represent data, describe how the variables are related, fit functions to data, perform regressions, and calculate residuals.

Example:

- **Measure the wrist and neck size of each person in your class and make a scatterplot. Find the least squares regression line. Calculate and interpret the correlation coefficient for this linear regression model. Graph the residuals and evaluate the fit of the linear equations.**

Next step, create assessments and engaging learning experiences