

Course Title:	Algebraic and Geometric Connections (A)
Grade(s):	10-12

Course Description	
This course is for students who have struggled in Algebra I and Geometry. Each unit in the course focuses on strengthening the mathematical skills students learned in Algebra I and Geometry through career-related applications: agriculture and agribusiness, business and marketing, health occupations, home economics, and industrial technology. Each unit of study will have lessons focused on mathematical skills, followed by laboratory activities and application problems. Units of study may include: shapes in two dimensions, shapes in three dimensions, ratios and proportions, scale drawings, using formulas, problems that involve linear equations, graphing data, solving problems with nonlinear equations, working with statistics, using right triangle relationships, geometry in the workplace, and working with spreadsheets. *Not NCAA Approved Course Units: 1. Writing & Solving Equations 2. Linear Functions & Graphs 3. Linear Systems 4. Ratios and Proportions 5. Two- and Three-Dimensional Shapes 6. Exponents, Exponential Functions, and Radicals 7. Quadratic Functions 8. Introduction to Polynomial Functions 9. Probability and Statistics	
Approved Curricular Materials/Textbook(s)	

Unit Title	Unit Description (Include Unit Objectives)	Unit Pacing
Unit 1:	This unit connects and extends the understanding of variables, expressions, and	3 weeks

WRITING & SOLVING EQUATIONS	real number operations to solve equations and proportions. The unit builds on the understanding of equivalence and how this concept applies in solving equations and proportions. Students will review different techniques and processes to solve one-step and two-step equations, and will apply these skills to basic application problems. Unit Topics Include: • Operations on Real Numbers • Solving Linear Equations • Solving Equations with a Variable on Both Sides • Literal Equations and Formulas • Applications of Linear Equations	(August - September)
Unit 2: LINEAR FUNCTIONS & GRAPHS	The unit focuses on extending students' understanding of linear equations. Students analyze descriptions of lines and write their equations in different forms: Slope-Intercept Form, Point-Slope Form, and Standard Form. Students will learn that the choice of the form is dependent on the given information, and that any form can be converted to another form using the properties of equality. Unit Topics Include: • Slope • Slope-Intercept Form • Point-Slope Form • Standard Form • Parallel and Perpendicular Lines • Scatter Plots / Lines of Best Fit	4 weeks (September - October)
Unit 3: LINEAR SYSTEMS	Students will extend their understanding of solving equations to solving systems of equations. They will begin the unit by developing a conceptual understanding of what is meant by the solution to a system of equations. Students learn different methods to solve systems of linear equations, and can identify when each solution method is most useful. They will solve systems of equations graphically and by several algebraic methods, and will be able to identify when systems of linear equations have one, none, or infinite solutions.	4 weeks (October - November)

	Students will also learn how to use matrices to solve systems of equations Unit Topics Include: • Solving systems of two equations using data tables • Solving systems of two equations graphically (by hand and with a graphing utility) • Solving systems of two equations by elimination • Solving systems of two equations by substitution • Solving systems of three equations in three variables algebraically • Introduction to matrices • Operations with matrices • Using matrices to solve systems of equations	
Unit 4: RATIOS & PROPORTIONS	The concepts of ratios and proportions are fundamental in a student's ability to work with rational functions in Algebra 2 and to understand similarity and the Trigonometric Ratios in Geometry and Precalculus. They are also important in understanding percentages. In this unit, students will review the skills needed to work with ratios and proportions and reinforce their understanding of how ratios and proportions are used in a variety of real-world applications. Unit Topics Include: • Solving Rational Equations • Working with Percentages • Similarity in Geometric Shapes • Special Triangles • Trigonometric Ratios • Using Ratios in Unit Conversions	4 weeks (November - December)
Unit 5: TWO- & THREE-DIMENSIONAL	This unit focuses on the real-world applications of two- and three-dimensional geometry. Students will review the basic properties of several shapes and the skills associated with finding the perimeter and area of these two-dimensional shapes. They will also examine the properties of three-dimensional objects and	4 weeks (December - January)

SHAPES	use the formulas for surface area and volume. Unit Topics Include: • Perimeter and Area • Right Triangles - Pythagorean Theorem & Simplifying Radicals - Trigonometric Ratios • Surface Area and Volume • Rewriting literal equations to solve for a particular variable • Unit Conversions • Simplifying Square Roots	
Unit 6: EXPONENTS, EXPONENTIAL FUNCTIONS, & RADICALS	In this unit, students extend their knowledge of functions to include exponential functions. Students use the properties of exponents to simplify expressions and learn to identify, write, graph, and transform exponential functions. Students use exponential functions to model real-world situations and make predictions. In Algebra 1, students used multiple representations to model exponential functions arising from real-world phenomena, including population change, interest on investments, and radioactive decay. Similar to their work with linear functions, students use recursive thinking to generate y-values in a table for exponential functions. They notice that, instead of a constant rate of change like linear functions, exponential functions have a constant growth/decay factor. Students describe recursive thinking with statements like, “to get the NEXT y-value, I multiply the y-value I have NOW by the growth factor of 1.4.” Eventually, students build their skills in writing explicit representations purely from contexts. To do so, students distinguish between rates and factors and learn, for example, that a growth rate of 2% equates to a growth factor of 1.02. Unit Topics Include: • Properties of Exponents & Rational Exponents • Exponential Functions • Exponential Growth and Decay • Geometric Sequences • Transformations of Exponential Functions	5 weeks (January - February)

Unit 7: QUADRATIC FUNCTIONS	The unit focuses on extending students' previous understanding of functions to include quadratic functions: graphing them, using them to model real-world situations, and comparing them to linear and exponential functions. Students learn to solve quadratic equations using tables, graphs, and factoring. Students also solve quadratic equations using square roots, completing the square, and the quadratic formula. Students will study quadratic functions represented algebraically in several forms: standard/polynomial form, $f(x) = ax^2 + bx + c$; factored form, $f(x) = a(x - p)(x - q)$; and vertex form, $f(x) = a(x - h)^2 + k$. They will use graphing utilities to analyze the graphs and tables for each of these forms and identify what each form reveals about the function. Once they understand the usefulness of different forms, students will employ algebraic skills to generate equivalent forms. Unit Topics Include: ● Solving Quadratic Equations Using Graphs and Tables - Using a Graphing Utility ● Solving Quadratic Equations by Factoring - Greatest Common Factors - Difference of Two Squares - Quadratic Trinomials ● Solving Quadratic Equations Using Square Roots / Simplifying Radicals ● Completing the Square / Rewriting Quadratic Expressions ● The Quadratic Formula and the Discriminant / Simplifying Radicals ● Key Features of a Quadratic Function ● Quadratic Functions in Vertex Form ● Quadratic Functions in Factored Form / Intercept Form ● Quadratic Functions in Standard Form ● Modeling with Quadratic Functions ● Linear, Exponential, and Quadratic Models	8 weeks (March - April)
Unit 8:	This unit moves beyond simple lines and curves to understand more complex "shapes" in math. Think of polynomials like LEGO sets. Just like you can take	4 weeks

INTRODUCTION TO POLYNOMIAL FUNCTIONS	basic bricks and snap them together to build something massive—like a skyscraper or a spaceship—polynomials take simple numbers and variables and combine them to create complex shapes and patterns. Students learn how the "Degree" (the highest exponent) acts like a remote control for the graph—telling it which way to point (end behavior), how many times to turn, and how many zeros the function has. Students also learn how to find the zeros of these functions. In addition, students explore the basics of Polynomial functions: learning to add, subtract, and multiply polynomials; using what we know about quadratic equations to break bigger polynomials into smaller "factors"; and using the "zeros" from equations to sketch accurate graphs on paper without needing a calculator. This unit focuses on practical skills that connect what students see in an equation to what they see on a graph: Unit Topics Include: • The Language of Polynomials: Identifying terms, coefficients, and the Leading Coefficient • The Degree of a polynomial • Sketching Polynomials • Polynomial Arithmetic: Addition/Subtraction: Focusing on "combining like terms" (a carry-over from Algebra 1) • Multiplying Polynomials • Division Basics: Introducing Synthetic Division • Factoring - Review of Quadratics	(April - May)
Unit 9: PROBABILITY & STATISTICS (Time Permitting)	This unit introduces students to data collection and analysis. Students will learn the vocabulary of statistics, different ways of collecting data, and different ways of representing data. Probability is the mathematical study of how likely an event is to occur. This unit will introduce students to the basic vocabulary associated with probability and how to calculate the probability of an event given different scenarios.	2 weeks (May - June)

