

**Course Title:** Pre-Algebra  
**Course Provider:** Aventa  
**DESE code #:** 115810  
**Number of Semesters:** Two  
**Per Semester Cost:** \$299.00

**Prerequisites:**

None

**Course Description:**

This course builds upon the essential skills or arithmetic as they apply to algebra. Real numbers and linear equations, linear inequalities, factoring, fractions, graphing and some elements of geometry are stressed.

**Course Syllabus/Outline:**

**Semester 1**

Basics

- Integer math, including addition, subtraction, multiplication, and division of positive and negative integers, and orders of operations
- Absolute values
- Positive exponents, and exponents in orders of operations
- Factors, prime numbers, prime factors, GCF, and LCM

Fractions

- Fractions as division problems, reducing fractions using prime factors, mixed numbers, and improper fractions
- Multiplying and dividing fractions
- Adding and subtracting fractions
- Negative exponents and multiplying exponents

Decimals and Percents

- Decimal numbers
- Converting fractions to decimals and decimal to fractions
- Number sense regarding decimals
- Percents
- Converting decimals to percents and percents to decimals
- Converting fractions to percents and percents to fractions

Word Problems

- Translating English word problems into math equations
- Creating and using a translation dictionary
- Strategies for problems solving

**Semester 2**

More Number Basics

- Number properties
- Rounding
- Significant digits
- Practicing skills from last semester

Polynomials

- Definitions
- Adding and subtracting polynomials
- Multiplying and dividing polynomials
- Evaluating polynomials
- Practicing skills from last semester

Factoring and Basic Geometry

- Factoring basics

- Factoring polynomials
- Basic geometric shapes
- Formulas for perimeter and area
- Right triangles and the Pythagorean Theorem
- Practicing skills from last semester

#### Equations

- Solving equations
- Checking your work
- Cartesian coordinate system
- Plotting points
- Linear equations
- Graphing linear equations
- Solving linear equations

#### Probability and Data Analysis

- Definition of probability
- Expressing probabilities as fractions, decimals, and percents
- Graphical data representations
- Making predictions from data
- Mean, median, and mode
- Data analysis projects

#### **Special notes from evaluation team:**

For either 8<sup>th</sup> or 9<sup>th</sup> graders.

**Course Title:** Algebra I  
**Course Provider:** Florida Virtual  
**DESE code #:** 115810  
**Number of Semesters:** Two  
**Per Semester Cost:** \$375.00

**Prerequisites:**

Successful completion of 7th grade mathematics.

**Course Description:**

Algebra I is the foundation! The skills you'll acquire in this course contain the basic knowledge you'll need for all your high school math courses. Relax! This stuff is important, but everyone can do it. Everyone can have a good time solving the hundreds of real-world problems that are answered with algebra.

Each module in this course is presented in a step-by-step way right on your computer screen. You won't have to stare at the board from the back of a classroom. There are even hands-on labs to make the numbers, graphs and equations more real. It's all tied to real-world applications like sports, travel, business and health.

This course is designed to give you the skills and strategies for solving all kinds of mathematical problems. It will also give you the confidence that you can handle everything that high school math has in store for you.

**Course Syllabus/Outline:**

**Segment 1**

- Data Tables [creating and interpreting]
- Venn diagrams and sets
- Ratios, Percentages, and Fractions [general review]
- Grouping Numbers [real, rational, irrational, integers, whole, counting]
- Order of Operations
- Translating English to Algebraic Equations
- Absolute Value [evaluating expressions]
- Exponents [negative exponents, fractional exponents, 0 power]
- Naming Rules Using Algebraic Properties
- Combining Like Terms
- Solving Equations [one step and multi-step linear equations]
- Solving Absolute Value Equations
- Solving Literal Equations [variables only]
- Inverse and Direct Variation
- Relations and Functions [notating and evaluating]
- Applying Distance Formula
- Linear Equations slope intercept form and graphing components]
- Slopes and Intercepts [using standard form and the point slope formula]
- Advanced Slope
- Writing Equations of Lines
- Graphing Lines [three different methods, parallel and perpendicular lines]
- Applying Linear Equations
- Systems of Equations [solving simultaneous equations through addition or substitution method]

**Segment 2**

- Defining Polynomials
- Adding and Subtracting Polynomials
- Multiplying and Dividing Polynomials

- Powers
- FOIL
- Radical Expressions [multiplying, dividing, adding, subtracting]
- Pythagorean Theorem
- Areas and Volumes of Cylinders
- Greatest Common Factor
- Factoring By Grouping
- Factoring Trinomials [multiple methods]
- Solve Equations by Factoring
- Solving Quadratics [by factoring and the quadratic formula]
- Discriminant
- Analyzing Graphs of Quadratic Equations
- Simplifying Rational Expressions
- Multiplying and Dividing Rational Expressions
- Adding and Subtracting Rational Expressions
- Solving Equations With Rational Expressions
- Scientific Notation
- Graphing Inequalities on a Number Line
- Solving Inequalities
- Solving Systems of Inequalities
- Graphing Systems of Inequalities

**Special notes from evaluation team:**

**Course Title:** Algebra I Foundations  
**Course Provider:** Aventa  
**DESE code #:** 115810  
**Number of Semesters:** Two  
**Per Semester Cost:** \$299.00

**Prerequisites:**

Successful completion of 7<sup>th</sup> grade mathematics.

**Course Description:**

The purpose of this course is to allow the student to gain mastery in working with and evaluating mathematical expressions, equations, graphs, and other topics in a year long algebra course. Topics included are real numbers, simplifying real number expressions with and without variables, solving linear equations and inequalities, solving quadratic equations, graphing linear and quadratic equations, polynomials, factoring, linear patterns, linear systems of equality and inequality, simple matrices, sequences, and radicals. Assessments within the course include multiple-choice, shortanswer, or extended response questions. Also included in this course are self-check quizzes, audio tutorials, and interactive games.

The course content has been appropriately chunked into smaller topics to increase retention and expand opportunities for assessment. With each topic, quizzes are presented to the student. Audio readings are included with every portion of content, allowing auditory learners the opportunity to engage with the course. Test pools and randomized test questions are utilized in quizzes as well as unit exams, ensuring that students taking the course will not be presented with the same exams. Additionally, the course includes additional practice activities (such as cloze activities), as well as pre-topic vocabulary lists, that introduce key vocabulary in English and in Spanish.

**Course Objectives:**

After completing this course, students will be able to:

- Read, write, evaluate, and understand the properties of mathematical expressions including real numbers, radicals, and polynomials
- Add, subtract, multiply, and divide radical expressions, polynomials, and polynomial expressions
- Read, write, solve, and graph linear and quadratic equations and inequalities
- Students will solve absolute value equations and inequalities
- Work effectively with ratios and direct and inverse variation
- Solve systems of linear equations and inequalities
- Work with arithmetic sequences and linear patterns
- Understand basic statistics including measures of central tendencies and box plots
- Understand different types of graphs, including histograms, line graphs, circle graphs, and stem-and-leaf plots

**Course Syllabus/Outline:**

**Semester 1**

Numbers and Expressions

- Evaluating Expressions
- Some Useful Properties
- Integers
- Exponents and Roots
- Logic and Graphs

Real Numbers

- Rational Numbers
- Addition and Subtraction of Rational

Numbers

- Multiplication and Division of Rational Numbers

- Estimation and Problem Solving
- Closure and Properties of Equality

#### Equations

- Equations
- Multi-Step Problems
- Ratios, Proportions and Percent
- Problem Solving

#### Functions and Linear Equations

- The Coordinate Plane and Relations
- Graphing Linear Equations
- Patterns and Sequences
- Linear Equations
- Data

#### Inequalities

- Simple Inequalities
- Multi-Step Inequalities
- Absolute Value
- Graphing Inequalities in Two Variables

#### **Semester 2**

#### Solving Systems of Linear Equations and Inequalities

- Graphing Systems of Equations
- Substitution
- Elimination and Matrices
- Graphing Inequalities
- Statistics and Box and Whiskers

#### Polynomials and Factoring

- Scientific Notation
- Polynomials and Addition and Subtraction
- Multiplying Polynomials
- Factors and GCF
- Factoring Trinomials
- Special Factors

#### Quadratic Functions and Radicals

- Quadratic Functions
- Solving Quadratic Equations
- Radicals and Radical Operations
- Radical Equations

#### Rational Expressions

- Inverse Variation
- Multiplying and Dividing Rational Expressions
- Adding and Subtracting Rational Expressions
- Solving Rational Equations

#### **Special notes from evaluation team:**

**Course Title:** Algebra II  
**Course Provider:** Aventa  
**DESE code #:** 115810  
**Number of Semesters:** Two  
**Per Semester Cost:** \$299.00

**Prerequisites:**

Successful completion of Algebra I and Geometry.

**Course Description:**

In this course students will use their prior knowledge from previous courses to learn and apply Algebra II skills. This course will include topics such as functions, radical functions, rational functions, exponential and logarithmic functions, trigonometry, geometry, conic sections, systems of equations, probability, and statistics. Students will apply the skills that they learn in this course to real world situations.

**Course Objectives:**

After completing this course students will be able to:

- Understand the major topics in Algebra II
- Identify how the major topics in Algebra II relate to real world situations
- Apply the topics in Algebra II to various problems
- Explain how the topics in Algebra II relate to the greater context of mathematics

Note: Java is needed for the embedded graphing calculator applet (GCalc). A free download is available at <http://www.java.com/en/download/>.

**Course Syllabus/Outline:**

**Semester One**

**UNIT I: Linear and Quadratic Functions**

Section 1 - Functions and Relations

Section 2 - Solving Linear Equations and Inequalities

Section 3 - Writing and Graphing Linear Equations and Inequalities

Section 4 - Graphing Quadratic Functions

Section 5 - Solving Quadratic Equations and Inequalities

Section 6 - Graphing Zeros and Min/Max Values

Section 7 - Determining a Quadratic Function

**UNIT II: Radical Functions**

Section 1 - Roots and Properties of Exponents

Section 2 - Graphing Radical Functions and Domain and Range

Section 3 - Solving Radical Equations

**UNIT III: Rational Functions**

Section 1 - Direct and Inverse Variation

Section 2 - Graphing Rational Functions and Domain and Range

Section 3 - Solving Rational Equations

**UNIT IV: Exponential and Logarithmic Functions**

Section 1 - Comparing Exponential and Logarithmic Functions

Section 2 - Graphing Exponential Functions and Domain and Range

Section 3 - Exponential Growth and Decay

Section 4 - Graphing Logarithmic Functions and Domain and Range

Section 5 - Solving Exponential and Logarithmic Equations

**UNIT V: Trigonometric Functions**

Section 1 - Right Triangle Trigonometry

Section 2 - Basic Angles and Radian Measure

Section 3 - Trigonometric Values in all Four Quadrants

Section 4 - Inverse Trigonometric Values

Section 5 - Graphing Trigonometric Functions

**Semester Two**

**UNIT VI: Systems of Equations and Inequalities**

Section 1 - Matrices and Determinants

Section 2 - Systems of Equations

Section 3 - Systems of Inequalities

Section 4 - Systems of Equations with Three Variables

**UNIT VII: Geometry**

Section 1 - Constructing and Transforming Geometric Shapes

Section 2 - Geometry of Quadrilaterals

Section 3 - Geometry of Triangles

Section 4 - Geometry of Circles

**UNIT VIII: Conic Sections**

Section 1 - Introduction to Conic Sections

Section 2 - Parabolas

Section 3 - Circles

Section 4 - Ellipses

Section 5 - Hyperbolas

**UNIT IX: Probability and Statistics**

Section 1 - Determining Probability

Section 2 - Permutations and Combinations

Section 3 - Binomial Theorem

Section 4 - Scatterplots and Lines of Best Fit

Section 5 - Scatterplots and Curves of Best Fit

Section 6 - Sampling Methods and Experimental Designs

Section 7 - The Normal Curve

**UNIT X: Patterns and Sequences, Logic and Reasoning**

Section 1 - Arithmetic Sequences and Series

Section 2 - Geometric Sequences and Series

Section 3 - Logic

**Special notes from evaluation team:**

**Course Title:** Algebra II Honors  
**Course Provider:** Connections Academy  
**DESE code #:** 115810  
**Number of Semesters:** Two  
**Per Semester Cost:** \$435.00

**Prerequisites:**

Successful completion of Algebra 1 and Geometry

**Course Description – Semester 1:**

Students continue their exploration of higher-level mathematics in this comprehensive Honors course. After reviewing concepts from Algebra 1, students in Honors Algebra 2 A move into studying linear systems, graphing, and matrices. Students build upon previous knowledge of quadratic equations and functions and begin to examine polynomials and their functions. Students also study radical functions and rational exponents in preparation for working with exponential and logarithmic functions. This Honors level course includes more rigorous curriculum and greater opportunities for students explore concepts and demonstrate critical thinking skills.

**Course Syllabus/Outline – Semester 1:**

**Units:**

Tools of Algebra

In this unit, you will review previously learned mathematical principles and extend prior mathematical knowledge. Concepts emphasized in this unit will reappear throughout the course, so take the time to complete each lesson carefully.

As you work through the unit, you will have the opportunity to review basic properties of real numbers. You will focus on the properties of operations, equality, and inequalities, as well as use these properties to solve one-variable equations and inequalities. You will also review and solve equations and inequalities that involve absolute value. Finally, you will examine the fundamental concepts of experimental, theoretical, and geometric probability.

Functions, Equations, and Graphs

In this unit, you will define and graph relations and functions using verbal descriptions, lists, tables, and mapping diagrams. Specifically, you will examine linear functions and solve linear equations using slope. You will also examine direct variation and learn how to model many real-world situations using linear models. Finally, you will graph absolute value functions and analyze vertical and horizontal translations.

Linear Systems

In this unit, you will continue your study of linear equations by solving systems of linear equations and inequalities. You will determine if the system of linear equations or inequalities can be solved graphically or algebraically. You will examine a branch of mathematics called linear programming in order to determine the maximum and minimum values for real-world problems. At the end of the unit, you will solve and graph systems of linear equations with three variables.

Matrices

In this unit, you will be introduced how to organize data into matrices. You will learn how to add matrices, subtract matrices, and matrix multiplication. You will transform geometric figures using matrix operations. You will also explore  $2 \times 2$  and  $3 \times 3$  matrices, determinants, and inverses. Finally, you will solve systems of equations using inverse matrices, matrices of systems, and augmented matrices and systems.

Quadratic Equations and Functions

In this unit, you will explore quadratic equations and functions. You will study the properties of parabolas and use these properties to graph, find the maximum and minimum values of quadratic functions, and translate parabolas. You will learn how to factor quadratic expressions and solve quadratic equations by

factoring, finding square roots, and graphing. At the end of the unit, you will be introduced to complex numbers and solve quadratic expressions by completing the square and by using the Quadratic Formula.

### Polynomials and Polynomial Functions

In this unit, you will use your knowledge of the properties of linear and quadratic functions to classify and examine polynomials and polynomial functions. Then, you will learn how to find linear factors and zeros of a polynomial function, divide polynomials, and solve polynomial equations. You will be introduced to several methods of finding the roots of polynomial equations including the Rational Root Theorem, Irrational Root Theorem, and the Imaginary Root Theorem. You will also solve polynomial equations with complex roots using the Fundamental Theorem of Algebra. At the end of this unit, you will evaluate probability problems using permutations, combinations, Pascal's Triangle, and the Binomial Theorem.

### Radical Functions and Rational Exponents

In this unit, you will review properties of exponents and be introduced to roots and radical expressions. You will use the skills from this lesson to multiply and divide rational expressions. Then, you will explore binomial radical expressions and rational exponents. You will expand your knowledge of functions by learning important function operations, composite functions, inverse relations and inverse functions. Finally, you will combine your knowledge of functions by graphing radical functions.

### Honors Algebra 2 A Final

In this unit, you will have the opportunity to prepare for and take the final exam. Since this is a comprehensive exam, it may be helpful to organize your notes in the order of the course outline before you begin to review. Using the test-taking strategies that you have previously learned can help you be successful with both objective and essay questions.

#### **Textbook:**

Prentice Hall Mathematics: Algebra 2

#### **Textbook (online access):**

Prentice Hall Mathematics: Algebra 2

#### **Workbook:**

PH All-in-One Student Workbook (Algebra 2)

### **Course Description – Semester 2:**

Students in Honors Algebra 2 B are provided greater opportunities to explore concepts and demonstrate critical thinking skills. Students begin exploring exponential and logarithmic functions. Rational functions, quadratic relations, probability, and trigonometric identities are also explored in detail, preparing students for continued study in precalculus. Periodic functions, trigonometry, and statistics round out the Honors Algebra 2 curriculum in the B course.

### **Course Syllabus/Outline – Semester 2:**

#### **Units:**

#### Exponential and Logarithmic Functions

In this unit, you will begin your study of exponential and logarithmic functions by exploring exponential models such as exponential growth and decay. There are many real-world applications of exponential functions including compound interest, depreciation, population growth, and radioactive decay. You will define and learn the properties of exponential and logarithmic functions. Then, you will explore logarithmic functions as inverses and natural logarithms. At the end of this unit, you will apply what you learned in this unit to solve exponential and logarithmic equations.

#### Rational Functions

In this unit, you will expand your knowledge of rational functions. You will explore and graph inverse variations. You will learn how to find points of discontinuity and vertical asymptotes using the graphs of

rational functions. Then, you will review how to simplify rational expressions. You will use algebraic formulas to add and subtract rational expressions. You will solve rational equations and check the solutions for extraneous answers. Finally, you will use algebra to solve problems involving probability of multiple events.

### Quadratic Relations and Conic Sections

In this unit, you will identify the curves of a conic section and graph several equations that describe them. You will review how the graphs of quadratic equations are parabolas before analyzing parabolas using the terms focus and directrix. Then, you will write and solve equations of a circle, ellipse, and parabola using the center and radius of a circle, the foci of an ellipse, and the foci of a hyperbola. Finally, you will identify and write equations of translated conic sections.

### Sequences and Series

In this unit, you will continue your study of sequences and series. You will identify and use formulas to generate mathematical patterns, arithmetic sequences, and geometric sequences. Then, you will evaluate arithmetic series using summation notation. You will define and understand the difference between a finite and an infinite geometric series. At the end of this unit, you will find the area of a curve using inscribed and circumscribed rectangles.

### Probability and Statistics

In this unit, you will expand your knowledge of probability and statistics. You will explore probability distributions because you will use them for the rest of this unit. You will solve conditional probability problems using formulas and tree diagrams. You will analyze data by calculating the measures of central tendency. You will find the standard deviation and use it to interpret the values of a data set. Then, you will define and practice the terms sample, sample proportion, random sample, and margin of error while solving real-world sample problems. Finally, you will solve problems involving binomial and normal distributions.

### Periodic Functions and Trigonometry

In this unit, you will identify the cycle, period, and amplitude of periodic functions. You will examine the unit circle and work with angles in standard position. You will calculate the angle measure in radians and use the central angle to determine the length of an arc. Then, you will graph and solve sine, cosine, and tangent trigonometric functions as well as their reciprocal functions. At the end of the unit, you will translate the sine and cosine function.

### Trigonometric Identities and Equations

In this unit, you will examine trigonometric identities and verify them using the unit circle. You will solve trigonometric equations using the inverses of trigonometric functions. Then, you will explore the relationship between right triangles and trigonometric ratios, and you will use these ratios to calculate side lengths and angle measures in a right triangle. You will examine and solve problems that involve the Law of Sines and the Law of Cosines. Finally, you will identify angle, double-angle, and half-angle identities and examine how they are related to the unit circle.

### Honors Algebra 2 B Final

In this unit, you will have the opportunity to prepare for and take the final exam. Since this is a comprehensive exam, it may be helpful to organize your notes in the order of the course outline before you begin to review. Using the test-taking strategies that you have previously learned can help you be successful with both objective and essay questions.

#### **Textbook:**

Prentice Hall Mathematics: Algebra 2

#### **Textbook (online access):**

Prentice Hall Mathematics: Algebra 2

**Workbook:**

PH All-in-One Student Workbook (Algebra 2)

**Special notes from evaluation team:**

Strong sequence of Trigonometry application

**Course Title:** Pre-Calculus  
**Course Provider:** Connections Academy  
**DESE code #:** 115866  
**Number of Semesters:** Two  
**Per Semester Cost:** \$395.00

**Prerequisites:**

Successful completion of Algebra 2

**Course Description – Semester 1:**

This course is an in-depth study of functions and a review of algebraic, geometric, and trigonometric principles and techniques. Students investigate and explore the characteristics of linear, polynomial, and trigonometric functions, and use graphing calculators to solve and evaluate various functions, equations, and inequalities.

**Course Syllabus/Outline – Semester 1:**

**Units:**

Linear Relations and Functions

In this unit, you will review previously learned mathematical principles and extend prior mathematical knowledge. Concepts emphasized in this unit will reappear throughout the course, so take the time to complete each lesson carefully.

As you work through the unit, you will have the opportunity to review properties and operations of linear and nonlinear relations and functions. You will focus on the concepts of function composition and use these concepts to graph functions. You will also review how to write linear equations as well as equations for parallel and perpendicular lines. Then, you will use these concepts to model real-world situations that involve linear functions. Finally, you will identify and graph piecewise functions.

Systems of Linear Equations and Inequalities

In this unit, you will evaluate and graph systems of equations with two and three variables. You will review how to add, subtract, and multiply matrices. Then, you will use matrices to model motion and solve systems of equations using the inverses of matrices. You will also solve systems of linear inequalities by graphing and locating the minimum and maximum values. Finally, you will be introduced to linear programming procedures and use these procedures to solve real-world linear programming problems.

The Nature of Graphs

In this unit, you will analyze and create graphs to solve many real-world situations. First, you will perform tests on a graph to determine if the graph of a relation is symmetrical. You will also identify and sketch linear and nonlinear families of graphs, including transformations, polynomials, absolute value, and radical inequalities. Then, you will solve and graph inverses of relations and functions problems. You will identify and evaluate continuity, end behavior, critical points, and extrema of functions. Finally, you will graph radical functions and solve direct, inverse, and joint variation problems.

Polynomial and Rational Functions

In this unit, you will continue your study of polynomial and rational functions. You will find the roots of polynomial equations as well as use the discriminant to describe the roots of quadratic equations. You will calculate the factors of a polynomial using the Remainder, Factor, and Rational Root Theorems. Then, you will solve rational equations and decompose a fraction into partial fractions. You will also solve radical equations and inequalities using the same procedures you learned throughout this unit. Finally, you will use polynomial functions to solve real-world situations.

The Trigonometric Functions

In this unit, you will explore trigonometric functions. You will review angle and degree measure concepts as well as how to calculate the values for the trigonometric ratios using a right triangle. You will find the

values of the six trigonometric ratios using the unit circle. Then, you will apply your knowledge of trigonometry to determine inverse trigonometric functions, to find missing angle and side measures, and to solve right triangles. Finally, you will explore and solve problems using the Law of Sines and the Law of Cosines.

### Graphs of Trigonometric Functions

In this unit, you will continue your study of trigonometry by examining graphs of trigonometric functions. You will review angle and radian measure concepts including radian and degree measure, arc length, and area of a sector. You will explore linear and angular velocity. Then, you will examine the graphs for the sine and cosine functions. In addition, you will learn how to calculate the amplitude and period as well as translate the graphs for the sine and cosine functions. Finally, you will graph other trigonometric functions including secant, cosecant, tangent, and cotangent functions as well as graph inverse trigonometric functions.

### Trigonometric Identities and Equations

In this unit, you will identify trigonometric identities and solve trigonometric equations. You will explore reciprocal, quotient, Pythagorean, symmetry, and opposite-angle trigonometric identities and use them to verify other trigonometric identities. Then, you will learn and solve trigonometric equations and inequalities using the sum, difference, double-angle, and half-angle identities. Finally, you will learn how to write a linear equation in normal form and find the distance from a point to a line.

### Precalculus A Final

In this unit, you will have the opportunity to prepare for and take the final exam. Since this is a comprehensive exam, it may be helpful to organize your notes in the order of the course outline before you begin to review. Using the test-taking strategies that you have previously learned can help you be successful with both objective and essay questions.

#### **Textbook:**

Glencoe Advanced Mathematical Concepts

#### **Textbook (online access):**

Glencoe Advanced Mathematical Concepts

#### **Workbook:**

Advanced Mathematical Concepts Workbook

### **Course Description – Semester 2:**

The second course in Precalculus examines vectors and parametric equations, complex numbers, and exponential and logarithmic functions. The final unit introduces students to the fundamentals of calculus. Mathematical reasoning and problem solving skills are stressed as students prepare for future high school or college coursework in calculus.

### **Course Syllabus/Outline – Semester 2:**

#### **Units:**

#### Vectors and Parametric Equations

In this unit, you will review previously learned mathematical principles and extend prior mathematical knowledge. Concepts emphasized in this unit will reappear throughout the course, so take the time to complete each lesson carefully. As you work through the unit, you will be introduced to vectors and parametric equations. You will explore vector notation, including terms such as magnitude, direction, and resultant. You will learn how to add, subtract, and multiply vectors algebraically and geometrically. Then, you will determine if two vectors are perpendicular by finding their cross product. You will write, solve, and graph two-dimensional and three-dimensional vector and parametric equation problems. Finally, you will use your knowledge of vectors to solve real-world applications involving vectors.

### Polar Coordinates and Complex Numbers

In this unit, you will expand your knowledge of complex numbers and be introduced to polar coordinates. You will continue your study of polar coordinates by graphing polar equations, converting polar and rectangular coordinates, and writing the polar form of a linear equation. Then, you will learn how to add, subtract, multiply, and divide complex numbers in rectangular form as well as multiply and divide complex numbers in polar form. Finally, you will use De Moivre's Theorem to calculate the powers and roots of complex numbers.

### Conics

In this unit, you will review and expand your knowledge of geometry. You will review how to find the distance and midpoint using a coordinate plane and prove geometric relationships. Then, you will use algebra to write and graph the standard and general form of an equation for circles, ellipses, hyperbolas, and parabolas. You will explore rectangular and parametric forms of conic sections. You will identify the discriminant and graph conic transformations. Finally, you will solve systems of second-degree equations and inequalities.

### Exponential and Logarithmic Functions

In this unit, you will explore exponential and logarithmic functions. You will evaluate and simplify rational exponent expressions and equations, graph exponential equations and functions, and solve exponential growth and decay problems using the number  $e$ . Then, you will solve equations and inequalities involving common and natural logarithms. Finally, you will model real-world situations with exponential and logarithmic functions.

### Sequences and Series

In this unit, you will continue your study of sequences and series. You will identify and use formulas to generate mathematical patterns, arithmetic sequences, and geometric sequences. You will explore limits and use them to evaluate infinite arithmetic and geometric sequences and series. Then, you will analyze a series to determine if it convergent or divergent. You will write a series in sigma notation using the  $n$ th term. You will learn the Binomial Theorem and use it to solve special sequences and series. Finally, you will solve and graph functions using iteration and prove conjectures using mathematical induction.

### Combinatorics and Probability

In this unit, you will extend your knowledge of probability. You will review the Counting Principle, independent and dependent events, permutations, and combinations. You will explore permutations with repetitions and circular combinations. Then, you will solve problems that involve the probability of an event, odds, probability of a compound event, and conditional probability. Finally, you will find the probability of an event using the Binomial Theorem.

### Statistics and Data Analysis

In this unit, you will explore statistics and data analysis methods. You will draw and interpret data using bar graphs, line plots, back-to-back bar graphs, three-dimensional bar graphs, and histograms. You will calculate measures of central tendency for a set of data. Then, you will analyze data using measures of variability including range, quartiles, interquartile range, semi-interquartile range, mean deviation, and standard deviation. You will explore normal distributions. Finally, you will determine the standard error of the mean and level of confidence for a sample set of data.

### Precalculus B Final

In this unit, you will have the opportunity to prepare for and take the final exam. Since this is a comprehensive exam, it may be helpful to organize your notes in the order of the course outline before you begin to review. Using the test-taking strategies that you have previously learned can help you be successful with both objective and essay questions.

**Textbook:**

Glencoe Advanced Mathematical Concepts

**Textbook (online access):**

Glencoe Advanced Mathematical Concepts

**Workbook:**

Advanced Mathematical Concepts Workbook

**Special notes from evaluation team:**

Includes semester of Trigonometry that would be required for AP Calculus

**Course Title:** Geometry  
**Course Provider:** Connections Academy  
**DESE code #:** 115865  
**Number of Semesters:** Two  
**Per Semester Cost:** \$395.00

**Prerequisites:**

Successful completion of Algebra 1

**Course Description – Semester 1:**

Using the basic principles of logic, Geometry A students learn to construct formal proofs and then study parallel and perpendicular lines, triangles and their properties and relationships, and quadrilaterals. Throughout the course, students are exposed to various technologies and strategies for problem-solving and test-taking.

**Course Syllabus/Outline – Semester 1:**

**Units:**

Tools of Geometry

In this unit, you will review the basic principals of geometry in preparation for extensive study of the geometry course. You will begin by using mental math to evaluate patterns and predict future outcomes using deductive reasoning. You will then use terms you are already familiar with including point, line, and plane in postulates about segments, rays, lines, planes, and angles. While building on your knowledge of geometry you will use tools, such as a straightedge and a compass to measure geometric shapes, angles, and segments to construct your own figures. In the next section, you will expand your knowledge of the coordinate plane, including how to find the distances between points, and how to calculate the midpoints of segments. Finally, you will measure perimeters and circumferences, as well as find areas of various shapes.

Reasoning and Proof

In this unit, you will use your knowledge of deductive reasoning to write special types of statements. The statements are known as conditionals, biconditionals, and definitions. These statements will help you to determine the validity of other geometric events. You will use this information to determine your preliminary conclusions about geometric relationships.

Parallel and Perpendicular Lines

In this unit, you will continue to use deductive reasoning to make conclusions about parallel and perpendicular lines. You will use parallel lines in relation to other geometric figures, using them to measure shapes. The Polygon Angle-Sum Theorem will be used to classify triangles and find measures of angles. To finish out the unit you will learn to construct your own angle bisectors, perpendicular lines, quadrilaterals, and parallel lines.

Congruent Triangles

In this unit, you will discover how to recognize and prove that triangles are congruent. You will be introduced to postulates and theorems to help you determine the congruency of triangles. Throughout the unit you will be noting different types of triangles, including right, congruent, isosceles, and equilateral and seeing how they relate to the different postulates you use them with to complete proofs. Your work in this unit will help you manage the rest of this course.

Relationships Within Triangles

In this unit, you will test your knowledge of triangle relationships. With this knowledge you will discover how to use what you know to determine geometric relationships within other figures. You will learn more intricate details about triangles and lines and how they affect one another geometrically, involving concurrent lines and bisectors. Finally, you will explore the roles of indirect reasoning, inverses, and contrapositives in determining inequalities in triangles.

Quadrilaterals

In this unit, you will apply what you have learned about triangles, postulates, algebraic techniques, and other methods of proof in the study of quadrilaterals. You will learn the different properties of polygons and parallelograms as well as classification techniques for working with quadrilaterals. Finally, you will be introduced to special parallelograms and how to place figures on the coordinate plane.

Geometry A Final

In this unit, you will have the opportunity to prepare for and take the final exam. Since this is a comprehensive exam, it may be helpful to organize your notes in the order of the course outline before you begin to review. Using the test-taking strategies that you have previously learned can help you be successful with both objective and essay questions.

**Textbook:**

Prentice Hall Mathematics: Geometry

**Textbook (online access):**

Prentice Hall Mathematics: Geometry

**Workbook:**

PH Geometry Study Guide and Practice Workbook

**Course Description – Semester 2:**

In Geometry B, students learn to find area, surface area, and volume, and study the concept of similarity as it relates to various figures, including an in-depth valuation of circles and their unique properties. Students are also introduced to right angle trigonometry. As in Geometry A, students learn various test-taking strategies to increase performance on state assessments and college entrance exams.

**Course Syllabus/Outline – Semester 2:****Units:**Area

In this unit, you will find the area formulas of various figures and learn how area relates in different figures. You will use the  $30^\circ$ - $60^\circ$ - $90^\circ$  triangles as well as the  $45^\circ$ - $45^\circ$ - $90^\circ$  triangles to explore new triangle relationships. You will also use the Pythagorean Theorem to find areas of triangles, quadrilaterals, and regular polygons.

Similarity

In this unit, you will learn about similar polygons and how some polygons, although they look similar, are not the same size. By using the similar polygons definitions you will learn how to prove triangles similar. Finally, you will take a look at perimeters and angles and determine how they relate to one another.

Right Triangle Trigonometry

In this unit, the sine, cosine, and tangent trigonometric ratios will be introduced and used extensively in order to develop a new way of thinking about geometry and right triangles. Finally, you will examine ratios in order to find missing variables, such as lengths and angle measurements.

Surface Area and Volume

In this unit, you will examine nets that describe various solid shapes. Using the nets you will notice the commonalities between two and three-dimensional figures. With the nets you will be able to create space figures and drawing that will help you measure lengths and areas of solid figures. The most important skill you will develop during this unit is the ability to find the surface areas and volumes of various figures.

Circles

In this unit, you will expand the skills you have acquired in this course regarding circles. You will find tangent lines, chords and arcs, inscribed angles, and angle measures and segment lines.

### Transformations

In this unit, you will conclude your study of geometry. At this point, you will have a solid understanding of the different ways geometry can be applied to real-life situations. You will examine the geometric plane and the different transformations on the plane. You will identify and perform reflections, translations, and rotations. Finally, you will explore and study dilations.

### Geometry B Final

In this unit, you will have the opportunity to prepare for and take the final exam. Since this is a comprehensive exam, it may be helpful to organize your notes in the order of the course outline before you begin to review. Using the test-taking strategies that you have previously learned can help you be successful with both objective and essay questions.

#### **Textbook:**

Prentice Hall Mathematics: Geometry

#### **Textbook (online access):**

Prentice Hall Mathematics: Geometry

#### **Workbook:**

PH Geometry Study Guide and Practice Workbook

#### **Special notes from evaluation team:**

**Course Title:** Geometry Foundations  
**Course Provider:** Aventa  
**DESE code #:** 115865  
**Number of Semesters:** Two  
**Per Semester Cost:** \$299.00

**Prerequisites:**

Algebra I

**Course Description:**

This is comprehensive course featuring geometric terms and processes, logic and problem solving. The course includes topics such as parallel line and planes, congruent triangles, inequalities and quadrilaterals. Various forms of proof are studied. Emphasis is placed upon reasoning and problem solving skills gained through study of similarity, areas, volume, circles, and coordinate geometry. The course content has been appropriately chunked into smaller topics to increase retention and expand opportunities for assessment. With each topic, quizzes are presented to the student. Audio readings are included with every portion of content, allowing auditory learners the opportunity to engage with the course. Test pools and randomized test questions are utilized in quizzes as well as unit exams, ensuring that students taking the course will not be presented with the same exams. Additionally, the course includes additional practice activities (such as cloze activities), as well as pre-topic vocabulary lists, that introduce key vocabulary in English and in Spanish.

**Course Syllabus/Outline:**

**Semester 1**

- The Language of Geometry
- Reasoning and Introduction to Proof
- Parallels
- Congruent Triangles
- Applying Congruent Triangles

**Semester 2**

- Quadrilaterals
- Similarity
- Right Triangles and Trigonometry
- Circles
- Polygons and Area

**Special notes from evaluation team:**

**Course Title:** AP Calculus AB  
**Course Provider:** Connections Academy  
**DESE code #:** 115866  
**Number of Semesters:** Two  
**Per Semester Cost:** \$445.00

**Prerequisites:**

Successful completion of Precalculus A. A TI-83+ or TI-84+ graphing calculator is required for this course.

**Course Description:**

AP Calculus AB is a college-level course covering such concepts as derivatives, integrals, limits, approximation, applications, and modeling. In this course, students begin by reviewing function notation, then exploring absolute value, piecewise, exponential, logarithmic, trigonometric, polynomial, and rational functions. After studying limits and continuity, students move on to concepts of derivatives, including the chain rule, differentiation, implicit differentiation, and logarithmic differentiation. Toward the end of the course, students will apply what they have learned to solve integration problems. A writing component is requested.

**Course Syllabus/Outline:**

**Semester 1**

**Introduction (Unit)**

**Lessons**

Welcome to Calculus

Research Paper Introduction

**Limits and Their Properties (Unit)**

**Lessons**

Introduction

Graphs and Models: Part 1

Graphs and Models: Part 2

Linear Models and Rates of Change

Functions and Their Graphs

Fitting Models to Data

Research Assignment: Science Application

Introduction to Finding Limits

Finding Limits Graphically and Numerically

Evaluating Limits Analytically

Research Paper: Thesis Statement

Continuity and One-Sided Limits

Infinite Limits

Research Paper Outline

Unit 2 Review

Unit 2 Test

**Differentiation (Unit)**

**Lessons**

Introduction

The Tangent Line Problem

Basic Differentiation Rules

Research Paper: Rough Draft Part 1

Product and Quotient Rules

The Chain Rule

Assignment: Position, Velocity, and Acceleration

Implicit Differentiation

Related Rates

Research Paper: Rough Draft Part 2

**Unit 3 Review**  
**Unit 3 Test**  
**Applications of Differentiation (Unit)**  
**Lessons**  
**Introduction**  
**Extrema on an Interval**  
**Rolle's and the Mean Value Theorems**  
**Increasing and Decreasing Functions**  
**Concavity and the Second Derivative Test**  
**Limits at Infinity**  
**A Summary of Curve Sketching**  
**Optimization**  
**Newton's Method**  
**Differentials**  
**Research Paper: Final Paper**  
**Unit 4 Review**  
**Unit 4 Test**  
**Final Review and Exam (Unit)**  
**Lessons**  
**Calculus A Final Review**  
**Calculus A Final Exam**

**Textbook:**  
Houghton Mifflin Calculus

**Textbook (online access):**  
Calculus

**Semester 2:**  
**Integration (Unit)**  
**Lessons**  
**Introduction**  
**Antiderivatives and Indefinite Integration**  
**Area and Definite Integrals: Part 1**  
**Area and Definite Integrals: Part 2**  
**Research Assignment: Riemann Sums and Area**  
**The Fundamental Theorem of Calculus**  
**Substitution and Numerical Integration: Part 1**  
**Substitution and Numerical Integration: Part 2**  
**Unit Review**  
**Unit Test**  
**Logarithmic, Exponential, and other Transcendental (Unit)**  
**Lessons**  
**Introduction**  
**The Natural Logarithmic Function: Part 1**  
**The Natural Logarithmic Function: Part 2**  
**Inverse and Exponential Functions: Part 1**  
**Inverse and Exponential Functions: Part 2**  
**Inverse and Exponential Functions: Part 3**  
**Inverse Trigonometric Functions: Part 1**  
**Inverse Trigonometric Functions: Part 2**  
**Hyperbolic Functions**  
**Research Assignment: Suspension Bridges**  
**Unit Review**  
**Unit Test**

**Differential Equations (Unit)****Lessons****Introduction****Slope Fields and Growth and Decay: Part 1****Slope Fields and Growth and Decay: Part 2****Research Assignment: Modeling Radioactive Decay****Separation of Variables: Part 1****Separation of Variables: Part 2****Unit Review****Unit Test****Applications of Integration (Unit)****Lessons****Introduction****Area Between Two Curves****Volumes, Arc Lengths, and Surfaces: Part 1****Volumes, Arc Lengths, and Surfaces: Part 2****Volumes, Arc Lengths, and Surfaces: Part 3****Volumes, Arc Lengths, and Surfaces: Part 4****Writing Assignment: Which Method and When?****Work, Moments, and Fluids: Part 1****Work, Moments, and Fluids: Part 2****Work, Moments, and Fluids: Part 3****Unit Review****Unit Test****Final Review and Exam (Unit)****Lessons****Calculus B Final Review****Calculus B Final Exam****Textbook:**

Houghton Mifflin Calculus

**Textbook (online access):**

Calculus

**Special notes from evaluation team:**

**Course Title:** AP Calculus BC  
**Course Provider:** Connections Academy  
**DESE code #:** 115866  
**Number of Semesters:** Two  
**Per Semester Cost:** \$445.00

**Prerequisites:**

Successful completion of AP Calculus AB and/or Precalculus. A TI-83+ or TI-84+ calculator is required for this course.

**Course Description:**

In this course, students focus on developing the thinking skills necessary for problem solving in advanced mathematics. After studying functions and graphs, limits and continuity, derivatives, and applications, students turn to antiderivatives, definite integrals, and infinite sequences and series. Includes Trigonometry component.

**Textbook:**

Calculus: Concepts and Contexts

**Course Syllabus/Outline:**

**Special notes from evaluation team:**

**Course Title:** AP Statistics  
**Course Provider:** Florida Virtual  
**DESE code #:** 115875  
**Number of Semesters:** Two  
**Per Semester Cost:** \$400.00

**Prerequisites:**

Algebra II

**Course Description:**

Statistics are used everywhere from fast food businesses ordering hamburger patties to insurance companies setting rates to predicting a student's future success by the results of a test. Students will become familiar with the vocabulary, method, and meaning in the statistics which exist in the world around them. This is an applied course in which students actively construct their own understanding of the methods, interpretation, communication, and application of statistics. Each unit is framed by enduring understandings and essential questions designed to allow students a deep understanding of the concepts at hand rather than memorization and emulation. Students will also complete several performance tasks throughout the year consisting of relevant, open-ended tasks requiring students to connect multiple statistical topics together. The TI-83+/84 OR 89 calculator and computers will be used to explore the world of data and the patterns which can be found by analyzing this information as well as statistical relationships. General topics of study include "exploring data," "planning and design of a study," "anticipating patterns," and "statistical inference."

**Course Syllabus/Outline:**

Segment 1

- Dotplots, stemplots (back-to-back stemplots), histograms, cumulative frequency plots, and parallel boxplots
- Center, shape, spread, clusters, gaps, outliers and other unusual features
- Position using quartiles, percentiles, and standardized (z) scores
- Boxplots (and modified) with the five number summary
- Center and spread both within a group and between groups
- Position of different distributions using standardization
- Correlation and linearity
- Least-squares regression lines
- Transformations to achieve linearity (logarithmic and power)
- Marginal and joint frequencies for two-way tables
- Conditional relative frequencies and determine association
- Distributions in bar charts and residual plots
- Populations, samples, and random selection
- Sources of bias in sampling and surveys (undercoverage, voluntary response, including confounding variables, the placebo effect, and blinding)
- Sampling methods (simple random sampling, stratified random sampling, and cluster sampling)
- Treatments, control groups, experimental units, random assignments, and replication
- Completely randomized designs
- Different experimental designs (randomized block design, matched pairs design)
- Generalize results from collected data
- Probability models
- Long-run relative frequencies
- Law of Large Numbers
- Independence and disjoint
- Conditional probability
- Mean and standard deviation for sums and differences of independent random variables
- Binomial and Geometrical distribution, finding the mean and standard deviation

- Properties of the normal distribution as a model for measurements
- Sampling distribution of a sample proportion and sample mean
- Central Limit Theorem
- Sampling distribution of a difference between two sample proportions and means

**Segment Two**

- Conduct significance tests
- Probabilities in Type I, Type II errors, and Power
- Confidence intervals and significance tests of means (both 1 sample and 2 sample)
- Sample size for a desired margin of error
- Confidence intervals and significance tests of proportions (both 1 sample and 2 sample)
- Determine sample size for a desired margin of error
- Chi-squared goodness of fit and chi-squared test of independence
- Assumptions for inference for regression or a linear regression test
- Conduct significance tests for linear regressions
- Useful language for symbolically modeling and thus simplifying and analyzing our world
- Mathematics is a logical and objective means of analyzing and solving problems
- Effective communication of mathematics is essential to its application
- Analysis of data makes use of graphical and numerical techniques to study patterns and departures from patterns
- Data must be collected according to a well-developed plan if valid information is to be obtained
- Probability is the tool used for anticipating what the distribution of data should look like under a given model
- Statistical inference guides decision making

**Special notes from evaluation team:**

**Course Title:** Consumer Math  
**Course Provider:** Aventa  
**DESE code #:** 115868  
**Number of Semesters:** Two  
**Per Semester Cost:** \$299.00

**Prerequisites:**

Algebra I – Used as an alternative for Algebra II

**Course Description:**

This comprehensive review and study of arithmetic skills apply to both personal and vocational business opportunities. Topics include whole numbers, fractions, percentages, basic statistics, and graphs. Practical applications in finance, taxes, budgeting, banking and home ownership are provided.

**Course Syllabus/Outline:**

**Semester 1**

**All About Jobs**

- Decimal Review
- Working with Wages
- Review of Percents
- Review of Order of Operations

**Wages**

- Review of Fractions
- Forms and Time Cards
- Review of Equations
- Salary and Commission

**Deductions, Taxes, and Insurance**

- Payroll Deductions
- Health and Life Insurance
- Tables and Graphs
- Federal Income Tax

**Recreation and Spending**

- Movies and Events
- Costs of Recreation
- Buying Clothes and Shopping
- Buying Food and Eating Out

**Transportation**

- Transportation
- Taking Road Trips

**Semester 2**

**Personal Finances**

- Graphs and Linear Equations
- Net Worth and Purchasing Power
- Budgets

**Checking and Savings Accounts**

- Exponential Equations
- Checking Accounts
- Savings Accounts
- Passbook and deposit slips, simple interest, compound interest, comparing compound and simple interest using graphs and Ttables

**Credit**

- Using Credit Cards
- Loans

- Installment Buying
- Thinking about Credit

**Automobile Expenses**

- Buying an Automobile
- Operating Expenses
- Automobile Insurance
- Other Car Topics

**Housing**

- Renting an Apartment
- Buying a House
- Taxes and Insurance
- Decorating and Remodeling

**Special notes from evaluation team:**