

**Walter Payton College Prep**  
**Honors Advanced Algebra with Trigonometry BC Course Outline 2017 - 2018**  
*Textbook: 2<sup>nd</sup> Year Algebra: Patterns and Connections*

This course revisits some Algebra I material, but at a fast pace and in combination with other ideas and as extensions. Trigonometry is integrated throughout the course, including a study of the unit circle, as well as the laws of sines and cosines. Classroom instruction emphasizes problem solving and discovery over practice. Students are expected to become fluent in paper-and-pencil calculations, and to offer algebraic proofs of identities and extensions. The course reviews basic statistics and connects those ideas to combinatorics and the Binomial Theorem.

1st Semester: The Real Number System, Combinatorics, Linear Equations and Inequalities, Systems of Equations, Exponents, and Factoring

2nd Semester: Rational Expressions, Radicals, Quadratics, Exponentials, Logarithms, and Complex Numbers

### **Quarter 1**

#### Chapter 1

- Sets: Notation, Venn diagrams, Subsets
- Natural domain
- Representing problems with Algebra
- Arithmetic sequences and series
- Rate problems
- Field Axioms
- Clock and mod arithmetic
- Combinatorics (FCP, Permutations, Combinations)

#### Chapter 2 -Linear Sentences in One Variable

- Polynomial vocabulary
- Linear sentences & Literals
- Traditional Word Problems
- Rate problems
- Interval Notation
- Linear Inequalities in one variable
- Linear expressions and Absolute Value

### **Quarter 2**

#### Chapter 3 - Linear Functions and Relations

- Functions and relations
- Graphing 2D linear equations; slope intercept, point slope
- Unit circle, sin, cos, tan
- Linear inequalities in two variables
- Piecewise functions

#### Chapter 4

- Matrix operations
- Solving systems of equations
- Solving systems of inequalities and linear programming
- 3D graphing

### **Quarter 3**

#### Chapter 5

- Laws of exponents
- Binomial theorem
- Binomial distribution
- LCM and GCF
- Number bases
- Factoring polynomials
  - solving equations by factoring
  - solving inequalities by factoring and making a sign graph
- Factor theorem

#### Chapter 6 - Rational Functions

- Number Theory & Divisibility
- Long division of polynomials
- Combining rational functions
- Rational Functions in equations and inequalities
- Sigma and Pi notation
- Reciprocal trig functions: cot, sec, csc
- Law of sines, cosines

### **Quarter 4**

#### Chapter 7 - Radicals

- $2^{\text{nd}}$ ,  $3^{\text{rd}}$ , and nth roots and powers
- fractional powers
- Properties of radicals
- Simplification of radicals using exponential rep.
- Radical equations
- Graphs of radical functions

#### Chapter 9 - Exponential and Logarithmic Functions

- Exponential functions and their graphs
- Logarithms definition
- Exp/logs as inverses
- Log graphs
- Properties of logs, change of base
- Log equations and inequalities

#### Chapter 8 – Quadratics and Parabolas

- Completing the Square
- The Quadratic Formula
- Factoring over the Reals
- Sum/Product of the Roots (Theory of Equations)\*
- Graphs of Quadratics
- Focus/directrix representation
- Simple optimization
- Theory of Equations