

Walter Payton College Prep
Honors Advanced Algebra with Trigonometry Course Outline 2017- 2018
Textbook: CME Algebra 2

This course reviews material from Algebra I in greater depth and introduces new topics, such as logarithms and exponentials, which will be extended in Pre-Calculus. We use CAS and graphing calculators as a tool for investigation.

1st Semester: Linear Graphs, Functions, Systems of Equations, Quadratics, Right Triangle Trigonometry, Circular Functions

2nd Semester: Exponentials, Logarithms, Polynomials, Rational Expressions

Quarter 1

Unit 1 - Functions

- Identify key features of a function
 - Distinguish between relations, functions and one-to-one functions
 - Identify domain and range using appropriate set notation
 - Generating a sign graph for a factored expression
- Using function notation
 - Evaluating functions with numerical inputs
 - Combining functions (addition, subtraction, multiplication, division and composition)
- Generate and analyze the inverse of a function
 - Determine inverse of a function algebraically, numerically, graphically and verbally

Unit 2 - Polynomials

- Analyze linear functions
 - Determine slope, x- and y-intercepts, domain and range
 - Point-slope, slope-intercept and standard form
- Factoring polynomials
 - Factor out a GCF
 - Factor monic and non-monic quadratics
- Analyze quadratic functions
 - Identify the vertex, zeros, concavity, domain and range

Quarter 2

Unit 3 - Complex Numbers

- Arithmetic with complex numbers
 - Adding, subtracting, multiplying and dividing to write in the form $a + bi$
- Graphing complex numbers

- Graphing on the complex plane
- Determining the magnitude of a complex number

Unit 4 - Trigonometry

- Right triangle trig
 - Definitions of sine, cosine and tangent as ratios of sides of a right triangle
- Trig on the unit circle
 - Evaluate trig expressions whose inputs are values on the unit circle
- Trig functions
 - Amplitude, frequency and vertical translations
 - Graphing trig functions and determining the equation of a function given its graph
- Solving trig equations
 - Using inverse trig functions to identify all solutions to an equation on a given interval
- Triangle applications
 - Using Law of Sines and Cosines to solve problems in context

Quarter 3

Unit 5 - Logs and Exponentials

- Simplify expressions and solve equations involving exponents and radicals
 - Know the relationship between radicals and rational, non-integer exponents
- Identify, create and use exponential functions
 - Write an exponential function $y = ab^x$ through two given points
 - Graph an exponential function given its equation
 - Use an exponential model to predict future values
 - Identify domain, range, x- and y-intercepts of an exponential function
- Simplify and evaluate logarithmic expressions
 - Use the product and quotient properties of logarithms
- Identify, create and use logarithmic functions
 - Write a log equation $y = \log_b x$ through two points
 - Identify domain, range, x- and y-intercepts of a logarithmic function

Unit 6 - Sequences and Series

- Arithmetic and geometric sequences
 - Generate terms in a sequence given its recursive or closed-form formula
 - Create a recursive or closed-form formula for a given sequence
- Evaluating arithmetic and geometric series
 - Use Gauss's method to evaluate an arithmetic series
 - Use Euclid's method to evaluate a geometric series
- Identify and use patterns

- Explore first- and second-differences of a sequence to gain insight on that sequence
- Know that if first-difference is constant, sequence is linear; if second-difference is constant, sequence is quadratic, etc

Quarter 4

Unit 7 - Counting and Probability

- Counting possible outcomes
 - The Fundamental Counting Principle, permutations and combinations
- Finding the probability that an event will occur
 - Identify which quantities needed to be counted and carry it out
 - Compute $P = (\# \text{ of successful outcomes}) / (\text{total number of outcomes})$

Unit 8 - Transformations

- Identify, create and use translations and dilations
 - Perform a given transformation on the graph of some function
 - Identify the operations in a formula that result in translation or dilation of a graph