

**Walter Payton College Prep**  
**Precalculus AB Course Outline 2014- 2015**  
*Textbook: Precalculus with Limits, 3rd Ed. by Larson, Hostetler, Edwards*

**Quarter 1**

1. Graphs and Transformations (Chapter 1)

Topics:

- Transformations of elementary functions (linear, quadratic, square root, absolute value, and piecewise): translation, reflection, scaling.
- Increasing, decreasing, and constant intervals and relative/absolute minima and maxima. Even/Odd functions
- Composition of functions and inverse functions.

2. Polynomials (Chapter 2.1 to 2.5)

Topics:

- Quadratic Functions, optimization
- Polynomial end behavior
- Factor and remainder theorem,
- Zeros, complex numbers, Fundamental theorem of Algebra
- Difference Quotient

**Quarter 2**

3. Rational Functions (Ch. 2.6 & 2.7) & Limits (Ch. 12.1 - 12.4)

Topics:

- Rational Functions
- Graphs of rationals, asymptotes
- Limits: notation, methods of evaluation
- ARC to IRC - Tangent line problem
- Derivatives

4. Conics (Chapter 10.1-10.3)

Topics:

- Conics: Parabolas, Ellipses, Hyperbolas
- Parametrics

5. Law of Sines and Cosines: (Chapter 6.1-6)

Topics:

- Law of Sines
- Law of Cosines
- Applications

### Quarter 3

#### 6. Trigonometric Functions (Chapter 4)

Topics:

- Angles: Radians and Degrees, terminal side
- Right Triangle Trig.
- Trig. of any angle; reference angles, estimation
- Unit circle & its properties
- Graphs of trig. functions (domain/range, amplitude, period) and transformations
- Inverse trig functions

#### 7. Analytic Trigonometry (Chapter 5)

Topics:

- Fundamental Identities and their uses
- Verifying/proving identities
- Solving trig. equations
- Formulas: Sum. Difference, Multiple-angle, Product-Sum

### Quarter 4

#### 8. Exponential and Logarithmic Functions (Chapter 3)

Topics:

- The exponential function and its transformations: components, properties.
- The logarithmic function and its transformations: components, properties.
- Solving exponential and logarithmic equations.

#### 9. Introduction to Calculus

Topics:

- Review of Difference Quotient and Limits
- ARC to IRC
- Increasing, Decreasing, Concavity, Points of Inflection Review
- Derivatives of Polynomial Functions

### **Quarter 3: Trig Extensions, Polynomials and Rational Functions**

Topics:

- Further trig extensions: simplifying expressions, verifying identities, solving equations on a closed interval, utilizing sum and difference identities.
- Law of sines: solve oblique triangles given AAS, ASA, or SSA information.
- Law of cosines: solve oblique triangles given SSS or SAS information.
- Polynomial behavior: roots, zeros, end behavior, graphing and sign graphs.
- Long Division of Polynomials.
- Complex roots and conjugates.
- Rational functions: roots, asymptotes, holes.

Major projects/assessments:

- Derivation of cofunction identities, oblique triangle area formula, and  $\sin(u + v)$  identity.
- Solving trig equations on specified intervals as well as over the reals.
- Nine Squares trig identity extra credit assignment.
- Rice Krispies Lab—area maximization

### **Quarter 4: Conic Sections, Limits, and the Derivative**

Topics:

- Geometric definitions of parabolas, ellipses, and circles. (Hyperbolas can be considered if time permits).
- Limits: estimation of limits graphically and numerically, evaluation of limits to infinity and rationalizing techniques, evaluation of limits via substitution.
- Introduction to the derivative: approximating slopes of tangent lines using the definition of the derivative

Major projects/assessments:

- Paper Folding Activity: create parabolas and ellipses using patty paper
- Analysis of the Mirascope via Geometer's Sketchpad (teacher led)
- Avery Rocket Video and Discussion
- Nspire Secant to Tangent Line Activity (guided worksheet)