**Pre-Calculus**

**Syllabus**

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**Unit I: Functions from a Calculus Perspective**

1. **Functions**
2. **Analyzing Graphs of Functions and Relations**
3. **Continuity, End Behavior, and Limits**
4. **Extrema and Average Rates of Change**
5. **Parent Functions and Transformations**
6. **Function Operations and Composition of Functions**
7. **Inverse Relations and Functions**

**Unit II: Power, Polynomial, and Rational Functions**

1. **Power and Radical Functions**
2. **Polynomial Functions**
3. **The Remainder and Factor Theorems**
4. **Zeros of Polynomial Functions**
5. **Rational Functions**
6. **Nonlinear Inequalities**

**Unit III: Exponential and Logarithmic Functions**

1. **Exponential Functions**
2. **Logarithmic Functions**
3. **Properties of Logarithms**
4. **Exponential and Logarithmic Equations**
5. **Modeling with Nonlinear Regression**

**Unit IV: Trigonometric Functions**

1. **Right Triangle Trigonometry**
2. **Degrees and Radians**
3. **Trigonometric Functions on the Unit Circle**
4. **Graphing Sine and Cosine Functions**
5. **Graphing Other Trigonometric Functions**
6. **Inverse Trigonometric Functions**
7. **The Law of Sines and the Law of Cosines**

**Unit V: Trigonometric identities and Equations**

1. **Trigonometric Identities**
2. **Verifying Trigonometric Identities**
3. **Solving Trigonometric Equations**
4. **Sum and Difference identities**
5. **Multiple-Angle and Product-to-Sum Identities**

**Unit VI: Conic Sections and Parametric Equations**

1. **Parabolas**
2. **Ellipses and Circles**
3. **Hyperbolas**
4. **Rotations of Conic Sections**
5. **Parametric Equations**

**Unit VII: Vectors**

1. **Introduction to Vectors**
2. **Vectors in the Coordinate Plane**
3. **Dot Products and Vector Projections**
4. **Vectors in Three-Dimensional Space**
5. **Dot and Cross Products of Vectors in Space**

**Unit VIII: Polar Coordinates and Complex Numbers**

1. **Polar Coordinates**
2. **Graphs of Polar Equations**
3. **Polar and Rectangular Forms of Equations**
4. **Polar forms of Conic Sections**
5. **Complex Numbers and DeMoivre’s Theorem**

**Unit IX: Sequences and Series**

1. **Sequences, Series, and Sigma Notation**
2. **Arithmetic Sequences and Series**
3. **Geometric Sequences and Series**
4. **Mathematical Induction**
5. **The Binomial Theorem**
6. **Functions as Infinite Series**