Math: Honors Pre-Calculus and Trigonometry

UNIT / Weeks (not consecutive)	Timeline / Topics	Essential Questions
6	**Functions and Their Graphs** • Rectangular Coordinates • Graphs of Equations • Linear Equations in Two Variables • Functions • Analyzing Graphs of Functions • Transformations of Functions • Combinations of Functions: Composite Functions • Inverse Functions	• How can you use graphs of equations in solving real-life problems? • How can you describe the characteristics of and recognize graphs of parent functions? • How do you use a coordinate plane to model and solve real-life problems? • How can you explain whether relations between two variables are functions? • How can you use combinations and compositions of functions to model and solve real-life problems? • What does it mean to solve equations graphically? • How do you build new functions from existing functions using transformations?
3.8	**Polynomials and Rational Functions** • Quadratic Functions and Models • Polynomial Functions of Higher Degree • Polynomial and Synthetic Division • Complex and Synthetic Division • Complex Numbers • Zeros of Polynomial Functions • Rational Functions • Nonlinear Functions	• How can you determine the minimum and maximum values of quadratic functions in real-life applications? • How can you use the Leading Coefficient Test to determine the end behavior of graphs of polynomial functions? • How can you use the Fundamental Theorem of Algebra to determine the number of zeros of polynomial functions? • What does Descartes's Rule of Signs and the Upper and Lower Bound Rules tell you about finding zeros of polynomials? • Can you describe how you find the domains of rational functions?
2.8	**Exponential and Logarithmic Functions** • Exponential Functions and Their Graphs • Logarithmic Functions and Their Graphs • Properties of Logarithms • Exponential and Logarithmic Equations • Exponential and Logarithmic Models	• How can you graph exponential functions and use the One-to-One Property? • Where do you use logarithmic functions to model and solve real-life problems? • How do you use the change-of-base formula to rewrite and evaluate logarithmic expressions?

		• How can you use properties of logarithms to expand or condense logarithmic expressions? • How can you use logistic growth functions to model and solve real-life problems?
5.2	**Trigonometry** • Radian and Degree Measure • Trigonometric Functions: The Unit Circle • Right Triangle Trigonometry • Trigonometric Functions of Any Angle • Graphs and Sine and Cosine Functions • Graphs of Other Trigonometric Functions • Inverse Trigonometric Functions • Applications and Models	• How can you use angles to model and solve real-life problems? • Explain how you can evaluate trigonometric functions using the unit circle? • Why are the domain and range critical when you evaluate sine and cosine functions? • How can you use a graphing calculator to evaluate trigonometric functions? • Describe how to find reference angles. • How do you evaluate trigonometric functions of any angle? • Describe how to use amplitude and period to help sketch the graphs of sine and cosine functions?
3.4	**Analytic Trigonometry** • Using Fundamental Identities • Verifying Trigonometric Identities • Solving Trigonometric Equations • Sum and Difference Formulas • Multiple-Angle and Product-to-Sum Formulas	• Are you able to explain how to recognize and write the fundamental trigonometric identities? • Are you able to describe how to use standard algebraic techniques to solve trigonometric equations? • Can you describe when to use sum and difference formulas to evaluate trigonometric functions, verify identities, and solve trigonometric equations?
2.4	**Additional Topics in Trigonometry** • Law of Sines • Law of Cosines	• How would you explain how to use the Law of Sines to solve oblique triangles (AAS or ASA)? • How can you describe when to use the Law of Sines to solve oblique triangles (SSA)? • When can you determine when to use the Law of Cosines to solve oblique triangles (SSS or SAS)? When it is prudent to use Heron's Area Formula to find the area of a triangle?

2.8	**Systems of Equations and Inequalities** • Linear and Nonlinear Systems of Equations • Two-Variable Linear Systems • Multivariable Linear Systems • Partial Fractions	• Can you describe how to use the method of substitution to solve systems of linear equations in two variables? • Are you able to describe how to use a graphical approach to solve systems of equations in two variables? • Can you explain how to interpret graphically the numbers of solutions of systems of linear equations in two variables? • How would you describe a situation involving being able to use systems of linear equations in two variables to model and solve real-life problems
3.6	**Sequences, Series and Probability** • Sequences and Series • Arithmetic Sequences and Partial Sums • Geometric Sequences and Series • The Binomial Theorem • Counting Principles • Probability	• How can you explain how to use sequence notation to write the terms of sequences? • How can you explain how to use factorial notation? • How can describe how to use summation notation to write sums? • Are you able to describe how to recognize, write, and find the nth terms of arithmetic sequences? • How can you describe how to find nth partial sums of arithmetic sequences? • How can you explain how to recognize, write, and find the nth terms of geometric sequences? • How would you explain the process of using mathematical induction to prove statements involving a positive integer? • How can you explain how to use the Binomial Theorem to calculate binomial coefficients? • How can you describe how to use binomial coefficients to write binomial expansions? • How can you determine the probabilities of independent events? • How can you determine the probability of the complement of an event?

5.6	**Topics in Analytic Geometry** • Lines • Introduction to Conics: Parabolas • Ellipses • Hyperbolas • Rotation of Conics	• Can you describe how to find the inclination of a line? • How can you explain how to write equations of ellipses in standard form and graph ellipses? • Can you explain how to find eccentricities of ellipses? • Are you able to explain how to rotate the coordinate axes to eliminate the -term in equations of conics? • Can you describe how to use the discriminant to classify conics?