# Allen Park High School Curriculum Map

## Content Area: Pre-Calculus

| | Ch | Content | Skills | Benchmarks | Assessment | Essential Questions |
|---|---|---|---|---|---|---|
| **Sep** | Ch 1 | • Functions and graph<br>• Real numbers and coordinates<br>• Graphing utilities | • Functions and graph<br>• Linear, quadratic and composition of functions<br>• Graph and solve polynomial functions and inequalities | • P1.1 know and use definition of function<br>• P1.2 perform algebraic operations<br>• P1.3 write expression for composition of function and find domain<br>• P1.4 determine function has inverse and write it if exists | Wksh 1.1-1.4<br>Mid Chap Test<br>Type 3 writing<br>Ch. Test | • How can one find the new dimensions of a surrounding are of a uniform length?<br>• How can a maximum area in an enclosed boundary be found, if the total length of a fence is given? |
| **October** | Ch 2 | • Functions and zeros<br>• Applications and finding the complete graph of the problem situations<br>• | • Polynomial functions and their zeros<br>• Solving linear and quadratic equations (algebraically and graphically)<br>• Introduction to parametric equations and inverse functions<br>• Finding a complete graph of a problem situation<br>• Solving higher order inequalities | • P1.4 determine function has inverse and write it if exists<br>• P1.5 determine two functions are inverses using composition<br>• P4.2 solve polynomial equations and inequalities of degree greater than or equal to three | Using Graphing Calculator<br>Mid Ch. & Ch. Test<br>Type 2 | • Find an algebraic representation in terms of 1 variable of the area of the rectangles whose perimeter is a given constant?<br>• Determine the production level or price, given a supply-and-demand equation?<br>• Find the possible lengths of the sides of the removed squares which must be removed from the 4 corners of rectangular cardboard sheet, in order to get a maximum volume. |
| **Nov** | Ch 3 | • Polynomial functions<br>• Graph of polynomials<br>• Real zeroes of polynomials<br>• Solving systems of equations and inequalities | • Continuity of functions<br>• Factor theorem<br>• Rational zeros and complex number zeros | • P1.7 understand concept of limit of function as x approaches a number or infinity<br>• P4.1 five polynomial function<br>• P4.2 solve polynomial equations and inequalities of degree grater that or equal to three<br>• P4.3 know and apply fundamental facts about polynomials | Worksheet<br>Quiz<br>Ch. Test | • Find an algebraic representation for the volume of a building in the shape of a box with a square cross section and a triangular prism forming the roof.<br>• When will an object, shot straight up into the air from the top of a platform of given height, and given initial velocity hit the ground?<br>• Find the same objects (mentioned above) maximum height? |

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| **Dec** | Ch 4 | • Rational functions with radicals<br>• Exponential functions<br>• Properties of logarithmic functions | • Rational functions and functions involving radicals<br>• Application of maximum and minimum values | • P5.1solve equations and inequalities involving rational functions<br>• P5.2 give vertical and horizontal asymptotes<br>• P5.3 know and apply definition and geometric interpretation of difference quotient | Quiz & Test On Ch. 4 Type 1& 2 Writing | • How much pure acid should be added to a given concentration of acid solution to produce a mixture of higher acid?<br>• How high about the ground should a light be placed to provide maximum illumination at the point P on the ground? (Given $I=K\ x/d^3$, with a horizontal distance from the base of the light pole to the given point P is a constant). |
| **Jan** | Ch 5 | • Exponential functions<br>• Logarithmic functions<br>• Angle measures<br>• Graphing sinx,cosx, tanx and their reciprocals | • Trig functions and theorem<br>• Half and double angle<br>• Growth and decay<br>• Simple and compound interest<br>• Solving logarithmic equations<br>• Transformation | • P2.1 use inverse relationship between exponential and logarithmic<br>• P2.2 graph logarithmic functions<br>• P2.3 compare large scale behavior of exponential and logarithmic functions with different bases<br>• P2.4 solve exponential and logarithmic equations<br>• P3.1 solve quadratic type equations by substitution<br>• P2.5 explain how parameters of exponential or logarithmic model relate to data | Mid and Chapter 5 Test Type 2 | • Find when the population of a town will a) double or b) triple, given $f(t) = P_o(1 + r)^t$<br>• Given the half-life of a certain radioactive substance and its initial weight(in grams), use the algebraic expression $f(t) = A_o(1/2)^t$/ the half life, to find there will be less than one gram?<br>• How can one find the amount of interest paid annually or monthly by a bank, if a given $ is deposited that will pay given % interest rate that is earning interest compounded annually? |
| **Feb** | Ch 6 | • Trigonometric functions<br>• Angles and their measures<br>• Applications of trig functions<br>• Graph of other trig functions | • Analytic trig<br>• Transformations of trig graphs<br>• Inverse trig functions<br>• Solving trig equations and inequalities<br>• Angle of elevating and angle of depression | • P6.1 define graph use all trig functions of any angle<br>• P6.2 graph transformations of sine and cosine functions<br>• P6.3 know basic properties of inverse trig functions<br>• P6.4 know basic trig identities for sine cosine and tangent<br>• P6.5 solve trig equations using basic identities and inverse functions<br>• P6.6 prove trig identities and derive some basic ones | Worksheet Ch. Test | • Find the length(s), if one is given the central angle of a circle of radius r and $s=r\ \Theta$ (where $\Theta$ is in radians)?<br>• Determine the building's height given the angle of elevation of the top of the building from a constant distance away from its base on level ground? |

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| **March** | Ch 6 & Ch 7 | • Trigonometric functions<br>• Trig functions of an acute angle | • Trig identities: sum, difference, double and ½ angle identities | • P6.6 prove of trig identities<br>• P6.7 finding a sinusoid | Quiz<br>Mid Ch. Test | • Determine either the angle of elevation or angle of depression from an observer at the building's top to an object located on the ground or in the air? |
| **April** | Ch 7 | • Analytic trigonometry and applications<br>• Inverse trigonometric functions<br>• Solving trigonometric equations<br>• Sum and difference identities | • Applications of Trig Law of sine's and cosines<br>Trig form of complex numbers<br>De Moines Theorem<br>Vectors<br>Finding sinusoid<br>solving trig equations by factoring | • P6.6 derive the difference formulas<br>• P6.7 finding a sinusoidal function to model a given data | Worksheet<br>Chapter Test | • Find the dimensions of width and height of a tunnel opening with a maximum cross-sectional area formed by a semi-circle with a given radius?<br>• Determine an angle within a right triangle, given either one of its legs or its hypotenuse?<br>• Determine the length across a lake by use of the Law of Sine's or Law of Cosines, depending on the givens? |
| **May** | Ch 9 | • Parametric equations<br>• Polar coordinates<br>• Matrix applications<br>• Motion problems and parametric equations | • Parametric equation<br>• Conic sections<br>• Matrices<br>• Binomial Theorem<br>• Converting from polar to rectangular form<br>• Graphing polar and parametric<br>• Solving motion problems<br>• Rotation of conic sections | • P9.1 Convert between polar and regular coordinates<br>• P9.2 Write complex numbers in polar form<br>• P9.3 Evaluate parametric equations<br>• P9.4 convert between parametric<br>• P9.5 graph curves described by parametric<br>• P9.6 use parametric equations in applied contexts | Quiz<br>Graphing Calculator Project | • By using parametric equations, find a vector equation for both the horizontal and the vertical components of a projectile motion situation?<br>• Using the same concepts in the above question, find out if a ball hit with a given initial velocity and the angle of elevation will be a home run of a stated distance? |

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| **June** | Ch 11 | • Finite and infinite series<br>• Binomial theorem and probability | • Sequence, series<br>• Permutations and combination<br>• Introduction to calculus<br>Limits reviewed<br>Intro to derivatives | • P8.1 use sigma and factorial notation<br>• P8.2 write an expression for the *n*th term<br>• P8.3 formulas for the sums of finite arithmetic and geometric sequences | Quiz and Test | • Finite and infinite series<br>• Binomial theorem and probability<br>• Sequence, series<br>• Permutations and combination<br>• Introduction to calculus<br>Limits reviewed<br>Intro to derivatives |