

Curriculum:

All CHAMP Curriculum is aligned with the Michigan High School Curriculum Expectation

First Year Curriculum

These courses emphasize basic algebraic concepts and skills, and also higher level reasoning involving problem solving and proof.

- **Algebra 1 Text** Algebra I: Expressions, Equations, and Applications by Paul A. Foerster
- **Algebra 2 Text** Algebra and Trigonometry: Functions and Applications by Paul A. Foerster

Program Specifics:

Algebra I

- Polynomials: terminology, evaluation, algebraic combinations, degree, long division
- Factoring: prime and common factors, difference of squares, quadratic trinomials, factoring by grouping
- Rational Expressions: dividing by monomials, simplifying by factoring, algebraic combinations, least common multiples, combinations of rational expressions
- Linear Equations: roots, literal equations, solutions of equations with rational expressions, story problems
- Linear Inequalities
- Graphs and the Cartesian coordinate system
- Positive integral exponents and roots
- Graphs of linear functions
- Functions: notation, evaluation, inverse of functions Lines: slope, various forms for equations of lines, parallel and perpendicular lines Variation: direct, inverse, joint
- Quadratic equations: solutions by factoring, completing the square, the quadratic formula
- Story problems involving linear and quadratic equations

Algebra II

- Factoring of sums and differences of cubes

- Exponents: zero, negative exponents, laws of exponents, rational exponents, exponential growth and decay
- Radicals: rules, notation, combinations, rationalizing the denominator
- Complex numbers
- Logarithms: definition, properties, antilogs, computations
- Quadratic equations: solutions by factoring, quadratic formula, character of solutions, equations involving “disguised quadratics”
- Inequalities: solutions, graphing linear and quadratic inequalities
- Simultaneous equations: solutions by graphing, elimination, and substitution, linear programming in two variables
- Simultaneous inequalities: solutions by graphing
- Direct and inverse variation
- Conic sections in simple positions: basic features of graphs of circles, parabolas, ellipses and hyperbolas, algebraic solutions of quadratic systems, translation of axes
- Polynomial and rational functions: remainder theorem, factor theorem, synthetic division, fundamental theorem of algebra, factors and zeros, Descartes rule of signs, rational solutions of polynomial equations
- Graphs of rational functions: intercepts, asymptotes, symmetry, asymptotic behavior
- Binomial theorem
- Sequences and series: arithmetic and geometric sequences, infinite geometric series, summation notation, sums of arithmetic and geometric series
- Matrices: determinants and inverses of 2×2 and 3×3 matrices, Cramer’s rule
- Problem solving in an algebraic setting
- A brief introduction to trigonometry: sines, cosines, and tangents, solutions to right triangles

Second Year Curriculum

These courses cover geometry with emphasis on logical structure using proof and problem solving and college algebra and trigonometry intended to prepare students for a university level Calculus course.

- **Geometry Text** Geometry by Moise and Downs
- **College Algebra/Trigonometry Text** Advanced Mathematics: A Pre-calculus Course by Brown and Robbins

Program Specifics

Geometry

- Introduction to mathematical logic: undefined terms, definitions, postulates, theorems
- Methods of proof: direct proof, indirect proof
- Points, lines, planes, length, angle measurement, perpendicularity
- Parallel lines, parallel postulate Angle measures in triangles and polygons
- Triangle congruence postulates and theorems: SAS, ASA, SSS, SAA
- Right triangles: the Pythagorean theorem, the hypotenuse-leg theorem
- Similarity of triangles and polygons Area and perimeter of triangles, polygons, and circles
- Circles: chords, angle measurement for central and inscribed angles
- Medians of a triangle, incenter, circumcenter, concurrence theorems for the medians, angle bisectors, and perpendicular bisectors of sides Inequalities in geometry
- Coordinate geometry in the plane and space
- Transformations in the plane: reflections, translations, rotations, rigid motions, similarity transformations Informal geometry in space: skew lines, parallel planes, perpendiculars to planes, dihedral angles, volume and surface areas, prisms, pyramids, spheres, cones, cylinders

College Algebra/Trigonometry

- Functions: zeros, graphs, inverses
- Exponents and logarithms, growth and decay
- Basic analytic geometry: loci, intercepts, symmetry, lines, distance formula, midpoint formula slope, parallel and perpendicular lines
- Parametric equations, distance from a point to a line, angle between lines, linear inequalities
- Graphs of algebraic relations: loci, nonlinear equations and inequalities Analytic geometry in space: coordinates, distance formula, direction cosines, planes, lines
- Angles and radian measure
- General definition of trigonometric functions: values at convenient angles
- Graphs of trigonometric functions: periodicity, ranges
- Trigonometric equations and inequalities
- Trigonometric identities: addition of angles formulas
- Inverse trigonometric functions

- Laws of sines and cosines: solution of triangles
- Circular and harmonic motion
- Graphs of composite trigonometric functions
- Vectors
- Polar coordinates: graphs using polar coordinates
- Conic sections, vertices, asymptotes, graphs
- Sequences and series
- Systems of linear equations, matrices
- Probability and counting problems