Mathematics Program

The Sachem Mathematics Department is committed to providing meaningful courses designed to motivate and encourage mathematical and critical thinking. The mathematics courses offered will not only aid in the development of conceptual understanding of mathematics, but will increase problem solving skills and enhance students' abilities to communicate and reason mathematically. *Elective courses will be offered based on sufficient student enrollment.

Sachem's Mathematics Core Requirement: 3 Years
Students must take the Algebra I Common Core Regents exam. Please see page 7 for specific diploma requirements. All students must earn at least three credits in mathematics to fulfill graduation requirements; four years of math is recommended.
 Please Note: Graphing Calculators (TI-83 or TI-84) are required for the Algebra I, Algebra IA, Algebra IB, Geometry, Geometry Honors, Algebra II, Algebra II Honors, Math 12, AP Statistics Courses and on the New York State Regents exams in applicable courses. The TI-89 calculator is required for the Math 12 Honors and AP Calculus courses.

Mathematics			
GRADE 9	**GRADE 10**	**GRADE 11**	**GRADE 12**
Algebra 1A	Algebra 1B	Algebra 1 Regents	Algebra 1 Regents
Algebra 1 Regents	Algebra 1 Regents	Geometry Regents	Geometry Regents
Geometry Honors	Geometry Regents	Geometry Regents Extended	Geometry Regents Extended
	Geometry Regents Extended	Geometry Skills	Geometry Skills
	Geometry Skills	Advanced Mathematics	Advanced Mathematics
	Algebra II Honors	Algebra II Regents	Algebra II Regents
	Advanced Placement Statistics	Algebra II Regents Extended	Algebra II Regents Extended
	Introduction to Computer Science	Math 12 (Pre Calculus)	Math 12 (Pre Calculus)
	Applied Geometry for College and Career	Math 12 Honors (Pre Calculus)	Math 12 Honors (Pre Calculus)
		Advanced Placement Statistics	Analysis of Mathematics
		Introduction to Computer Science	Math Topics/College Level
		Advanced Placement Computer Science with Gaming Applications	Calculus BC (Advanced Placement)
		Applied Geometry for College and Career	CalculusAB (Advanced Placement)
			Advanced Placement Statistics
			Practical Applications of Mathematics
			Introduction to Computer Science
			Advanced Placement Computer Science with Gaming Applications
			Applied Geometry for College and Career

Algebra IA (9)   Full
Yr., 1 Cr.
This course is for students who have been identified as needing Academic Intervention Services.
Prerequisite: Math 8
Course Description: Algebra IA is the first course of a two year program designed to prepare students for the Algebra I Regents Exam. This course deepens and extends the understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend. Students will also engage in methods for analyzing, solving and using quadratic functions.

Algebra IB (10)   Full
Yr., 1 Cr.
Prerequisite: Algebra IA
Course Description: Algebra IB is the second course of a two year program designed to prepare students for the Algebra I Regents Exam. This course offers a comprehensive review of the concepts covered in Algebra IA, as well as develops new concepts to complete the curriculum. This course deepens and extends the understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend. Students will also engage in methods for analyzing, solving and using quadratic functions.

Algebra I Regents (9, 10, 11, 12)   Full
Yr., 1 Cr.
Prerequisite: Math 8
Course Description: New York State requires all students to pass the Algebra I course and Regents exam to satisfy Regents diploma requirements. The fundamental purpose of this course is to formalize and extend the mathematics learned in middle school. This course deepens and extends the understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend. Students will also engage in methods for analyzing, solving and using quadratic functions.

Geometry Honors (9)   Full
Yr., 1 Cr.
Prerequisite: Algebra I Honors
Course Description: This is the second course in New York State's three year Algebra I, Geometry and Algebra II sequence. Entrance into this course is limited to honors students who have successfully completed Algebra I. The fundamental purpose of this course is to formalize and extend students' geometric experiences from middle school. Students explore more complex geometric situations and deepen their explanations of geometric relationships, moving towards formal mathematical arguments (proofs). Transformations and constructions are emphasized early in this course. This course is more rigorous and more extensive than the Geometry Regents curriculum.

Geometry Regents (10, 11, 12)   Full
Yr., 1 Cr. **Prerequisite:** Algebra I
Course Description: This is the second course in New York State's three year Algebra I Geometry and Algebra II sequence. The fundamental purpose of this course is to formalize and extend students' geometric experiences from middle school. Students explore more complex geometric situations and deepen their explanations of geometric relationships, moving towards formal mathematical arguments (proofs). Transformations and constructions are emphasized early in this course.

Geometry Regents Extended (10, 11, 12)   Full Yr., 1 Cr., Lab
Alternate Days
Prerequisite: Algebra I or Algebra IB
Course Description: This is the second course in New York State's three year Algebra I, Geometry and Algebra II. Students will study the Geometry curriculum for 7 ½ periods per week (one period each day plus one extra period on alternate days). The extra class time allows the pace of the instruction to be more appropriate to accommodate students who have experienced difficulty in math in the past. The fundamental purpose of this course is to formalize and extend students' geometric experiences from middle school. Students explore more complex geometric situations and deepen their explanations of geometric relationships, moving towards formal mathematical arguments (proofs). Transformations and constructions are emphasized early in this course.

Geometry Skills (10, 11, 12)   Full
Yr., 1 Cr.
Placement must be determined by the Committee on Special Education.
Prerequisite: Algebra I
Course Description: This course is designed to strengthen the students' algebraic skills and to enable them to apply these skills to more advanced geometry topics and practical application problems and projects. Some of the topics covered are axioms and postulates, congruence, triangles, inequalities, parallel and perpendicular lines, angle, sum, locus, circles, angle measurement, similarity, areas, polygons, constructions, trigonometry and coordinate geometry. This course terminates with a departmental final exam.

Advanced Mathematics (11, 12)   Full
Yr., 1Cr.
Prerequisite: Geometry Extended
Course Description: This course is designed to prepare students for the study of college level mathematics and follows successful completion of 2 math credits. Major topics of study include advanced algebraic manipulations and applications, logic and trigonometry. Students will use a variety of problem solving strategies to deepen their understanding of mathematical concepts.

Algebra II Honors (10)   Full
Yr., 1 Cr.
Prerequisite: Geometry Honors
Course Description: Algebra II is the third and final course offered in the New York State series. Entrance into this course is limited to honors students who have successfully completed Geometry Honors. The fundamental purpose of this course is to build upon knowledge of linear, quadratic and exponential functions. Students extend their repertoire of functions to include polynomial, rational, radical and trigonometric functions. Students work closely with the expressions that define the functions and continue to expand and hone their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers and solving exponential equations using the properties of logarithms. Students will also make inferences and conclusions from data and see how the visual displays and summary statistics they learned in earlier grades relate to different types of data and to probability distributions. This course is more rigorous and more extensive than the Algebra II Regents curriculum and may include a math project and participation in several math competitions.

Algebra II Regents (11, 12)   Full
Yr., 1 Cr.
Prerequisite: Geometry Regents
Course Description: Algebra II is the third and final course offered in the New York State series. The fundamental purpose of this course is to build upon knowledge of linear, quadratic and exponential functions. Students extend their repertoire of functions to include polynomial, rational, radical and trigonometric functions. Students work closely with the expressions that define the functions and continue to expand and hone their abilities to model situations and to solve equations, including solving quadratic

equations over the set of complex numbers and solving exponential equations using the properties of logarithms. Students will also make inferences and conclusions from data and see how the visual displays and summary statistics they learned in earlier grades relate to different types of data and to probability distributions.

Algebra II Regents Extended (11, 12)   Full Yr., 1 Cr., Lab
Alternate Days
Prerequisite: Geometry Regents Extended
Course Description: Algebra II is the third and final course offered in the New York State series. Students will study the Algebra II curriculum for 7 ½ periods per week (one period each day plus one extra period on alternate days). The extra class time allows the pace of the instruction to be more appropriate to accommodate students who have experienced difficulty in math in the past. The fundamental purpose of this course is to build upon knowledge of linear, quadratic and exponential functions. Students extend their repertoire of functions to include polynomial, rational, radical and trigonometric functions. Students work closely with the expressions that define the functions and continue to expand and hone their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers and solving exponential equations using the properties of logarithms. Students will also make inferences and conclusions from data and see how the visual displays and summary statistics they learned in earlier grades relate to different types of data and to probability distributions.

Math 12 (Pre Calculus) (11, 12)   Full
Yr., 1 Cr.
Prerequisite: Algebra II
Course Description: This course is for students who have demonstrated success in mathematics at a Regents pace. This course is the Prerequisite for college level calculus. The curriculum includes algebra, trigonometry, complex numbers, vectors, matrices, polynomials, rational and algebraic functions, induction, sequences and series. Calculus topics include limits, derivatives, rectilinear motion, maxima/minima and graphing applications.

Math 12 Honors (Pre Calculus)(11, 12)   Full
Yr., 1 Cr.
Prerequisite: Algebra II
Course Description: This course is a survey of mathematics covering advanced topics in algebra, linear algebra and elementary functions. This course will also include the following topics: trigonometry, mathematical induction, vectors, analytic geometry, functions, graphs of polynomial functions, circular functions, polar coordinates and graphs, conic sections, matrices, limits, introduction to derivatives of functions and integration of functions. This course is more intensive and more extensive than the Math 12 (Pre Calculus) curriculum and may include a math project and participation in several math competitions. It is expected that the students who are successful in this course will be enrolled in either Calculus AB or Calculus BC in their senior year.

Analysis of Mathematics (12 only)   Full
Yr., 1 Cr.
Prerequisite: Algebra II Extended
Course Description: This course is for students who plan to attend college, but do not plan to pursue a math/science based major. This course will give students a strong mathematical foundation to aid in their success on math placement exams for college. Success on placement exams ensures qualifying for enrollment into a matriculated math course in college. The course will cover various topics of mathematics not previously studied by the student. It will also explore topics previously studied but with greater depth and extension. The curriculum includes algebra, analytic geometry, trigonometry, functions, graphs, systems of equations, and inequalities.

Math Topics/College Level (12)   Full
Yr., 1 Cr.
Prerequisite: Math 12(Pre Calculus)
Course Description: This course is designed to give students a broader mathematical background to better prepare them for any math taken in college. It is **not** an Advanced Placement course but covers college level algebra and calculus. Topics will include the study of functions, derivatives and integrals. A strong emphasis placed on the application of these concepts to problems from the fields of business, social sciences and some life sciences.

Calculus BC (Advanced Placement) (12)   Full
Yr., 1 Cr.
Prerequisite: Math 12 Honors (Pre Calculus)
Course Description: This course is intended to prepare students for the Advanced Placement examination. Topics include differential and integral calculus (emphasizing conceptual understanding, computations and applications), differentiation of elementary algebraic; trigonometric, exponential, and logarithmic functions; graphing; modeling and maximization; the Riemann integral; the fundamental theorem; symbolic and numeric methods of integration; area under a curve; volume; improper integrals and Hospital's rule; polar and parametric equations and curves; sequences; series; Taylor series; differential equations; and modeling. Students are strongly encouraged to take the Advanced Placement examination which may lead to college credit..

Calculus AB (Advanced Placement) (12)   Full
Yr., 1 Cr.
Prerequisite: Math 12 or Math 12 Honors (Pre Calculus)
Course Description: This course is intended to prepare students for the Advanced Placement examination. Course contents include differential and integral calculus, (emphasizing conceptual understanding, computations and applications), differentiation of elementary algebraic, trigonometric, exponential, and logarithmic functions; graphing, modeling and maximization; the Riemann integral; the fundamental theorem; symbolic and numeric methods of integration; area under a curve; volume. Students are strongly encouraged to take the Advanced Placement examination which may lead to college credit.

Advanced Placement Statistics (10, 11, 12)   Full
Yr., 1 Cr.
This course is recommended for students enrolled in AP Psychology and/or Science Research.
Prerequisite: Algebra I
Course Description: This course is equivalent to a one semester introductory non calculus based college course. Students will be exposed to four broad conceptual themes:
· Exploring Data: Describing patterns and departures from patterns
· Sampling and Experimentation: Planning and conduct- ing a study
· Anticipating Patterns: Exploring random phenomena using probability and simulation
· Statistical Inference: Estimating population parameters and testing hypotheses.
The use of a graphing calculator and statistical software is an integral part of this course. Students are encouraged to take the AP exam in May for possible college credit.

Practical Applications of Mathematics (12)   Full
Yr., 1 Cr.
Prerequisite: Algebra I or Algebra IB
Course Description: Students will be taught how to use mathematical procedures in problem solving, decision-making, and day-to-day operations within cross-sections of occupations. A portion of this course will be designated to prepare students for math placement exams for community colleges. Success on placement exams ensures qualifying for enrollment into a matriculated math course in college.   Students

who have passed Geometry may not take this course. **Please note that Practical Applications of Mathematics cannot be used as a second math credit for any student.**

Introduction to Computer Science (10, 11, 12)   Full

Yr., 1 Cr.
Prerequisite: Algebra I
Course Description: This course is an introduction to computer programming. Students will meet daily in the computer lab where they will explore computer programming in a   project-oriented, hands-on environment. Students will use object oriented programming and basic programming concepts such as loop structures and conditional statements. The focus of this course is to develop algorithmic thinking and the ability to use abstraction rather than mastery of a single language. Students will practice problem solving and delve into web applications using a variety of computer programming languages. The course will prepare students to take Advanced Placement Computer Science.

Advanced Placement Computer Science with Gaming Applications (11,12)   Full

Yr., 1 Cr.
Pre- or corequisite: Introduction to Computer Science
This course teaches the fundamentals of the field of computer science with an emphasis on programming in the Java language.   The course emphasizes programming methodology with a concentration on problem solving, algorithms and data structures. By the end of the course, students will be able to write functional programs in the Java language. The course culminates in a final project where students work together to design and program their own games which utilize various graphics based packages in the Java programming language. Students may earn 3 or more college credits depending on their score on the Advanced Placement exam given in May.

Applied Geometry for College and Career (10,11,12)   Full

Yr., 1 Cr.
Prerequisite: Algebra I or Algebra IB
Course Description: Students will explore a variety of Geometric concepts within the NYS Regents Geometry curriculum and beyond. Topics will strengthen algebra skills needed for advanced math courses as well as introduce geometric and trigonometric relationships, coordinate geometry, transformational geometry, circle geometry, informal proofs and constructions. Computer technology will be utilized in a project based learning environment for specific topics. These skills may prepare students for the Geometry Regents exam and meet part of the NYS graduation requirement. This course will culminate in a departmental final exam (students have the option to take the Geometry Common Core Regents exam).