

MATHEMATICS

COURSE SEQUENCES

The most common course sequences are indicated below.

If Intro to Functions was successfully mastered in grade 8:		
Grade 9	Geometry A or Geometry H or Functions	
Grade 10	Functions H or Algebra 2 A or Pre-Calculus H	
Grade 11	Pre-Calculus H, Pre-Calculus A, plus Statistics AP or Calculus AP (as an additional elective)	
Grade 12	Calculus AP or Calculus A, plus Statistics AP or Multivariable Calculus	
If Intro to Functions was not successfully completed or taken in grade 8:		
A Level/ICR	Grade 9	Enriched Algebra A ICR
	Grade 10	Geometry A ICR; may double up with Algebra 2A ICR
	Grade 11	Algebra 2A ICR; or if students double up in 10 th Grade, Pre-Calculus A
	Grade 12	Pre-Calculus A; or Calculus A if students double up in Grade 10; plus Statistics AP (as an additional elective)
R Level	Grade 9	Algebra 1 R
	Grade 10	Geometry R
	Grade 11	Algebra 2 R
	Grade 12	Trigonometry R or Introduction to College Mathematics R or Discrete Math R
R Level/ICR	Grade 9	Algebra 1R/ICR with Integrated Math 9
	Grade 10	Geometry R/ICR
	Grade 11	Algebra 2 R/ICR
	Grade 12	Introduction to College Mathematics R or Discrete Math R
Other	Grade 9	Algebraic Concepts 1
	Grade 10	Algebraic Concepts 2
	Grade 11	Geometric Concepts

CORE MATH COURSES

ENRICHED ALGEBRA A: 9

5 credits

PREPARATION: Successful mastery of the pre-algebra course, 8th grade Enriched Math and less than masterful completion of EAA.

Enriched Algebra A is designed for the student who has already learned some of the major concepts and processes of algebra but seeks a deeper and broader understanding of the discipline. This course integrates the advanced elements of algebra with technology, problem solving, application and mathematical modeling. As well, Enriched Algebra A is designed to further develop the student's reasoning skills, with an emphasis on logic that is central to student achievement in upper level mathematics courses. At the conclusion of this course, students will be required to take and pass for graduation an end of course competency assessment.

ENRICHED ALGEBRA A: 9/ICR

5 credits

PREPARATION: Successful mastery of the pre-algebra course, 8th grade Enriched Math and less than masterful completion of EAA.

Enriched Algebra A is designed for the student who has already learned some of the major concepts and processes of algebra but seeks a deeper and broader understanding of the discipline. This course integrates the advanced elements of algebra with technology, problem solving, application and mathematical modeling. As well, Enriched Algebra A is designed to further develop the student's reasoning skills, with an emphasis on logic that is central to student achievement in upper level mathematics courses. At the conclusion of this course, students will be required to take and pass for graduation an end of course competency assessment.

ALGEBRA 1 R: 9

5 credits

PREPARATION: Successful completion of 8th grade Academic Math or unsuccessful completion of 8th grade Enriched Math

A study is made of the properties of the real number system through a mathematically informal and intuitive approach. The concepts of number properties, positive and negative numbers, factoring, mathematical symbols and notation are studied. These concepts are used to perform operations with algebraic expressions. Changing words to symbols, solution of word problems, and techniques of graphing linear equations and inequalities in the Cartesian plane are included. Additional topics include the solution of systems of linear equations and simple quadratic equations with their application through math modeling and lab reports as performance assessments. At the conclusion of this course, students will be required to take and pass for graduation an end of course competency assessment.

ALGEBRA 1 R: 9/ICR

5 credits

PREPARATION: Successful completion of 8th grade Academic Math or unsuccessful completion of 8th grade Enriched Math

A study is made of the properties of the real number system through a mathematically informal and intuitive approach. The concepts of number properties, positive and negative numbers, factoring, mathematical symbols and notation are studied. These concepts are used to perform operations with algebraic expressions. Changing words to symbols, solution of word problems, and techniques of graphing linear equations and inequalities in the Cartesian plane are included. Additional topics include the solution of systems of linear

equations and simple quadratic equations with their application through math modeling and lab reports as performance assessments. At the conclusion of this course, students will be required to take and pass for graduation an end of course competency assessment.

ALGEBRA 1 R/ICR WITH INTEGRATED ALGEBRA: 9

5 credits (Core Curriculum)

5 credits (Elective Math)

PREPARATION: Completion of 8th Grade Academic Math

This is a two-period course required for students whose mathematics skills indicate the need for additional support as they learn Algebra 1. One period will be devoted to the Algebra 1R program (see above); the second period will be Integrated Math 9. Since students in this course will study the Algebra 1R curriculum and are expected to study Geometry R and Algebra 2R in their sophomore and junior years, Integrated Math 9 will provide a second period of math study. In this portion of the two-period course, teachers will identify individual student's areas of weakness in mathematics and tailor a learning program that will build skill, strength, and self-confidence. As well, students will benefit from small group instruction when appropriate. Students will receive a grade in both portions of this two-period course. At the conclusion of this course, students will be required to take and pass for graduation an end of course competency assessment.

ALGEBRAIC CONCEPTS 1

5 credits

PREPARATION: Completion of 8th grade Academic Math

In this course, students will solidify their understanding of real numbers at a level and in a context appropriate for high school students and will be (re)introduced to algebraic concepts in a real world context. Solving linear equations, interpreting graphs, using rules of exponents, understanding polynomials and factoring are some of the major topics they will learn. Through the use of the graphing calculator, CBLs (calculator based labs) and manipulatives, students will gain an understanding of these algebraic concepts as they develop skills that will prepare them for the HSPA. Teacher will develop instructional and assessment strategies that will best help each student meet the goals of the curriculum. This course is only available to students with IEPs.

GEOMETRY H: 9

5 credits

PREPARATION: Mastery of Intro to Functions (8th grade)

This is a rigorous and fast-paced course available to 9th grade students who have mastered Intro to Functions in the middle school and who wish to study geometry in-depth. In addition to all units studied in Geometry A, the curriculum will include such topics as: locus of points, coordinate proofs, vectors, coordinates in space, reflections, translations, rotations, and dilations. (These additional topics exceed the standards recommended by NCTM and the NJ Core Content Standards). Students who master this course are expected to enroll in Functions H in the sophomore year.

GEOMETRY A/ICR: 9, 10

5 credits

PREPARATION: Mastery of Intro to Functions (8th grade) or successful completion of Enriched Algebra A (9th grade)

A study is made of the basic structure of two and three-dimensional Euclidean geometry. Geometry is based on undefined terms (point, line, and plane), defined terms, and postulates, all of which are used to prove theorems and to solve problems deductively. Understanding of these fundamental concepts is achieved through a study of lines, segments, angles, polygons,

and circles. The integration of algebra, methods of proof and fundamental concepts of mathematical logic are stressed. Additionally, the use of the Geometer's Sketchpad is used to reinforce concepts and develop performance assessments.

GEOMETRY R: 10

5 credits

PREPARATION: Successful completion of Algebra I R (9th Grade)

A study is made of the basic structure of two-dimensional Euclidean geometry. Geometry is based on undefined terms (point, line, and plane), defined terms, and postulates, all of which are used to prove theorems and solve problems deductively. Understanding of these fundamental concepts is achieved through a study of lines, segments, angles, polygons, and circles. In this course, the methods of proof are generally approached through carefully selected examples. Additionally, the use of the Geometer's Sketchpad is used to reinforce concepts and develop performance assessments.

GEOMETRY R: 10/ICR

5 credits

PREPARATION: Successful completion of Algebra I R (9th Grade)

A study is made of the basic structure of two-dimensional Euclidean geometry. Geometry is based on undefined terms (point, line, and plane), defined terms, and postulates, all of which are used to prove theorems and solve problems deductively. Understanding of these fundamental concepts is achieved through a study of lines, segments, angles, polygons, and circles. In this course, the methods of proof are generally approached through carefully selected examples. Additionally, the use of the Geometer's Sketchpad is used to reinforce concepts and develop performance assessments.

GEOMETRY R/ICR

5 credits (Core Curriculum)

WITH INTEGRATED GEOMETRY 10

5 credits (Math Electives)

(Full year West)

PREPARATION: Successful completion of Algebra 1R/ICR with Integrated Math 9

This is a two-period course required for students whose mathematics skills indicate the need for additional support as they learn Geometry. This double period will be devoted to the Geometry R program (see course description); as well as an integration of math skills. Since students in this course will study the Geometry R curriculum and are expected to study Algebra 2R in their junior year Integrated Geometry provides an extended period of math study. In this portion of the two-period course, teachers will identify individual student's areas of weakness in mathematics and tailor a learning program that will build skill, strength, and self – confidence. As well, students will benefit from small group instruction when appropriate. Students will receive a grade for both portions of this two period course.

GEOMETRIC CONCEPTS: 11

5 credits

PREPARATION: Successful completion of Algebraic Concepts 1 & Algebra Concepts II.

This course is designed for the student who has successfully completed Algebraic Concepts 1 and Algebra Concepts II or has demonstrated knowledge of the content and skills of the course. Students will learn the language of geometry through explorations and manipulations on such technology and materials as the Geometer's Sketchpad and Geoboards. They will apply their algebra skills in the study of triangles, polygons and circles. Teacher will develop instructional and assessment strategies that will best help each student meet the goals of the curriculum. This course is only available to students with IEPs.

INTEGRATED ALGEBRA (Second Semester)**2.5 credits****PREPARATION: Current enrollment in Algebra IR or Enriched Algebra A**

This course is required for students identified as “at-promise” in mathematics due to their level of math knowledge and skill indicated by NJ ASK 8 math score and achievement in the 9th grade math course. Teachers will identify individual student’s areas of weakness in mathematics and tailor a learning program that will build skill, strength, and self-confidence. As well, students will benefit from small group instruction when appropriate in this course. Students will receive a grade in this course. Additionally, students not originally identified but selected by their current math teacher, may rotate into and out of this course on an as-needed basis if space is available.

FUNCTIONS H: 10**5 credits****PREPARATION: Mastery of Intro to Functions (8th Grade) and successful completion of Geometry H (9th Grade)**

This is a rigorous course that serves as a precursor to Pre-Calculus H and Calculus AP. During the first marking period, students use their previously mastered Enriched Algebra A skills as they learn the major concepts and skills of the second year of algebra, all of which are then applied throughout the remaining three marking periods. Operations and transformations are performed on these functions to produce other more complicated functions, which are also analyzed. Probability and statistics through the study of central tendencies, is also explored. Application of concepts is reinforced through lab experiments and math modeling. Properties of functions and relations are reviewed and the study of the circular, algebraic, exponential and logarithmic functions is extended.

ALGEBRA 2 A/ICR: 10, 11, 12**5 credits****PREPARATION: Successful completion of Enriched Algebra A and Geometry A**

This course involves a continuation of the study of the properties of the real numbers begun in Algebra 1. A study of the operations with polynomials and rational expressions leads to an extension of the real number system to the complex number system. Linear, quadratic, and other polynomial functions are studied, followed by the exponential and logarithmic functions. Systems of linear equations, matrices, and inequalities are carefully discussed as are quadratic relations and systems. An introduction to trigonometry is included. The above concepts are reinforced and applied through verbal problem solving and applications to the real world through math modeling and lab reports as performance assessments.

ALGEBRA 2 R: 11, 12**5 credits****PREPARATION: Successful completion of Algebra 1 R and Geometry R**

This course involves a continuation of the study of the real numbers begun in Algebra 1. Linear, quadratic and other polynomial functions are studied, followed by the exponential and logarithmic functions. Systems of linear equations and inequalities are discussed as are quadratic relations and systems. These concepts are reinforced and applied through math modeling and lab reports as performance assessments.

ALGEBRA 2 R/ICR: 11, 12**5 credits****PREPARATION: Successful completion of Geometry R/ICS**

In this course, students will receive additional support from two teachers. They will study the Algebra 2 R curriculum and continue their math studies in Trigonometry R or Introduction to College Math R.

ALGEBRAIC CONCEPTS 2

5 credits

PREPARATION: Successful completion of Algebraic Concepts I

In this course, students will continue to develop their algebra skills begun in Algebraic Concepts 1. Through the use of graphing calculators, CBLs (calculator based labs) and manipulatives, students will deepen and expand their algebra skills as they prepare for the HSPA. Teacher will develop instructional and assessment strategies that will best help each student meet the goals of the curriculum and the New Jersey Core Content Standards. This course is only available to students with IEPs.

INTEGRATED MATH: 11 (First Semester)

2.5 credits

PREPARATION: Completion of Algebra 1 and Geometry

This course is required for students identified as at-promise in mathematics due to their level of math knowledge and skill indicated by HSPA math score and sophomore teacher recommendation. Teachers will identify individual student's areas of weakness in mathematics and tailor a learning program that will build skill, strength, and self-confidence. As well, students will benefit from small group instruction when appropriate in this course. Students will receive a grade in this course. Additionally, students not originally identified but selected by their current math teacher, may rotate into and out of this course on an as-needed basis if space is available. This may be done on a contract basis, and the grade may contribute to the final grade in the core course.

PRE-CALCULUS H: 11, 12

5 credits

PREPARATION: Successful completion of Enriched Algebra A, Geometry A or H, and Functions H.

This course continues the study of the properties of selected functions using both real and complex numbers. Limits of sequences and functions are studied in detail as a preparation for the calculus. Vectors and graphs in two and three-space are analyzed. An introduction to the derivative is made as a calculus preview incorporated through the year. Application of concepts is reinforced through math modeling and performance assessments using lab reports.

PRE-CALCULUS A: 11, 12

5 credits

PREPARATION: Successful completion of Enriched Algebra A, Geometry A, and Algebra II A

This course involves a review of the properties of the real number system and some properties of the complex number system. Properties of functions and relations are reinforced and the study of the algebraic, exponential, logarithmic and trigonometric functions is extended. Vectors are introduced. These concepts are reinforced through math modeling of real world applications, the use of technology, lab reports and other performance assessments.

TRIGONOMETRY R: 12

5 credits

PREPARATION: Successful completion of Algebra 1 R, Geometry R, and Algebra 2 R

This course involves a review of real number systems. Properties of Functions and relations are reviewed and expanded to include circular, trigonometric, algebraic, exponential and logarithmic functions. These concepts are reinforced through math modeling of real world applications, technology and lab reports as performance assessments.

INTRODUCTION TO COLLEGE MATHEMATICS R: 12**5 credits****PREPARATION:** Successful completion of Algebra 2 R or Algebra 2 R/ICS

This course involves review of algebra, geometry and extends the study of functions introduced in Algebra 1, 2, and Geometry. Other topics are sequences, series, central tendencies and probability. The use of math modeling technology and real world problems are incorporated on a regular basis.

DISCRETE MATH/PROBABILITY AND STATISTICS A: 12**5 credits****PREPARATION:** Successful completion of Algebra 2

This course is designed as a full year elective for senior students desiring an additional year of mathematics outside of the traditional course sequence. Topics covered in the first semester will include modeling, applications, election theory, fair division algorithms, matrices, graph theory, tree diagrams, counting and probability, and recursion. The entire second semester is devoted to the study of statistics with a review of some probability. The semester course offerings are non-sequential. The course is focused on building a direct and immediate connection between the mathematics of our world and the concrete, real-life problems in which mathematics is realized.

CALCULUS AP: 12**5 credits****PREPARATION:** Successful completion of Geometry A or H, Functions H, and Pre-Calculus H

This course involves a comprehensive study of the differential and integral calculus. The concepts of limits and continuity are analyzed as the basis for the study of the calculus. A balance is maintained between theory, applications, and manipulative techniques. Included are the concepts of differentiation of elementary and transcendental functions, differentials, and the definite integral, techniques of integration, series and differential equations. The B-C syllabus of the Advanced Placement Examination is satisfied and students are expected to take the AP exam.

CALCULUS A: 12**5 credits****PREPARATION:** Successful completion of Enriched Algebra A, Geometry A, Algebra 2A, and Pre-Calculus A

A brief review of algebra is followed by an intuitive approach to the concept of a limit. Also included in the study are the concepts of continuity, differentiation of elementary and transcendental functions, differentials, definite integral, and techniques of integration. Applications of both the integral and derivative are stressed. [The A-B syllabus of the Advanced Placement Examination is satisfied.] Additionally, application of calculus concepts is applied to the real world through experiments and lab reports.

HSPA PREPARATION MATH: 12**2.5/5 credits**

This math program provides remediation in algebra and geometry skills. Students are identified for this program based on their performance on the High School Proficiency Assessment (HSPA). The program is individualized in order to provide intensive instruction in skill areas in which the student is weak. In order to accomplish this, classes are kept small.

COMMON CORE ELECTIVES

STATISTICS AP: 11, 12

PREPARATION: Successful completion of Functions H, Algebra 2A, Pre-calculus H or Pre-Calculus

This course provides a pervasive study of the major concepts and tools for collecting, analyzing, interpreting, and drawing conclusions from data. Students are exposed to four broad conceptual themes: Exploring Data, Sampling and Experimentation, Anticipating Patterns, and Statistical Inference. Students will apply knowledge of numerical and graphical summaries of data, least-squares regression and logarithms, and probability and simulation to solve problems. In addition, students will perform a variety of significant tests in order to evaluate hypotheses. These tests include sample means, sample proportions, chi-square, and inference for regression.

MULTIVARIABLE CALCULUS H: 12

5 credits

PREPARATION: Successful completion of Calculus AP (11th grade)

This course is designed to extend the fundamental concepts of calculus from the two-dimensional setting to those in three dimensions. Students begin the year with a review and extension of their knowledge of parametric and polar curves before embarking upon the calculus of vector-valued functions. The notion of a function of a single real variable is generalized to that of a function of several variables, allowing the generalization of the ideas of limits and continuity, the derivative and the integral. The limit definition of the partial derivative is introduced as a parallel to that of the ordinary derivative, and once computational fluency is achieved, applications such as optimization problems and Lagrange Multipliers are explored. The central theme of the integral is generalized to that of the multiple integral, as several coordinate systems are explored in detail, including the polar, cylindrical and spherical coordinate systems as aids to such integration.