# High School Math Course Sequence

| Middle School | Grade 9 | Grade 10 | Grade 11 | Grade 12 |
|---|---|---|---|---|
| Algebra B Accel.<br><br>(*Opt Geo. Accel.) | Algebra 2/Trig H<br>Algebra 2 H<br>(*Opt Geo. H) | Trig/Calc. H<br>or<br>Pre-Calc. H | AP Calc. BC<br>AP Calc. AB<br>Calc. H | Calc. III HH<br>AP Calc. BC<br>AP Calc. AB<br>AP Statistics |
| Algebra B Accel.<br>or<br>Algebra B | Geometry H<br>or<br>Geometry | Algebra 2 H<br>or<br>Algebra 2 | Trig/Calc. H<br>Pre-Calc. H<br>Pre-Calc.<br>** Prob & Stats H<br>** Prob & Stats | AP Calc. AB<br>Calc. H<br>AP Stats<br>Prob. & Stats H<br>Prob. & Stats |
| Algebra B | Algebra I H<br>or<br>Algebra I | Geometry H<br>or<br>Geometry | Algebra 2 H<br>or<br>Algebra 2 | Pre-Calc.<br>or<br>Prob. & Stats |

\* Option to double in Geometry in 8th or 9th Grade to accelerate.
\*\* Alternate option to Pre-Calculus or recommend taking Probability & Statistics after Pre-Calculus.

Please keep in mind that we also have Computer Science offerings. In particular, AP Computer Science A will count as a third year of math starting with the class of 2020.

*PLEASE NOTE: These documents are designed as guides for students planning their course selections. Actual course selections should be made with the advice of the guidance counselor and the student's current academic teacher.*

## ALGEBRA I H (4001H)
*Grades 9: Level–Honors*
*Full Year – 5 credits*

This course will provide the student with an in-depth instruction, a fast pace of instruction, and a cooperative learning environment. The student must have self-motivation and the ability to comprehend reading materials. This course is an introduction to a more abstract and generalized form of mathematics than arithmetic. At the completion of the course the student will understand the operations with algebraic symbols, elementary set theory, solution of linear equalities and inequalities, graphing algebraic functions and relationships, elementary statistics and probability. Problem-solving and critical thinking are emphasized throughout the course, along with the application of the scientific calculator.

Proficiencies:
Understanding of variable expressions and solving equations.
Students will develop problem-solving strategies using algebraic concepts.
Familiarity with the coordinate plane and linear equations.
Understanding of factoring and applications of factoring in solving equations

## ALGEBRA I (4001)
*Grades 9: Level–Academic*
*Full Year – 5 credits*

This course is designed for those students who have not successfully completed the NJ State standards for Algebra. It will provide the student with an in-depth instruction, a fast pace of instruction and a cooperative learning environment. The student must have self-motivation and the ability to comprehend reading materials. This course is an introduction to a more abstract and generalized form of mathematics than arithmetic. At the completion of the course the student will understand the operations with algebraic symbols, elementary set theory, solution of linear equalities and inequalities, graphing algebraic functions and relationships, elementary statistics and probability. Problem-solving and critical thinking are emphasized throughout the course, along with the application of the scientific calculator.

Proficiencies:
Understanding of variable expressions and solving equations.
Students will develop problem-solving strategies using algebraic concepts.
Familiarity with the coordinate plane and linear equations
Understanding of factoring and applications of factoring in solving equations

## ALGEBRA I (84001)
*Grades 9, 10:   Level – Resource*
*Full Year – 5 credits*
*Prerequisite: Recommendation by the Child Study Team*

Algebra I 8431 is a resource center replacement class that is taught in the resource center program. It is designed for those students who require individualized and small group instruction. The goals and objectives in each student's IEP will be addressed throughout the course. Students will be aware of the operations with algebraic symbols, solutions of linear equations and inequalities, graphing algebraic functions and elementary statistics. Problem solving concepts are emphasized throughout the course.

## ESSENTIALS OF ALGEBRA AND MATHEMATICAL PATTERNS
*Grades 9, 10*
*Full Year – 5 credits*
*Prerequisite: Recommendation by the Child Study Team*

Essentials of Algebra and Mathematical Patterns are a resource center replacement class that is taught in the resource center program. The goals and objectives in each student's IEP will be addressed throughout the course. This course is designed for students who need additional reinforcement in number sense, arithmetic skills, basic algebra and patterns. The major focus is on every day, real-world application and skilled coupled with strengthening analytical thinking skills.

## GEOMETRY HONORS (4002H)
*Grades 9, 10 Level – Honors*
*Full Year – 5 credits*
*Prerequisite: Successful completion of an Algebra I Honors course with a ≥95 average*

Geometry Honors provides the student with a faster, more rigorous and more in depth mode of instruction. This course is intended for students with strong prior mathematical experiences. Fundamental algebra topics will be treated as review within the context of geometrical concepts. Higher order critical thinking skills and cooperative learning are fostered in an academic environment. At the completion of the course, the student will be able to understand the basic properties of geometric figures such as points, lines, planes, polygons and circles, reason deductively and be able to solve problems involving are, volume and coordinate geometry. Students are expected to read well and complete homework every night. Tools needed for the course are compass, protractor, ruler and scientific calculator.

Proficiencies:
Differentiate among various properties of one, two and three-dimensional figures.
Develop reasoning skills in proving theorems by applying definitions, theorems and postulates to diagrams and proofs.

**GEOMETRY (4002)**
*Grade 9, 10  Level – Academic*
*Full Year – 5 credits*
*Prerequisite: Successful completion of an Algebra I academic or honors course.*

Geometry provides the student instruction at a fast pace. Critical thinking skills are emphasized in a cooperative learning environment. At the completion of the course, the student will be able to understand the basic properties of geometric figures such as points, lines, planes, polygons and circles, reason deductively through using logic and completing proofs and be able to solve problems involving area, volume and coordinate geometry. Students are expected to read and do homework every night. Tools needed for the course are compass, protractor, ruler and scientific calculator.

Proficiencies:
Differentiate among various properties of one and two-dimensional figures.
Justify statements by recognizing and applying definitions, theorems and postulates as they relate to diagrams.

**GEOMETRY (84002)**
*Grades 10, 11  Level – Resource*
*Full Year – 5 credits*
*Prerequisite: Successful completion of Algebra I and recommendation by Child Study Team*

Geometry 8451 is a resource center replacement class that is taught in the resource center program. It is designed for those students who require individualized and small group instruction. The goals and objectives in each student's IEP will be addressed throughout the course. Students will develop knowledge of fundamental geometric concepts. Students will learn to use inductive and deductive reasoning, to identify and apply properties of geometric relations in plane and space and demonstrate an ability to use a calculator to solve multi-step word problems.

**ESSENTIALS OF GEOMETRY AND MATHEMATICAL REASONING**
*Grade 10, 11*
*Full Year – 5 credits*
*Prerequisite: Essentials of Algebra and Mathematical Patterns and recommendation by Child Study Team*

Essentials of Geometry and Mathematical Reasoning are the second year course and are intended to follow the Essentials of Algebra course. It is a resource center replacement class that is taught in the resource center program. The goals and objectives in each student's IEP will be addressed throughout the course. The course focuses on basic geometric concepts, spatial sense, measurement and definitions while reinforcing arithmetic and algebraic skills. Real-world applications and analytical skills are stressed.

**ALGEBRA II/TRIGONOMETRY H (4003TRH)**
*Grades 9, 10  Level – Honors*
*Full Year – 5 credits*
*Prerequisite:  Successful completion of an Algebra B accelerated course with a ≥90 and successful completion of Geometry Honors with a ≥90 average*

Algebra 2 Trigonometry Honors is a fast-paced course. It is highly rigorous and designed to prepare students for Trig-Calc Honors. It is the second course in the branch of mathematics that enables students to represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes. This course has a very minimal review of the topics of Algebra 1.

Algebra 2 Trigonometry includes a much more in-depth study of various topics including trigonometry, which involves the proving of identities and various applications of trigonometry.


**ALGEBRA II HONORS (4003H)**
*Grades 9, 10  Level – Honors*
*Full Year – 5 credits*
*Prerequisite:  Successful completion of an Algebra B course with an "A" and successful completion of Geometry Honors with a ≥75 average*

Algebra 2 Honors is a briskly paced course designed to prepare students for Pre-Calculus Honors and college math.  It is the second course in the branch of mathematics that enables students to represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.  Prerequisite concepts and skills from Algebra 1 are reviewed and enhanced.


**ALGEBRA II (4003)**
*Grades 10  Level – Academic*
*Full Year – 5 credits*
*Prerequisite: Successful completion of an Algebra I and a Geometry course*

Algebra II is a rigorous course that goes in-depth into solving and graphing polynomial, rational, radical and exponential equations, as well as systems of equations. Multiple-step problem solving is emphasized. Strong skills in Algebra are a firm prerequisite, including solving single variable linear equations and operating with signed numbers, fractions and radicals. Homework is assigned on a regular basis, as independent practice is essential to mastery of Algebra II skills.

**TRIGONOMETRY & INTRODUCTION TO CALCULUS HONORS (4006H)**
*Grades 10  Level – Honors*
*Full Year – 5 credits*
*Prerequisite: Successful completion of Algebra II/Trigonometry Honors with a ≥85 average or Algebra II Honors with a ≥95 average*

This course will provide the student with a comprehensive study of mathematics in preparation for a course in Advanced Placement calculus. At the completion of the first half of the course, the student will understand trigonometric functions, graphs and identities, triangle trigonometry and polar coordinates. The second half of the course will introduce the student to the topics of differential calculus. Topics covered include limits, continuity, the derivative and its applications. As recommended by the National Council of Teachers of Mathematics, students enrolled in this course should have a mastery of Algebra II and Geometry. Students completing this course successfully will be able to take a full year calculus course (from Calculus Honors, AP Calculus AB or AP Calculus BC).

**PRECALCULUS HONORS (4004H)**
*Grades 10  Level – Honors*
*Full Year – 5 credits*
*Prerequisite: Successful completion of Algebra II Honors with a ≥75 average or Algebra II/ Trigonometry Honors*

This course will provide the student with comprehensive fast-paced instruction and a cooperative learning environment. The student must be self-motivated and able to work with advanced algebraic and geometric concepts. The course extends and broadens the mathematical concepts introduced in previous years. At the completion of the course, the student will be able to understand trigonometric and circular functions, as well as more advanced algebraic concepts, such as logarithms,  graphs  of  rational functions and limits.

Proficiencies for Pre-Calculus Honors:
Students will be able to use circular definitions of trigonometric functions to solve problems involving triangular relationships applied to the real world, geometric shapes or otherwise.
Students will be able to graph trigonometric functions and evaluate equations involving trigonometric functions, including solving for angle measure.
Students will be able to factor polynomials of higher degrees than two with integral roots and recognize the relationship between the factorization and the graph of the function

Note: This course will not prepare students for AP Calculus BC the following year, but will provide highly proficient students with an opportunity for AP Calculus AB

**PRECALCULUS (4004)**
*Grades 11, 12  Level – Academic*
*Full Year – 5 credits*
*Prerequisite: Successful completion of Algebra II Academic*

This course will provide students with a traditional pace of instruction, a more individualized instruction, and a cooperative learning environment. Fundamental algebra topics will be treated as review within the context of trigonometric functions. At the completion of this course students will understand the concepts of a circular and trigonometric functions and their relationships and applications to real-life problems.

**APPLIED MATHEMATICS (8412)**
*Grades 11, 12*
*Full Year – 5 Credits*
*Prerequisite: Two years of math and recommendation by the Child Study Team*

Applied Mathematics is designed for students who need to fulfill the third year graduation requirement or who still need additional reinforcement of basic math skills. It is a resource center replacement class that is taught in the resource center program. The goals and objectives in each student's IEP will be addressed throughout the course. The course focuses on practical problem-solving that is found in social, consumer and career aspects of adult life. Sample topics include budgeting, credit, income tax, calculating a tip, and working with percentages to determine the discount on sale items. Emphasis is given to arithmetic skills, geometry, and algebra.

**AP CALCULUS (BC) (4007APC)**
*Grades 11, 12  Level – Advanced Placement*
*Full Year – 5 credits*
*Prerequisite: Successful completion of Trigonometry & Intro to Calculus with a ≥88 average*

This course will provide the student with an extremely fast-paced, rigorous course in calculus in preparation for the Advanced Placement Examination in Calculus BC. At the completion of the course the student will be able to understand and apply the concepts of limits, continuity, differential calculus, integral calculus, improper integrals, Taylor and McLaurin polynomials, series and their convergence/divergence, applications of polar coordinates, parametric representations of functions and their derivatives, vectors in the plane and differential equations. The use of the graphic calculator is incorporated throughout the course. Students are expected to take the AP Exam in Calculus BC.

Note: Honors Calculus is not sufficient preparation for AP Calculus.

**AP CALCULUS (AB) (4007APA)**
*Grades 11, 12  Level- Advanced Placement*
*Full Year – 5 credits*
*Prerequisites: Successful completion of Trigonometry & Intro to Calculus H with a ≥80 average or PreCalculus Honors with a ≥90 average*

This course will provide the student with a rigorous course in calculus with an accelerated pace in preparation for the AP Examination in AB Calculus. At the completion of the course, the student will understand the theory and applications of differential and integral calculus. As recommended by the National Council of Teachers of Mathematics, students enrolled in this course should have a mastery of algebra II, geometry, and trigonometry. Students are expected to take the AP Exam in May. It is expected that students  who successfully complete the course will have developed proficiency in the following areas:

- Evaluate limits, derivatives, and integrals.
- Apply derivatives to related rates, optimization problems, and velocity.
- Apply integrals to area, volume, and differential equations.
- Use advanced techniques of integration.
- Become proficient in the use of the graphic calculator.

**CALCULUS H (4007H)**
*Grades 11, 12  Level – Honors*
*Full Year – 5 credits*
*Prerequisite: Successful completion of Pre-Calculus Honors with an average of ≥75 average and a demonstrated proficiency in solving equations*

This course will provide the student with a rigorous course in calculus with in-depth instruction in the basic concepts of calculus. The course is designed for those students not planning to take the Advanced Placement Examination in Calculus. At the completion of the course, the student will have a clear understanding of the theory of limits, derivatives, integrals, and their applications. Topics covered include maxima and minima, related rates, area and volume, exponential, logarithmic, and trigonometric functions. As recommended by the National Council of Teachers of Mathematics, (NCTM), students who enroll in this course should have a mastery of algebra, geometry, and trigonometry.

Note: Juniors taking Honors Calculus will be offered AP Statistics as seniors.

**CALCULUS III HH (4008HH)**
*Grade 12  Level – High Honors*
*Full Year – 5 credits*
*Prerequisite:  Successful completion of AP Calculus BC with an average of ≥90*

This course in multivariable calculus is for those seniors who have successfully completed AP Calculus BC. Topics covered include vector-valued functions of several variables, multiple integration, directional derivatives, vector analysis, and calculus in three dimensions.

**ADVANCED PLACEMENT STATISTICS (4005AP)**
*Grades 11, 12  Level – Advanced Placement*
*Full Year - 5 credits*
*Prerequisites: Successful completion of Algebra II H with a ≥80 average or Algebra II/Trig H with a ≥75 average or successful completion of Pre-Calculus Honors with an 80 average*

This course provides in-depth instruction at a fast pace in a cooperative learning environment. It is intended for students who have strong mathematics background equivalent to Algebra II. This AP course is designed to prepare students to take the Advanced Placement College Board examination in Statistics. The instruction in this course is technology and calculator-based. This course is equivalent to an introductory non-calculus based statistics course offered by the mathematics departments at many colleges and universities. Those students intending to major in psychology, sociology, health sciences or business may wish to consider taking this course. Those intending to major in the sciences, engineering, and mathematics or computer science will find this course to be an effective preparation for the upper level calculus-based statistics course that they will take in college. Those students planning to take an AP science course in their senior year will benefit greatly from AP Statistics in their junior year. The approach taken in this course will allow students to build interdisciplinary connections with other subjects and with their world outside school.

This course will include the following major topics: exploring data, planning a study (deciding what and how to measure), anticipating patterns (introducing probability and simulation), and statistical inference. Students are expected to have a TI-83/84 plus calculator. Students are expected to take the AP Statistics Exam in May.

**PROBABILITY AND STATISTICS H (4005H)**
*Grades 11, 12  Level - Honors*
*Full Year - 5 credits*
*Prerequisites: Successful completion of Algebra II H with a ≥75 average or Pre-Calculus H with a ≥75 average*

This course provides an alternative to Calculus courses for those who wish to include a fourth year of math in the high school program. This course will include the following major topics: exploring data, planning a study (deciding what and how to measure), anticipating patterns (introducing probability and simulation), and statistical inference. Students are encouraged to use their own TI-83/84 plus calculator. Successful students will be able to perform exploratory data analysis, apply and interpret techniques of statistical inference, and critique and interpret various research design models. The approach taken in this course will allow students to build interdisciplinary connections with other subjects and with their world outside school.

**PROBABILITY AND STATISTICS (4005)**
*Grades 11, 12  Level - Academic*
*Full Year - 5 credits*
*Prerequisites: Successful completion of Algebra II or Pre-Calculus*

This course provides an alternative to Pre-Calculus for those who wish to include a fourth year of math in the high school program. Topics covered include exploring data, planning a study (deciding what and how to measure), anticipating patterns (introducing probability and simulation), and statistical inference. Students are encouraged to use their own TI-83/84 plus calculator. Successful students will be able to perform exploratory data analysis, apply and interpret techniques of statistical inference, and critique and interpret various research design models.

**COMPUTER SCIENCE I H (4101H)**
*Grades 9-12  Level - Honors*
*Semester – 2.5 credits*

This is an elective course which provides students with theory and hands-on training in the field of information technology. Computer Science Honors is designed to introduce students to principles of computer technologies ranging from computer hardware and operating systems to network security and professionalism. The central focus of this course is to give students hands-on experiences in solving real-world issues involving computer hardware and software. Some of the hands-on activities will involve disassembling a computer, using appropriate tools to diagnose computer problems, and performing preventive maintenance. Students will be exposed to a variety of computer applications, including graphics presentation software, computer programming software and 3-D modeling software.

**ADVANCED PLACEMENT COMPUTER SCIENCE A (AP CSA) (4101APA)**
*Grades 10\*, 11, 12  Level – Advanced Placement*
*Full Year – 5 credits*
*Prerequisite: Successful completion of Algebra II/Trig H with a ≥80 average or Algebra II H with a ≥95 average.  The Introduction to Computer Science course is strongly recommended for students without any prior experience.*

"The AP Computer Science A course is equivalent to a first-semester, college-level course in computer science. The course introduces students to computer science with fundamental topics that include problem solving, design strategies and methodologies, organization of data (data structures), approaches to processing data (algorithms), analysis of potential solutions, and the ethical and social implications of computing. The course emphasizes object-oriented and imperative problem solving and design using the Java language. These techniques represent proven approaches for developing solutions that can scale up from small, simple problems to large, complex problems. The AP Computer Science A course curriculum is compatible with many CS1 courses in colleges and universities"\*\* (\*\*taken from the "AP Computer Science: A Course Overview").

Students should be comfortable with functions and the concepts found in the uses of function notation. This course also builds upon a foundation of mathematical reasoning that should be acquired before attempting such a course. This course includes a substantial laboratory component in which students design solutions to problems. Students should be prepared to spend up to 3 hours per week beyond the standard class period completing labs.

Note: This course is best suited for juniors and seniors. Sophomores should speak to the instructor before enrolling in this course.


**ADVANCED PLACEMENT COMPUTER PRINCIPLES (AP CSP) (4101APP)**
*Grades 11, 12  Level – Advanced Placement*
*Full Year – 5 credits*
*Prerequisite: Successful completion of Algebra II/Trig H with a ≥80 average or Algebra II H with a ≥95 average*

"The AP Computer Science Principles course is designed to be equivalent to a first-semester introductory college computing course. AP Computer Science Principles offers a multidisciplinary approach to teaching the underlying principles of computation. The course will introduce students to the creative aspects of programming, abstractions, algorithms, large data sets, the Internet, cyber-security concerns, and computing impacts. AP Computer Science Principles also gives students the opportunity to use current technologies to create computational artifacts for both self-expression and problem solving. Together, these aspects of the course make up a rigorous and rich curriculum that aims to broaden participation in computer science.

In this course, student will develop computational thinking vital for success across all disciplines, such as using computational tools to analyze and study data and working with large data sets to analyze, visualize, and draw conclusions from trends. This course is unique in its focus on fostering student creativity. Students are encouraged to apply creative processes when developing computational artifacts and to think creatively while using computer software and other technology to explore questions that interest them. They will also develop effective communication and collaboration skills, working individually and collaboratively to solve problems, and discussing and writing about the importance of these problems and the impacts to their community, society and the world"** (**taken from the "AP Computer Science Principles Course Overview").

It is recommended that students have a strong foundation in basic functions and problem solving strategies. Students should also be able to use a Cartesian (x, y) coordinate system to represent points in a plane. This course also builds upon a foundation of mathematical and computational reasoning that should be acquired before attempting such a course.