Hunterdon Preparatory School
General Mathematics I Curriculum

General Mathematics at the Hunterdon Preparatory School is a course designed for students who have skill deficits and specific learning disabilities that require remedial action before the students can move forward to higher order thinking math courses. Every student at the Hunterdon Preparatory School arrives with comprehensive evaluation results that provide a starting point for remediation. Students with IQs within the average range often display below average math skills that have already been broken down into sub categories, allowing teachers to target weak areas and craft individual instruction for a wide variety of different skill sets. Students are also informally assessed on a daily basis as they review each day's prior lesson for skill retention and mastery. It is important for students to be able to connect math skills to everyday life and to develop the ability to think and reason effectively. Training their brains to think analytically becomes easier and makes more sense once students can manipulate number systems with confidence and order.

General Mathematics begins with basic skills. These skills are fundamental and while mastery is not always possible due to processing and memory issues, students learn compensatory skills and the use of calculators as they advance towards more abstract content. This helps students perform computations with reasonable speed and accuracy. Appropriate techniques for attacking problems brings better understanding and more successful outcomes to the students who recognize the need for stronger math skills and for those students who seek to fix the skills that comprise the college Accuplacer. Poor basic skills sometimes become an impediment for students who are registered to take the SATs and math instructors must backtrack to review computation skills prior to SAT test dates in order to prepare students as best they can.

Topics included in general math instruction are numeration, computation, problem-solving, geometry, measurement, money, time, charts, graphs, fractions and decimals. Many of these skill sets have confused our students in the earlier grades and have been a constant source of frustration and failure. Multiplication facts are, in particular, an area where our students struggle; the facts are not at their fingertips as would be expected by middle and high school. Students are reintroduced to vocabulary and symbols such as regrouping, less than or greater than, quotients and properties. Rudimentary geometry and measurement skills become the building blocks for more difficult math skills. Students are assessed on not only their ability to grasp basic concepts but on their work ethic and cooperation. Students are encouraged to reinforce their daily instruction by completing assignments on Khan Academy for homework. Students who

regularly access Kahn Academy from home are more likely to see positive results in their skills acquisition.

The Hunterdon Preparatory School has supported hundreds of students through remedial math in its thirty-seven year history. Students who work hard and are receptive to instruction have notably raised their proficiency levels to closer to grade level appropriateness. In many cases, students have overcome their disabilities in math to successfully complete college level Algebra classes with accommodations.

COURSE OBJECTIVES

- Students will understand ratio concepts and use ratio reasoning to solve problems.

- Students will apply and extend previous understandings of multiplication and division to divide fractions by fractions.

- Students will be able to multiply and divide multi-digit numbers and find common factors and multiples.

- Students will be able to apply and extend previous understandings of numbers to the system of rational numbers.

- Students will be able to apply and extend previous understandings of arithmetic to algebraic expressions.

- Students will be able to reason about and solve one-variable equations and inequalities.

- Students will represent and analyze quantitative relationships between dependent and independent variables.

- Students will solve real-world and mathematical problems involving area, surface area, and volume.

- Students will develop understanding of statistical variability.

- Students will summarize and describe distributions.

- Students will make sense of problems and persevere in solving them.

- Students will be able to reason abstractly and quantitatively.

- Students will be able to construct viable arguments and critique the reasoning of others.

- Students will model with mathematics.

- Students will use appropriate tools strategically.

Hunterdon Preparatory School
General Mathematics II Curriculum

General Mathematics II continues the remediation process by delving more deeply into fundamental level skills. Students continue to make the connections necessary to become proficient at problem solving and use of the four basic operations. Students receive instruction on utilizing calculators for harder, multi-step functions. More complex geometry skills are introduced and their relationships to real life math are examined in practical applications. Students learn to solve problems related to measurement, money and time. Graphs and charts of a more sophisticated nature are examined and discussed. Students who do well in this remedial math class often move next to Pre-Algebra and the courses that follow.

The nature of remedial math at the Hunterdon Preparatory School requires the math instructors to provide direct, one-to-one instruction to their students. Teachers adjust to a variety of learning and processing styles. Students who lack fluency in this area are given the extra time they need to produce the desired results. When new concepts are introduced, individual students are taken step-by-step through each process and an infinite number of examples are available to ensure that students are thoroughly grasping operations and procedures. Students are assessed by ability, effort and receptiveness to instruction.

Students sometimes express frustration with remedial math. There is anxiety involved in working below grade level in any subject but especially in mathematics. Some students would rather avoid math than put in the time and effort to repair their skills. As students get closer to high school graduation, the inadequacy they feel when performing mathematical tasks begins to affect their overall outlook for the future. Students at the Hunterdon Preparatory School are encouraged to use the support systems available to them to address this challenge head-on and lay to rest their long standing belief that "I stink at math." Students who struggle with math are often uniquely talented at other things that make for fine post high school career goals. These students may only ever have to take a single math class to complete a college program and if they are willing to seek support and accommodations at the college level, they will be able to successfully meet their program's math requirement. When looked at in that context, the obstacle some know as mathematics loses it power to overwhelm and paralyze. That is when the move towards higher order thinking math skills becomes a reality.

COURSE OBJECTIVES

- Students will understand ratio concepts and use ratio reasoning to solve problems.

- Students will apply and extend previous understandings of multiplication and division to divide fractions by fractions.

- Students will be able to multiply and divide multi-digit numbers and find common factors and multiples.

- Students will be able to apply and extend previous understandings of numbers to the system of rational numbers.

- Students will be able to apply and extend previous understandings of arithmetic to algebraic expressions.

- Students will be able to reason about and solve one-variable equations and inequalities.

- Students will represent and analyze quantitative relationships between dependent and independent variables.

- Students will solve real-world and mathematical problems involving area, surface area, and volume.

- Students will develop understanding of statistical variability.

- Students will summarize and describe distributions.

- Students will make sense of problems and persevere in solving them.

- Students will be able to reason abstractly and quantitatively.

- Students will be able to construct viable arguments and critique the reasoning of others.

- Students will model with mathematics.

- Students will use appropriate tools strategically.

Hunterdon Preparatory School
Business Mathematics Curriculum

The first half of our Business Mathematics course at the Hunterdon Preparatory School focuses on personal finance. Students are instructed on the following practical skills: how to compute gross income by calculating straight- time pay, overtime pay, commissions and salary. Students will maintain a checking account, compute average monthly expenditures and plan a personal budget. Students will learn about cash purchases by figuring out unit prices, total purchase price and the use of coupons and rebates. They will discuss and practice the use of charge accounts, calculating the new balance on a charge account and determining finance charges and fees. Students will make a hypothetical vehicle purchase for the purpose of understanding the cost of operating and maintaining a vehicle, the difference between liability and comprehensive insurance and insurance surcharges. Students will work independently or in small groups to determine housing costs and computing down payments for a mortgage loan. Using online realty websites, students are exposed to the financial and contractual obligations of the home owner. They learn how mortgages and equity works and what could be expected as a down-payment, monthly payments, total amount paid, and total interest charged. Personal income taxes and property taxes are considered. This helps students make the inferences necessary to justify and promote a positive outcome. The use of graphs and charts provide visual tools to enable students to grasp the many variables in the development of personal financial stability. Long term goals and how to achieve them can be a topic for individual discussion with the math instructor while our counselors target team work, coping and stress management and the communication required to effectively address short term goals that lead to long term goal achievement.

During the second half of the Business Mathematics curriculum students will turn their attention to mathematics in a much bigger sense, the world of business. Students can anticipate a lengthier project where they become the business owner, determining the cost of recruiting new employees and computing salaries after merit increases and cost-of-living adjustments. The prime cost of manufacturing an item will discussed in depth allowing for the breakeven point of producing an item. Through practice exercises students will calculate the selling price of an item based on cost and markup rate, computing projected sales and figuring the cost of advertising. There will be a unit on warehousing and distributing goods as students estimate storage space and cost, total inventory value and the variety and cost of shipping.

Purchasing merchandise from different suppliers and the use of different discounts methods gives each student perspective on the many responsibilities involved in running a business. Sales and marketing, advertising, inflation and overhead will be covered through national, international

and corporate overviews and presentations, including employer payroll taxes, depreciating assets and financial statements.   As many of our students are developing marketable skills such as ceramics, window painting, dessert making and technological skills, business math gives their imaginations a chance to consider additional career possibilities that coincide with things they are competent at and interested in.

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COURSE OBJECTIVES

- Students will gain an understanding of how statistics can be used to gain information about a population.

- Students will use data from a random sample to draw inferences about a population with an unknown characteristic of interest

- Students will investigate chance processes and develop, use, and evaluate probability models.

- Students will develop a probability model and use it to find probabilities of events. They will compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

- Students will find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

- Students will be able to summarize, represent, and interpret data on a single count or measurement variable.

- Students will summarize, represent, and interpret data on two categorical and quantitative variables.

- Students will be able to interpret linear models.

- Students will understand and evaluate random processes underlying statistical experiments.

- Students will make inferences and justify conclusions from sample surveys, experiments and observational studies.

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- Students will understand independence and conditional probability and use them to interpret data.

- Students will calculate expected values and use them to solve problems.

- Students will use probability to evaluate outcomes of decisions.

Hunterdon Preparatory School
Consumer Mathematics I Curriculum

Consumer Mathematics I is for high school students who have neither the prerequisite skills for higher order thinking math courses nor the goal to attend a traditional college program following graduation. The students who take Consumer Math I receive daily remedial skill review as they are introduced to new concepts that have practical applications in daily life. Students are taught to collect, organize, display and analyze data. Problem solving exercises that are related to careers are closely examined and a variety of appropriate strategies to solve problems are offered to students as they collaborate with math their instructors. At the Hunterdon Preparatory School, Consumer Math I is designed for students to develop reasoning skills at their own individual ability level. Students whose math skills are well below grade level are given checkbooks and play money to help them become more financially literate.

Students can practice communicating their mathematical thinking to others without embarrassment or feeling stupid. At times, students with stronger math skills serve as peer tutors and this strengthens the relationships among instructional group members. Students are encouraged to work to the best of their ability and they have access to layers of support that can help them ameliorate skill deficits for once and for all.

Skills that are targeted in Consumer Mathematics I are whole number skills, fraction, skills, decimal skills, and other basic math skills such as estimating, ratio and proportion and reading graphs and tables. Using technology, students are able to produce graphs and charts of their own. Understanding interest, using formulas and measurement are all topics covered at each student's individual pace, ability and motivation.

The lessons are of the most practical nature. Earning money is of high interest to our high school students. They study wages, overtime, tips, piecework and commissions. Conversely, they discuss paying taxes and W-2 forms, the federal budget, determining refund or balance and property taxes. This leads to preparing a budget that includes managing a household, buying food and clothes, buying an maintaining a vehicle, mass-transportation costs and saving money for home repairs and improvements and hopefully, a nice vacation.

Students who complete Consumer Mathematics I have a clearer picture of the realities of living independently. Many students look forward to getting their drivers' licenses without realizing

the cost and responsibility of car ownership. Computing gas expenses and considering insurance premiums for the first time can lead to some lively discussions and debates.

Preparing for careers is a major focus for students taking Consumer Mathematics I. The skill sets acquired are useful tools when pursuing work as auto mechanics, carpenters and electricians. These hands-on occupations are much in need of skilled laborers and as many as 1 in 4 of our high school graduates seek to continue their educations via trade schools, apprenticeships and specialized programs. Consumer Math students may consider taking Business Math as seniors and Accounting as fifth year students to further prepare themselves for the possibility of starting and running their own businesses.

COURSE OBJECTIVES

- Students will be able to divide multi-digit numbers using the standard algorithm.

- Students will be able to add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

- Students will be able to apply and extend previous understandings of numbers to the system of rational numbers.

- Students will understand that positive and negative numbers are used together to describe quantities having opposite directions or values

- Students will use positive and negative numbers to represent quantities in real-world contexts, and be able to explain the meaning of 0 in each situation.

- Students will understand a rational number as a point on the number line. They will extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

- Students will recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line.

- Students will understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane.

- Students will recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

- Students will be able to find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

- Students will understand ordering and absolute value of rational numbers.

- Students will be able to write, interpret, and explain statements of order for rational numbers in real-world contexts.

- Students will understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity

in a real-world situation.

- Students will solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.

- Students will extend the properties of exponents to rational exponents.

- Students will be able to classify numbers as rational or irrational.

- Students will be able to reason quantitatively and use units to solve problems.

- Students will perform arithmetic operations with complex numbers.

- Students will make sense of problems and persevere in solving them.

- Students will be able to reason abstractly and quantitatively.

- Students will construct viable arguments and critique the reasoning of others.

- Students will be able to model with mathematics.

- Students will use appropriate tools strategically.

Hunterdon Preparatory School
Consumer Mathematics II Curriculum

Consumer Mathematics II is a course for students who have struggled to master the concepts in Consumer Mathematics I. For those students who have proceeded at a slower pace because they need daily review of prerequisite skills, Consumer Mathematics II gives them the opportunity to continue to work on remediating basic skills while using real life math activities to gain their own level of proficiency in this area. Students who take Consumer Mathematics II at the Hunterdon Preparatory School may have their math instruction directly tailored to job sampling, internships and apprenticeships. Methods and materials are developed with the individual student's fifth year goals in mind. It is possible to liaison with employers to invent job specific math assignments and realistic objectives to reach for.

Calculator practice is a regular component of Consumer Mathematics II. Students need to be able to use this tool effectively and efficiently to compensate for weak basic skills. Students are instructed on the use of a variety of different calculator models and the functions that are most often seen within the trades. Students learn to store numbers in the device's memory, arriving at square roots and percentages, decimal, fraction and customary measurement conversions. Students are often provided with addition, subtraction, multiplication and division tables as an additional support. It is important that students understand calculator terminology and become familiar with the style and brand of calculator that works best for them. Students who are conscientious when they are attending to precision produce accurate results.

The use of websites such as Khan Academy and Real Math are used to reinforce the concepts that are introduced, broken down into steps and practiced during class. Different levels of instructional materials are offered to students at the appropriate level for them. Although there are assessments for mastery following every unit, the real progress is often reflected at reevaluation or on statewide assessments where students have improved their skills and acquired the ability to persevere through academic tasks that are difficult for them. This perseverance raises self-esteem, builds character and gives students hope for the future.

Students who are taking Consumer Mathematic II as seniors have the added experience of having Transition class where the emphasis is on preparing for workplace. Developing transition plans and goals coincides with Consumer Math concepts. More attention is given to recognizing and honing interests and strengths and remediating math skills becomes just another facet of

preparing for life after high school. Students who are hard workers but who require additional support to reach their goals have nothing to fear from the future.

COURSE OBJECTIVES

- Students will be able to divide multi-digit numbers using the standard algorithm.

- Students will be able to add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

- Students will be able to apply and extend previous understandings of numbers to the system of rational numbers.

- Students will understand that positive and negative numbers are used together to describe quantities having opposite directions or values

- Students will use positive and negative numbers to represent quantities in real-world contexts, and be able to explain the meaning of 0 in each situation.

- Students will understand a rational number as a point on the number line. They will extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

- Students will recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line.

- Students will understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane.

- Students will recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

- Students will be able to find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

- Students will understand ordering and absolute value of rational numbers.

- Students will be able to write, interpret, and explain statements of order for rational numbers in real-world contexts.

- Students will understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.

- Students will solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.

- Students will extend the properties of exponents to rational exponents.

- Students will be able to classify numbers as rational or irrational.

- Students will be able to reason quantitatively and use units to solve problems.

- Students will perform arithmetic operations with complex numbers.

- Students will make sense of problems and persevere in solving them.

- Students will be able to reason abstractly and quantitatively.

- Students will construct viable arguments and critique the reasoning of others.

- Students will be able to model with mathematics.

- Students will use appropriate tools strategically.

Hunterdon Preparatory School
Algebra I Curriculum

Algebra is a branch of mathematics that uses mathematical statements to describe relationships between things that vary over time. Algebra I is one of the most critical courses that students take in high school as it introduces them to a powerful reasoning tool with applications in many different careers. Algebra teaches them how to solve problems and think abstractly, which are skills that pay off no matter what career path a student decides to pursue. It provides people with tools to solve problems with unknown answers.When a mathematical statement is used to describe a relationship, letters are often used to represent the unknown or the quantity that varies, since it is not a fixed amount, and these letters and symbols are referred to as variables. Students in the Algebra I course learn to take this concept and develop critical thinking and problem solving skills as the mathematical equations are applied to everyday life situations. At the Hunterdon Preparatory School, students arrive with a varied knowledge base and specific sets of skills in mathematics, and their yearly curriculum is dictated by their abilities based on these skill sets. The focus of Algebra I is to formalize and extend the mathematics that the student has already learned in previous mathematic classes and to help develop their thinking, specifically in terms of logic, patterns, problem solving, and deductive and inductive reasoning.

In the Hunterdon Preparatory School Algebra I course, students first learn to master the fundamentals of algebra including the order of operations, the sets of real and whole numbers, and to interpret the structure of expressions. Students then learn how to use expressions, equations, and inequalities to model real-life situations and to solve word problems. They also use formulas to evaluate a given expression. Students learn the properties of numbers and compute real numbers by graphing, adding, subtracting, multiplying, and dividing these numbers. They examine the concepts of ratios, rates, and percent and how they are applied in everyday life situations.

As they progress through the course, students learn about the distributive property and how to combine like terms in an equation. Students study how to solve equations and inequalities with one variable and to graph inequalities. They also learn what a function is and use the coordinate plane to graph linear equations using the slope-intercept form. Students then experiment with writing linear equations and applying them in real-life situations. Students practice writing, solving and graphing linear inequalities, and they learn to solve absolute value equations and inequalities. Students continue on with learning different operations with polynomials, exponents and exponential functions. Students finish up the course with applying algebraic concepts to

geometry by examining the Pythagorean Theorem, the distance formula, and logical reasoning and proofs.

Throughout the year, student progress and performance in Algebra I class is determined by a number of progress indicators. Students participate in individualized assignments and homework, collaborative group work, computer software programs, and the viewing of instructional mathematic webcasts.

COURSE OBJECTIVES

- Students will be able to interpret the structure of expressions and write them in equivalent forms to solve problems

- Students will be able to perform arithmetic operations on polynomials

- Students will understand the relationship between zeros and factors of polynomials

- Students will use polynomial identities to solve problems

- Students will be able to rewrite rational functions

- Students will create equations that describe numbers or relationships

- Students will be able to understand solving equations as a process of reasoning and be able to explain the reasoning verbally and in writing

- Students will be able to solve equations and inequalities in one variable

- Students will be able to represent and solve equations and inequalities graphically

- Students will make sense of problems and persevere in solving them.

- Students will learn to reason abstractly and quantitatively.

- Students will construct viable arguments and critique the reasoning of others.

- Students will be able to model with mathematics.

- Students will be able to use appropriate tools strategically.

Hunterdon Preparatory School
Algebra II Curriculum

Algebra II is the branch of mathematics which builds upon the concepts taught in Algebra I and Geometry and extends them to explore such concepts as the analysis and graphing of polynomials, the study of conics, and trigonometric functions. Students also work more extensively with matrices to solve equations. They likewise learn how to identify and solve quadratic equations and inequalities, and they work with exponential and logarithmic functions for the first time. Algebra II teaches the type of higher order thinking that is required in such fields as medicine where nurses and doctors need to master the more complex mathematics taught in order to understand how medications affect patients, how to diagnose or treat medical problems and to understand the chemistry and physics involved with medicine. Careers in business also require the higher order of thinking taught in Algebra II as economic principles and business decisions are based on understanding how variables affect one another. Business organizers and managers need a solid understanding of variables, their relationships, and how to calculate risk. At the Hunterdon Preparatory School, students arrive with a varied knowledge base and specific sets of skills in mathematics, and their yearly curriculum is dictated by their abilities based on these skill sets. Students taking Algebra II should enter the course possessing a strong fundamental background in mathematic skills and an understanding of the major concepts taught in the Algebra I course and the Geometry course. Students who have poor mathematic skills and difficulty understanding concepts in Algebra II will have opportunities to improve their skills by going over prerequisite skills and reviewing basic Algebra concepts at the beginning of the course.

In the Hunterdon Preparatory School Algebra II course, students review previously learned skills such as classifying real numbers and identifying the distribution, identity, community and associated properties. Students then move to solve equations and graph inequalities and absolute value problems. They learn how to perform operations using polynomials and to understand relationships between zeroes and factors of polynomials. Students interpret functions and model relationships between two quantities, graph functions and read and create tables. They learn to determine domain and range values of linear and quadratic functions, analyze situations involving quadratic functions, and solve quadratic equations using graphs, tables and the Quadratic Formula.

Throughout the course, students are exposed to how these concepts relate to real-life situations and what their relationship is to possible future career choices. Students proceed to learn the properties of Matrix Operations and solving systems of equations using Cramer's Rule. Students

work with operations of polynomials and they learn about factoring techniques. Students learn the composition of functions, how to build new functions from existing functions, and to understand the concept of function and function notation. Students also are exposed to interpreting data, making inferences, and justifying their conclusions based on experiments and observational studies.

Throughout the year, student progress and performance in Algebra II class is determined by a number of progress indicators. Students participate in individual classroom work and homework, collaborative group work, computer software programs, and the viewing of instructional mathematic webcasts.

COURSE OBJECTIVES

- Students will be able to interpret the structure of expressions and write them in equivalent forms to solve problems

- Students will be able to perform arithmetic operations on polynomials

- Students will understand the relationship between zeros and factors of polynomials

- Students will use polynomial identities to solve problems

- Students will be able to rewrite rational functions

- Students will create equations that describe numbers or relationships

- Students will be able to understand solving equations as a process of reasoning and be able to explain the reasoning verbally and in writing

- Students will be able to solve equations and inequalities in one variable

- Students will be able to represent and solve equations and inequalities graphically

- Students will make sense of problems and persevere in solving them.

- Students will learn to reason abstractly and quantitatively.

- Students will construct viable arguments and critique the reasoning of others.

- Students will be able to model with mathematics.

- Students will be able to use appropriate tools strategically.

Hunterdon Preparatory School
Geometry Curriculum

Geometry is the branch of mathematics concerned with the properties and relations of points, lines, surfaces, solids, space, and higher dimensional analogs. Its beginnings and development date back thousands of years. Geometry is an original field of mathematics, and is indeed the oldest of all sciences, going back at least to the times of Euclid, Pythagoras, and other "natural philosophers" of ancient Greece. Initially, geometry was studied to understand the physical world we live in. It is the visual study of shapes, sizes, patterns, and positions, and is essential to the understanding of a multitude of human activities including the building of structures, navigation, measurements, the use of machines, and artistic designs and patterns.

Studying geometry provides many foundational skills and helps to build the thinking skills of logic, deductive reasoning, analytical reasoning, and problem solving. At the Hunterdon Preparatory School, students arrive with a varied knowledge base and specific sets of skills in mathematics, and their yearly curriculum is dictated by their abilities based on these skill sets. The focus of the Geometry course is to formalize and extend the mathematics that the student has already learned in previous mathematic classes and to help develop their thinking, specifically in terms of logic, patterns, problem solving, and deductive and inductive reasoning. Throughout the course, students are exposed to how these mathematical concepts relate to real-life situations, as well as a continual examination of the numerous career opportunities to be found which are associated with the study of geometry such as architects, engineers, and physicists.

The Hunterdon Preparatory School Geometry course begins with an overview of the basic geometric principles including figures, symbols, definitions, and postulates. Students next move on to studying deductive reasoning and "if – then statements" and "proofs" which demonstrate how certain statements about the properties of lines and angles are "true". The definitions of the types of lines and planes are examined, including the concepts of parallel and perpendicular lines, as well as the properties of the angles of polygons and triangles. Students are then exposed to the concept of congruency and the properties of congruent triangles, followed by the properties and theorems of quadrilaterals which include parallelograms, trapezoids, and rhombuses. They study the inequalities of geometric lines and angles, and how to write indirect proofs.

 As they progress through the course, students learn about similar polygons, ratios, proportion, and similarities, in order to make drawings in different scales. They study the importance of the right triangle and the Pythagorean theory, and touch on the concept of trigonometry and sines,

cosines, and tangents. The next important unit focuses on circles and spheres and their measurements including arcs, chords, and tangents. Students also explore the different methods of measuring the area of polygons and the area and volume of solids. They finish the course by studying coordinate geometry which combines Geometry with Algebra.

Throughout the year, student progress and performance in Geometry class is determined by a number of progress indicators. Students participate in individual classroom work and homework, collaborative group work, computer software programs, and the viewing of instructional mathematic webcasts.

COURSE OBJECTIVES

- Students will experiment with transformations in the plane.

- Students will understand congruence in terms of rigid motions.

- Students will be able to prove geometric theorems.

- Students will be able to make geometric constructions.

- Students will understand similarity in terms of similarity transformations.

- Students will prove theorems involving similarity.

- Students will be able to define trigonometric ratios and solve problems involving right triangles.

- Students will apply trigonometry to general triangles.

- Students will understand and apply theorems about circles.

- Students will find arc lengths and areas of sectors of circles.

- Students will translate between the geometric description and the equation for a conic section.

- Students will use coordinates to prove simple geometric theorems algebraically.

- Students will be able to explain volume formulas and use them to solve problems.

- Students will visualize relationships between two-dimensional and three-dimensional objects.

- Students will be able to apply geometric concepts in modeling situations.

- Students will make sense of problems and persevere in solving them.

- Students will practice reasoning abstractly and quantitatively.

- Students will construct viable arguments and critique the reasoning of others.

- Students will use appropriate tools strategically.

At the Hunterdon Preparatory School, the majority of our students reach the summit of their ability level after taking Algebra II. The degree of remediation necessary to master concepts in Algebra, Geometry and Algebra II is a long and arduous, somewhat gratifying experience and students are grateful and excited to turn their attention to more practical math skills in our Business Math curriculum. There are, however, exceptional students who have not only the ability and motivation necessary to grasp more advanced concepts but the desire to pursue careers in the STEM fields through attendance at competitive colleges and universities. For these students, Trigonometry provides the foundation for Pre-Calculus and Calculus. In the classroom, students taking our Trigonometry course will start with a review of some basic concepts such as the Pythagorean Theorem, types of angles, the coordinate plane and use of the distance formula. Students will examine interval notation, and relations and functions. They will revisit basic geometry concepts such as degree measure, complementary and supplementary angles, conversions between decimal degrees and degrees, minutes and seconds. Students will study the six trigonometric functions as well as Reciprocal, Pythagorean, Quotient and Co function. They will find the trigonometric function values of an Acute Angle in a right triangle and solve right triangles. Students will gain the skills necessary to grasp radian measures and the circular functions of real numbers. Students will graph circular functions of Sine and Cosine and master the characteristics of the sine and cosine functions. Trigonometric Fundamental functions and Identities will provide students with practice verifying trigonometric identities including the sum and difference between the identities of sine, cosine and tangent. Our Trigonometry course moves each student forward to Pre-Calculus by the end of the school term. Students who require more time and processing for Pre-Calculus may start the following school year off picking up where they left off in Pre-Calculus until the teacher is confident that the students have the necessary skills to advance to Calculus.

Our single-variable Calculus course provides students with the opportunity to develop a conceptual understanding of calculus and its applications. The course emphasizes learning new concepts using the "Rule of Four" (numeric, graphic, symbolic and verbal) approach. The curriculum comprises the following topics:

- limits
- continuity

- average and instantaneous rates of change
- derivatives and their applications
- the basic rules of differentiation
- anti-differentiation
- Fundamental Theorems of Calculus
- definite integrals
- areas between curves and volume

Graphing calculators and other technology are used to reinforce mathematical relationships, confirm written work, and to assist in interpreting results.

The concept of the **limit of a function** is essential to the study of calculus. It is used in defining some of the most important concepts – continuity, the derivative of a function, and the definite integral of a function. The limit of a function $f(x)$ describes the behavior of the function close to a particular x value. We will study different techniques in evaluating limits (graphical analysis, pattern recognition, simple substitution, and algebraic simplification).

Many theorems in calculus require that functions be continuous on intervals of real numbers. To successfully carry out differentiation and integration over an interval, it is important to make sure the function is continuous. The definition of and rules for establishing **continuity** of a function will be established from the perspectives of limits as well as geometrically and graphically.

Average and instantaneous rates of change are one of the core applications of differential calculus. This course will examine how rates of change can be interpreted graphically (using tangent and secant lines of a given function) and as an introduction to the concept of differentiation.

Differential calculus is the mathematical study of small, subtle change. The **derivative** of a function tells how the dependent variable tends to change "with respect to" the independent variable. Intuitively, we might say that the derivative at a point is approximately the rate of change in the function when the change in the independent variable is "very small". The use of the first derivative analyze the behavior of a function at a given point will include critical points, the Extreme Value Theorem, the Mean Value Theorem, increasing and decreasing functions, local maxima and minima, and absolute maxima and minima.

The use of the second derivative tells how the derivative is changing. Applications of the second derivative will include concavity of a function, inflection points, and the use of the second derivative in sketching graphs.

Once a core understanding of the mechanics of differentiation is established, the **basic rules of differentiation** will be covered in depth. These include common rules for differentiation, the chain rule, implicit differentiation, exponential differentiation rules, trigonometric and inverse trigonometric differentiation rules, and logarithmic function differentiation rules.

The course will then cover the study of reversing the process of differentiation, and the reasons why one might want to reverse differentiation. The definition of the **anti-derivative** will be covered, as will the basic rules for **anti-differentiation**, including finding anti-derivatives by substitution and the use of indefinite integrals.

The **definite integral** of a function is closely related to the anti-derivative and indefinite integral of a function. The primary difference is that the indefinite integral, if it exists, is a real number value, while the latter two represent an infinite number of functions that differ only by a constant. The course will cover the development of the definition of the definite integral and the use of the Riemann sum.

The **Fundamental Theorem of Calculus** establishes the relationship between indefinite and definite integrals and introduces a technique for evaluating definite integrals without using Riemann sums. (Evaluating the limit of Riemann sum can be extremely time-consuming and difficult).

The course will conclude with a review of applications of the definite integral, including calculating the area between two functions, finding **volumes of solids** with known cross sections, and finding the **volumes of solids** of revolution.

COURSE OBJECTIVES

Pre-Calc/Calculus Objectives

- Students will understand that a function is a rule that assigns to each input exactly one output.

- Students will be able to graph a function as a set of ordered pairs consisting of an input and the corresponding output.

- Students will be able to compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

- Students will interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line.

- Student will be able to give examples of functions that are not linear.

- Students will use functions to model relationships between quantities.

- Students will be able to construct a function to model a linear relationship between two quantities.

- Students will determine the rate of change and initial value of a function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph.

- Students will interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

- Students will be able to describe qualitatively the functional relationship between two quantities by analyzing a graph.

- Students will be able to sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Trigonometry Objectives

- Understand radian measure of an angle as the length of the arc on the unit circle subtended by the

angle.

- Students will be able to explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

- Students will use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for x, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.

- Students will be able to use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

- Students will model periodic phenomena with trigonometric functions with specified amplitude, frequency, and midline.

- Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.

- Students will be able to use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.[*]

- Students will be able to prove and apply trigonometric identities.

- Students will be able to prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.

- Students will be able to prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.

Accounting, or accountancy, can be defined as the measurement, processing and communication of financial information about economic entities. Accounting plays a vital role in the day-to-day activities of every business in the world today, and it is often described as "the language of business". It dates back to the beginnings of civilization in Mesopotamia as accountants played an important role in the development of cities and trade, and its more modern roots lay in the financial dealings of merchants during the Italian Renaissance and the development of businesses and corporations during the Industrial Revolution. The Hunterdon Preparatory School Accounting curriculum is designed to provide students with basic skills that will allow them the opportunity to evaluate a potential career in business, or to select business as a major or minor in college. At the Hunterdon Preparatory School, students arrive with a varied knowledge base and specific sets of skills in mathematics, and their yearly curriculum is dictated by their abilities based on these skill sets. Students in the Accounting course are taught critical thinking skills, problem solving skills, decision-making skills, and the importance of responsibility, communication, and cooperation skills with their peers in order to formulate sound business decisions.

The Hunterdon Preparatory School Accounting curriculum seeks to impress upon students the pervasiveness of accounting systems in our world today, and it provides them with a broad overview of the various fields and economic activities that are involved with business and finance. The subject matter and principles included in the curriculum are basic to understanding today's business environment, and it also provides students with a continual examination of the numerous career opportunities to be found in the different fields of accounting and business. Students are first introduced to the business world and how businesses are organized and operate in a free enterprise system. Students learn the Generally Accepted Accounting Principles (GAAP) and how these principles are implemented in a business environment. They examine the different types of business transactions and the accounting equation, as well as the importance of accounting ethics. The curriculum next moves to explore the recording of business transactions, or "source documents", and how journals, ledgers, and work sheets are kept. One of the most important aspects covered in the course is that of double-entry accounting procedures.

The curriculum then proceeds to introduce students to the role of banking and reconciling bank accounts. Students learn the ins and outs of checking accounts, and they are exposed to double-sided (debit/credit) accounting theory. Major units on payroll accounting, tax records and preparing tax returns, and business financial statements are studied, including notes payable and

receivable and cash receipt journals. Students also focus on the sales and cash receipts of merchandising businesses and view these in terms of sole proprietorships, partnerships, and corporations. They likewise explore the concepts of assets, depreciation, inventories, cash funds, and uncollected accounts receivable.

Throughout the year, student progress and performance in accounting class is determined by a number of progress indicators. Students participate in individual classroom work and homework, collaborative group work, computer software programs, and the viewing of instructional mathematic webcasts.

COURSE OBJECTIVES

- Students will develop an understanding of the role that accountants play in business and society.

- Students will be able to describe career opportunities in the accounting profession.

- Students will demonstrate the skills and competencies required to be successful in the accounting profession and/or in an accounting-related career.

- Students will develop an understanding and working knowledge of an annual report and financial statements.

- Students will assess the financial condition and operating results of a company and analyze and interpret financial statements and information to make informed business decisions.

- Students will identify and describe generally accepted accounting principles (GAAP), explain how the application of GAAP impacts the recording of financial transactions, and the preparation of financial statements.

- Students will use planning and control principles to evaluate the performance of an organization and apply differential analysis and present-value concepts to make decision.

- Students will develop a working knowledge of individual income tax procedures and requirements to comply with tax laws and regulations.

- Students will be able to summarize, represent, and interpret data on a single count or measurement variable.

- Students will summarize, represent, and interpret data on two categorical and quantitative variables.

- Students will be able to interpret linear models.

- Students will understand and evaluate random processes underlying statistical experiments.

- Students will make inferences and justify conclusions from sample surveys, experiments and observational studies.

- Students will understand independence and conditional probability and use them to interpret data.

- Students will calculate expected values and use them to solve problems.

- Students will use probability to evaluate outcomes of decisions.