COLUMBIA HIGH SCHOOL MATH COURSE

ALGEBRA 1 AT-A-GLANCE

ALGEBRA 1

Algebra 1 builds on Grade 8 Math and prepares students for further study in Geometry and Algebra 2. The course focuses on foundational ideas such as proportional reasoning, equivalent forms of expressions or numbers (including integers and exponents), linearity and rate of change (represented and connected in situations, tables, graphs and equations) and operational reasoning (as they evaluate or simplify expressions, or solve equations.) Students will also find absolute value, solve and graph linear inequalities and solve systems of equations and identify key aspects of the graphs of quadratic functions.

The College Prep and Honors levels look more deeply at quadratic functions as well as introduce students to other non-linear functions.

Performance Measures:

Classwork: 0-20% of grade

Homework: 5-10% of grade

Assessments: 70-85% of grade

	Algebra 1 Level 2	Algebra 1 College Prep	Algebra 1 Honors
Algebra 1 Builds on and Extends Prior Knowledge of…	Write linear equations in slope-intercept form	Write linear equations in multiple forms	Translate between multiple forms of linear equations
	Solving equations by examining systems graphically and algebraically. Write and graph linear inequalities in one or two variables	Write and solve systems and interpret the solutions in context. Write and graph linear inequalities in one or two variables given in varied forms.	Create systems that yield specific solutions including infinite and no solution. Represent real world situations with inequalities
	Operations to use the distributive property to simplify an expression	Investigate common patterns in polynomial multiplication	Simplifying multi-term polynomials (i.e. a binomial times a trinomial)
	Graphing to include linear inequalities and quadratics	Identify the characteristics of a parabola	Graphing absolute value and square root functions
	Solving to include quadratic equations and linear inequalities. Factor polynomials using quadratic formulas and square roots	Solve compound and absolute value inequalities	Solve by completing the square and factor by grouping
	Exponents to model exponential growth and decay	Analyze graphs or tables to determine the equation of an exponential function	Use exponential functions to model real-world growth and decay and analyze their characteristics
Expectations	Students will be able to apply a range of mathematical procedures accurately and efficiently. Students are given prompts and reviews, whenever necessary, to help them recall relevant concepts and procedures, such as proportional reasoning and solving single-variable linear equations. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.	Students will be able to apply a wide range of mathematical procedures (often with the aim of manipulating numbers and equations into equivalent forms) accurately and efficiently. Students are expected to be able to recall relevant concepts and procedures, such as proportional reasoning and solving single-variable linear equations with some prompting and review, if necessary. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.	Students will be able to apply a wider range of mathematical procedures (to manipulate numbers and equations into equivalent forms) with a high degree of accuracy and efficiency. Students are expected to be able to recall relevant concepts and procedures, such as proportional reasoning and solving single-variable linear equations with little to no prompting. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.

Course Goals	Students will to be able to explain their reasoning verbally when applying most mathematical procedures and be able to construct viable arguments to justify a solution method. Students will to work towards being able to independently make sense out of problems and devise entry point strategies for solving them.	Students will be able to explain their reasoning quantitatively when applying most mathematical procedures and construct viable arguments to justify a solution method. Students will be able to independently make sense out of problems and persevere towards solutions.	Students will be able to explain their reasoning abstractly when applying all mathematical procedures and be able to construct and critique viable arguments to justify a solution method. Students will be able to independently make sense out of problems and look for and make use of structure.
Course Content	Algebra Level 2 focuses on rate of change. Algebraic activities include representational and transformational tasks, as well as generalizing and justifying activities. Throughout the course, concepts and skills are initially presented through real and familiar situations, followed by activities that enable students to determine, develop and articulate structural distinctions	Algebra College Prep includes a wider exploration of functions with respect to their graphs. Additionally students will be analyzing solutions to equations in context.	Algebra Honors extends the learning to include more complex functions and how they can be transformed. Furthermore, students will model functions and look for patterns when manipulating expressions and solving equations.

COLUMBIA HIGH SCHOOL MATH COURSE

GEOMETRY AT-A-GLANCE

GEOMETRY

Geometry builds on Algebra 1 and Grade 8 Math to prepare students for further study in Algebra 2. The course is designed to enable students to develop the logical reasoning that is the foundation of mathematical proof. A primary goal of this Geometry curriculum is for students to develop Geometric Habits of Mind. These habits include: reasoning with relationships, generalizing geometric ideas, investigating invariants and balancing exploration and reflection. Students will make conjectures based on investigations using geometric constructions, diagrams, and geometric properties and relationships and use some form of proof to verify or refute conjectures. Students will have legitimate opportunities to experiment, hypothesize, measure, analyze, test, talk, write, explain, and justify their ideas, engaging in real mathematics. Geometry tools (compass, protractor and ruler) will be integral to the course.

The College Prep, Honors and Advanced levels will conduct more thorough proofs and have rising expectations of the level to which students independently derive formulas and identify relationships.

Performance Measures:

Classwork: 0-20% of grade

Homework: 5-10% of grade

Assessments: 70-85% of grade

	Geometry Level 2	Geometry College Prep	Geometry Honors	Geometry Advanced
Geometry Builds on and Extends Prior Knowledge of…	Geometric terms to determine if a conjecture is true	Write deductive arguments using correct vocabulary	Write conjectures and arguments	Create arguments that include the use of tangential relationships
	Geometric relationships to demonstrate a working knowledge of congruence and similarity	Justify congruence and similarity in the form of a paragraph or flow chart proof	Model the conditions that determines congruence and similarity	Identify congruence and similarity conjectures and how to apply them
Academic Support	Support will focus heavily on helping students persevere in problem solving and use the correct tools precisely. Teachers will reference "parent" problems, presented to give students problem-solving frameworks they can use in an ongoing basis. In terms of geometric proofs, the focus will be on developing students' abilities to justify their work and to understand proofs that are presented in class.	Support will focus on helping students persevere in solving multi-step problems, use tools correctly and precisely, and to select useful mathematical models. Teachers will reference "parent" problems, presented to give students problem-solving frameworks they can use in an ongoing basis. Proofs will be presented that students can learn and understand.	Support will focus on all of the mathematical practice standards, helping students to persevere and collaborate in generating idiosyncratic solutions. Later, they will use them to create more general/powerful solutions for both proofs and problems that require algebraic calculations. Students are taught about building proofs and are expected to use the proofs they know to create new, albeit similar, proofs.	Support will focus on all of the mathematical practice standards, helping students to persevere and collaborate to create innovative solutions to new problems. Students quickly move from learning foundational ideas to applying them in novel contexts and new proofs.
Expectations	Students will be able to apply a range of mathematical procedures (such as area and perimeter calculations and geometric constructions)	Students will be able to apply a wide range of mathematical procedures (such as area and perimeter calculations and geometric constructions)	Students will be able to apply a wider range of mathematical procedures (such as area and perimeter calculations and geometric constructions) with a high degree of accuracy and	Students will be able to apply a wider range of mathematical procedures (such as area and perimeter calculations and geometric constructions) with the highest degree

	accurately and efficiently. With prompts and reviews, whenever necessary, student will recall relevant concepts and procedures, such as proportional reasoning and solving single-variable linear equations. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.	accurately and efficiently. Students will be able to recall relevant concepts and procedures, such as proportional reasoning and solving single-variable linear equations with some prompting and review, if necessary. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.	efficiency. Students will be able to recall relevant concepts and procedures, such as proportional reasoning and solving single-variable linear equations with little to no prompting. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.	of accuracy and efficiency. Students will be able to recall relevant concepts and procedures, such as proportional reasoning and solving single-variable linear equations with no prompting. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.
Course Goals	Students will to be able to explain their reasoning verbally when applying most mathematical procedures and be able to construct viable arguments to justify a solution method. Students will to work towards being able to independently make sense out of problems and devise entry point strategies for solving them.	Students will be able to explain their reasoning quantitatively when applying most mathematical procedures and construct viable arguments to justify a solution method. Students will be able to independently make sense out of problems and persevere towards solutions.	Students will be able to explain their reasoning abstractly when applying all mathematical procedures and be able to construct and critique viable arguments to justify a solution method. Students will be able to independently make sense out of problems and look for and make use of structure.	Students will be able to explain their reasoning abstractly when applying all mathematical procedures and be able to construct and critique viable arguments to justify a solution method. Students will be able to independently make sense out of problems and while strategically using appropriate tools.
Course Content	Geometry Level 2 includes an analysis of plane, solid, and coordinate geometry as they relate to both abstract mathematical concepts as well as real-world problem situations. Topics include logic and proof, parallel lines and polygons, perimeter and area analysis, volume and surface area analysis and similarity and congruence. Emphasis will be placed on developing critical thinking skills as they relate to logical reasoning and argument. Students will be required to use different technological tools and manipulatives to discover and explain much of the course content.	Geometry College Prep includes a more in-depth analysis of plane geometry and the relationships between figures.	Geometry Honors extends the learning to include analytic geometry to derive formulas write conjectures.	Geometry Advanced adds enrichment and extension topics to include a higher degree of algebra required in the study and performance of transformations, Pythagorean Theorem, similarity, area and volume. Students also receive an early preview of trigonometry topics typically introduced to students in Algebra 2 or Precalculus.

COLUMBIA HIGH SCHOOL MATH COURSE

ALGEBRA 2

Algebra 2 formalizes the idea of what makes a function and emphasizes various families of functions. Students will analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. They will also identify and compare the properties of classes of functions. In addition to becoming proficient with linear, quadratic, and exponential functions, students will begin to develop an understanding of logarithmic and polynomial functions as well. These topics will be utilized both for their abstract ideas and for modeling real-world phenomena.

The College Prep, Honors and Advanced levels will have higher expectations of Algebra 1 mastery and extend the learning to include more complex functions.

Performance Measures:

Classwork: 5-20% of grade

Homework: 5-10% of grade

Assessments: 70-85% of grade

	Algebra 2 Level 2	Algebra 2 College Prep	Algebra 2 Honors	Algebra 2 Advanced
Prior Knowledge Expectations	With prompts and reviews, whenever necessary, students will be able to recall relevant Algebra 1 and Geometry concepts and procedures. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.	Students will be able to recall relevant Algebra 1 and Geometry concepts and procedures with some prompting and review, if necessary. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.	Students will be able to recall relevant Algebra 1 and Geometry concepts and procedures with little to no prompting. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.	Students will be able to recall relevant Algebra 1 and Geometry concepts and procedures with no prompting. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.
Academic Support	Assessments will be preceded by extensive review time with work that models upcoming tests and quizzes	Assessments will be preceded by review time with work that models upcoming tests and quizzes	Review materials will be provided to students as well as a framework to best prepare for upcoming assessments	Students will be expected to access review materials as needed and rely on strong study habits
Course Goals	Students will to be able to explain their reasoning verbally when applying most mathematical procedures and be able to construct viable arguments to justify a solution method. Students will to work towards being able to independently make sense out of problems and devise entry point strategies for solving them.	Students will be able to explain their reasoning quantitatively when applying most mathematical procedures and construct viable arguments to justify a solution method. Students will be able to independently make sense out of problems and persevere towards solutions.	Students will be able to explain their reasoning abstractly when applying all mathematical procedures and be able to construct and critique viable arguments to justify a solution method. Students will be able to independently make sense out of problems and look for and make use of structure.	Students will be able to explain their reasoning abstractly when applying all mathematical procedures and be able to construct and critique viable arguments to justify a solution method. Students will be able to independently make sense out of problems and while strategically using appropriate tools.
Course Content	Linear Functions Quadratic Functions Polynomial Functions (Select)	Linear Functions Quadratic Functions Polynomial Functions Inverse Functions	Linear Functions Quadratic Functions Polynomial Functions Inverse Functions	Linear Functions Quadratic Functions Polynomial Functions Inverse Functions

| | Inverse Functions
Radical Functions
Exponential Functions
Logarithmic Functions
(Select)
Conic Sections (Select) | Radical Functions
Exponential Functions
Logarithmic Functions
Rational Functions (Select)
Conic Sections (Select) | Radical Functions
Exponential Functions
Logarithmic Functions
Rational Functions
Conic Sections (Select)
Trigonometric Functions
(Select) | Radical Functions
Exponential Functions
Logarithmic Functions
Rational Functions
Conic Sections
Trigonometric Functions |

PRECALCULUS

Precalculus is designed to prepare students for success in college-level Calculus. The course provides a thorough examination of the properties, behavior and manipulation of important functions such as polynomial, rational, exponential, logarithmic and trigonometric functions. Beyond the study of these functions, the course also provides an in-depth treatment of Analytic Trigonometry, Sequences and Series and Limits.

Performance Measures:

Classwork: 5-20% of grade

Homework: 5-10% of grade

Assessments: 70-85% of grade

The Honors and Advanced levels will spend little to no time reviewing Algebra 2 skills in order to include a unit on limits. The college prep course will forego the limits unit and, if time permits, include a unit on Probability and Counting, which would prepare students for college-level Statistics. .

	Precalculus College Prep	Precalculus Honors	Precalculus Advanced
Precalculus Builds on and Extends Prior Knowledge of…	Algebra 2 with extensive practice on radical/exponential expressions and solving linear and quadratic equations	Algebra 2 with practice as needed on radical/exponential expressions and solving linear and quadratic equations	Prior master of all topics expected
	Polynomials to perform operations and Apply the Fundamental Theorem of Algebra	Identify the asymptotes, intercepts, end behavior, etc. of a rational function and its graph	Prior master of these topics expected
	Trigonometry to explore the unit circle, sketch graphs and prove trigonometric identities	Identify cofunction identities and apply angle formulas	Use sinusoidal graphs as mathematical models
	Sequences to express them using summation notation	Sequences to express them using summation notation	Correctly formulate and prove a hypothesis using mathematical induction
	Statistics to compute probabilities	Statistics not taught at this level. Construct Pascal's Triangle expand binomial expressions	Statistics not taught at this level
	Limits not taught at this level	Functions to explain the concept of a limit and find their value	Identify intervals where a function is continuous
Expectations	Students will be able to apply a wider range of mathematical procedures (often with the aim of manipulating numbers and equations into equivalent forms) accurately and efficiently. Students will be able to recall simplifying rational expressions and solving or factoring of quadratic equations with some prompting and review, if necessary. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.	Students will be able to apply a wider range of mathematical procedures (often with the aim of manipulating numbers and equations into equivalent forms) with a high degree of accuracy and efficiency. Students will be able to recall simplifying rational expressions and solving or factoring of quadratic equations with little to no prompting. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.	Students will be able to apply a wider range of mathematical procedures (often with the aim of manipulating numbers and equations into equivalent forms) with a high degree of accuracy and efficiency. Students will be able to recall simplifying rational expressions and solving or factoring of quadratic equations with no prompting. Students are then expected to be able to apply those concepts and procedures towards the creation of new knowledge.
Course Goals	Students will be able to explain their reasoning quantitatively when applying most mathematical	Students will be able to explain their reasoning abstractly when applying all mathematical	Students will be able to explain their reasoning abstractly when applying all mathematical

	procedures and construct viable arguments to justify a solution method. Students will be able to independently make sense out of problems and persevere towards solutions.	procedures and be able to construct and critique viable arguments to justify a solution method. Students will be able to independently make sense out of problems and look for and make use of structure.	procedures and be able to construct and critique viable arguments to justify a solution method. Students will be able to independently make sense out of problems and while strategically using appropriate tools.
Course Content	Precalculus college prep centers on functions, and aims to enable students to decide what kind of function will best fit a set of real-world data. As they did in Algebra 2, students will regularly work with functions in four ways: applying mathematics in real situations; representing mathematical concepts algebraically, verbally, numerically, and graphically; developing and strategizing through mathematical properties and relationships; and carrying out various algorithms. This course strives to give students a balance between the acquisition of key concepts and the mastery of skills that lay the foundation for calculus.	Precalculus Honors extends the learning to include following topics: • Sequences and Series • Concept of a limit	Precalculus Advanced extends the learning to include following topics: • Parametrics • Polar Coordinates • Infinite series and convergence