



Greenwich Public Schools Curriculum Overview

College Algebra and Trigonometry

Personalized learning is achieved through standards-based, rigorous and relevant curriculum that is aligned to digital tools and resources.

Note: Teachers retain professional discretion in how the learning is presented based on the needs and interests of their students.

Course Description

College Algebra & Trigonometry

Full Year

022500 6 Blocks 1 Credit

Prerequisite: Algebra 2A or C or better in Algebra 2B

This year-long course is designed to strengthen a student's Algebra 2 skills while introducing them to several Precalculus topics. Content includes a comprehensive study of quadratic, rational, polynomial, exponential and logarithmic functions, as well as an introduction to right triangle and circular trigonometry. Students who successfully complete this course are eligible to take Precalculus the following year.

Unit Guide

Unit 1 Expressions, Equations, Inequalities and Functions

Unit 2 Factoring, Graphing and Applications of Quadratics

Unit 3 Rational Expressions

Unit 4 Polynomial Functions

Midterm Review & Midterm Exam*

Unit 5 Trigonometry

Unit 6 Exponential and Logarithmic Equations

Unit 7 Statistics

Final Review & Final Exam*

***Note:** Semester exam review packets, answer keys and formula sheets can be found by joining our [Schology Math Department Review Course](#), using COURSE access code P9V9X-H6V37.

Mathematical Practices

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.

Enduring Understandings

- **Unit 1:**
 - Systems of equations can be solved by graphing, substitution, or eliminating a variable.
 - To obtain a solution to an equation, no matter how complex, always involves the process of undoing the operations.
 - Simplify expressions involving exponents by using the properties of exponents.
 - Functions are a mathematical way to describe relationships between two quantities that vary.
 - Functions can be represented in a variety of ways
- **Unit 2:**
 - Many real-world situations can be modeled with quadratic functions.
 - Factors are a subset of a product and with the distributive property allow options in solving polynomials.
 - Multiplying and factoring polynomials are related.
 - Solving polynomials involves the reversal of operations, the distributive property and rules of exponents.
- **Unit 3:** To analyze the structure of rational expressions, we must extend the known rules of functions.
- **Unit 4:** By knowing the degree and leading coefficient of a polynomial, you can describe the end behavior and number of roots, and make predictions about the shape of the graph.
- **Unit 5:**
 - Pythagorean Theorem can be used to find the missing side of a right triangle.
 - Special right triangles have properties that allow their side lengths to be determined using the ratios of the side lengths.
 - Use the special right triangle ratios in order to find side lengths
 - Trigonometric relationships can be used to solve right triangles.
 - Create equations to solve right triangles
 - Apply trigonometric equations to real world situations using angles of elevation and depression.
 - How to describe an angle and convert between radian and degree measure
 - How to identify a unit circle and its relationship to real numbers
 - How to evaluate trigonometric functions of any angle
 - How to use the fundamental trigonometric identities
 - How to use standard algebraic techniques and inverse trigonometric functions to solve trigonometric equations
- **Unit 6:**
 - Write expressions or equations or change the form of an equation to model contexts and connect components of those expressions and equations to graphs and contexts.
 - Logarithmic functions are the inverse of exponential functions and have parallel properties to exponents used to rewrite expressions and solve equations.
 - The properties of logarithms can be used to change the form of equations to reveal solution paths.
 - Use knowledge of exponents and logarithms to solve exponential modeling problems where a piece of information is missing.
- **Unit 7:**
 - Sets of data can be described and compared using various statistical measures, depending on what characteristics you want to study.
 - Standard deviation is a measure of how far the numbers in a data set deviate from the mean.

- Statistics is necessary to make accurate decisions involving data.
- Graphs produce visual displays of data in meaningful ways.
- Measuring the spread of data is essential for comparing data sets.
- The distribution of outcomes of many real-life events can be approximated by the normal curve.
- Proper experimental design is necessary to ensure unbiased results.

Essential Questions:

- *Unit 1:*
 - What is a system of equations?
 - What does the number of solutions (none, one or infinite) of a system of linear equations represent?
 - What are the advantages and disadvantages of solving a system of linear equations graphically versus algebraically?
 - How can systems of equations be used to represent situations and solve problems?
 - What is an expression?
 - What is an equation?
 - What does equality mean?
 - What is an inequality?
 - How can we use linear equations and linear inequalities to solve real world problems?
 - What is a solution set for a linear equation or linear inequality?
 - What is a function?
 - What are the different ways that functions may be represented?
 - How can functions be used to model real world situations, make predictions, and solve problems?
 - How do you perform operations with polynomial functions?
- *Unit 2:*
 - What features distinguish the graph of a quadratic function from other graphs?
 - How can an understanding of polynomials help in understanding quadratic functions and equations?
 - How are quadratic equations used in the “real” world?
 - How can polynomials be simplified and applied to solve problems?
 - Can two algebraic expressions that appear to be different be equivalent?
 - How are the properties of real numbers related to polynomials?
- *Unit 3:*
 - How do you multiply and divide rational expressions?
 - How do you add and subtract rational expressions?
 - How do you solve rational equations?
- *Unit 4:*
 - What strategies do we have for identifying real and complex roots?
 - How can you write a polynomial function given its zeros?
 - How can you graph a polynomial function?
- *Unit 5:*
 - How do you use the Pythagorean Theorem to solve right triangles?
 - How can the basic trig functions be used to solve right triangles?
 - How can you convert from radians to degrees and vice versa?
 - How do you sketch angles (in both radians and degrees) in standard position?
 - How do you use coterminal and reference angles (in both radians and degrees) to evaluate trigonometric ratios?
 - How do you use quadrant angles to evaluate trigonometric ratios?

- *Unit 6:*
 - What is the relationship between logarithmic and exponential functions?
 - How do you use the properties of logarithms to rewrite expressions?
 - How do you solve exponential and logarithmic equations?
- *Unit 7:*
 - What are some useful ways to evaluate sets of data?
 - How are the measures of central tendency useful to help understand real life data?
 - How are measures of central tendency different from standard deviation?
 - How does one define statistics?
 - Why is accurate decision making important?
 - What are some implications of the inappropriate use of data?
 - How do graphs enhance the display of data?
 - How does one know which graph is appropriate to use for a given set of data?
 - Why does one need to analyze the spread of data?
 - In what situations might it be useful to compare the spread of data?
 - What is a normal curve?
 - Why is an understanding of the normal curve essential to statistics?
 - In what situations can the normal curve be applied to data?
 - What considerations should be made when designing an experiment?
 - What does it mean for results to be considered biased?

Resources and Assured Experiences

GHS Capstone Task:

[Vision of the Graduate](#) #3 - Explore, define, and solve complex problems

- Basketball - to complete after Unit 2 Factoring, Graphing & Applications of Quadratics

Extra Resources:

- SAT and Placement test questions (use SAT Heart of Alg domain p. 50, 53, 55 of Teacher Implementation guide)
- [Desmos](#) activities
- Section 7.4, 8.3, 8.7 of Honors Algebra 2
- Section 4.4, 5.1, 5.3 in Precalculus

Quarterly Grading

Quarter Grades will be determined using the following components:

- Participation (includes Classwork) = 10%
- Preparation (includes Homework) = 20%
- Assessments (both Summative & Formative) = 70%

Connecticut Common Core State Standards

- *Unit 1:* CCSS.MATH.CONTENT.HSA.REI.B.3, C.5, C.6, C.7; HSF.IF.A.1, A.2; HSA.APR.A.1.
- *Unit 2:* CCSS.MATH.CONTENT.HSA.REI.B.4, B.4b.
- *Unit 3:* CCSS.MATH.CONTENT.HSA.APR.D.7; HSA.REI.A.2.
- *Unit 4:* CCSS.MATH.CONTENT.HSF.IF.C.7, C.7c; HSA.APR.B.2, B.3.
- *Unit 5:* CCSS.MATH.CONTENT.8.G.B.7; HSF.TF.A.1, A.2, A.3.
- *Unit 6:* CCSS.MATH.CONTENT.HSF.IF.C.7, C.7e; HSF.BF.B.5
- *Unit 7:* CCSS.MATH.CONTENT.HSS.ID.A.1, A.2, A.4.