Greenwich Public Schools Curriculum Overview

Honors Algebra 2

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

Honors Algebra 2
Full Year
028150 6 Blocks 1 Credit
Prerequisite: B- or better in Honors Geometry or an A- or better in Geometry A with teacher recommendation and a grade of B- or better in Algebra 1 or B- or better Test & Quiz Average in 8th grade Geometry.
This course continues in an accelerated and comprehensive manner. It covers the study of linear, quadratic, rational, polynomial, exponential, logarithmic and trigonometric functions. Additional topics include conic sections, sequences and series, counting principles, probability and statistics. Successful completion of the course is a preparation for Honors Precalculus.

Unit Guide

Prerequisite Unit (Linear Equations)
Unit 1: Functions and Their Graphs
Unit 2: Quadratics
Unit 3: Polynomials & Rational Functions
Unit 4: Counting and Probability
Midterm Review & Midterm Exam*
Unit 5: Exponential and Logarithmic Functions
Unit 6: Trigonometric Functions
Unit 7: Conics
Unit 8: Series and Sequences
Unit 9: Statistics
Final Review & Final Exam*

***Note**: Semester exam review packets, answer keys and formula sheets can be found by joining our Schoology 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

- *Prerequisite Unit:* A system of linear equations is an algebraic way to compare two equations that model a situation and find the breakeven point or choose the most efficient or economical plan.
- *Unit 1*: Functions help to model, analyze and predict situations.
- *Unit 2*:
    - Many real-world situations can be modeled with quadratic functions.
    - How and why quadratic equations are used.
    - How to determine which method of solving is best to use given the situation.
    - When solving radical equations, extraneous solutions may exist and need to be addressed.
- *Unit 3*:
    - In order to analyze the structure of polynomial equations and their real life applications, the known rules of functions must be extended.
    - In order to analyze the structure of rational equations and their real life applications, the known rules of functions must be extended.
- *Unit 4*: Probability can be used to determine the outcome of decisions.
- *Unit 5*:
    - Exponential functions model growth and decay
    - 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.
- *Unit 6*: Trigonometric functions help to model periodic phenomena.
- *Unit 7*:
    - A conic is the intersection of a plane and a doublenapped cone
    - A conic section can be classified based on its general equation
    - Recognize, write, and interpret equations of conic sections.
    - Recognize conic sections as useful in applications.
- *Unit 8*:
    - Sequences and series are a direct result of finding patterns.
    - Sequences and series can be used to model real-life situations.
- *Unit 9*: Data interpretations help develop informed decisions and predictions.

Essential Questions:

- *Prerequisite Unit:*
    - 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?
- *Unit 1*:
    - How do you find the domain of a function?
    - How can the vertical line test be used to determine whether a graph is a function?
    - How do you obtain information from or about the graph of a function?
    - How do you identify changes in a graph's behavior?

    - What are the essential properties of the functions listed in the library of functions?
    - What are the patterns for the transformations of functions?
    - How can tables, graphs and rules relating variables be used to answer real-world and mathematical questions about the relationships between variables?
    - How does the shape of a graph, the patterns in a table, the parts of the rule or verbal description give clues about the way the variables are related to one another?
- *Unit 2*:
    - What is a quadratic function?
    - How does factoring assist in finding the zeros (roots / intercepts) of a quadratic function?
    - How is the process of completing the square used to solve quadratic equations?
    - How does the discriminant test assist in determining the nature of a quadratic function's roots?
    - How is the quadratic formula used to solve quadratic equations?
    - What are the different ways to solve quadratic equations and when is each appropriate?
    - What features distinguish the graph of a quadratic function from other graphs?
    - What are the advantages and disadvantages of different forms of the quadratic function and different methods for solving quadratic equations?
    - What properties / characteristics of quadratic functions are necessary in order to analyze and graph?
    - What are the advantages / disadvantages in having a quadratic function written in standard form? Vertex form? Intercept form?
    - How can you determine the equation of a quadratic function from its graph? From its given characteristics?
    - How can quadratic functions model real world applications?
    - How can we solve equations with complex and real roots?
    - What strategies do we have for identifying real and complex roots?
- *Unit 3*:
    - How do you perform operations with polynomial functions?
    - How can you find all of the zeros of a polynomial function?
    - How can you write a polynomial function given its zeros?
    - How can you graph a polynomial function?
    - How can a polynomial function model real-world applications and assist in drawing conclusions?
    - Is a rational expression and its simplified form equivalent?
    - Why are rational functions useful in the real world?
    - Why do extraneous solutions sometimes arise when solving rational equations?
- *Unit 4*:
    - How can you use the fundamental counting principle and permutations to calculate the number of choices for a situation?
    - How can you use combinations to calculate the number of choices for a situation?
    - How can combinations assist in binomial expansion?
    - How can you determine the likelihood that an event will occur?
    - How do you find the probability of compound events?
    - How do you establish whether events are dependent or independent?
    - How do you compute the probability of two events when the occurrence of one affects the probability of the other?
- *Unit 5*:
    - What does the graph of an exponential growth/decay model look like?
    - How can exponential growth/decay models reflect real world applications?
    - How does base e relate to exponential growth and decay?

- What is the relationship between logarithmic and exponential functions?
- What does the graph of a logarithmic function look like?
- How do you use the properties of logarithms to rewrite expressions?
- How do you solve exponential and logarithmic equations?

- *Unit 6*:
  - How are trigonometric functions used in right triangles?
  - How are inverse trigonometric functions used?
  - How can trigonometric functions be used to solve real-world applications?
  - What is the relationship between degree and radian measurement?
  - How can you evaluate trigonometric functions at any angle?
- *Unit 7*:
  - How do I identify and apply the characteristics of the conic sections?
  - How do I identify the characteristics of circles from equations?
  - What characteristics of circles are necessary to graph and write the equations of circles?
  - How do I identify characteristics of parabolas graphically and algebraically centered on the origin? How do I identify characteristics of parabolas graphically and algebraically not centered on the origin?
  - How do I identify characteristics of ellipses graphically and algebraically centered on the origin? How do I identify characteristics of ellipses graphically and algebraically not centered on the origin?
  - How do I identify characteristics of hyperbolas graphically and algebraically centered on the origin? How do I identify characteristics of hyperbolas graphically and algebraically not centered on the origin?
- *Unit 8*:
  - What is a sequence?
  - What is a series?
  - How are sequences & series related?
  - What is an arithmetic sequence/series?
  - What is a geometric sequence/series?
  - What is sigma (the summation symbol)?
  - What are the types of real-life situations where sequences & series can be used as models and prediction tools?
  - How does the vocabulary of sequences & series apply to the real life situations they model?
  - How is a graphing calculator used to work with sequences & series?
- *Unit 9*:
  - How do you describe data using statistical measures?
  - How can the normal curve be used to approximate probability
  - What does it mean for data to be skewed?
  - How do you develop different sampling methods for collecting data?
  - How can you identify flaws in survey questions and experiments?

Resources and Assured Experiences

Textbook Information:
Algebra & Trigonometry
Pearson (7th Edition)
ISBN 0-13-411926-6

GHS Capstone Task:
Vision of the Graduate #3 - Explore, define, and solve complex problems

- The Bridge - to complete after Unit 7: Conics

Quarterly Grading

Quarter Grades will be determined using the following components:

- Participation (includes Classwork) = 5%
- Preparation (includes Homework) = 5%
- Assessments (both Summative & Formative) = 90%

Connecticut Common Core State Standards

- *Prerequisite Unit:* CCSS.MATH.CONTENT.HSA-REI.B.3, C.5, C.6.
- *Unit 1*: CCSS.MATH.CONTENT.HSF.IF.B.4, B.5, C.7.
- *Unit 2*: CCSS.MATH.CONTENT.HSA-REI.A.1, A.2, B.4, B.4b; HSA-SSE.A.2, B.3a; HSF.IF.C.7a, C.8a; HSN.CN.A.1, A.2, C.7
- *Unit 3*: CCSS.MATH.CONTENT.HSA.APR.A.1, B.2, B.3; HSF.IF.C.7, C.7c, C.8, C.9; HSA.CED.A.2; HSA.REI.A.2.
- *Unit 4*: CCSS.MATH.CONTENT.HSS.MD.B.6, B.7; HSS.CP.A.1, A.2, A.3, A.4, A.5, B.6, B.7, B.8, B.9.
- *Unit 5*: CCSS.MATH.CONTENT.HSA.CED.A.1; HSF.IF.B.4, B.5, C.7, C.7e, C.9; HSF.BF.A.1; HSF.LE.A.4.
- *Unit 6*: CCSS.MATH.CONTENT.HSF.TF.A.1, A.2; HSG.SRT.C.6, C.7, C.8.
- *Unit 7*: CCSS.MATH.CONTENT.HSG.GPE.A.1, A.2, A.3
- *Unit 8*: CCSS.MATH.CONTENT.HSF.BF.A.1, A.2; HSA.SSE.B.4.
- *Unit 9*: CCSS.MATH.CONTENT.HSS.ID.A.1, A.2, A.3, A.4, B.6.