

RUTHERFORD HIGH SCHOOL
Rutherford, New Jersey

COURSE OUTLINE
HONORS ALGEBRA 2

I. INTRODUCTION

Honors Algebra 2 is the first course in the high school honors mathematics curriculum. It is intended for ninth graders who have been selected for the accelerated mathematics program in seventh grade and who have completed Algebra 1 by the end of eighth grade. Students will continue to apply the problem solving techniques of these previous courses and build on the knowledge gained in the middle grades.

Students in this course will use technology on a daily basis in the form of the graphing calculator. Through discovery exercises and laboratory explorations they will discover many of the concepts for themselves. They will take an active part in cooperative learning situations, participate in a variety of assessment methods and become self-reliant, independent thinkers.

Students in this course will continue to appreciate the application of mathematics to the real world by examining where and how algebraic concepts are used in everyday life.

II. OBJECTIVES

Note: References to the New Jersey Core Curriculum Content Standards appear as a numeral in parentheses.

A. SKILLS

The student will be able to:

1. Extend the concepts learned in Algebra 1 to a higher level of mathematical thought. (4.5)
2. Understand algebra as a logical structure of abstract thinking. (4.1, 4.3, 4.5)
3. Manipulate algebraic expressions and apply the results appropriately to problem-solving situations. (4.3)
4. Use technology appropriately to solve algebraic problems. (4.3, 4.5)
5. Represent and understand the behavior of a variety of algebraic relationships and functions and use them to model real-world phenomena. (4.2, 4.3, 4.4)

B. CONTENT

The student will be able to:

1. Analyze equations and inequalities by: (4.1.12A, 4.4.12A)
 - a. Applying the properties of the real number system.
 - b. Interpreting data through measures of central tendency.
 - c. Applying solutions of equations and inequalities to a variety of situations.
 - d. Applying the concept of absolute value to real-life problem solving.
1. Interpret and model data by: (4.3.12C)
 - a. Analyzing real-world data for patterns.
 - b. Finding an algebraic model through graphical methods.
 - c. Applying an algebraic model to make predictions.
 - d. Exploring how probability can be used to make predictions.
 - e. Using a matrix data structure to analyze and solve problems.
2. Investigate linear functions and relationships by: (4.4.12A)
 - a. Interpreting linear models and graphs.
 - b. Finding a linear model through graphical methods.
 - c. Applying the line of best fit to make predictions.
 - d. Using linear inequalities to model real-world problems.
3. Use systems of linear equations and inequalities by: (4.2.12C)
 - a. Analyzing real-world problems involving quantities that are related in multiple ways.
 - b. Using systems of linear equations to solve problems.
 - c. Applying systems of linear inequalities appropriately.
 - d. Exploring the use of linear programming in business.
4. Explore polynomials and radical expressions by: (4.3.12D)
 - a. Simplifying expressions and solving equations containing integral or rational exponents, complex numbers and radicals.
 - b. Applying radical equations to application problems.
5. Investigate algebraic structure and patterns by: (4.3.12A)
 - a. Analyzing real-world data for patterns displaying arithmetic growth.
 - b. Applying arithmetic sequences and their sums to model patterns.
 - c. Analyzing real-world data for patterns displaying geometric growth.
 - d. Applying geometric sequences and their sums to model patterns.
 - e. Applying complex number structure to fractal geometry.
6. Analyze quadratic functions and relationships by: (4.3.12D)
 - a. Determining non-linear patterns in real-world data.
 - b. Applying quadratic equations to a variety of problems.
 - c. Solving quadratic equations both algebraically and graphically.

- d. Identifying and investigating the conic sections.
 - e. Modeling situations, which require quadratic systems for solution.
7. Determine the relationship between roots and powers by: (4.1.12B)
- a. Simplifying expressions and solving equations with integral and rational exponents.
 - b. Exploring the relationship between radicals and roots in terms of applications to real-world problems.
 - c. Analyzing the relationship between various functions and their inverses.
8. Explore exponential and logarithmic functions by: (4.3.12C)
- a. Investigating exponential functions as models of growth and decay.
 - b. Determining the relationship between exponential functions and logarithmic functions.
 - c. Solving real-world problems using both models.
9. Interpret various forms of data by: (4.4.12B)
- a. Utilizing counting principles in combinations and permutations.
 - b. Calculating probability of a variety of possible events.
 - c. Determining strategies of solving problems in probability.
 - d. Analyzing data using technology.
10. Investigate trigonometry by: (4.2.12E)
- a. Defining the six trigonometric functions of a right triangle.
 - b. Solving triangles using trigonometric functions.
 - c. Using trigonometric functions to solve application problems.
11. Build the real number system by: (4.1.12A, 4.1.12B, 4.5C)
- a. Reading and studying The New Mathematics by Irving Adler that systematically reviews the construction of the real number system.
 - b. Understanding the implications of Gödel's Incompleteness Theorem for mathematical systems and related disciplines.

III. PROFICIENCY LEVELS

Honors Algebra 2 is the first course in the high school honors mathematics sequence. Students completing Algebra 1 Grade 8 who have met the honors criteria are recommended for this course.

IV. METHODS OF ASSESSMENT

Students will be evaluated by a variety of assessment tools and strategies, which include teacher-made tests and quizzes, homework, notebook (portfolio), computer labs, projects, presentations and a final exam.

Students will also be encouraged to assess their own work in order to strive for the highest level of achievement they can attain. Through perseverance, a strong work ethic, and regular participation, students can gain self-confidence in their ability to do mathematics and often improve their overall marking period grades.

V. GROUPING

Honors Algebra 2 is a homogeneously grouped freshman level course.

VI. ARTICULATION/SCOPE

The length of the course is one year.

VII. RESOURCES

A. TEXT

Algebra 2, McDougall Littell, 2004.

B. RESOURCES

Algebra 2, Glencoe/McGraw-Hill, 1998.

Focus on Advanced Algebra, Addison-Wesley, 1996.

Modern Algebra and Trigonometry, Houghton-Mifflin Publishing Co, 1973.

C. SOFTWARE

Appleworks 6.0
MacBestGrapher
Tools of Math-Algebra
Green Globs
Algebra Xpresser
Geometer's Sketchpad

D. SUPPLIES

Algebra Tiles
Spinners, Dice, Coins and Cards
Conic Sections

VIII. METHODOLOGIES

Students in this course will use technology on a daily basis in the form of the TI-83 Graphing Calculator. Through discovery exercises and laboratory explorations they will discover many of the concepts for themselves. They will take an active part in using various algebraic manipulatives in cooperative learning situations, thus applying teamwork to the learning process.

IX. SUGGESTED ACTIVITIES

- A. Collaborative projects with appropriate level science course.
- B. Portfolio work
- C. Oral Presentations
- D. Use of appropriate software programs to reinforce concepts.

X. INTERDISCIPLINARY CONNECTIONS

Connections are made to science by means of collaborative projects coordinating topics in the two subject areas. Connections are also made by means of formulas used in Computer Programming classes. Writing assignments and portfolios strengthen the connection between mathematics and language arts literacy and fine arts.

XI. PROFESSIONAL DEVELOPMENT

As per the PIP/100 hour statement: the teacher will continue to improve through participation in a variety of professional development opportunities.