

## **MATHEMATICS DEPARTMENT**

## **ALGEBRA I (H): COURSE #310**

### **The Department's Educational Philosophy**

The study of mathematics will enhance the ability of all students to problem solve and to reason. Through a strong standardized departmental program that emphasizes problem solving, communicating, reasoning and proof, making connections, and using representations, students will develop self-confidence and a positive attitude towards mathematics.

Our curriculum matches that of the Massachusetts Mathematics Curriculum Framework, and we are philosophically aligned with the National Council of Teachers of Mathematics Standards.

### **Guiding Principles**

- Mathematical ideas should be explored in ways that stimulate curiosity, create enjoyment of mathematics, and develop depth of understanding.
- Effective mathematics programs focus on problem solving and require teachers who have a deep knowledge of the discipline.
- Technology is an essential tool in a mathematics education, and all students should gain facility in using it where advantageous.
- All students should have a high-quality mathematics program.
- Assessment of student learning in mathematics should take many forms to inform instruction and learning.
- All students should understand the basic structure of mathematics.
- All students should recognize that the techniques of mathematics are reflections of its theory and structure.
- All students should gain facility in applying mathematical skills and concepts.
- All students should understand the role of inductive and deductive reasoning in mathematic and real life situations.

## **ALGEBRA I (H): COURSE #310**

**Course Frequency:** Full-year course, five times per week

**Credits Offered:** Five

**Prerequisites:** Yearly grade of A in Grade 8 Level AE or permission of Department Leader.

### **Background to the Curriculum**

This course, now using the 1992 edition of the Dolciani Algebra 1 text, used earlier editions of the same text in prior years. The text is followed quite closely and goes far beyond the 2000 edition of the National Council of Teachers of Mathematics curriculum standards and the 2000 edition of the Massachusetts State Framework recommendation for a first-year algebra course. The course is, therefore, well aligned with national and state guidelines. Teachers bring in other material where appropriate and make minor changes as to the specific sections taught each year, after consultation with the RDL

### **Core Topics/Questions/Concepts/Skills**

Performing operations/simplify expressions

Solving linear and non-linear equations in one variable

Applying algebra to modeling

Operations on polynomials

Graphing linear and non-linear functions

Set theory

Domain, range, and composition of functions

Topics in Probability and Statistics

Understanding the role of proof

Solving systems of equations and inequalities in more than one variable

Use of irrational and rational numbers and the Pythagorean Theorem

## **Course-End Learning Objectives**

*Students will be able to:*

- 1] Simplify numerical expressions.
- 2] Solve linear equations and inequalities.
- 3] Solve word problems involving perimeter, coins, percentage, mixture, investment, etc.
- 4] Add, subtract, multiply, and divide polynomials.
- 5] Factor polynomials.
- 6] Solve quadratic equations by factoring.
- 7] Perform operations on rational expressions using factoring.
- 8] Solve fractional equations.
- 9] Graph points and lines in the plane.
- 10] Graph line using slope and y-intercept.
- 11] Solve systems of equations in two variables.
- 12] Simplify square root radicals.
- 13] Apply the Pythagorean Theorem.
- 14] Solve word problems using two variables.
- 15] Solve absolute value equations and inequalities.
- 16] Understand the topics of set theory.
- 17] Solve quadratic equations by completing the square and using the quadratic formula.
- 18] Find the domain and range of functions.
- 19] Use function notation and evaluating functions.
- 20] Solve direct, inverse, joint, and combined variation problems.
- 21] Understand composition of functions.
- 22] Simplify higher index radical expressions.
- 23] Graph parabolic and other polynomial functions.
- 24] Solve quadratic inequalities.
- 25] Apply introductory techniques in Probability and Statistics.
- 26] Understand the role of proof in Algebra.

## **Assessment**

Students are generally assessed by in-class tests and quizzes, which are administered regularly throughout a marking period. Generally, two quizzes are equivalent to a test. The students' attitude, effort, and quality of homework preparations will also impact their term grade to a small degree. Teachers informally assess students every day by asking pivotal questions, as well as questions involving mechanics or concepts, and the students' term grades may be positively affected to a small degree based on their responses.

A standardized midyear examination and final examination are administered to all students in this course in order to assess their long-term retention of the course material.

## **Technology Learning Objectives Addressed in This Course**

**(This section is for faculty and administrative reference; students and parents may disregard.)**

Course activity: skills &/or topics taught

- 1] Graphing calculators are used to introduce graphing of Linear and polynomial Functions.
- 2] Graphing calculators are used to solve systems of Linear Equations.
- 3] Graphing calculators are used to introduce the concept of Data Analysis and Best Fit Lines.

## **Materials and Resources**

Text: Dolciani Algebra 1, 1992.

Teachers use other texts for supplementary ideas, such as the Glencoe Algebra 1 text or D.C. Heath Algebra 1 text. Review materials that resemble the departmental exams are used by all teachers of the course. Some teachers may employ the software package "Algebra Plotter Plus" to have students investigate a concept at the Mac Lab. Teachers may also have students investigate problems using graphing calculators.