

Honors Algebra 2 Syllabus

Teacher: Mrs. Cuba 2008-2009

Room: S109

Philosophy: Welcome to your study of the second level of algebra! As you know from previous schooling, algebra is a widely used tool in problem solving. We will continue your study of functions and equations as well as introduce new concepts such as logarithms and matrices. I expect you to put forth your best effort, enjoy the journey of learning, and have a great year!

Required Materials: You need to bring to class daily your textbook, graphing calculator, notebook, pencils and a folder for handouts.

Assessment: Ninety percent of your grade is based on your work on comprehensive tests, quizzes, and graded assignments. Partial credit is given based on shown work. Tests are worth two or three times more points than quizzes or graded assignments. The remaining ten percent of your grade is based on your work on daily written assignments. All of these assignments should be done in pencil and kept in your notebook. You must label the assignment with the page number and problem number and include the work for each problem, not just the answer. Each assignment is due at the beginning of the class period. It is graded as follows: 4 points - completely done and on time
3 points - partially done on time
2 points - late and completely done
1 point - late and partially done
0 points - not done

In May, all students in this course are **required to take the SAT 2 level 1 exam. We will prepare for this exam throughout the course with time provided for practice exams and discussion.

Classroom Expectations: Our class time is limited! It is therefore expected that during class you will **be attentive, maintain a positive attitude, put forth your best effort,** and **respect others.**

**Tentative Honors Algebra 2 Schedule Text: Algebra and Trigonometry
Structure and Method Book 2
(Brown, Dolciani, Sorgenfrey & Kane, 2000)**

Week Chapters Sections Topics

1 1 All Basic concepts of algebra (independent 2 All except 2.6, 2.7 study); Inequalities
2 3 All Linear equations and functions
3 3 All Linear equations and functions
4 3 All Linear equations and functions
5 4 All Products and factors of polynomials
6 4 All Products and factors of polynomials
7 4 All Products and factors of polynomials
8 5 All except 5.3 Rational expressions
9 5 All except 5.3 Rational expressions
10 5 All except 5.3 Rational expressions
11 5 All except 5.3 Rational expressions
12 Review and exam

-----Second Trimester-----

1 6 All Irrational and complex numbers
2 6 All Irrational and complex numbers
3 6 All Irrational and complex numbers
4 7 All Quadratic equations and functions
5 7 All Quadratic equations and functions
6 7 All Quadratic equations and functions
7 7 All Quadratic equations and functions
8 8 All except 8.8, 8.9 Variation and polynomial equations
9 8 All except 8.8, 8.9 Variation and polynomial equations
10 8 All except 8.8, 8.9 Variation and polynomial equations
11 10 All Exponential and logarithmic functions

-----Third Trimester-----

1 10 All Exponential and logarithmic functions
2 10 All Exponential and logarithmic functions
3 15 All Statistics and probability
4 15 All Statistics and probability

- 5 15 All Statistics and probability
- 6 11 All Sequences and series
- 7 11 All Sequences and series
- 8 Review for SAT 2
- 9 Review for SAT 2
- 10 16 All Matrices and determinants
- 11 16 All Matrices and determinants
- 12 Final exam

Honors Algebra 2 Outline

I. Review of basic concepts of algebra (independent study)

- A. Language of algebra
 - 1. Types of numbers (natural, whole, integers, rational, irrational, real)
 - 2. Graphing on a number line
 - 3. Review of basic definitions
 - 4. Review of basic principles (substitution, order of operations)
- B. Operating with real numbers
 - 1. Review of properties
 - 2. Review of operations (addition, subtraction, multiplication, division)
- C. Solving equations and problems
 - 1. Solving equations in one variable
 - 2. Translating words into symbols
 - 3. Plan for solving a word problem

II. Inequalities

- A. Solving inequalities in one variable
 - 1. Properties of Order
 - a. Comparison
 - b. Transitive
 - c. Addition
 - d. Multiplication
 - 2. Transformations that produce equivalent inequalities
 - 3. Combined inequalities
 - a. Conjunction
 - b. Disjunction
 - 4. Applications (word problems)
- B. Working with absolute value
 - 1. Absolute value in open sentences
 - 2. Solving absolute value sentences graphically

III. Linear equations and functions

- A. Open sentences in two variables
 - 1. Ordered pair
 - 2. Finding solutions of open sentences in two variables
 - 3. Applications (word problems)
- B. Graphing linear equations in two variables
 - 1. Basic vocabulary
 - 2. Slope of a line
 - 3. Forms of a line
 - a. Standard
 - b. Slope-intercept
 - c. Point-slope
 - 4. Graphing
 - a. By plotting points
 - b. By finding x - and y -intercepts
 - c. By using slope and y -intercept
- C. Finding an equation of a line
 - 1. Given its slope and a point on the line
 - 2. Given two points on the line
- D. Parallel and perpendicular lines
- E. Linear systems
 - 1. Methods of solving
 - a. Graphing
 - b. Substitution
 - c. Linear combination
 - 2. Consistent, inconsistent
 - 3. Using systems to solve word problems
 - 4. Graphing a system of linear inequalities in two variables
- F. Functions
 - 1. Mapping diagram
 - 2. Domain
 - 3. Range
 - 4. Notation
 - 5. Finding values of functions
 - 6. Graphing
 - 7. Types
 - a. Greatest-integer
 - b. Signum
 - c. Linear
 - d. Constant
 - 8. Difference between a function and a relation
 - 9. Vertical-Line Test

IV. Products and factors of polynomials

A. Working with polynomials

1. Basic vocabulary
2. Adding and subtracting polynomials
3. Using laws of exponents to multiply a polynomial by a monomial
4. Multiplying polynomials (FOIL method)

B. Factors of polynomials

1. Using prime factorization
 - a. Greatest common factor (GCF)
 - b. Least common multiple (LCM)
2. Factoring
 - a. Factoring out the GCF
 - b. Recognizing special products
 - i. Difference of two squares
 - ii. Perfect square trinomials
 - iii. Sum and difference of cubes
 - c. Factoring by grouping
 - d. Factoring quadratic polynomials that are not perfect squares
 - e. Factoring completely

C. Applications of factoring

1. Solving polynomial equations
 - a. Zero-Product Property
 - b. Multiple roots
2. Using polynomial equations to solve word problems
3. Using sign graphs to solve polynomial inequalities

V. Rational expressions

A. Using the laws of exponents

1. Multiplication rule for fractions
2. Simplifying quotients of monomials
3. Zero and negative exponents

B. Rational algebraic expressions

1. Simplifying
2. Finding domain
3. Finding zeros
4. Graphing rational functions
 - a. Holes
 - b. Asymptotes
 - c. Zeros
5. Multiplying and dividing
6. Adding and subtracting
7. Simplifying complex fractions

C. Problem solving using fractional equations

1. Solving equations and inequalities having fractional coefficients
2. Solving fractional equations
3. Recognizing extraneous roots
4. Applications (word problems)

VI. Irrational and complex numbers

A. Roots and radicals

1. Basic vocabulary and definitions
2. Finding roots of real numbers
3. Properties of radicals
 - a. Product Property
 - b. Quotient Property
4. Rationalizing the denominator
5. Simplest radical form
6. Sums of radicals
7. Binomials containing radicals
 - a. Simplifying products
 - b. Simplifying quotients
 - c. Conjugates
8. Solving equations containing radicals
9. Recognizing extraneous roots

B. Real numbers and complex numbers

1. Rational and irrational numbers
 - a. Completeness Property of Real Numbers
 - b. Decimal representations
2. The imaginary number i
 - a. Definition
 - b. Square roots of negative numbers
3. Complex numbers
 - a. Definition
 - b. Equality of complex numbers
 - c. Operations involving complex numbers
 - i. Addition
 - ii. Subtraction
 - iii. Multiplication
 - iv. Division (using complex conjugates)
 - d. Finding reciprocals
 - e. Conjugates
 - i. Properties of conjugates
 - ii. Relationship between conjugates and absolute value
 - iii. Properties of absolute value

VII. Quadratic equations and functions

- A. Solving quadratic equations
 - 1. By completing the square
 - 2. By using the quadratic formula
- B. Roots of quadratic equations
 - 1. Using the discriminant to determine the nature of roots
 - 2. Test for rational roots
- C. Recognizing and solving equations in quadratic form
- D. Graphing parabolas
 - 1. Forms
 - a. Standard
 - b. Completed-square
 - 2. Finding vertices
 - 3. Finding axes of symmetry
 - 4. Opening up or down
 - 5. Width of parabola
 - 6. Translations of parabolas
 - 7. Finding intercepts and zeros
 - 8. Minimum or maximum values
 - 9. Finding domain and range
- E. Finding an equation of a quadratic
 - 1. Relationship between roots and coefficients of a quadratic equation
 - 2. Given two roots
 - 3. Given information about the graph
- F. Applications (word problems)

VIII. Variation and polynomial equations

- A. Variation and proportion
 - 1. Direct
 - a. Definition
 - b. Means and extremes
 - c. Mean proportional or geometric mean
 - d. Applications (word problems)
 - 2. Inverse
 - a. Definition
 - b. Applications (word problems)
 - 3. Joint
 - a. Definition
 - b. Applications (word problems)
- B. Polynomial equations
 - 1. Dividing polynomials
 - a. Polynomial long division
 - b. Synthetic division

2. Useful theorems
 - a. Remainder Theorem
 - b. Factor Theorem
 - c. Theorem concerning number of roots
 - d. Conjugate Root Theorem
 - e. Descartes' Rule of Signs
 - f. Rational Root Theorem

IX. Exponential and logarithmic functions

- A. Exponential functions
 1. Rational exponents
 - a. Definition
 - b. Conversion between exponential form and simplest radical form
 2. Irrational exponents
 3. Solving exponential equations
- B. Composition of functions
- C. Inverse functions
 1. Definition
 2. Horizontal-Line Test
- D. Logarithmic functions
 1. Definition of common logarithm
 2. Relationship to exponential functions
 3. Laws of logarithms
 4. Applications of logarithms
 - a. Using common logarithms to solve equations involving powers
 - b. Change-of-Base Formula
 - c. Exponential growth and decay
 - i. Compound Interest Formula
 - ii. Doubling-Time Growth Formula
 - iii. Half-Life Decay Formula
 5. Natural logarithm and e

X. Statistics and probability

- A. Statistics
 1. Presenting statistical data
 - a. Frequency distribution
 - b. Histogram
 - c. Stem-and-leaf plot
 - d. Box-and-whisker plot
 2. Measures of central tendency
 - a. Mean
 - b. Median

- c. Mode
- 3. Measures of dispersion
 - a. Range
 - b. First and third quartiles
 - c. Variance
 - d. Standard deviation
- 4. Normal distribution
 - a. Standard normal distribution
 - b. Finding z -scores
- 5. Correlation
 - a. Drawing scatter plots
 - b. Determining correlation coefficients
 - c. Finding and using linear regression lines
- B. Counting
 - 1. Fundamental counting principles
 - 2. Permutations
 - a. Definition of $n!$
 - b. Formula
 - c. Symbol and how to read it
 - d. Finding the number of permutations of the elements of a set
 - 3. Combinations
 - a. Formula
 - b. Symbol and how to read it
 - c. Finding the number of combinations of the elements of a set
- C. Probability
 - 1. Sample spaces and events for random experiments
 - 2. Finding the probability that an event will occur
 - 3. Venn diagrams
 - a. Intersection of sets
 - b. Union of sets
 - c. Disjoint sets
 - d. Complement of a given set
 - 4. Mutually exclusive events and their probability
 - 5. Independent events and their probability

XI. Sequences and series

- A. Arithmetic
 - 1. Definition
 - 2. Common difference
 - 3. Finding a formula for the n th term
 - 4. Finding specified terms
 - 5. Arithmetic means
- B. Geometric

1. Definition
2. Common ratio
3. Finding a formula for the n th term
4. Finding specified terms
5. Geometric means
- C. Applications (word problems)
 - D. Series and sigma notation
- E. Sums of finite arithmetic and geometric series
- F. Infinite geometric series
- G. Binomial expansions

XII. Matrices and determinants

- A. Definition of terms
 1. Matrix
 - a. Elements
 - b. Rows
 - c. Columns
 - d. Dimensions
 2. Types of matrices
 - a. Row matrix
 - b. Column matrix
 - c. Square matrix
 - d. Zero matrix
 - e. Identity matrix
 - f. Inverse matrices
- B. Operations with matrices
 1. Addition and subtraction of matrices
 - a. Definition
 - b. Properties of addition of matrices
 2. Scalar multiplication
 - a. Definition
 - b. Properties of scalar multiplication
 3. Matrix multiplication
 - a. Definition
 - b. Properties of matrix multiplication
- C. Applications of matrices
 1. Communication matrix
 2. Dominance relation
- D. Determinants
 1. Finding determinants
 - a. Of a 2×2 matrix
 - b. Of a 3×3 matrix

2. Finding the inverse of a matrix
3. Evaluating third-order determinants using expansion by minors
4. Properties of determinants
5. Cramer's Rule: solving systems of equations using determinants