

MATHEMATICS

College Algebra II

Curriculum

Grade 11/12

Vineland Public Schools
Vineland, New Jersey

2007-2008

Vineland Board of Education

Frank Giordano, President
Jacqueline Gavigan, Vice President
Mayra Arroyo
Allan Bernardini
Anthony Fanucci
Ronald Franceschini, Jr
Christopher M. Snyder
Paul Spinelli
Thomas Ulrich

Administration

Charles Ottinger, Superintendent of Schools
Dr. Keith Figgs, Assistant Superintendent
Dr Mary Gruccio, Assistant Superintendent
Mr. Kevin Franchetta, Assistant Superintendent
Theodore Peters, Assistant Superintendent

Supervisor of Mathematics

Mrs. Donna J. Nedohon

Curriculum Writing Team

Mr. Richard Gasior
Mrs. Teresa Rosa-Rhoades

Vineland Public Schools
Vineland, NJ
2007-2008

Vineland Public Schools Mission Statement

We believe that all Vineland Public School students can learn. We recognize that learning is the result of a strong partnership of parents, teachers, and the community, as students are challenged to become active participants in quest for excellence. Our goal is to ensure a safe, creative, stimulating and caring environment, which promotes self-esteem, sound character, responsibility and respect for diversity. This will enable students to become knowledgeable, skillful life-long learners who are contributing citizens in our changing society. We expect the best from our students and will give no less of ourselves.

Course Description

This College Algebra Two course provides students with necessary math skills that are essential for all students whether college or workplace bound. Students will be proficient in taking the NJ State end-of-course-assessments in Algebra 2. This course provides the student with in-depth learning of mathematical skills and concepts mandated by the New Jersey Core Curriculum Content Standards. This course builds upon the NJ CCS skills obtained in the fourth and eighth grade core objectives with emphasis on developing the skills needed to be proficient with the twelfth grade NJCCS. Students will be introduced to NJ HSPA 11 questioning techniques.

Students will be able to apply the relevant math concepts to solve specific problems. Additionally, students will be able to apply these skills to demonstrate their application in various academic courses.

Instruction will be in combination of teacher presentations, discussions, activities, classroom exercises, and student led discovery. The course is divided into multiple units covering the traditional skills and concepts required for advancement into pre-calculus in a rigorous college preparatory program. Recommended time lines are included with each topic allowing sufficient classroom time for the completion of supplemental activities, exercises, and projects, as well as instruction.

Course Goals

In accordance with New Jersey Core Curriculum Content Standards for Mathematics, this course will provide successful completion of all relevant Standards in section 4. All students will use mathematical applications to gather and organize information and to solve problems. All students will develop an understanding of the nature and impact of mathematical concepts as they relate to the individual, society, and the environment.

These goals are to promote:

1. Exposure to a variety of learning environments that will be conducive to our multicultural society.
2. An increase in student self-esteem and confidence in his/her mathematical ability.
3. The value of mathematics and make student aware of its use in various careers.
4. Communication of mathematical thinking to peers and teachers both orally and in writing.(NJCC4.5B1)
5. The use of reasoning to support their mathematical conclusions and problem solutions.(NJCC4.5D2)
6. Learning of College Algebra II through problem solving, inquiry, and discovery.(NJCC4.5A1)
7. Understanding how mathematical ideas interconnect and build on one another to produce a coherent whole.(NJCC4.5C6)
8. Apply College Algebra II in practical situations and in other disciplines. (NJCC4.5C4)
9. Use of technology as a problem solving tool and investigate properties of functions and their graphs. (NJCC4.5F3, F4)
10. Use of a variety of techniques available for solving and graphing higher degree equations and functions.
11. Use of linear and quadratic equations and inequalities to represent real world data.
12. Use of basic logarithm and exponential functions to model real world phenomena and solve problems that involve varying quantities.(NJCC4.3C1)
13. A variety of problem solving techniques and strategies to solve problems.(NJCC4.5A3)

NJ Core Content Curriculum Standards for Mathematics

Standard 4.1 Number and Numerical Operations-All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.

4.1 Number and Numerical Operations

- A. Number Sense
- B. Numerical Operations
- C. Estimation

Standard 4.2 Geometry and Measurement- All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe, and analyze phenomena.

4.2 Geometry and Measurement

- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measurement
- E. Measuring Geometric Objects

Standard 4.3 Patterns and Algebra-All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, algebraic concepts and processes.

4.3 Patterns and Algebra

- A. Patterns and Relationships
- B. Functions
- C. Modeling
- D. Procedures

Standard 4.4 Data Analysis, Probability, and Discrete Mathematics-All students will develop an understanding of the concepts and techniques of data analysis, probability, and discrete mathematics, and will use them to model situations, solve problems, and analyze and draw appropriate inferences from data.

4.4 Data Analysis, Probability, and Discrete Mathematics

- A. Data Analysis (Statistics)
- B. Probability
- C. Discrete Mathematics-Systemic Listing and Counting
- D. Discrete Mathematics-Vertex-Edge Graph and Algorithms

Standard 4.5 Mathematical Processes-All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

4.5 Mathematical Processes

- A. Problem Solving
- B. Communication
- C. Connections
- D. Reasoning
- E. Representations
- F. Technology

COURSE CONTENT

I. Equations and Inequalities

- 1.1 Real Numbers and Number Operations
- 1.2 Algebraic Expressions and Models
- 1.3 Solving Linear Equations
- 1.4 Rewriting Equations and Formulas
- 1.5 Problem Solving Using Algebraic Models
- 1.6 Solving Linear Inequalities
- 1.7 Solving Absolute Value Equations and Inequalities

II. Linear Equations and Functions

- 2.1 Functions and their Graphs
- 2.2 Slope and Rate of Change
- 2.3 Quick Graphs of Linear Equations
- 2.4 Writing Equations of Lines
- 2.5 Correlation and Best-Fitting Lines
- 2.6 Linear Inequalities in Two Variables
- 2.7 Piecewise Functions
- 2.8 Absolute Value Functions

III. Systems of Linear Equations and Inequalities

- 3.1 Solving Linear Systems by Graphing
- 3.2 Solving Linear Systems Algebraically
- 3.3 Graphing and Solving Systems of Linear Inequalities
- 3.4 Linear Programming
- 3.5 Graphing Linear Equations in Three Variables
- 3.6 Solving Systems of Linear Equations in Three Variables

IV. Matrices and Determinants

- 4.1 Matrix Operations
- 4.2 Multiplying Matrices
- 4.3 Determinants and Cramer's Rule
- 4.4 Identity and Inverse Matrices

V. Quadratic Functions

- 5.1 Graphing Quadratic Functions
- 5.2 Solving Quadratic Equations by Factoring
- 5.3 Solving Quadratic Equations by Finding Square Roots
- 5.4 Complex Numbers
- 5.5 Completing the Square
- 5.6 The Quadratic Formula and the Discriminant
- 5.7 Graphing and Solving Quadratic Inequalities

VI. Polynomials and Polynomial Functions

- 6.1 Using Properties of Exponents
- 6.2 Evaluating and Graphing Polynomial Functions
- 6.3 Adding, Subtracting, and Multiplying Polynomials
- 6.4 Factoring and Solving Polynomial Functions
- 6.5 The Remainder and the Factor Theorems
- 6.6 Finding Rational Zeros
- 6.7 Using the Fundamental Theorem of Algebra

VII. Powers, Roots, and Radicals

- 7.1 n th roots and Rational Exponents
- 7.2 Properties of Rational Exponents
- 7.3 Power Functions and Function Operations
- 7.4 Inverse Functions

VIII. Exponential and Logarithmic Functions

- 8.1 Exponential Growth
- 8.2 Exponential Decay

IX. Rational Equations and Functions

- 9.1 Inverse and Joint Variation
- 9.2 Graphing Simple Rational Functions
- 9.4 Multiplying and Dividing Rational Expressions
- 9.5 Addition, Subtraction, and Complex Fractions
- 9.6 Solving Rational Equations

X. Sequences and Series

- 10.1 Formulas of Sequences
- 10.2 Arithmetic and Geometric Sequences
- 10.3 Infinite Geometric Series
- 10.4 Recursive Sequences

X. Probability

- 11.1 Fundamental Counting Principle
- 11.2 Permutations
- 11.3 Combinations
- 11.4 Probability and Odds

COURSE OBJECTIVES

I. Equations and Inequalities

1.1 Graph and order real numbers; and identify and use properties of real numbers. (4.1 A1-3)

1.2 Evaluate and simplify algebraic expressions (4.3 C, D1)

1.3 Solve linear equations and use them to solve real life problems. (4.3 B, D; 4.5A)

1.4 Rewrite equations with more than one variable and rewrite common formulas.

1.5 Use a general problem solving plan to solve real life problems (4.5 A&E)

1.6 Solve simple inequalities and compound inequalities. (4.3 C)

1.7 Solve absolute value equations and inequalities and use them to solve real life problems. (4.3 D)

II. Linear Equations and Functions

2.1 Represent relations and functions; and graph and evaluate linear equations. (4.3 B)

2.2 Find slopes of lines and classify parallel and perpendicular lines; and use slope to solve real life problems. (4.3 B, 4.2 A)

2.3 Use the slope intercept form of an equation to graph the equation; and use the standard form of an equation to graph the equation. (4.3 B-C)

2.4 Write linear equations and direct variation equations. (4.3 B)

2.5 Use a scatter plot to identify the correlation shown by a set of data and approximate the best fitting line for a set of data. (4.4 A)

2.6 Graph linear inequalities in two variables and use them to solve real life problems. (4.3 C)

2.7 Represent basic piecewise functions. Discuss and analyze continuity and informally address the definition.(4.3 B)

2.8 Represent absolute value functions (and transformations) and use them to model real life situations. (4.3 D)

III. Systems of Linear Equations and Inequalities (4.3 B, D; 4.5 C)

3.1 Graph and solve systems of linear equations in two variables, and use them to solve real life problems

3.2 Use algebraic methods to solve linear systems and model real life situations.

3.3 Graph a system of linear inequalities to find the solutions of the system and use them to solve real life situations.

3.4 Solve linear programming problems and use to solve real life problems

IV. Matrices and Determinants (4.1 B3; 4.3 B)

4.1 Add and subtract matrices, multiply by a scalar, and solve matrix equations, and use them to organize data.

4.2 Multiply two matrices and use the process in real life situations.

4.3 Evaluate determinants and use Cramer's rule to solve systems of linear equations.

4.4 Find and use inverse matrices.

V. Quadratic Functions (4.3 C, D; 4.1 B)

5.1 Graph quadratic functions and use them to solve real life problems. Use transformations of functions to reflect, translate, rotate and shrink.

5.2 Factor quadratic expressions and solve quadratic functions by factoring, and find the zeros of quadratic functions.

5.3 Solve quadratic equations by finding the square roots, and use quadratic equations to solve real life problems

5.4 Solve quadratic equations with complex solutions and perform operations with complex numbers. (All operations of complex numbers)

5.5 Solve quadratic equations by completing the square and write quadratic functions in vertex form.

5.6. Use the quadratic formula to solve quadratic equations and use in real life models.

5.7 Use the Graphing Calculator to graph quadratic inequalities in two variables.

VI. Polynomial and Polynomial Functions (4.1 B, 4.1 D1-2)

6.1 Use properties of exponents to evaluate and simplify expressions involving powers and use exponents and scientific notation to solve real life problems.

6.2 Evaluate and graph a polynomial function.

6.3 Add, subtract, and multiply polynomials and use real life situations.

6.4 Factor polynomial expressions and use to solve polynomial equations.

6.5 Divide polynomials and relate the result to the remainder theorem and the factor theorem.

6.6 Find the rational zeros of a polynomial function and use polynomial equations in real life problems.

6.7 Use the Fundamental Theorem of Algebra and Theory of Equations to determine rational roots, to determine the number of zeros of a polynomial function, and use technology to approximate the real zeros of a polynomial function. (Apply Rational Root Theorem)

VII. Powers, Roots, and Radicals (4.1 B – C; 4.3 B)

7.1 Evaluate n th roots of real number using both radical notation and rational exponent notation.

7.2 Use properties of rational exponents to evaluate and simplify expressions and apply to real life situations.

7.3 Perform operations with functions including power functions and apply to real life problems

7.4 Find inverses of linear functions and nonlinear functions.

7.4 Solve radical equations; watch for extraneous roots

VIII. Exponential and Logarithmic Functions (4.3 B – C)

8.1 Graph exponential growth functions and use to model real life problems.

8.2 Graph exponential decay functions to model real life problems.

8.3 Evaluate, Use Properties, and solve Exponential and Logarithmic Equations.

IX. Rational Equations and Functions (4.3 B, C, D)

9.1 Write and use inverse variations models and joint variation models.

9.2 Graph simple rational functions.

9.3 Multiply and divide rational expressions and use them to model real life quantities

9.4 Add and subtract rational expression and simplify complex fractions.

9.5 Solve rational equations and use them to solve real life problems.

X. Sequences and Series

10.1 Write and determine the general equation of sequences

10.2 Use Arithmetic and Geometric Sequences and Series

10.3 Determined the sum of an Infinite Geometric Series

10.4 Find Recursive definition of a sequence

XI. Probability

11.1 Use the Fundamental Counting Principle, Permutations, and Combinations

11.2 Determine the Probability and Odds of an Event

Proficiency

Satisfactory student achievement in each of the proficiencies listed in this curriculum shall be determined by student attainment of the 70% district passing-standard. Such proficiency shall be measured by a multiplicity of evaluation techniques and activities that include, but are not restricted to the following:

1. Teacher-made tests/quizzes
2. Class participation
3. Homework assignments
4. Reports, Projects, Alternative Assessments
5. Oral reports and presentations: includes PowerPoint Presentation
6. Notebook/Journal
7. Cooperative group projects/activities

Instructional Resources

Larson, Ron; Boswell, Laurie; Kanold, Timothy; Stiff, Lee; ALGEBRA 2, McDougal Littell Inc., 2001

TI-83 Plus Graphing Calculator, Texas Instrument Inc.

College Algebra II Pacing Chart

I. Equations and Inequalities

Day(s)	Lesson Topic, Content, Objectives
	Algebra I Review Take Home Assignment
1	Orientation, Books, Diagnostic Testing
2-3	Real Numbers, Operations, Algebraic Expressions
4-5	Solve linear equations and real world problems
6-7	Rewriting Equations and Formulas
8-10	Solving linear inequalities Solving Absolute Equations
11	Unit Assessment
	Alternative Assessment(s)

II. Linear Equations and Functions

Day(s)	Lesson Topic, Content, Objectives
1-3	Relations, Functions, Lines
4-8	Slope/Parallel/ Perpendicular/Distance/Midpoint
9-10	Graphing Lines
11-13	Determine the Equation of a Line
14-16	Linear Inequalities and their Graphs
17-19	Basic Piecewise Functions and Continuity
20-22	Absolute Value Functions w/ Transformations
23	Unit Assessment
	Alternative Assessment(s)
	HSPA Problems

III. Systems of Linear Equations and Inequalities

Day(s)	Lesson Topic, Content, Objectives
1-2	Graphs of Linear Equations & Inequalities
3-6	Solving Linear Equalities Analytically
7-9	Systems of Linear Inequality
10	Unit Assessment
	Alternative Assessment(s) Linear Programming
	HSPA Problems

IV. Matrices and Determinants

Day(s)	Lesson Topic, Content, Objectives
1-3	Operations w/ Matrices
4-5	Multiply Matrices by row/column
6-8	Cramer's Rule and Determinants
9-10	Matrix Inverses
12	Unit Assessment
	Alternative Assessment(s)
	HSPA Problems

V. Quadratic Functions

Day(s)	Lesson Topic, Content, Objectives
1-3	Graph and Transform Quadratic Functions
4-7	Factor and solve Quadratic Expressions and Equations
7-14	Complex Number System
15	Unit Assessment (Half of Chapter 5)
	Good-Bye 2007!!!!
	Hello 2008!!!
16-19	Thorough Review Quadratics/ Complex Numbers
20-24	Completing the Square
25-28	Graphing Calculator Activities: Inequalities & Real World
29	Review Quadratics and Complex Numbers
30	Unit Assessment
	Alternative Assessment(s)
	HSPA Problems

Midterm: January 29, 2008

VI. Polynomial and Polynomial Functions

Day(s)	Lesson Topic, Content, Objectives
1-2	Properties of Exponents; Scientific Notation
3-4	Graphing Polynomial Functions
5-10	Operations of Polynomials
11-13	Factorization of Polynomials
14-19	Remainder, Factor, Rational Root Theorems. Theory of Equations and Fund. Theorem of Algebra
20	Unit Assessment
	Alternative Assessment(s)
	HSPA Problems

VII. Powers, Roots and Radicals

Day(s)	Lesson Topic, Content, Objectives
1-3	Rational Exponents; Powers,
4-6	Simplify Radical Expressions; Apply Real World
7-10	Power functions Composition of Functions
11-13	Basic Inverse Functions
14-16	Solve Radical Equations
17	Unit Assessment
	Alternative Assessment(s)
	HSPA Problems

VIII. Exponential and Logarithmic Functions

Day(s)	Lesson Topic, Content, Objectives
1-5	Exponential Growth and Decay
6-11	Properties of Logarithms
12-14	Solving Logarithmic and Exponential Equations
	Modeling w/ Exponential and Power Functions – Alternative Assessment Project
	Unit Assessment
	Alternative Assessment(s)
	HSPA Problems

IX. Rational Equations and Functions

Day(s)	Lesson Topic, Content, Objectives
1-3	Write Inverse Variation Models
4-6	Graphing Simple Rational Functions
7-10	Mult. & Divide Rational Expressions: Real World Apps
11-13	Complex Fractions
14-16	Real World Situations w/ Rational Expression
17	Unit Assessment
	Alternative Assessment(s)
	HSPA Problems

X. Sequences and Series

Day(s)	Lesson Topic, Content, Objectives
1-3	Arithmetic and Geometric Sequences/Series
4-5	Formulas for Sequences
5-7	Recursive Sequences & Infinite Geometric Series
8	Unit Assessment
	Alternative Assessment(s)
	HSPA Problems

XI. Probability

Day(s)	Lesson Topic, Content, Objectives
1-4	Permutations, Combinations, and Counting Principle
5-8	Probability & Odds
9	Unit Assessment
	Alternative Assessment(s)
	HSPA Problems

COLLEGE ALGEBRA II PACING CHART

A Pacing Chart is a Teaching Time Frame Guide

First Marking Period 10 weeks	Chapter 1 10 Days	Chapter 2 23 days	Chapter 3 10 days	
Second Marking Period 10 weeks	Chapter 4 12 Days	Chapter 5 30 Days	Review for Midterm Exam	Midterm
Third Marking Period 10 weeks	Chapter 6 20 Days	Chapter 7 17 Days	Chapter 8 6 Days	
Fourth Marking Period 10 weeks	Chapter 8 (cont.) 10 Days	Chapter 11 16 Days	Chapter 12 17 Days	Review for Final Assessment

Final Assessment: TBD