Roselle Park School District

Mathematics Department

Course of Study

Algebra II Honors
ALGEBRA II HONORS

The purpose of this guide is to provide the instructor with a scope and sequence and the course objectives. In order to understand how these objectives are to be achieved, a sequence of topics is listed for each unit. Space is provided on each page to allow for notes and recommendations. The New Jersey Core Curriculum Content Standards and the New Jersey Core Course Proficiencies are infused throughout the units.

This guide applies to all students and meets the Affirmative Action guidelines.

Written by:  
Susan Guercio  
Irene Baran  
Alex Gomez  
Anne Marciano  
Catherine Marshall  
Carol Spiesbach  
Janet Zahumeny  
Jennifer Zavacky

Edited by:  
Valarie Baker  
Supervisor of Curriculum and Instruction

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ROSELLE PARK PUBLIC SCHOOLS
MATHEMATICS PHILOSOPHY

Our children need to be well prepared for lives and careers in a technological world and in a global economy. They need to be able to solve problems and reason effectively. They need to use complex information and advanced tools. They need to know and understand how to use and apply mathematics. These high standards will benefit both our children and our society.

The Roselle Park High School Mathematics Curriculum will develop students’ understanding of concepts and help them to acquire essential skills. Their philosophy is based upon the fact that all students possess the ability to be rational thinkers, independent problem solvers, and efficient users of technology. Each student can achieve success and pride while developing these skills. A comprehensive program has been developed in a spiral and sequential format so that students will learn the many aspects of mathematics and its applications. Emphasis will be placed on being actively involved in learning mathematics, writing and talking about math, using critical thinking skills in problem solving, using calculators, computers, and other mathematical tools of learning, and achieving at a high level.

Consideration will be given to the individual student’s needs, interests, and abilities. All students must develop and sharpen their skills, deepen their understanding of mathematical concepts and processes, and hone their problem-solving, reasoning, and communication abilities while using mathematics to make sense of, and solve, compelling problems. For this to occur, rigorous mathematical content must be organized, taught, and assessed in a problem-solving environment. The students will be challenged to use math in meaningful ways, so that they come to realize how useful mathematics will be in their lives. Moreover, the curriculum will also encourage the development of positive attitudes and interests in mathematics, which will last a lifetime.
Roselle Park Public Schools Educational Goals

GOALS

1. Communicate mathematically through written, oral, symbolic, and visual forms of expression.

2. Understand the interrelationships of mathematical ideas and the roles that mathematics plays in other disciplines and in life.

3. Use calculators, computers, manipulatives, and other mathematical tools to enhance mathematical thinking and understanding.

4. Develop the ability to pose and solve mathematical problems in mathematics, other disciplines, and everyday experiences.

5. Develop reasoning ability and become self-reliant, independent mathematical thinkers.

6. Demonstrate high levels of mathematical thought through experiences which extend beyond traditional computation, algebra, and geometry.

7. Develop an understanding of patterns, relationships, and functions, and use them to represent and explain real world phenomena.
I. **Descriptions:**
   This course follows the study of geometry. For a majority of students there has been a full year since the study of elementary algebra. Time must be devoted to a review of the essentials of algebra, but from a higher level. There is more emphasis on problem-solving and quantitative reasoning. In addition, time and emphasis is devoted to proof and algebraic structure.

II  **Unit Topics**

- Basic Concepts of Algebra
- Inequalities and Proof
- Linear Equations and Functions
- Products and Factors of Polynomials
- Rational Expressions
- Irrational and Complex Numbers
- Quadratic Equations and Functions
- Variation and Polynomial Equations
- Analytic Geometry
- Exponential and Logarithmic Functions
- Sequences and Series
- Matrices and Determinants
- HSPA Review

III  **Objectives:**

1. To review basic concepts and skills of algebra studied in previous courses
2. To demonstrate an understanding of axioms of real numbers by supplying reasons for the steps of an algebraic proof
3. To solve various types of inequalities including combined inequalities and those containing absolute values
4. To solve word problems using inequalities
5. To graph/write linear equations given a variety of information
6. To solve systems of equations and inequalities
7. To graph/write functions and relations
8. To work with polynomials, review operations, laws of exponents and products of polynomial
9. To factor composite, monomials, and polynomials
10. To use factoring and the zero-product rule to solve polynomial equations, inequalities, and word problems
11. To simplify adding, subtracting, multiplying, and dividing rational expressions
12. To review and extend the laws of exponents to include zero and negative exponents
13. To solve equations with fractional coefficients and fractional equations
14. To simplify and perform operations with radicals, and solve radical equations
15. To distinguish between rational and irrational numbers
16. To expand the number system to include imaginary and complex numbers
17. To solve quadratic equations using factoring, completing the square and quadratic formula, and equations in quadratic form
18. To graph quadratic equations
19. To solve problems using direct, inverse and joint variation
20. To divide polynomials using long and synthetic division, and use the rational root theorem
21. To use distance and midpoint formulas
22. To graph and write equations of circles, and parabolas
23. To algebraically solve systems of nonlinear equations and systems containing 3 equations with 3 variables
24. To graph and solve exponential / logarithmic equations
25. To use the laws of logarithms to solve a variety of problems
26. To find a formula and terms of an arithmetic sequence
27. To find a formula and terms of a geometric sequence
28. To use sigma notation and sum series
29. To learn and apply matrix terminology
30. To operate with matrices
31. To use determinants
32. To review the skills need to successfully take the HSPA

IV Types of Evaluations:

1. Test
2. Quizzes
3. Notebook/Class work
4. Class participation
5. Notebooks
6. Rubric based assessment
V Standards of Evaluation:

90 - 100 A
80 - 89 B
70 - 79 C
65 - 69 D
0 - 64 F

VI Textbook:

Algebra 2-New Jersey
McDougal Littell, copyright 2008,
Houghton Mifflin Company

VII Expectations:

1. Students are responsible for textbooks and other supplies necessary to complete class work.
2. Students will maintain notes required by teacher.
3. Students are expected to list and to follow all directions necessary to complete assignment.
4. Students will be responsible for acceptable performance such as class attendance, make-up work, and testing.
5. Students are expected to make efficient use of calculators, computers, manipulatives, and other mathematical tools.
6. Students will review daily homework and concepts.
7. Students will organize reviews for tests including test-taking and test-preparation strategies.
8. Students will work effectively to complete group/individual assignments.
9. Students will review/take a mid-term and final.
4.1 All students will develop the ability to pose and solve mathematical problems in mathematics, other disciplines, and everyday experiences.

**Descriptive Statement:** Problem posing and problem solving involve examining situations that arise in mathematics and other disciplines and in common experiences, describing these situations mathematically, formulating appropriate mathematical questions, and using a variety of strategies to find solutions. By developing their problem-solving skills, students will come to realize the potential usefulness of mathematics in their lives.

Building upon knowledge and skills gained in the preceding grades, and demonstrating continued progress in Indicators 4, 5, 6, 7, 8, 12, and 14 above, by the end of **Grade 12**, students:

15. Use discovery-oriented, inquiry-based, and problem-centered approaches to investigate and understand the mathematical content appropriate to the high school grades.
16. Recognize, formulate, and solve problems arising from mathematical situations, everyday experiences, applications to other disciplines, and career applications.
17. Monitor their own progress toward problem solutions.
18. Explore the validity and efficiency of various problem-posing and problem-solving strategies, and develop alternative strategies and generalizations as needed.

4.2 All students will communicate mathematically through written, oral, symbolic and visual forms of expression.

**Descriptive Statement:** Communication of mathematical ideas will help students clarify and solidify their understanding of mathematics. By sharing their mathematical understandings in written and oral form with their classmates, teachers, and parents, students develop confidence in themselves as mathematics learners and enable teachers to better monitor their progress.

9. Formulate questions, conjectures, and generalizations about data, information, and problem situations.
10. Reflect on a clarify their thinking so as to present convincing arguments for their conclusions.
4.3 All students will connect mathematics to other learning by understanding the interrelationships of mathematical ideas and the roles that mathematics and mathematical modeling play in other disciplines and in life.

Descriptive Statement: Making connections enables students to see relationships between different topics, and to draw on those relationships in future study. This applies within mathematics, so that students can translate readily between fractions and decimals, or between algebra and geometry; to other content areas, so that students understand how mathematics is used in the sciences, the social sciences, and the arts; and to the everyday world, so that students can connect school mathematics to daily life.

12. Recognize how mathematics responds to the changing needs of society, through the study of the history of mathematics.

4.4 All students will develop reasoning ability and will become self-reliant, independent mathematical thinkers.

Descriptive Statement: Mathematical reasoning is the critical skill that enables a student to make use of all other mathematical skills. With the development of mathematical reasoning, students recognize that mathematics makes sense and can be understood. They learn how to evaluate situations, select problem-solving strategies, draw logical conclusions, develop and describe solutions, and recognize how those solutions can be applied. Mathematical reasoners are able to reflect on solutions to problems and determine whether or not they make sense. They appreciate the pervasive use and power of reasoning as a part of mathematics.

12. Make conjectures based on observation and information, and test mathematical conjectures, arguments, and proofs.
13. Formulate counter-examples to disprove an argument.

4.5 All students will regularly and routinely use calculators, computers, manipulatives, and other mathematical tools to enhance mathematical thinking, understanding, and power.

Descriptive Statement: Calculators, computers, manipulatives, and other mathematical tools need to be used by students in both instructional and assessment activities. These tools should be used, not to replace mental math and paper-and-pencil computational skills, but to enhance understanding of mathematics and the power to use mathematics. Historically, people have developed and used manipulatives (such as fingers, base ten blocks, geoboards, and algebra tiles) and mathematical devices (such as protractors, coordinate systems, and calculators) to help them understand and develop mathematics. Students should explore both new and familiar concepts with calculators and computers, but should also become proficient in using technology as it is used by adults, that is, for assistance in solving real-world problems.
8. Use calculators and computers effectively and efficiently in applying mathematical concepts and principles to various types of problems.

4.6 All students will develop number sense and an ability to represent numbers in a variety of forms and use numbers in diverse situations.

Descriptive Statement: Number sense is defined as an intuitive feel for numbers and a common sense approach to using them. It is a comfort with what numbers represent, coming form investigating their characteristics and using them in diverse situations. It involves an understanding of how different types of numbers, such as fractions and decimals, are related to each other, and how they can best be used to describe a particular situation. Number sense is an attribute of all successful users of mathematics.

20. Extend their understanding of the number system to include real numbers and an awareness of other number systems.
21. Develop conjectures and informal proofs of properties of number systems and sets of numbers.
22. Extend their intuitive grasp of number relationships, uses, and interpretations, and develop an ability to work with rational and irrational numbers.
23. Explore a variety of infinite sequences and informally evaluate their limits.

4.7 All students will develop spatial sense and an ability to use geometric properties and relationships to solve problems in mathematics and in everyday life.

Descriptive Statement: Spatial sense is an intuitive feel for shape and space. It involves the concepts of traditional geometry, including an ability to recognize, visualize, represent, and transform geometric shapes. It also involves other, less formal ways of looking at two- and three-dimensional space, such as paper-folding, transformations, tessellation’s, and projections. Geometry is all around us in art, nature, and the things we make. Students of geometry can apply their spatial sense and knowledge of the properties of shapes and space to the real world.

20. Understand and apply properties involving angles, parallel lines, and perpendicular lines.
21. Analyze properties of three-dimensional shapes by constructing models and by drawing and interpreting two-dimensional representations of them.
22. Use transformations, coordinates, and vectors to solve problems in Euclidean geometry.
23. Use basic trigonometric ratios to solve problems involving indirect measurement.
24. Solve real-world and mathematical problems using geometric models.
25. Use inductive and deductive reasoning to solve problems and to present reasonable explanations of and justifications for the solutions.
26. Analyze patterns produced by processes of geometric change, and express them in terms of iteration, approximation, limits, self-similarity, and fractals.
27. Explore applications of other geometry’s in real-world contexts.
4.8 All students will understand, select, and apply various methods of performing numerical operations.

**Descriptive Statement:** Numerical operations are an essential part of the mathematics curriculum. Students must be able to select and apply various computational methods, including mental math, estimation, paper-and-pencil techniques, and the use of calculators. Students must understand how to add, subtract, multiply, and divide whole numbers, fractions, and other kinds of numbers. With calculators that perform these operations quickly and accurately, however, the instructional emphasis now should be on understanding the meanings and uses of the operations, and on estimation and mental skills, rather than solely on developing paper-and-pencil skills.

13. Extend their understanding and use of operations to real numbers and algebraic procedures.

4.9 All students will develop an understanding of and will use measurement to describe and analyze phenomena.

**Descriptive Statement:** Measurement helps describe our world using numbers. We use numbers to describe simple things like length, weight, and temperature, but also complex things such as pressure, speed, and brightness. An understanding of how we attach numbers to those phenomena, familiarity with common measurement units like inches, liters, and miles per hour, and a practical knowledge of measurement tools and techniques are critical for students’ understanding of the world around them.

17. Use techniques of algebra, geometry, and trigonometry to measure quantities indirectly.
18. Use measurement appropriately in other subject areas and career-based contexts.
19. Choose appropriate techniques and tools to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) of measurements.

4.10 All students will use a variety of estimation strategies and recognize situations in which estimation is appropriate.

**Descriptive Statement:** Estimation is a process that is used constantly by mathematically capable adults, and that can be mastered easily by children. It involves an educated guess about a quantity or a measure, or an intelligent predication of the outcome of a computation. The growing use of calculators makes it more important than ever that students know when a computed answer is reasonable; the best way to make that decision is through estimation. Equally important is an awareness of the many situations in which an approximate answer is a good as, or even preferable to, an exact answer.

11. Estimate probabilities and predict outcomes from real-world data.
12. Recognize the limitations of estimation, assess the amount of error resulting from estimation, and determine whether the error is within acceptable tolerance limits.

4.11 All students will develop an understanding of patterns, relationships, and functions and will use them to represent and explain real-world phenomena.

**Descriptive Statement:** Patterns, relationships, and functions constitute a unifying theme of mathematics. From the earliest age, students should be encouraged to investigate the patterns that they find in numbers, shapes, and expressions, and, by doing so, to make mathematical discoveries. They should have opportunities to analyze, extend, and create a variety of patterns and to use pattern-based thinking to understand and represent mathematical and other real-world phenomena. These explorations present unlimited opportunities for problem-solving, making and verifying generalizations, and building mathematical understanding and confidence.

14. Analyze and describe how a change in an independent variable can produce a change in a dependent variable.
15. Use polynomial, rational, trigonometric, and exponential functions, to model real-world phenomena.
16. Recognize that a variety of phenomena can be modeled by the same type of function.
17. Analyze and explain the general properties and behavior of functions, and use appropriate graphing technologies to represent them.
18. Analyze the effects of changes in parameters on the graphs of functions.
19. Understand the role of functions as a unifying concept in mathematics.

4.12 All students will develop an understanding of statistics and probability and will use them to describe sets of data, model situations, and support appropriate inferences and arguments.

**Descriptive Statement:** Probability and statistics are the mathematics used to understand chance and to collect, organize, describe, and analyze numerical data. From weather reports to sophisticated studies of genetics, from election results to product preference surveys, probability and statistical language and concepts are increasingly present in the media and in everyday conversations. Students need this mathematics to help them judge the correctness of an argument supported by seemingly persuasive data.

17. Estimate probabilities and predict outcomes from actual data.
18. Understand sampling and recognize its role in statistical claims.
19. Evaluate bias, accuracy, and reasonableness of data in real-world contexts.
20. Understand and apply measures of dispersion and correlation.
21. Design a statistical experiment to study a problem, conduct the experiment, and interpret and communicate the outcomes.
22. Make predictions using curve fitting and numerical procedures to interpolate and extrapolate from known data.
23. Use relative frequency and probability, as appropriate, to represent and solve problems involving uncertainty.
24. Use simulations to estimate probabilities.
25. Create and interpret discrete and continuous probability distributions, and understand their application to real-world situations.
26. Describe the normal curve in general terms, and use its properties to answer questions about sets of data that are assumed to be normally distributed.
27. Understand and use the law of large numbers (that experimental results tend to approach theoretical probabilities after a large number of trials).

4.13 All students will develop an understanding of algebraic concepts and processes and will use them to represent and analyze relationships among variable quantities and to solve problems.

Descriptive Statement: Algebra is a language used to express mathematical relationships. Students need to understand how quantities are related to one another, and how algebra can be used to concisely express and analyze those relationships. Modern technology provides tools for supplementing the traditional focus on algebraic techniques, such as solving equations, with a more visual perspective, with graphs of equations displayed on a screen. Students can then focus on understanding the relationship between the equation and the graph, and on what the graph represents in a real-life situation.

14. Model and solve problems that involve varying quantities using variables, expressions, equations, inequalities, absolute values, vectors, and matrices.
15. Use tables and graphs as tools to interpret expressions, equations, and inequalities.
16. Develop, explain, use, and analyze procedures for operating on algebraic expressions and matrices.
17. Solve equations and inequalities of varying degrees using graphing calculators and computers as well as appropriate paper-and-pencil techniques.
18. Understand the logic and purposes of algebraic procedures.
19. Interpret algebraic equations and inequalities geometrically, and describe geometric objects algebraically.

4.14 All students will apply the concepts and methods of discrete mathematics to model and explore a variety of practical situations.

Descriptive Statement: Discrete mathematics is the branch of mathematics that deals with arrangements of distinct objects. It includes a wide variety of topics and techniques that arise in everyday life, such as how to find the best route form one city to another, where the objects are cities arranged on a map. It also includes how to count the number of different combinations of toppings for pizzas, how best to schedule a list of tasks to be done, and how computers store and
retrieve arrangements of information on a screen. Discrete mathematics is the mathematics used by decision-makers in our society, from workers in government to those in health care, transportation, and telecommunications. Its various applications help students see the relevance of mathematics in the real world.

11. Understand the basic principles of iteration, recursion, and mathematical induction.
12. Use basic principles to solve combinatorial and algorithmic problems.
13. Use discrete models to represent and solve problems.
14. Analyze iterative processes with the aid of calculators and computers.
15. Apply discrete methods to problems of voting, apportionment, and allocations, and use fundamental strategies of optimization to solve problems.

4.15 All students will develop an understanding of the conceptual building blocks of calculus and will use them to model and analyze natural phenomena.

**Descriptive Statement:** The conceptual building blocks of calculus are important for everyone to understand. How quantities such as world population change, how fast they change, and what will happen if they keep changing at the same rate are questions that can be discussed by elementary school students. Another important topic for all mathematics students is the concept of infinity - what happens as numbers get larger and larger and what happens as patterns are continued indefinitely. Early explorations in these areas can broaden students’ interest in and understanding of an important area of applied mathematics.

12. Develop and use models based on sequences and series.
13. Develop and apply procedures for finding the sum of finite arithmetic series and of finite and infinite geometric series.
14. Develop an informal notion of limit.
15. Use linear, quadratic, trigonometric, and exponential models to explain growth and change in the natural world.
16. Recognize fundamental mathematical models (such as polynomial, exponential, and trigonometric functions) and apply basic translations, reflections, and dilation’s to their graphs.
17. Develop and explain the concept of the slope of a curve and use that concept to discuss the information contained in graphs.
18. Develop an understanding of the concept of continuity of a function.
19. Understand and apply approximation techniques to situations involving initial portions of infinite decimals and measurement.

4.16 All students will demonstrate high levels of mathematical thought through experiences which extend beyond traditional computation, algebra, and geometry.
**Descriptive Statement:** High expectations for all students form a critical part of the learning environment. The belief of teachers, administrators, and parents that a student can and will succeed in mathematics often makes it possible for that student to succeed. Beyond that, this standard calls for a commitment that all students will be continuously challenged and enabled to go as far mathematically as they can.

By the end of **Grade 12**, students:

1. Study a core curriculum containing challenging ideas and tasks, rather than one limited to repetitive, low-level cognitive activities.
2. Work at rich, open-ended problems which require them to use mathematics in meaningful ways, and which provide them with exciting and interesting mathematical experiences.
3. Recognize mathematics as integral to the development of all cultures and civilizations, and in particular to that of our own society.
4. Understand the important role that mathematics plays in their own success, regardless of career.
5. Interact frequently with parents and other members of their communities, including men and women from a variety of cultural backgrounds, who use mathematics in their daily lives and occupations.
6. Receive services that help them understand the mathematical skills and concepts necessary to assure success in the core curriculum.
7. Receive equitable treatment without regard to genre, ethnicity, or predetermined expectations for success.
8. Learn mathematics in classes which reflect the diversity of the school’s total student population.
9. Be provided with opportunities at all grade levels for further study of mathematics, especially including topics beyond traditional computation, algebra, and geometry.
10. Be challenged to maximize their mathematical achievements at all grade levels.
11. Experience a full program of meaningful mathematics so that they can pursue post-secondary education.
### SCOPE AND SEQUENCE

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<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td></td>
<td>Basic Concepts of Algebra</td>
<td>Inequalities and Proof</td>
<td>Linear Equations and Functions</td>
<td>Products and Factors of Polynomials</td>
<td></td>
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<tr>
<td>10</td>
<td>Products and Factors of Polynomials</td>
<td>Rational Expressions</td>
<td>Irrational and Complex Numbers</td>
<td>Quadratic Equations and Functions</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>19</td>
<td>Quadratic Equations</td>
<td>Variation and Polynomial Equations</td>
<td>Analytic Geometry</td>
<td>HSPA Review</td>
<td>Exponential Functions</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>28</td>
<td>Exponential and Logarithmic Functions</td>
<td>Sequences and Series</td>
<td>Matrices and Determinants</td>
<td>Final Exam and Review</td>
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UNIT I BASIC CONCEPTS OF ALGEBRA Duration: 10 Days

A. Major Objectives:

1. To review basic concepts and skills of algebra studied in previous courses.
2. To demonstrate an understanding of axioms of real numbers by supplying reasons for the steps of an algebraic proof.

B. Sequence of Topics:

1. Real numbers and their graphs
2. Simplifying expression
3. Basic properties of real numbers
4. Sums and differences
5. Products
6. Quotients
7. Solving equations in one variable
8. Words to symbols
9. Problem solving equations


D. Supplemental Materials:

1. Dolciani – Study Guide, Reteaching and Practice
2. Dolciani – Practice Masters
3. Dolciani – Multiple Choice Tests
5. Teacher made worksheets
6. Teacher made transparencies

E. Suggested Assignments, Projects, Field Trips, Speakers:

1. Complete exercises in textbook for each lesson
2. Complete practice worksheets
3. Use calculator/computer to complete classroom and homework problems
4. Complete/review chapter prior to test/quizzes using text and teacher made materials
5. HSPA Do Now

F. Suggested Assessments:

1. Test
2. Quizzes
3. Notebook/classwork
4. Class participation
5. Homework

G. Alignment to New Jersey Core Curriculum Content Standards:

Mathematics
1. 4.1  15, 16, 17, 18
2. 4.2  9, 10
3. 4.6  20, 22
4. 4.8  13, 14
5. 4.13 14, 15, 16, 17, 18

Cross Content
6. 2  2, 7, 10
7. 3  1, 2, 3, 9, 10, 11
8. 4  1, 2, 9, 10, 11
UNIT II INEQUALITIES AND PROOF

Duration: 10 days

A. Major Objectives:

1. To solve various types of inequalities including combined inequalities and those containing absolute values.
2. To solve work problems using inequalities.

B. Sequence of Topics:

1. Solving inequalities in one variable
2. Solving combined inequalities
3. Problem solving using inequalities
4. Absolute value in open sentences
5. Solving absolute value sentences graphically
6. Theorems and proofs


D. Supplemental Materials:

1. Dolciani – Study Guide, Reteaching and Practice
2. Dolciani – Practice Masters
3. Dolciani – Multiple Choice Tests
5. Teacher made worksheets
6. Teacher made transparencies

E. Suggested Assignments, Projects, Field Trips, Speakers:

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1. Test
2. Quizzes
3. Notebook/classwork
4. Class participation
5. Homework
G. Alignment to New Jersey Core Curriculum Content Standards:

1. Mathematics
   a. 4.2  9, 10
   b. 4.3  11, 12
   c. 4.4  12, 13
   d. 4.6  20, 22
   e. 4.7  20, 21, 24
   f. 4.9  17, 19
   g. 4.13 14, 15, 16, 17, 18
   h. 4.15 14, 15, 16

2. Cross Content
   a. 2  2, 7, 10
   b. 3  1, 2, 3, 9, 10, 11, 13
   c. 4  1, 2, 9, 10, 11
UNIT III     LINEAR EQUATIONS AND FUNCTIONS

Duration: 18 days

A. **Major Objectives:**
   1. To graph/write linear equations given a variety of information
   2. To solve systems of equations and inequalities
   3. To graph/write functions and relations

B. **Sequence of Topics:**
   1. Open sentences in two variable
   2. Linear inequalities in two variables
   3. Graphs of linear equations in two variables
   4. The slope of a line
   5. Finding an equation of a line
   6. Systems of linear equations in two variable
   7. Problem solving using systems
   8. Functions
   9. Linear Functions
   10. Relations

C. **Core Material:**

   *Algebra and Trigonometry-Structure and Method,*
   Dolciani, Sorgenfrey, Brown, and Kane, Houghton-Mifflin, 1990

D. **Supplemental Materials:**

   1. Dolciani – Study Guide, Reteaching and Practice
   2. Dolciani – Practice Masters
   3. Dolciani – Multiple Choice Tests
   5. Teacher made worksheets
   6. Teacher made transparencies

H. **Suggested Assignments, Projects, Field Trips, Speakers:**

   1. Complete exercises in textbook for each lesson
   2. Complete practice worksheets
   3. Use calculator/computer to complete classroom and homework problems
   4. Complete/review chapter prior to test/quizzes using text and teacher made materials
   5. HSPA Do Now

F. **Suggested Assessments:**
1. Test
2. Quizzes
3. Notebook/classwork
4. Class participation
5. Homework

G. Alignment to New Jersey Core Curriculum Content Standards:

1. Mathematics
   a. 4.1  15, 16, 17, 18
   b. 4.3  11, 12
   c. 4.5  8
   d. 4.7  20, 21, 24
   e. 4.11 14, 15, 16, 17
   f. 4.13 14, 15, 16, 17, 18
   g. 4.14 12, 13
   a. **Cross Content** 2, 7, 10
   b. 3  1, 2, 3, 9, 10, 11
   c. 4  1, 2, 9, 10, 11

2.
UNIT IV PRODUCTS AND FACTORS OF POLYNOMIALS Duration: 15 days

A. Major Objectives:
   1. To work with polynomials, review operations, laws of exponents and products of polynomials
   2. To factor composite, monomials, and polynomials
   3. To use factoring and the zero-product rule to solve polynomial equations, inequalities, and word problems

B. Sequence of Topics:
   1. Polynomials
   2. Using laws of exponents
   3. Multiplying polynomials
   4. Using prime factorization
   5. Factoring polynomials
   6. Factoring quadratic polynomials
   7. Solving polynomial equations
   8. Problem solving using polynomial equations
   9. Solving polynomial inequalities


D. Supplemental Materials:
   1. Dolciani – Study Guide, Reteaching, and Practice
   2. Dolciani – Practice Masters
   3. Dolciani – Multiple Choice Test
   5. Teacher made worksheet
   6. Teacher made transparencies

E. Suggested Assignments, Projects, Field Trips, Speakers:
   1. Complete exercises in textbook for each lesson
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   3. Use calculator/computer to complete classroom and homework problems
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F. Suggested Assessments:
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   a. 4.1  15, 16, 17, 18
   b. 4.3  11, 12
   c. 4.6  20, 22
   d. 4.11 14, 15, 16, 17
   e. 4.13 14, 15, 16, 17, 18
   f. 4.14 13, 14

2. Cross Content
   a. 2  2, 7, 10
   b. 3  1, 2, 3, 9, 10, 11, 13
   c. 4  1, 2, 9, 10, 11
UNIT V  RATIONAL EXPRESSIONS  Duration:  15 days

A.  Major Objectives:

1.  To simplify by adding, subtracting, multiplying, and dividing rational expressions
2.  To review and extend the laws of exponents to include zero and negative exponents

B.  Sequence of Topics:

1.  Quotients of monomials
2.  Zero and negative exponents
3.  Scientific notation and significant digits
4.  Rational algebraic expressions
5.  Products and Quotients of Rational expressions
6.  Sums and differences of rational expressions
7.  Complex fractions
8.  Fractional coefficients
9.  Fractional equations


D.  Supplemental Materials:

1.  Dolciani – Study Guide, Reteaching and Practice
2.  Dolciani – Practice Masters
3.  Dolciani – Multiple Choice Test
5.  Teacher made worksheets
6.  Teacher made transparencies

E.  Suggested Assignments, Projects, Field Trips, Speakers:

1.  Complete exercises in textbook for each lesson
2.  Complete practice worksheets
3.  Use calculator/computer to complete classroom and homework problems
4.  Complete/review chapter prior to test/quizzes using text and teacher made materials
5.  HSPA Do Now

F.  Suggested Assessments:

1.  Test
2. Quizzes
3. Notebook/classwork
4. Class participation
5. Homework

G. Alignment to New Jersey Core Curriculum Content Standards:

1. Mathematics
   a. 4.1 15, 16, 17, 18
   b. 4.3 11, 12
   c. 4.7 20, 21, 24
   d. 4.8 13, 14
   e. 4.11 14, 15, 16, 17
   f. 4.13 14, 15, 16, 17, 18

2. Cross Content
   a. 2 2, 7, 10
   b. 3 1, 2, 3, 9, 10, 11, 13
   c. 4 1, 2, 9, 10, 11
UNIT VI IRRATIONAL AND COMPLEX NUMBERS Duration: 15 days

A. Major Objectives:

1. To simplify and perform operations with radicals, and solve radical equations
2. To distinguish between rational and irrational numbers
3. To expand the number system to include imaginary and complex numbers

B. Sequence of Topics:

1. Roots of real numbers
2. Properties of radicals
3. Sums of radicals
4. Binomials containing radicals
5. Equations containing radicals
6. Rational and irrational numbers
7. The imaginary number i
8. The complex numbers


D. Supplemental Materials:

1. Dolciani – Study Guide, Reteaching and Practice
2. Dolciani – Practice Masters
3. Dolciani – Multiple Choice Tests
5. Teacher made worksheets
6. Teacher made transparencies

E. Suggested Assignments, Projects, Field Trips, Speakers:

1. Complete exercises in textbook for each lesson
2. Complete practice worksheets
3. Use calculator/computer to complete classroom and homework problem
4. Complete/review chapter prior to test/quizzes using text and teacher made materials
5. HSPA Do Now

F. Suggested Assessments:
1. Test
2. Quizzes
3. Notebook/classwork
4. Class participation
5. Homework

G. **Alignment to New Jersey Core Curriculum Content Standards:**

1. **Mathematics**
   a. 4.5  8
   b. 4.8 13, 14
   c. 4.10 12
   d. 4.11 14, 15, 16, 17
   e. 4.13 14, 15, 16, 17, 18
   f. 4.15 14, 15, 16
   g. 4.16 1, 2, 3, 4, 6, 7, 11

2. **Cross Content**
   a. 2  2, 7, 10
   b. 3 1, 2, 3, 9, 10, 11
   c. 4 1, 2, 9, 10, 11

28
UNIT VII QUADRATIC EQUATIONS AND FUNCTIONS


A. Major Objectives:

1. To solve quadratic equations using factoring, completing the square, and quadratic formula, and equations in quadratic form
2. To graph quadratic equations

B. Sequence of Topics:

1. Completing the square
2. The quadratic formula
3. Equations in quadratic form
4. Graphing $y-k = a(x-h)^2$


D. Supplemental Materials:

1. Dolciani – Study Guide, Reteaching and Practice
2. Dolciani – Practice Masters
3. Dolciani – Multiple Choice Tests
5. Teacher made worksheets
6. Teacher made transparencies

E. Suggested Assignments, Projects, Field Trips, Speakers:

1. Complete exercises in textbook for each lesson
2. Complete practice worksheets
3. Use calculator/computer to complete classroom and homework problems
4. Complete/review chapter prior to test/quizzes using text and teacher made materials
5. HSPA Do Now

F. Suggested Assessments:

1. Test
2. Quizzes
3. Notebook/classwork
4. Class participation
5. Homework
G. Alignment to New Jersey Core Curriculum Content Standards:

1. Mathematics
   a. 4.7  20, 21, 24
   b. 4.11 14, 15, 16, 17
   c. 4.14 12, 13
   d. 4.13 14, 15, 16, 17, 18

2. Cross Content
   a. 2  2, 7, 10
   b. 3  1, 2, 3, 9, 10, 11
   c. 4  1, 2, 9, 10, 11
UNIT VIII  VARIATION AND POLYNOMIAL EQUATIONS  Duration:  13  days

A.  Major Objectives:

1. To solve problems using direct, inverse and joint variation
2. To divide polynomials using long and synthetic division, and use the rational root theorem

B. Sequence of Topics:

1. Direct variation and proportion
2. Inverse joint variation
3. Dividing polynomials
4. Synthetic division
5. Remainder and factor theorems
6. Finding rational roots


D. Supplemental Materials:

1. Dolciani – Study Guide, Reteaching and Practice
2. Dolciani – Practice Masters
3. Dolciani – Multiple Choice Tests
5. Teacher made worksheets
6. Teacher made transparencies

E. Suggested Assignments, Projects, Field Trips, Speakers:

1. Complete exercises in textbook for each lesson
2. Complete practice worksheets
3. Use calculator/computer to complete classroom and homework problems
4. Complete/review chapter prior to test/quizzes using text and teacher made materials
5. HSPA Do Now
F. Suggested Assessments:

1. Test
2. Quizzes
3. Notebook/classwork
4. Class participation
5. Homework

G. Alignment to New Jersey Core Curriculum Content Standards:

1. Mathematics
   a. 4.1 15, 16, 17, 18
   b. 4.11 14, 15, 16, 17
   c. 4.12 17, 18
   d. 4.13 14, 15, 16, 17, 18

2. Cross Content
   a. 2 2, 7, 10
   b. 3 1, 2, 3, 9, 10, 11
   c. 4 1, 2, 9, 10, 11
UNIT IX     ANALYTIC GEOMETRY

Duration: 15 days

A. Major Objectives:
   1. To use the distance and midpoint formulas
   2. To graph and write equations of circles and parabolas
   3. To algebraically solve systems of nonlinear equations and systems containing three equations with three variables

B. Sequence of Topics:
   1. Distance and midpoint formulas
   2. Circles
   3. Parabolas
   4. Solving quadratic systems
   5. Systems of linear equations in three variable


D. Supplemental Materials:
   1. Dolciani – Study Guide, Reteaching and Practice
   2. Dolciani – Practice Masters
   3. Dolciani – Multiple Choice Tests
   5. Teacher made worksheets
   6. Teacher made transparencies

E. Suggested Assignments, Projects, Field Trips, Speakers:
   1. Complete exercises in textbook for each lesson
   2. Complete practice worksheets
   3. Use calculator/computer to complete classroom and homework problems
   4. Complete/review chapter prior to test/quizzes using text and teacher made materials
   5. HSPA Do Now

F. Suggested Assessments:
   1. Test
   2. Quizzes
   3. Notebook/classwork
   4. Class participation
5.  Homework

G.  Alignment to New Jersey Core Curriculum Content Standards:

1.  Mathematics
   a.  4.1  15, 16, 17, 18
   b.  4.7  20, 21, 24
   c.  4.11 14, 15, 16, 17
   d.  4.13 14, 15, 16, 17, 18

2.  Cross Content
   a.  2  2, 7, 10
   b.  3  1, 2, 3, 9, 10, 11, 13
   c.  4  1, 2, 9, 10, 11
UNIT X     EXPONENTIAL AND LOGARITHMIC FUNCTIONS     Duration:  15 days

A.  Major Objectives:

1. To graph and solve exponential /logarithmic equations
2. To use the laws of logarithms to solve a variety of problems

B.  Sequence of Topics:

1. Rational exponents
2. Real number exponents
3. Composite and inverses of functions
4. Definition of logarithms
5. Laws of logarithms
6. Applications of logarithms
7. Exponential growth and decay
8. The natural logarithm function


D.  Supplemental Materials:

1. Dolciani – Study Guide, Reteaching and Practice
2. Dolciani – Practice Masters
3. Dolciani – Multiple Choice Tests
5. Teacher made worksheets
6. Teacher made transparencies

E.  Suggested Assignments, Projects, Field Trips, Speakers:

1. Complete exercises in textbook for each lesson
2. Complete practice worksheets
3. Use calculator/computer to complete classroom and homework problems
4. Complete/review chapter prior to test/quizzes using text and teacher made materials
5. HSPA Do Now

F.  Suggested Assessments:

1. Test
2. Quizzes
3. Notebook/classwork
4. Class participation
5. **Homework**

### G. Alignment to New Jersey Core Curriculum Content Standards:

#### 1. **Mathematics**
- **a.** 4.3 11, 12
- **b.** 4.7 20, 21, 24
- **c.** 4.8 13, 14
- **d.** 4.10 12
- **e.** 4.11 14, 15, 16, 17
- **f.** 4.15 14, 15, 16
- **g.** 4.16 1, 2, 3, 4, 6, 7, 11

#### 2. **Cross Content**
- **a.** 2 2, 7, 10
- **b.** 3 1, 2, 3, 9, 10, 11
- **c.** 4 1, 2, 9, 10, 11
UNIT XI  SEQUENCES AND SERIES                                      Duration: 15 days

A.  **Major Objectives:**

1. To find a formula and terms of an arithmetic sequence
2. To find a formula and terms of a geometric sequence
3. To use sigma notation and sum series

B.  **Sequence of Topics:**

1. Types of sequences
2. Arithmetic sequences
3. Geometric sequences
4. Series and sigma notation
5. Sums of arithmetic and geometric series
6. Infinite geometric series

C.  **Core Material:**


D.  **Supplemental Materials:**

1. Dolciani – Study Guide, Reteaching and Practice
2. Dolciani – Practice Masters
3. Dolciani – Multiple Choice Tests
5. Teacher made worksheets
6. Teacher made transparencies

E.  **Suggested Assignments, Projects, Field Trips, Speakers:**

1. Complete exercises in text for each lesson
2. Complete practice worksheets
3. Use calculator/computer to complete classroom and homework assignments
4. Complete/review chapter prior to test/quiz using text and teacher made materials

F. **Suggested Assessments:**

1. Test
2. Quizzes
3. Notebook/classwork
4. Class participation
5. Homework
6. Rubric Based Assessment

F. **Alignment to New Jersey Core Curriculum Content Standards:**

1. **Mathematics**
   - a. 4.1 15, 16, 17, 18
   - b. 4.2 9, 10
   - d. 4.4 12, 13
   - e. 4.5 8
   - f. 4.6 20, 22
   - h. 4.8 13, 14
   - j. 4.10 12
   - k. 4.11 14, 15, 16, 17
   - l. 4.12 17, 18
   - m. 4.13 14, 15, 16, 17, 18
   - n. 4.14 12, 13
   - o. 4.15 14, 15, 16
   - p. 4.16 1, 2, 3, 4, 6, 7, 11

2. **Cross Content**
   - a. 2 2, 7, 10
   - b. 3 1, 2, 3, 9, 10, 11
   - c. 4 1, 2, 9, 10, 11
UNIT XII  MATRICES AND DETERMINANTS  Duration: 10 days

D.  Major Objectives:

1. To learn and apply matrix terminology
2. To operate with matrices
3. To use determinants

E.  Sequence of Topics:

1. Definition of terms
2. Addition and scalar multiplication
3. Matrix multiplication
4. Application of matrices
5. Determinants
6. Inverses of matrices


D.  Supplemental Materials:

7. Dolciani – Study Guide, Reteaching and Practice
8. Dolciani – Practice Masters
9. Dolciani – Multiple Choice Tests
11. Teacher made worksheets
12. Teacher made transparencies

G.  Suggested Assignments, Projects, Field Trips, Speakers:

1. Complete exercises in textbook for each lesson
2. Complete practice worksheets
3. Use calculator/computer to complete classroom and homework problems
4. Complete/review chapter prior to test/quizzes using text and teacher made materials
5. HSPA Do Now

F.  Suggested Assessments:

1. Test
2. Quizzes
3. Notebook/classwork
4. Class participation
5. Homework

G. Alignment to New Jersey Core Curriculum Content Standards:

4. Mathematics
   h. 4.3 11, 12
   i. 4.7 20, 21, 24
   j. 4.8 13, 14
   k. 4.10 12
   l. 4.11 14, 15, 16, 17
   m. 4.15 14, 15, 16
   n. 4.16 1, 2, 3, 4, 6, 7, 11

5. Cross Content
   d. 2 2, 7, 10
   e. 3 1, 2, 3, 9, 10, 11
   f. 4 1, 2, 9, 10, 11
UNIT XIII  HSPA SKILLS  Duration: 8 days

B. Major Objectives:

1. To review the skills needed to successfully take the HSPA

B. Sequence of Topics:

1. Number sense, concepts and applications
2. Spacial sense and geometry
3. Data analysis, probability, statistics, and discrete math
4. Patterns, functions, and algebra

F. Core Material

HSPA Success Work* A*Text in Mathematics,
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D. Supplemental Materials:

1. HSPA Mathematics Coach, Mervine Edwards, EDI, 2000
2. Released materials from the state
3. Teacher made transparencies
4. Teacher made worksheets

E. Suggested Assignments, Projects, Field Trips, Speakers:

4. Complete exercises in text for each lesson
5. Complete practice worksheets
6. Use calculator/computer to complete classroom and homework assignments
7. Complete/review chapter prior to test/quiz using text and teacher made materials

F. Suggested Assessments:

1. Test
2. Quizzes
3. Notebook/classwork
4. Class participation
5. Homework
6. Rubric Based Assessment
H. Alignment to New Jersey Core Curriculum Content Standards:

1. Mathematics
   a. 4.1  15, 16, 17, 18
   b. 4.2  9, 10
   c. 4.3  11, 12
   d. 4.4  12, 13
   e. 4.5  8
   f. 4.6  20, 22
   g. 4.7  20, 21, 24
   h. 4.8  13, 14
   i. 4.9  17, 19
   j. 4.10 12
   k. 4.11 14, 15, 16, 17
   l. 4.12 17, 18
   m. 4.13 14, 15, 16, 17, 18
   n. 4.14 12, 13
   o. 4.15 14, 15, 16
   p. 4.16 1, 2, 3, 4, 6, 7, 11

2. Cross Content
   a. 2  2, 7, 10
   b. 3  1, 2, 3, 9, 10, 11
   c. 4  1, 2, 9, 10, 11
BIBLIOGRAPHY


