MATHEMATICS

Integrated Algebra II

Curriculum

Vineland Public Schools
Vineland, NJ

2007 - 08

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Integrated Algebra II

Overview/Description:

This course is a modified version (Cohort I) in a three-year integrated mathematics program that replaces the traditional Algebra-Geometry-Advanced Algebra/Trigonometry-Pre-calculus sequence. Each course features interwoven strands of algebra and functions, statistics and probability, geometry and trigonometry, and discrete mathematics. These three courses will provide a common core of broadly useful mathematics for all students. They were developed to prepare students for success in college, in careers, and in daily life in contemporary society.

The curriculum builds upon the theme of mathematics as sense-making. Through investigations of real-life contexts, students develop a rich understanding of important mathematics that makes sense to them and, in turn, enables them to make sense out of new situations and problems.

The mathematical content in this third course is the mathematics that all tenth/eleventh grade students should have the opportunity to learn . The organization of the student text differs in several other ways from traditional text- books. There are no boxed-off definitions, "worked-out" examples, or content summaries. Students learn mathematics by doing mathematics. Concept images are developed as students complete investigations and later concept definitions appear. Mathematical ideas are developed and then shared by groups of students at strategically placed Checkpoints in the lessons. This discussion leads to a class summary of shared understandings.

NJ MATH STANDARDS

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, AND 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 INTERFERENCES 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

V. Detailed Course of Study/Topical Outline with Timeline

Modified Version for Cohort I students (2004-2005)

UNIT	TOPIC	WEEKS	
Four	**Power Models** A. Same Shape Different Size B. Inverse Variation C. Quadratic Models D. Radicals and Fractional Power Models E. Looking Back		
Five	**Network Optimization** A. Find the Best Networks B. Shortest paths and Circuits C. Looking Back		
Six	**Geometric Form and Its Function** A. Flexible Quadrilaterals B. Triangles and Trigonometric Ratios D. Looking Back		
Three	**Patterns of Association** A. Seeing and Measuring Association B. Correlation C. Least Squares Regression D. Looking Back		
Seven	**Patterns in Chance** A. Waiting Times B. The Multiplication Rule C. Probability Distributions D. Expected Value of a Probability Distribution E. Looking Back		

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:

7 Teacher-made tests/quizzes

8 Class participation

9 Homework Assignments

10 Reports and Projects

11 Oral reports and presentations

12 Notebook/Journal

13 Cooperative group project/activities

X. TEXTBOOK(S) AND SUPPLEMENTAL/RESOURCE MATERIALS

A. Textbooks

Contemporary Mathematics in Context- Course 2 – Part A **Author:** ***Hirsch, Coxford, et al.*** Publisher: Glencoe/McGraw-Hill *Copyright:* 2003	Contemporary Mathematics in Context – Course 2 – Part B **Author:** ***Hirsch, Coxford, et al.*** **Publisher:Glencoe/McGraw-Hill** *Copyright:* 2003

B. Supplemental/Resource Materials

1. New Jersey Department of Education, Academic and Professional Standards: Curriculum and Instruction, http://www.nj.gov/njded/aps/cccs/.

2. NJ Department of Education, NJPEP: Virtual Academy, http://www.njpep.org/index.html

3. Teacher Resource Manual

4. Teacher Assessment Guide

5. RAP's – Review and Practice Manuals

6. Integrated Mathematics Author: Rubenstein, Crane, Butts, Publisher: McDougal Littell, Copyright: 2002

7. Algebra1: Author: Larson, Boswell, Kanold, Stiff, Publisher: McDougal Littell, Copyright: 2001

8. Geometry: Author: Larson, Boswell, Stiff, Publisher: McDougal Littell, Copyright: 2001

C. TI-83 Plus Graphing Calculator

Course Objectives:

All topics will satisfy standard 4.5: Problem Solving, Communication, Connections, and Reasoning.

I. Power Models

4.1 To develop understanding of the types of situations that could be represented by power models, inverse power models, and quadratic models (4.3.12C)

4.1 To model situations involving direct variation, inverse variation, and quadratic relationships (4.3.12C)

4.1 To compare patterns found in tables and graphs of models of the forms $y = ax^2$, $y = ax^3$, $y = a/x^2$, $y = a/x^3$, and $y = ax^2 + bx + c$ (4.3.12B)

4.1 To develop understanding of the different rates of change in various models (4.3.12B)

4.1 To find good estimates of solutions to quadratic equations and to be able to check those solutions (4.3.12D)

4.1 To simplify expressions by applying properties of exponents and rewriting radical expressions (4.3.12C,D)

4.2 To determine and explore inverse variation models $y = 1/x$, and $y = 1/x^2$ through tables and graphs (4.3.12C,D)

4.3 To estimate and determine the solution of a quadratic equation (4.3.12B)

4.3 To determine the number of solutions for various equations related to a quadratic model (4.3.12B)

4.4 To explore properties and the meanings of square and cube root functions (4.3.12B,C,D)

4.4 To simplify radical expressions (4.3.12B)

II. Network Optimization

5.1 To represent, analyze, and apply real world situations using spanning trees and student generated algorithms. (4.4.12D)

5.1 To construct and interpret a distance matrix for a network (4.4.12D)

5.2 To represent analyze, and apply real world situations using shortest paths (4.4.12D)

III. Geometric Form and Its Function

6.1 To recognize the use of quadrilaterals in the construction of common objects (4.2.12D)

6.1 To describe similar plane shapes; determine if plane shapes are similar; and use the relationship among lengths, angles, and areas of similar shapes (4.2.12B)

6.2 To determine the sine, cosine, and tangent of an angle in a right triangle (4.2.12E)

6.2 To recognize the use of triangles in real-world situations (4.2.12E)

IV. Patterns of Association

3.1 To explore association through the interpretation of scatter plots (4.4.12A)

3.2 To understand that a high correlation between two variables does not necessarily mean that one variable causes the other (4.4.12A)

3.2 To understand that a set of points may not follow a linear model even though the correlation is strong; that a linear model may be appropriate even if the correlation is weak (4.4.12A)

3.2 To use the least squares regression line for prediction; understand when that is appropriate (4.4.12A)

V. Patterns in Chance

7.1 To identify when trials are independent (4.4.12B)

7.1 To construct frequency distributions when trials are independent (4.4.12B)

7.2 To use an area model and the Multiplication Rule to find the probability that two independent events both occur (4.4.12B)

7.2 To decide if two events are independent (4.4.12B)

7.3 To construct the theoretical frequency distribution and probability distribution for a waiting time situation (4.4.12B)

7.4 To compute the expected value of games of chance, probability distribution, and waiting time distribution (4.4.12B)

7.4 To discover a simple formula for expected value (4.4.12B)

Integrated Algebra II Pacing Chart – 11th Grade
"Contemporary Mathematics in Context"
Unit 4: Power Models

	Stand.	Lesson Objectives	Activities/Assignments
Number Operations Review		Review of fractions Signed Numbers Operations Order of Operations	
Day 1-9			Algebra I Chapters 1 & 2 Guided practice Worksheets
Day 10			Assessment
Solving Equations Review		Use the Addition Property of Equality and the Multiplication Property of Equality to solve linear equations	
Day 11-19			Algebra I Chapter 3 Guided practice Worksheets
Day 20			Assessment
Lesson 1		**Same Shape, Different Size**	
Day 21 Invest 1		Starting from Cube One	Pg 234 TATS PG 235: 1-2
Day 22			Pg 236: 3-4
Day 23			Pg 236, Experiment 1-3, Checkpoint
Day 24			Pg 238: On Your Own
Day 25			Review – M.O.R.E.
Day 26			Assessment
Day 27 Invest 2		The Shape of $y = ax^2$ and $y = ax^3$	Pg 239: Experiment 1: 1-2 Experiment 2: 1-3
Day 28			Pg 239: Experiment 3: 1-2 Experiment 4: 1 Hw Pg 241: On Your Own
Day 29			Review – M.O.R.E.
Day 30			Assessment
Lesson 2		**Inverse Variation**	
Day 31 Invest 1		Travel Times	Pg 250 TATS Pg 251: 1-5

			HW: On Your Own
Day 32 Invest 2		Sound and Light	Pg 253: 1-4
Day 33			Pg 254: 5 Pg 256: On Your Own
Day 34			Assessment
Day 35 Invest 3		The Shape of Inverse Variation Models	Pg 257: Experiment 1: 1-2 Experiment 2: 1-4
Day 36			Pg 257: Experiment 3: 1-3 Pg 259 On Your Own
Day 37			Calculator Activity, Checkpoint a on p. 258
Day 38			M.O.R.E. p. 259 (1-3)
Day 39			Review
Day 40			Assessment
Laws of Exponents Review		Use properties of exponents to multiply and divide exponential expressions. Evaluate powers that have zero and negative exponents.	
Day 41 - 49			Algebra I Chapter 8 Guided practice worksheets
Day 50			Assessment
Lesson 3		**Quadratic Models**	
Day 50 Invest 1		Going Up…Going Down	TATS p. 265, p. 266 (1-2)
Day 51			p. 267 (3, 4, 6)
Day 52			p. 269 (9-10), Checkpoint, HW On Your Own on p. 271
Day 53 Invest 2		Profit Prospects	p. 272 (1-5)
Day 54			p. 273 On Your Own
Day 55			Assessment covering Days 21-25
Day 56 Invest 3		The Shape of Quadratic Models	p. 274 Experiments 1 & 2
Day 57			p. 275 Experiments 3 & 4, HW - p. 277 On Your Own
Day 58 Invest 4		Solving Quadratic Equations	p. 278 (1-4)
Day 59			p.280 On Your Own (in class)
Day 60 Invest 5		How Many Solutions are Possible?	p. 281 (1-4)

Day 61			p. 282 On Your Own (in class)
Day 62			Review - M.O.R.E. (varying problems)
Day 63			Assessment on Investigations 3-5
Radical Review		Add subtract, multiply, and divide radical expressions. Solve radical equations. Use the Pythagorean Theorem and its Converse.	
Day 64-73			Algebra I Chapter 12 Guided practice Worksheets
Day 74			Assessment
Lesson 4		**Radicals and Fractional Power Models**	
Day 75 Invest 1		The Power of a Brace	TATS on p. 289, p. 290 (1,2)
Day 76			p. 292 (3-4), p. 293 On Your Own
Day 77 Invest 2		Powerful Radicals	p. 295 (1-3), HW - p. 297 Checkpoint
Day 78			Assessment on Invest 1 & 2
Day 79 Invest 3		Cube Roots	p. 298 (1-4), Checkpoint on p. 299
Day 80			Assessment on Invest 3

Integrated Algebra II Pacing Chart – 11th Grade
"Contemporary Mathematics in Context"
Unit 5: Network Optimization

	Stand.	Lesson Objectives	Activities/Assignments
Polynomial Review		Add, Subtract, and multiply polynomials. Divide a polynomial by a monomial. Factor polynomials.	
Day 1-9			Algebra I Chapter 10 Guided practice Worksheets
Day 10			Assessment
Lesson 1		**Finding the Best Networks**	
Day 11 Invest 1		Optimizing a Computer Network	Pg. 321 (1-2), HW p. 325 On Your Own
Day 12 Invest 2		Optimizing a Road Network	Pg. 326 (1-3), HW p. 328 On Your Own (a. only)
Day 13			Assessment on Invest 1 & 2
Lesson 2		**Shortest Paths and Circuits**	
Day 14 Invest 1		Shortest Routes	Pg. 341 (1,2)
Day 15			Pg. 341 (3a-c)
Day 16 Invest 2		Graph Games	Pg. 345 (1,2)
Day 17			Pg. 347 Checkpoint and Discussion on Euler Circuits
Day 18-19 Invest 3		The Traveling Salesperson Problem	Pg. 348 (1, 2, 4a-e), p. 352 On Your Own
Lesson 3		**Looking Back**	
Day 20			Review
Day 21			Assessment on Lesson 2

Integrated Algebra II Pacing Chart – 11th Grade
"Contemporary Mathematics in Context"
Unit 6: Geometric Form and Its Function

	Stand.	Lesson Objectives	Activities/Assignments
Quadrilaterals in the Coordinate Plane		Properties of Quadrilaterals Slope, Distance, Midpoint Formulas Parallel and Perpendicular Lines	
Day 1 - 9			Geometry Chapters 1 & 3 Integrated Mathematics 2 Unit 5 Guided Practice Worksheets
Day 10			Assessment
Lesson 1		**Flexible Quadrilaterals**	
Day 11 Invest 1			
Day 12		Using Quadrilaterals in Linkages	TATS on p. 369, p. 371 (1)
Day 13			p. 371 (2-4), HW – p. 372 On Your Own
Day 14			Review – M.O.R.E Examples p. 377 (1-3, 5)
Day 15-17			Assessment on Invest 1
Lesson 2			Project – p. 378 #4
Day 18 Invest 1		**Triangles and Trigonometric Ratios**	
Day 19		Triangles with a Variable-Length Side	TATS on p. 384, p. 385 (1), HW – p. 386 #2 unless time permits
Day 20			p. 385 (3-5)
Day 21 Invest 2			Assessment on Invest 1
Day 22		What's The Angle?	p. 395 (1-3)
Day 23-24			p. 397 (4-6)
Day 25			p. 397 #7 and supplement with additional calculator activities,

			Checkpoint on p. 399, On Your Own on p. 399
Day 26			Review
Day 27 Invest 3			Assessment on Invest 2
Day 28		Measuring Without Measuring	p. 400 (1-2)
Day 29			p. 402 (3-5)
Day 30			p. 403 (6-8), Checkpoint on p. 404
Day 31			p. 405 On Your Own and Supplemental Examples
Day 32			Review – M.O.R.E. Examples
Day 33			Assessment on Invest 3
Day 34			Review Lesson 1
Day 35			Review Lesson 2
Day 36			Assessment on Unit 6

HSPA Prep once a week

Integrated Algebra II Pacing Chart – 11th Grade
"Contemporary Mathematics in Context"
Unit 3: Patterns of Association

	Stand.	Lesson Objectives	Activities/Assignments
Review Graphing Linear Functions		Graph a linear function. Find the intercepts. Graph a linear equation in slope-intercept form.	
Day 1-9			Algebra I Chapter 4 Guided practice worksheets
Day 10			Assessment
Lesson 1		**Seeing and Measuring Association**	
Day 11 Invest 1		Rank Correlation	Pg 171-172: TATS, 1-2
Day 12			Pg173: Checkpoint and On Your Own
Day 13-14			Pg 175: 5, 7
Day 15			Pg 179 On Your Own, Review – M.O.R.E. p. 179-180)
Day 16			Assessment on Invest 1
Lesson 2		**Correlation**	
Day 17			Pg 193: 9 & Pg 195 On Your Own
Day 18 Invest 2		Association and Causation	Pg 197 Discussion on Causation, Lurking Variable, Pg 198: 2
Day 19			Assessment on Invest 1 & 2
Lesson 3		**Least Squares Regression**	
Day 20 Invest 1		How Good Is The Fit?	TATS, Pg 212, #1
Day 21			Pg 214 (2-3)
Day 22			Pg 215: On Your Own
Lesson 4		**Looking Back**	
Day 23			Pg 228 (2-3)
Day 24-27			Frog Project
Day 28			Test Review
Day 29			Unit 3 Assessment

HSPA Prep once a week

Integrated Algebra II Pacing Chart – 11th Grade
"Contemporary Mathematics in Context"
Unit 7: Patterns in Chance

	Stand.	Lesson Objectives	Activities/Assignments
Probability Overview		Systematic Listing and Counting Sample Space Counting Principals Probability Law of Large Numbers	
Day 1 -10			Integrated Mathematics 2 Unit 6 Guided Practice Worksheets
Day 11 -12			Dice Experiment
Lesson 1		**Waiting Times**	
Day 13 -14 Invest 1		Waiting for Doubles	TATS on p. 457, p.458 (1-2), HW – On Your Own on p. 459
Day 15 - 16 Invest 2		Independent Trials	p. 460 (1-3) On Your Own on p. 461
Day 17 Invest 3		The Distribution of Waiting Times	p. 462 (1, 3)
Day 18			On Your Own on p. 465
Day 19			Review – M.O.R.E.
Day 20			Assessment on Lesson 1
Lesson 2		**The Multiplication Rule**	
Day 21 Invest 1		Multiplying Probabilities	p. 472 (1-3)
Day 22			p. 474 (4-6)
Day 23			p. 475 (7-10)
Day 24			Review – M.O.R.E.
Day 25			Assessment on Lesson 2
Lesson 4		**Expected Value of a Probability Distribution**	
Day 26 -27 Invest 1		What's a Fair Price?	p. 511 (1-4), Checkpoint on p. 512, HW – p. 513 On Your Own
Day 28 Invest 2		Fair Price and Expected Value	p. 513 (1-2)
Day 17			p. 514 (3-4)
Day 18			Review – M.O.R.E.
Day 19			Assessment on Invest 1 & 2
Day 20 Invest 3		Expected Value of a Waiting-Time Distribution	p. 521 (1, 2)

Day 21			p. 523 (3 & On Your Own)
Day 22			Review – M.O.R.E.
Day 23			Assessment on Invest 3
Day 24			Review – Unit 7
Day 25			Assessment on Unit 7

HSPA Prep once a week