

DARIEN PUBLIC SCHOOLS
CURRICULUM GUIDE

ALGEBRA 1

DARIEN PUBLIC SCHOOLS

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Mrs. Clara C. Sartori
Mrs. Kim Westcott

CURRICULUM GUIDE AUTHORS

Darien High School Mathematics Department:
Patrick Dooley, *Dan Haron, Shirley Taylor, Ann Hannon, Susan Wood, Tom Jockers,
Mike O'Brien, Marsha Kasoney, Mike Sullivan, Dan Record, Bonita Messman, and
*Dan Kensek (MMS)

*Curriculum Guide Authors

DATES

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*Unit 9 is an enrichment unit for all levels based upon time considerations.

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**Unit 10 is done with Grade 8 Accelerated only.

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SECTION I - Course Information

STATEMENT OF PHILOSOPHY

MATHEMATICS DEPARTMENT PHILOSOPHY

We believe in creating learning environments where students practice and acquire the knowledge of mathematics. We believe that students should be able to proficiently apply a range of numerical, algebraic, geometric, and statistical concepts and the skills to formulate, analyze, and solve real world problems. The learning environment will facilitate inquiry, use of technology and the exploration of real world phenomena. It will support continuous development of mathematical skills and the appreciation of mathematics as a discipline. Our mathematics program seeks to graduate students who will possess a sense of numbers, data analysis, spatial relationships, symbolic representations, and the ability to communicate mathematics with others.

DISTRICT MATHEMATICS PHILOSOPHY

Mathematics is a vigorous and growing discipline – a universal language useful for communication and research in other disciplines. We want our students to reason and communicate mathematically, to be mathematical problem-solvers, to value mathematics and to feel confident in their ability to use mathematics. Creating such a foundation necessitates a well-articulated and developmentally appropriate mathematics program for all, developing the mathematical power of each.

Mathematics is more than a collection of concepts and skills to be mastered. It is the exploration of ideas and concepts, the understanding of relationships, the ability to make predictions, to analyze data, to estimate results, to communicate ideas and to solve problems in this ever-changing world. It is no longer limited to the study of complex calculations and formulas. We are moving from a curriculum often dominated by memorization of isolated facts and procedures to one that emphasizes conceptual understandings, multiple representations, deliberate connections and mathematical problem solving. Rather than being a transmitter of knowledge, the teacher becomes a facilitator of learning, guiding, questioning, listening, clarifying and creating an environment in which the student is an active participant in learning.

The needs of today's society demand that all students become mathematically literate to function effectively. It will be necessary for our students to be able to use mathematics in their personal lives, further studies and future workplaces. As educators, we must recognize that students have differing abilities, performance levels, needs and interests and provide them with the best mathematics education possible so that they may achieve their personal ambitions and career goals.

Too often, students have learned to compute without understanding why the computation procedures make sense or how they apply to their lives. Instruction must focus on the behaviors that contribute to the development of mathematical thinking and number sense – explaining procedures used, justifying reasoning, judging the reasonableness of solutions and reflecting on the application of concepts.

When students gain knowledge from meaningful experiences, they are much more likely to retain and use what they have learned. Sound practice in the teaching of mathematics means that students are guided to use concrete materials and explore ideas with classmates. In this way, knowledge evolves from personal experience.

The fundamental objective of education has always been to prepare students to be contributing members of the society in which they live. The objectives of this mathematics curriculum support and affirm this tradition.

PROGRAM GOALS

- Introduce students to the language of Algebra.
- Students will perform operations with real numbers.
- Students will be able to solve equations with one variable.
- Students will be able to graph linear and nonlinear equations and demonstrate an understanding of relationships between representations of a function.
- Students will be able to graph and solve systems of linear equations.
- Students will become proficient in performing operations with polynomials.
- Students will be able to analyze and interpret graphs of linear and nonlinear functions.
- Students will be able to analyze, interpret and solve real world problems.
- Students will be provided with an opportunity to acquire the skills necessary to solve problems involving factoring polynomials.

OVERVIEW

Students will use fundamental operations, properties and algebraic transformations to solve equations and inequalities, to problem solve and to solve systems of equations. Students will use the skills acquire in the course to analyze, interpret and formulate a plan to solve word problems. They will also study graphs, factoring, quadratic equations, and data analysis and their applications to real life examples.

In addition to being offered on the high school level, Algebra I can be taken in the Middle School in either 7th grade (double accelerated) or in 8th grade (accelerated). Algebra I, for regular students, can be taken in 9th or 8th grade, depending upon the mathematic readiness of the students. The prerequisite course content for algebra I is pre-algebra.

When offered at the middle school level, all elements of the Algebra I curriculum are covered in the 8th grade (accelerated) and 7th grade (double accelerated), but the scope and sequence may change slightly from Algebra I as it is offered on a regular level.

ESSENTIAL QUESTIONS

For Course:

1. Can students develop, use, explain, and analyze procedures for working with algebraic expressions, equations, and inequalities, including those that contain absolute value?
2. Can students solve systems of equations using a variety of methods such as linear combinations, graphing, and substitution?
3. Can students translate among and use tabular, symbolic, and graphical representations of relations and functions?
4. Can students find, use, and explain the relationship between slope and rate?
5. Can students develop, use and understand the limitations of linear functions to model real-world situations?
6. Can students use factoring patterns and the Quadratic Formula to solve quadratic equations and word problems?

K-12 Math Curriculum Essential Questions

- How does math help us to make sense of our world?
- How does math help us to understand real-world phenomena, make decisions and meet challenges?
- What are the natural and cultural patterns around us?
- How does math, as a universal language, empower us and help us to communicate?

Discussion Ideas:

Understand patterns in the world around us
To be able to function in society (ex. understand paychecks)
Deductive reasoning
Intelligent citizenship
Problem-solving skills
Abstract/concrete
Opening the mind to possibilities
Effective communication
Mental math
Understanding practical uses
Technology and math

PROCESS SKILLS

- Reading (Comprehending)
- Reading (Analyzing)
- Reading (Appreciating)
- Writing mathematical equations
- Speaking the language of algebra
- Listening
- Viewing
- Using graphs and tables
- Studying
- Reasoning and Reflecting
- Using Learning Resources and Technology
- Working Independently and Collaboratively
- Performing
- Quantifying
- Understanding Number Operations
- Using and Creating Formulas
- Problem Solving

STUDENT PERFORMANCE SUMMARY

- Demonstration
- Model with Written Explanation and/or Visuals
- Cooperative Learning
- Computer based lab work
- Tests and quizzes
- Projects linked to science
- Preparation for standardized tests
- Homework and class participation
- Practical and theoretical applications

GRADING GUIDELINES

	<u>Expectations of Students</u>	<u>% of Report Card Grade</u>
Homework	100% of all assignments	0 -10%
Notebook	All notes maintained	0 – 10%
Tests	All tests taken/made up	45 – 60%
Quizzes	All quizzes taken/made up	30 – 40%
Mid-Year Exams		20% of semester grade No more than 25% of quarter grade
Final Exams		20% of semester grade No more than 25 % of quarter grade
Projects		0 – 20%
Class Participation		0 – 5%

SECTION II – Units of Study

SUMMARY OF UNITS

<u>Unit Title</u>	<u>Duration (Weeks)</u>
Unit 1: Introduction to Algebra	3 Weeks
Unit 2: Working with Real Numbers	2 Weeks
Unit 3: Solving Equations and Word Problems	3 Weeks
**Unit 3B: Solving Inequalities	2 Weeks
Unit 4: Polynomials	6 Weeks
Unit 5: Factoring Polynomials & Applications of Quadratic Equations	8 Weeks
Unit 6: Introduction to Functions	4 Weeks
Unit 7: Systems of Linear Equations	4 Weeks
Unit 8: Rational & Irrational Numbers	4 Weeks
*Unit 9: Analyzing Rational Expressions	If Time Permits
**Unit 10: Quadratics	2 Weeks

*Unit 9 is an enrichment unit for all levels, based upon time considerations.

**Units 3B and 10 are for 8th grade accelerated.

UNIT 1: INTRODUCTION TO ALGEBRA

1. Can the students use mathematical properties to evaluate and simplify expressions and formulas?
2. Can the students translate verbal expressions into mathematical expressions and equations and solve open sentences?

STANDARDS

1. Number Sense Students will use numbers to count, measure, compare, order, scale, locate and label, and use a variety of numerical representations to present, interpret, communicate and connect various kinds of numerical information.

2. Operations Students will add, subtract, multiply and divide with whole numbers, fractions, decimals and integers, and develop strategies for selecting the appropriate computational and operational methods for solving problems.

9. Algebra and Functions Students will use algebraic skills and concepts, including functions, to describe real-world phenomena symbolically and graphically, and to model quantitative change.

CONTENT KNOWLEDGE OBJECTIVES

Content:

1. Variables
2. Grouping Symbols
3. Equations
4. Translating Words into symbols
5. Translating Sentences into Equations
6. Translating Problems into Equations
7. Creating a Plan to Solve Word Problems

Skills:

1. Simplify numerical expressions and evaluate algebraic expressions.
2. Simplify expressions with and without grouping symbols
3. Find solution sets of equations over a given domain.
4. Translate phrases into variable expressions.
5. Translate word sentences into equations.
6. Translate simple word problems into equations.
7. Devise and use a plan to solve word problems over a given domain.
8. Use opposites and absolute values.

* - Not covered in the 200 level course

VOCABULARY

Variable	Grouping symbol
Value of a variable	Equation
Variable expression	Side of an equation
Numerical expression	Open sentence
Value of a numerical expression	Domain of a variable
Simplify an expression	Domain of a variable
Substitution principle	Solution set
Evaluate an expression	Solve an open sentence
Real numbers	Integers
Whole numbers	Absolute value

PERFORMANCE ASSESSMENT

Tests
Quizzes
Homework
Special Assignments
Class participation
Oral Presentations
Group Projects

CAREER AWARENESS (where appropriate)

Power plant technician
Construction engineer

CORE TEXT FOR STUDENTS

Algebra: Structure & Method Book 1, McDougall Litell

ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

See section IV, Learning Resources

MATERIALS AND SUPPLIES

See section IV, Learning Resources

UNIT 2: WORKING WITH REAL NUMBERS

1. Can students add, subtract, multiply and divide real numbers?
2. Can the students recognize the need for and use the distributive property in expressions and equations?
3. Can the students formulate and solve problems involving consecutive integers?

STANDARDS

1. Number Sense Students will use numbers to count, measure, compare, order, scale, locate and label, and use a variety of numerical representations to present, interpret, communicate and connect various kinds of numerical information.

2. Operations Students will add, subtract, multiply and divide with whole numbers, fractions, decimals and integers, and develop strategies for selecting the appropriate computational and operational methods for solving problems.

9. Algebra and Functions Students will use algebraic skills and concepts, including functions, to describe real-world phenomena symbolically and graphically, and to model quantitative change.

CONTENT KNOWLEDGE OBJECTIVES

Content:

1. The Distributive Property
2. Rules for Multiplication
3. Consecutive Integer problems
4. Dividing Real Numbers

Skills:

1. Use the distributive property to simplify expressions
2. Multiply real numbers.
3. Write equations to represent relationships among integers.
4. Divide real numbers and simplify expressions involving quotients.

* - Not covered in the 200 level course

VOCABULARY

Distributive property
Simplify a variable expression
Even integer
Consecutive even integers
Reciprocal

Equivalent expressions
Consecutive integers
Odd integer
Consecutive Odd integers
Multiplicative Inverse

PERFORMANCE ASSESSMENT

Tests
Quizzes
Homework
Special Assignments
Class participation
Oral Presentations
Group Projects

CORE TEXT FOR STUDENTS

Algebra: Structure & Method Book 1, McDougall Litell

ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

See section IV, Learning Resources

MATERIALS AND SUPPLIES

See section IV, Learning Resources

UNIT 3: SOLVING EQUATIONS AND WORD PROBLEMS

1. Can the students solve equations using several transformations?
2. Can the students solve equations with variables on both sides?
3. Can the students recognize the need for and use the distributive property in solving word problems?

STANDARDS

1. Number Sense Students will use numbers to count, measure, compare, order, scale, locate and label, and use a variety of numerical representations to present, interpret, communicate and connect various kinds of numerical information.

2. Operations Students will add, subtract, multiply and divide with whole numbers, fractions, decimals and integers, and develop strategies for selecting the appropriate computational and operational methods for solving problems.

3. Estimation and Approximation Students will make estimates and approximations, and judge the reasonableness of results.

9. Algebra and Functions Students will use algebraic skills and concepts, including functions, to describe real-world phenomena symbolically and graphically, and to model quantitative change.

CONTENT KNOWLEDGE OBJECTIVES

Content:

1. Transforming Equations: Addition/Subtraction
2. Transforming Equations: Multiplication/Division
3. Using Several Transformations
4. Using Equations to Solve Problems
5. Equations with Variables on Both Sides
6. Problem Solving: Using Charts *
7. Cost, Income and Value Problems *

Skills:

1. Solve equations using addition or subtraction.
2. Solve equations using multiplication or division.
3. Solve equations by using more than one transformation.
4. Create and use a plan to solve word problems involving equations.
5. Solve equations with the variable on both sides.
6. Organize the facts of a problem in a chart. *
7. Solve problems involving cost, income and value. *

* - Not covered in the 200 level course

VOCABULARY

Equivalent equations
Inverse operations
Null set

Transformation
Empty set

PERFORMANCE ASSESSMENT

Tests
Quizzes
Homework
Special Assignments
Class participation
Oral Presentations
Group Projects

CAREER AWARENESS (where appropriate)

Loan officer
Store manager
Astronomer

CORE TEXT FOR STUDENTS

Algebra: Structure & Method Book 1, McDougall Litell

ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

See section IV, Learning Resources

MATERIALS AND SUPPLIES

See section IV, Learning Resources

UNIT 3B : SOLVING INEQUALITIES AND ABSOLUTE VALUE

1. Can the students solve inequalities using several transformations?
2. Can the students graph inequalities?
3. Can the students solve and graph inequalities with absolute value?

STANDARDS

1. Number Sense Students will use numbers to count, measure, compare, order, scale, locate and label, and use a variety of numerical representations to present, interpret, communicate and connect various kinds of numerical information.

2. Operations Students will add, subtract, multiply and divide with whole numbers, fractions, decimals and integers, and develop strategies for selecting the appropriate computational and operational methods for solving problems.

3. Estimation and Approximation Students will make estimates and approximations, and judge the reasonableness of results.

9. Algebra and Functions Students will use algebraic skills and concepts, including functions, to describe real-world phenomena symbolically and graphically, and to model quantitative change.

CONTENT KNOWLEDGE OBJECTIVES

Content:

1. Inequalities
2. Sets
3. Angles
4. Absolute Value

Skills:

1. Solve Inequalities using properties of inequality
2. Use inequalities to classify angles
3. Use inequalities to solve geometric problems
4. Determine the union and intersection of sets using graphs and Venn Diagrams
5. Solve compound inequalities
6. Apply the definitions of less than and absolute value
7. Draw and interpret circle graphs

VOCABULARY

Acute angle
Right angle
Obtuse angle
Straight angle

Intersection
Union
Venn Diagram
Vertex

PERFORMANCE ASSESSMENT

Tests
Quizzes
Homework
Special Assignments
Class participation
Oral Presentations
Group Projects

CORE TEXT FOR STUDENTS

Algebra 1: An Integrated Approach, McDougall Littell

ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

See section IV, Learning Resources

MATERIALS AND SUPPLIES

See section IV, Learning Resources

UNIT 4: POLYNOMIALS

1. Can the students write and simplify expressions using exponents?
2. Can the students add, subtract, and multiply polynomials including operations with powers?
3. Can the students transform a formula to express a particular variable in terms of other variables?
4. Can the students solve word problems involving uniform motion and area?

STANDARDS

1. Number Sense Students will use numbers to count, measure, compare, order, scale, locate and label, and use a variety of numerical representations to present, interpret, communicate and connect various kinds of numerical information.

2. Operations Students will add, subtract, multiply and divide with whole numbers, fractions, decimals and integers, and develop strategies for selecting the appropriate computational and operational methods for solving problems.

9. Algebra and Functions Students will use algebraic skills and concepts, including functions, to describe real-world phenomena symbolically and graphically, and to model quantitative change.

CONTENT KNOWLEDGE OBJECTIVES

Content:

1. Exponents
2. Adding and Subtracting Polynomials
3. Multiplying Monomials
4. Powers of Monomials
5. Multiplying Monomials by Polynomials
6. Multiplying Polynomials
7. Transforming Formulas *
8. Rate-Time-Distance problems *
9. Area Problems

Skills:

1. Write and simplify expressions involving exponents.
2. Add and subtract polynomials
3. Multiply monomials.
4. Find powers of monomials.

5. Multiply a polynomial by a monomial.
6. Multiply polynomials.
7. Transform a formula. *
8. Solve word problems involving uniform motion. *
9. Solve word problems involving area.

* - Not covered in the 200 level course

VOCABULARY

Power	Binomial
Base	Trinomial
Exponent	Coefficient
Exponential form	Similar or like terms
Monomial	Polynomial in simplest form
Constant	Degree of a monomial
Polynomial	Degree of a polynomial
Uniform motion	

PERFORMANCE ASSESSMENT

Tests
 Quizzes
 Homework
 Special Assignments
 Class participation
 Oral Presentations
 Group Projects

CAREER AWARENESS (where appropriate)

Architect
 Mechanical engineer
 Photographer

CORE TEXT FOR STUDENTS

Algebra: Structure & Method Book 1, McDougall Litell

ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

See section IV, Learning Resources

MATERIALS AND SUPPLIES

See section IV, Learning Resources

UNIT 5: FACTORING POLYNOMIALS AND APPLICATIONS OF QUADRATIC EQUATIONS

1. Can the students factor polynomials of the following types: GCF, difference of two squares, and trinomials?
2. Can the students factor completely involving combinations of different types of factoring?
3. Can the students use factoring or the quadratic formula to solve polynomial equations?
4. Can the students formulate and solve word problems using factoring and the Quadratic Formula?

STANDARDS

1. Number Sense Students will use numbers to count, measure, compare, order, scale, locate and label, and use a variety of numerical representations to present, interpret, communicate and connect various kinds of numerical information.

2. Operations Students will add, subtract, multiply and divide with whole numbers, fractions, decimals and integers, and develop strategies for selecting the appropriate computational and operational methods for solving problems.

CONTENT KNOWLEDGE OBJECTIVES

Content:

1. Dividing monomials
2. Monomial Factors of Polynomials (Greatest Common Factor)
3. Difference of Two Squares
4. Factoring Trinomials
5. Solving Equations by Factoring
6. Solving Equations by the Quadratic Formula
7. Solving Word Problems by Factoring and Using the Quadratic Formula

Skills:

1. Simplify quotients of monomials and Find the GCF of several monomials.
2. Divide polynomials by monomials and find monomial factors of polynomials.
3. Factor differences of two squares.
4. Factor quadratic trinomials whose quadratic coefficient is 1 and whose constant term is positive.
5. Factor quadratic trinomials whose quadratic coefficient is 1 and whose constant term is negative.

6. Factor polynomials completely using several methods.
7. Use factoring in solving polynomial equations.
8. Solve problems by writing and factoring quadratic equations.
9. Use the Quadratic Formula in solving polynomial equations.
10. Solve problems by writing a quadratic equation and using the Quadratic Formula to solve. *

* - Not covered in the 200 level course

VOCABULARY

Factor	Greatest common factor of monomials
Factor set	Prime number
Prime factorization	Greatest monomial factor of a polynomial
Quadratic term	Quadratic polynomial
Linear term	Quadratic equation
Cubic equation	Polynomial equation
Standard form of a polynomial equation	Linear equation

PERFORMANCE ASSESSMENT

Tests
 Quizzes
 Homework
 Special Assignments
 Class participation
 Oral Presentations
 Group Projects

CAREER AWARENESS (where appropriate)

Decorator
 Physicist

CORE TEXT FOR STUDENTS

Algebra: Structure & Method Book 1, McDougall Litell

ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

See section IV, Learning Resources

MATERIALS AND SUPPLIES

See section IV, Learning Resources

UNIT 6: INTRODUCTION TO FUNCTIONS

1. Can the students graph ordered pairs and linear equations using slope-intercept form?
2. Can the students find the slope and write the equation for a given line?
3. Can the students understand what a function is, both linear and nonlinear, and define a function using tables and graphs?

STANDARDS

1. Number Sense Students will use numbers to count, measure, compare, order, scale, locate and label, and use a variety of numerical representations to present, interpret, communicate and connect various kinds of numerical information.

3. Estimation and Approximation Students will make estimates and approximations, and judge the reasonableness of results.

9. Algebra and Functions Students will use algebraic skills and concepts, including functions, to describe real-world phenomena symbolically and graphically, and to model quantitative change.

CONTENT KNOWLEDGE OBJECTIVES

Content:

1. Equations in Two Variables
2. Points, Lines, and Graphs
3. Slope of a Line
4. Slope-Intercept Form
5. Determining the Equation of a Line
6. Functions Defined by Equations *
7. Graphs of Quadratic Functions *

Skills:

1. Solve equations in two variables over given domains of the variables.
2. Graph ordered pairs and linear equations in two variables.
3. Find the slope of a line using its graph, two points, and/or its equation.
4. Write, manipulate, and use the slope-intercept form of a linear equation.
5. Find an equation of a line given the slope and one point on the line, or given two points on the line.
6. Understand what a function is and define a function by using equations. *
7. Graph a quadratic function using its x-intercepts, vertex, and y-intercept. *
8. Solve projectile motion problems using the Quadratic Formula. *

* - Not covered in the 200 level course

VOCABULARY

Solution	X-coordinate
Ordered pair	Abscissa
Plot	Y-coordinate
Horizontal Axis	Ordinate
Origin	Coordinate axes
Vertical axis	Coordinate plane
X-axis	Quadrants
Y-axis	Graph of an equation
Graph of an ordered pair	Linear equation
Coordinates	Standard form
Slope	Slope-intercept form of an equation
Collinear	Parallel
Y-intercept	X-intercept
Vertex	Solutions of a quadratic equation
Parabola	

PERFORMANCE ASSESSMENT

Tests
Quizzes
Homework
Special Assignments
Class participation
Oral Presentations
Group Projects

CAREER AWARENESS (where appropriate)

Pilot
Land surveyor
Statistician

CORE TEXT FOR STUDENTS

Algebra: Structure & Method Book 1, McDougall Litell

ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

See section IV, Learning Resources

MATERIALS AND SUPPLIES

See section IV, Learning Resources

UNIT 7: SYSTEMS OF LINEAR EQUATIONS

1. Can the students solve systems of equations using graphing, substitution, and the elimination method?
2. Can the students use systems of equations to solve a variety of word problems?

STANDARDS

2. Operations Students will add, subtract, multiply and divide with whole numbers, fractions, decimals and integers, and develop strategies for selecting the appropriate computational and operational methods for solving problems.

3. Estimation and Approximation Students will make estimates and approximations, and judge the reasonableness of results.

9. Algebra and Functions Students will use algebraic skills and concepts, including functions, to describe real-world phenomena symbolically and graphically, and to model quantitative change.

CONTENT KNOWLEDGE OBJECTIVES

Content:

1. Solving Systems of Equations by Graphing
2. The Substitution Method
3. The Addition-Subtraction Method
4. The Multiplication-Addition-Subtraction (Elimination) Method
5. Applications for Systems of Equations

Skills:

1. Use graphs to solve systems of linear equations.
2. Use the substitution method to solve systems of linear equations.
3. Use addition or subtraction to solve systems of linear equations in two variables.
4. Use multiplication with the addition-or-subtraction method to solve systems of linear equations.
5. Apply systems of linear equations to solve real world problems.

* - Not covered in the 200 level course

VOCABULARY

System of equations

System of simultaneous equations

Solution of a system

Intersection point

PERFORMANCE ASSESSMENT

Tests

Quizzes

Homework

Special Assignments

Class participation

Oral Presentations

Group Projects

CAREER AWARENESS (where appropriate)

Nutritionist

CORE TEXT FOR STUDENTS

Algebra: Structure & Method Book 1, McDougall Litell

ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

See section IV, Learning Resources

MATERIALS AND SUPPLIES

See section IV, Learning Resources

UNIT 8: RATIONAL AND IRRATIONAL NUMBERS

1. Can the students simplify, add, subtract, multiply, and divide radicals?
2. Can the students use the Pythagorean theorem to solve geometric problems?
3. Can the students solve simple radical equations?

STANDARDS

1. Number Sense Students will use numbers to count, measure, compare, order, scale, locate and label, and use a variety of numerical representations to present, interpret, communicate and connect various kinds of numerical information.

2. Operations Students will add, subtract, multiply and divide with whole numbers, fractions, decimals and integers, and develop strategies for selecting the appropriate computational and operational methods for solving problems.

5. Measurement Students will make and use measurements in both customary and metric units to approximate, measure and compute length, area, volume, mass, temperature, angle and time.

6. Spatial Relationships and Geometry Students will analyze and use spatial relationships and basic concepts of geometry to construct, draw, describe and compare geometric models and their transformations, and use geometric relationships and patterns to solve problems.

CONTENT KNOWLEDGE OBJECTIVES

Content:

1. Multiplying, Dividing and Simplifying Radicals
2. Adding and Subtracting Radicals
3. Multiplication of Binomials containing Radicals
4. Simple Radical Equations

Skills:

1. Simplify radicals and to find decimal approximations of irrational square roots.
2. Find square roots of variable expressions and use them to solve equations and problems.
3. Simplify products and quotients of radicals.
4. Simplify sums and differences of radicals.
5. Multiply binomials containing square-root radicals and to rationalize binomial denominators that contain square-root radicals.
6. Solve simple radical equations.

* - Not covered in the 200 level course

VOCABULARY

Rational number	Principal square root
Terminating decimal	Radical sign
Repeating decimal	Radical
Square root	Radicand
Irrational numbers	Simplest form of a radical
Rationalizing the denominator	Radical Equation

PERFORMANCE ASSESSMENT

Tests
Quizzes
Homework
Special Assignments
Class participation
Oral Presentations
Group Projects

CAREER AWARENESS (where appropriate)

Land surveyor
Mechanical engineer

CORE TEXT FOR STUDENTS

Algebra: Structure & Method Book 1, McDougall Litell

ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

See section IV, Learning Resources

MATERIALS AND SUPPLIES

See section IV, Learning Resources

UNIT 9: ANALYZING RATIONAL EXPRESSIONS

1. Can the students simplify, add, subtract, multiply and divide rational expressions?

STANDARDS

1. Number Sense Students will use numbers to count, measure, compare, order, scale, locate and label, and use a variety of numerical representations to present, interpret, communicate and connect various kinds of numerical information.

2. Operations Students will add, subtract, multiply and divide with whole numbers, fractions, decimals and integers, and develop strategies for selecting the appropriate computational and operational methods for solving problems.

9. Algebra and Functions Students will use algebraic skills and concepts, including functions, to describe real-world phenomena symbolically and graphically, and to model quantitative change.

CONTENT KNOWLEDGE OBJECTIVES

Content:

1. Simplifying Fractions
2. Multiplying Fractions *
3. Dividing Fractions *
4. Least Common Denominators *
5. Adding and Subtracting Fractions *
6. Mixed Expressions *
7. Polynomial Long Division *

Skills:

1. Simplify algebraic fractions.
2. Multiply algebraic fractions *
3. Divide algebraic fractions. *
4. Express two or more fractions with their least common denominator *
5. Add and subtract algebraic fractions *
6. Write mixed expressions as fractions in simplest form *
7. Divide polynomials *

* - Not covered in the 200 level course

VOCABULARY

Least common denominator

Mixed expression

Divisor

Dividend

PERFORMANCE ASSESSMENT

Tests

Quizzes

Homework

Special Assignments

Class participation

Oral Presentations

Group Projects

CORE TEXT FOR STUDENTS

Algebra: Structure & Method Book 1, McDougall Littell

ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

See section IV, Learning Resources

MATERIALS AND SUPPLIES

See section IV, Learning Resources

UNIT 10 : QUADRATICS

1. Can the students graph quadratics in the vertex form?
2. Can the students convert quadratics in standard form into vertex form by completing the square?
3. Can students use the discriminant to determine the number and type of roots of a quadratic equation?
4. Can the students apply their knowledge of quadratics to projectile motion problems?

STANDARDS

1. Number Sense Students will use numbers to count, measure, compare, order, scale, locate and label, and use a variety of numerical representations to present, interpret, communicate and connect various kinds of numerical information.

2. Operations Students will add, subtract, multiply and divide with whole numbers, fractions, decimals and integers, and develop strategies for selecting the appropriate computational and operational methods for solving problems.

3. Estimation and Approximation Students will make estimates and approximations, and judge the reasonableness of results.

8. Patterns Students will discover, analyze, describe, extend and create patterns, and use patterns to describe mathematical and other real-world phenomena.

9. Algebra and Functions Students will use algebraic skills and concepts, including functions, to describe real-world phenomena symbolically and graphically, and to model quantitative change.

CONTENT KNOWLEDGE OBJECTIVES

Content:

1. Graphing quadratic equations
2. Finding vertex, axis of symmetry, and intercepts of a quadratic equations
3. Completing the square
4. Discriminant
5. Projectile motion problems

Skills:

1. Graph equations of the form $y = x^2$
2. Graph equations of the form $y = |x|$
3. Graph equations of the form $y = (x - h)^2 + k$
4. Graph equations of the form $y = |x - h| + k$
5. Graph equations of the form $y = a(x - h)^2 + k$
6. Graph equations of the form $y = a|x - h| + k$
7. Compare absolute value graph and the parabola
8. Find x- and y- intercepts of a parabola
9. Use the discriminant to determine whether a quadratic function can be factored
10. Use the discriminant to determine the number and type of roots
11. Solve projectile motion problems
12. Recognize projectile motion as a quadratic function

VOCABULARY

Axis of symmetry
Discriminant

Completing the square

PERFORMANCE ASSESSMENT

Tests
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CORE TEXT FOR STUDENTS

Algebra 1: An Integrated Approach, McDougall Littell

ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

See section IV, Learning Resources

MATERIALS AND SUPPLIES

See section IV, Learning Resources

SECTION III - Goals and Standards

RELATED GOALS and STANDARDS

Connecticut Content Standards

- 1. Number Sense** Students will use numbers to count, measure, compare, order, scale, locate and label, and use a variety of numerical representations to present, interpret, communicate and connect various kinds of numerical information.
- 2. Operations** Students will add, subtract, multiply and divide with whole numbers, fractions, decimals and integers, and develop strategies for selecting the appropriate computational and operational methods for solving problems.
- 3. Estimation and Approximation** Students will make estimates and approximations, and judge the reasonableness of results.
- 4. Ratios, Proportions and Percents** Students will use ratios, proportions and percents to represent relationships between quantities and measures and solve problems involving ratios, proportions and percents.
- 5. Measurement** Students will make and use measurements in both customary and metric units to approximate, measure and compute length, area, volume, mass, temperature, angle and time.
- 6. Spatial Relationships and Geometry** Students will analyze and use spatial relationships and basic concepts of geometry to construct, draw, describe and compare geometric models and their transformations, and use geometric relationships and patterns to solve problems.
- 7. Probability and Statistics** Students will use basic concepts of probability and statistics to collect, organize, display and analyze data, simulate events and test hypotheses.
- 8. Patterns** Students will discover, analyze, describe, extend and create patterns, and use patterns to describe mathematical and other real-world phenomena.
- 9. Algebra and Functions** Students will use algebraic skills and concepts, including functions, to describe real-world phenomena symbolically and graphically, and to model quantitative change.

10. Discrete Mathematics Students will use the concepts and processes of discrete mathematics to analyze and model a variety of real-world situations that involve recurring relationships, sequences, networks, combinations and permutations.

NCTM Standards

1. Number & Operations

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems
- Understand meanings of operations and how they relate to one another
- Compute fluently and make reasonable estimates

2. Algebra

- Understand patterns, relations, and functions
- Represent and analyze mathematical situations and structures using algebraic symbols
- Use mathematical models to represent and understand quantitative relationships
- Analyze change in various contexts

3. Geometry

- Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships
- Specify locations and describe spatial relationships using coordinate geometry and other representational systems
- Apply transformations and use symmetry to analyze mathematical situations
- Use visualization, spatial reasoning, and geometric modeling to solve problems

4. Measurement

- Understand measurable attributes of objects and the units, systems, and processes of measurement
- Apply appropriate techniques, tools, and formulas to determine measurements

5. Data Analysis & Probability

- Understand and apply basic concepts of probability

6. Problem Solving

- build new mathematical knowledge through problem solving;
- solve problems that arise in mathematics and in other contexts;
- apply and adapt a variety of appropriate strategies to solve problems;
- monitor and reflect on the process of mathematical problem solving

7. Reasoning & Proof

- recognize reasoning and proof as fundamental aspects of mathematics;
- make and investigate mathematical conjectures;
- develop and evaluate mathematical arguments and proofs;
- select and use various types of reasoning and methods of proof

8. Communication

- organize and consolidate their mathematical thinking through communication;
- communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
- analyze and evaluate the mathematical thinking and strategies of others;
- use the language of mathematics to express mathematical ideas precisely

9. Connections

- recognize and use connections among mathematical ideas;
- understand how mathematical ideas interconnect and build on one another to produce a coherent whole;
- recognize and apply mathematics in contexts outside of mathematics.

10. Representation

- create and use representations to organize, record, and communicate mathematical ideas;
- select, apply, and translate among mathematical representations to solve problems;
- use representations to model and interpret physical, social, and mathematical phenomena

SECTION IV – Learning Resources

SUPPLEMENTAL RESOURCES

MOST OF THE RESOURCES BELOW ARE LOCATED IN THE MATHEMATICS DEPARTMENT SUPPLY CLOSET

Textbooks

- Algebra I, Smith et. Al, Prentice Hall
- Algebra I concepts and skills, Larson et. Al, McDougal Litell
- Algebra I, Schultz et. al. Holt Publishing

Websites

- www.nctm.org
- www.learner.org/exhibits/dailymath
- www.math.temple.edu/~paulos
- www.mathforum.org
- www.maa.org
- www.mathematicallycorrect.com
- www.personal.cfw.com/~clayford
- www.math.com
- www.math.uah.edu/psol
- www.nilesonline.com/stats
- www.mathmistakes.com
- www.innumeracy.com
- www.techlar.com/fractals
- www.superstringtheory.com

Other Resources

- TTL/C-5 Computer Lab
- Microsoft Excel
- TI-83 graphing calculator
- World Almanac
- Media center
- Geometers Sketchpad
- Winplot
- LiveMath
- Access