

**Blind Brook School District**  
**Math 1A: Integrated Algebra**  
**Math Standards Curriculum Alignment**  
**August 2007**

**Unit 1: Real Number System and Algebraic Expressions, Equations and Inequalities**

Time Frame: 25 days

**Unit Outline:**

- Order of operations: PEDMAS
- Absolute value and operations with integers
- Exponential expressions
- Variables
- Set-builder notation, interval notation, roster form
- Real number system
- Properties of the real number system, including binary operation tables
- Algebraic expressions and formulas: verbal  $\leftrightarrow$  algebraic
- Literal equations
- Linear equations and inequalities

**Content Strands**

- A.N.1 Identify and apply the properties of real numbers (closure, commutative, associative, distributive, identity, inverse) *Note: Students do not need to identify groups and fields, but students should be engaged in the ideas. Students will understand meanings of operations and procedures, and how they relate to one another.*
- A.A.29 Use set-builder notation and/or interval notation to illustrate the elements of a set, given the elements in roster form
- A.A.1 Translate a quantitative verbal phrase into an algebraic expression
- A.A.2 Write a verbal expression that matches a given mathematical expression
- A.N.6 Evaluate expressions involving absolute value(s), and exponential expression(s)
- A.A.3 Distinguish the difference between an algebraic expression and an algebraic equation
- A.A.4 Translate verbal sentences into mathematical equations or inequalities
- A.A.5 Write algebraic equations or inequalities that represent a situation
- A.A.22 Solve all types of linear equations in one variable
- A.A.24 Solve linear inequalities in one variable
- A.A.6 Analyze and solve verbal problems whose solution requires solving a linear equation in one variable or linear inequality in one variable
- A.A.21 Determine whether a given value is a solution to a given linear equation in one variable or linear inequality in one variable
- A.A.23 Solve literal equations for a given variable

**Process Strands**

- A.PS.1 Use a variety of problem solving strategies to understand new mathematical content
- A.PS.4 Use multiple representations to represent and explain problem situations (e.g., verbally, numerically, algebraically, graphically) *Students will apply and adapt a variety of appropriate strategies to solve problems.*
- A.PS.5 Choose an effective approach to solve a problem from a variety of strategies (numeric, graphic, algebraic)
- A.PS.10 Evaluate the relative efficiency of different representations and solution methods of a problem
- A.CM.12 Understand and use appropriate language, representations, and terminology when describing objects, relationships, mathematical solutions, and rationale
- A.CN.8 Develop an appreciation for the historical development of mathematics
- A.CM.3 Present organized mathematical ideas with the use of appropriate standard notations, including the use of symbols and other representations when sharing an idea in verbal and written form.
- A.CM.8 Reflect on strategies of others in relation to one’s own strategy
- A.CM.10 Use correct mathematical language in developing mathematical questions that elicit, extend, or challenge other students’ conjectures
- A.CM.11 Represent word problems using standard mathematical notation
- A.CN.1 Understand and make connections among multiple representations of the same mathematical idea
- A.R.4 Select appropriate representations to solve problem situations
- A.R.5 Investigate relationships between different representations and their impact on a given problem

**Vocabulary:**

Closure Property	Real Numbers	Subset	Denominator
Associative Property	Irrational Numbers	Set	Numerator
Commutative Property	Rational Numbers	Set Builder Notation	Fraction
Distributive Property	Natural Numbers (Counting)	Universal Set	Radical
Identity Property	Integer	Element	Multiple
Inverse property	Field	Finite Sample Space	Representations
Equivalent	Group	Algebraic Problem	Simplest Form
Number Theory	Connection	Arithmetic	Decimal
Equation	Interpretations	Operations	Absolute Value
Evaluate	Communicate	Algebraic Expression	Procedure
Formula	Organize	Algebraic Equation	Diagram
Expression	Translate	Coefficient	Quotient
Variable	Analyze	Linear Equation in one variable	Ratio
Symbol	Formulate	Solution Set	Sum

Inequality Communicate Comprehension Conclusion Conjecture Decoding Standard mathematical Notation Technical Writing Numerically Verbally	Systematic Approach	Linear Inequality in one variable Literal equation Verbal Expression Algebraically Verbal Sentence Satisfies the equation Means Extremes	
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## Unit 2: Exponents and Exponential Functions

Time Frame: 18 days

### Unit Outline:

- Positive integral exponents
- Laws of exponents
- Scientific notation
- Exponential functions
- Exponential models

### Content Strands

- A.N.4 Understand and use scientific notation to compute products and quotients of numbers
- A.A.12 Multiply and divide monomial expressions with a common base, using the properties of exponents *Note: Use integral exponents only*
- A.A.9 Analyze and solve verbal problems that involve exponential growth and decay

### Process Strands

- A.RP.3 Recognize when an approximation is more appropriate than an exact answer

### Vocabulary:

Conjecture Constraint Analyze	Quantitative Model Exponential Growth and Decay Integral Exponent Exponential Expression	Exponential Function Exponent Properties of Exponents Common Base Scientific notation
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## Unit 3: Polynomials and Quadratics

Time Frame: 30 days

### Unit Outline:

- Definitions and degree
- Operations on monomials and polynomials
- Factorization of polynomials: GCF, difference of 2 squares, quadratic, trinomials, completely
- Quadratic equations: solution using factoring and graphing
- Quadratic models
- Zeros, vertex, axis of symmetry of a quadratic function
- Sum and product of the roots

### Content Strands

- A.A.13 Add, subtract, and multiply monomials and polynomials
- A.A.14 Divide a polynomial by a monomial or binomial, where the quotient has no remainder
- A.A.19 Identify and factor the difference of two perfect squares
- A.A.20 Factor algebraic expressions completely, including trinomials with a lead coefficient of one (after factoring a GCF)
- A.A.27 Understand and apply the multiplication property of zero to solve quadratic equations with integral coefficients and integral roots
- A.A.28 Understand the difference and connection between roots of a quadratic equation and factors of a quadratic expression
- A.A.8 Analyze and solve verbal problems that involve quadratic equations
- A.G.4 Identify and graph linear, **quadratic** (parabolic), absolute value, and exponential functions
- A.G.10 Determine the vertex and axis of symmetry of a parabola, given its graph (See A.A.41) *Note: the vertex will have an ordered pair of integers and the axis of symmetry will have an integral value.*
- A.A.41 Determine the vertex and axis of symmetry of a parabola, given its equation (See A.G.10)
- A.G.8 Find the roots of a parabolic function graphically *Note: Only quadratic equations with integral solutions*

## Process Strands

- A.CM.4 Explain relationships among different representations of a problem
- A.PS.1 Use a variety of problem solving strategies to understand new mathematical content
- A.PS.4 Use multiple representations to represent and explain problem situations (e.g., verbally, numerically, algebraically, graphically)
- A.PS.5 Choose an effective approach to solve a problem from a variety of strategies (numeric, graphic, algebraic)
- A.PS.10 Evaluate the relative efficiency of different representations and solution methods of a problem
- A.CM.12 Understand and use appropriate language, representations, and terminology when describing objects, relationships, mathematical solutions, and rationale
- A.CN.8 Develop an appreciation for the historical development of mathematics

## Vocabulary:

Coefficient	Monomial	Factoring
Integral Coefficient	Binomial	Greatest Common Factor
Lead Coefficient	Trinomial	Difference of two perfect squares
Integral Roots	Polynomial	
Roots of an equation	Axis of symmetry	
Quadratic Equation	Ordered Pair	
Solution set(s)	Roots of a Parabolic Function	
Zeroes of a function	Vertex	
	Roots of a Quadratic Function	
	Zeros of a function	

## Internet Resources:

<http://illuminations.nctm.org/LessonDetail.aspx?ID=L381>

<http://illuminations.nctm.org/LessonDetail.aspx?ID=L376>

## Unit 4: Rational Expressions and Equations

Time Frame: 20 days

### Unit Outline:

- Values that make a fraction undefined
- Simplification of fractions
- Operations on fractions with unlike monomial and like binomial denominators
- Equations involving fractional expressions: linear and quadratic
- Algebraic proportions: linear and quadratic

### Content Strands

- A.A.15 Find values of a variable for which an algebraic fraction is undefined
- A.A.16 Simplify fractions with polynomials in the numerator and denominator by factoring both and renaming them to lowest terms
- A.A.18 Multiply and divide algebraic fractions and express the product or quotient in simplest form
- A.A.17 Add or subtract fractional expressions with monomial or like binomial denominators
- A.A.26 Solve algebraic proportions in one variable which result in linear or quadratic equations
- A.A.25 Solve equations involving fractional expressions [expressions with monomial or like binomial denominators which result in linear equations in one variable]
- A.N.5 Solve algebraic problems arising from situations that involve fractions, decimals, percents (decrease/increase and discount), and proportionality/direct variation

### Process Strands

- A.CM.1 Communicate verbally and in writing a correct, complete, coherent, and clear design (outline) and explanation for the steps used in solving a problem
- A.CM.5 Communicate logical arguments clearly, showing why a result makes sense and why the reasoning is valid

### Vocabulary:

Fractional Expression	Lowest terms fraction
Proportionality/direct variation	Undefined
Profit	Appropriate Unit
Discount	Conversion
Percent of increase/decrease	error
Product	
Proportion	

**Internet Resources:**

<http://regentsprep.org>

<http://www.edhelper.com>

[http://www.maths.mq.edu.au/numeracy/web\\_mums/module2/worksheet23/module2.pdf](http://www.maths.mq.edu.au/numeracy/web_mums/module2/worksheet23/module2.pdf)

<http://www.lphs.net/academics/math/□arley/algebraic%20fractions.doc>

[http://www.lboro.ac.uk/research/helm/c\\_helm\\_backup\\_24nov03/helm\\_website/documents/wbol\\_blk06.pdf](http://www.lboro.ac.uk/research/helm/c_helm_backup_24nov03/helm_website/documents/wbol_blk06.pdf)

## Unit 5: Radical Expressions and Right Triangle Trigonometry

Time Frame: 20 days

### Unit Outline:

- Simplification of radicals
- Operations on radicals
- Radical equations
- Pythagorean Theorem
- Definitions of trigonometric ratios: sine, cosine, tangent
- Acute angles of a right triangle: use SOH CAH TOA
- Sides of a right triangle: use SOH CAH TOA

### Content Strands

- A.N.2 Simplify radical terms (no variable in the radicand)
- A.N.3 Perform the four arithmetic operations using like and unlike radical terms and express the result in simplest form
- A.A.45 Determine the measure of a third side of a right triangle using the Pythagorean theorem, given the lengths of any two sides
- A.A.42 Find the sine, cosine, and tangent ratios of an angle of a right triangle, given the lengths of the sides
- A.A.44 Find the measure of a side of a right triangle, given an acute angle and the length of another side
- A.A.43 Determine the measure of an angle of a right triangle, given the length of any two sides of the triangle

### Process Strands

- A.R.6 Use mathematics to show and understand physical phenomena (e.g., find the height of a building if a ladder of a given length forms a given angle of elevation with the ground)
- A.CM.6 Support or reject arguments or questions raised by others about the correctness of mathematical work
- A.RP.10 Extend specific results to more general cases

**Vocabulary:**

Radical	Radicand	Like/Unlike radical terms
Proof	Angle of elevation	Right Angle
Refute	Angle of depression	Right triangle
	Angle	Hypotenuse
	Acute Angle	Legs of a right triangle
	Adjacent side/angles	Trigonometry
	Triangle	Opposite side/angle
		Pythagorean theorem
		Cosine
		Sine
		Tangent

**Internet Resources:**

<http://illuminations.nctm.org/LessonDetail.aspx?ID=L622>

## Unit 6: Coordinate Plane and Graphical Analysis

Time Frame: 28 days

### Unit Outline:

- Function definition
- Domain and range/independent and dependent variables
- Vertical line test
- Function notation
- Graphical exploration of linear, quadratic, absolute value, and exponential functions
- Slope and y-intercept of constant and linear functions; slope-intercept and point-slope form; 2-point formula
- Horizontal and vertical lines
- Parallel lines and their slopes
- Direct variation
- Linear models with slope as rate of change and y-intercept as initial condition

### Content Strands

- A.G.4 Identify and graph linear, quadratic (parabolic), absolute value, and exponential functions
- A.A.39 Determine whether a given point is on a line, given the equation of the line
- A.A.32 Explain slope as a rate of change between dependent and independent variables
- A.A.33 Determine the slope of a line, given the coordinates of two points on the line
- A.M.1 Calculate rates using appropriate units (e.g., rate of a space ship versus the rate of a snail)
- A.A.34 Write the equation of a line, given its slope and the coordinates of a point on the line
- A.A.35 Write the equation of a line, given the coordinates of two points on the line
- A.A.36 Write the equation of a line parallel to the x- or y-axis
- A.A.37 Determine the slope of a line, given its equation in any form
- A.A.38 Determine if two lines are parallel, given their equations in any form
- A.G.3 Determine when a relation is a function, by examining ordered pairs and inspecting graphs of relations
- A.G.5 Investigate and generalize how changing the coefficients of a function affects its graph

**Process Indicators:**

- A.PS.6 Use a variety of strategies to extend solution methods to other problems
- A.PS.7 Work in collaboration with others to propose, critique, evaluate, and value alternative approaches to problem solving
- A.PS.9 Interpret solutions within the given constraints of a problem
- A.R.1 Use physical objects, diagrams, charts, tables, graphs, symbols, equations, and objects created using technology as representations of mathematical concepts
- A.R.8 Use mathematics to show and understand mathematical phenomena (e.g., compare the graphs of the functions represented by the equations  $y = x^2$  and  $y = -x^2$ )

**Vocabulary:**

Chart Graph Table	Function Absolute Value Function Parabolic Function Quadratic Function	Constraint Graphically Parameter Pattern Refute Mathematical Visual Relation $x$ -intercept $y$ -intercept	Coordinates Line parallel to axes Parabola Parallel Slope $x$ -axis $y$ -axis
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## Unit 7: Systems of Equations and Inequalities

Time Frame: 20 days

### Unit Outline:

- Linear-linear system of equations: algebraic and graphic solutions
- Linear-quadratic system of equations: algebraic and graphic solutions
- Graph of linear inequalities
- Linear-linear system of inequalities: graphic solution

### Content Strands

- A.G.6 Graph linear inequalities
- A.G.7 Graph and solve systems of linear equations and inequalities with rational coefficients in two variables (See A.A.10)
- A.A.40 Determine whether a given point is in the solution set of a system of linear inequalities
- A.A.10 Solve systems of two linear equations in two variables algebraically (See A.G.7)
- A.A.7 Analyze and solve verbal problems whose solution requires solving systems of linear equations in two variables
- A.G.9 Solve systems of linear and quadratic equations graphically *Note: Only use systems of linear and quadratic equations that lead to solutions whose coordinates are integers.*
- A.A.11 Solve a system of one linear and one quadratic equation in two variables, where only factoring is required. *Note: The quadratic equation should represent a parabola and the solution(s) should be integers.*

### Process Strands

- A.PS.7 Work in collaboration with others to propose, critique, evaluate, and value alternative approaches to problem solving
- A.CN.2 Understand the corresponding procedures for similar problems or mathematical concepts

### Vocabulary:

Counter Example Solution Set	System of Linear Equations Systems of Linear Inequalities	Quadratic-Linear System of Equations
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