

Freetown Lakeville Public Schools

Grade Algebra I Unit Guide
Mathematics

June 19, 2003

Grade Algebra I Curriculum Guideline

Purpose of this Curriculum Guide:

Grade Algebra I Mathematics Mission:

Grade Algebra I Mathematics Philosophy:

This curriculum was written by:

Grade Algebra I Curriculum Guideline

Unit:

Topic:

Student Learning Outcomes

Textbook References, Resources and Materials

- 30701** Identify and calculate with the properties of operations on real numbers and algebraic expressions, including the associative, commutative, and distributive properties.
- Identify and calculate with identity and inverse elements for addition and multiplication.
- Memorize the square roots of perfect squares through 225.
- Calculate square roots of positive numbers, zero and x squared.
- Compare and order a given set of real numbers (i.e., decimals, fractions, integers, square roots, etc.).
- Simplify square root expressions, perfect and non-perfect (i.e., square root of 40, $36x$ squared y).
- Understand the relationship between n th powers and n th roots as inverse operations.
- Memorize cube roots of perfect cubes through 125.
- 30702** Apply the order of operations to simplify numeric expressions (positive integer exponents only).
- Simplify numeric expressions involving absolute value.
- Apply order of operations in word problems.
- 30703** Approximate without a calculator square roots and cube roots to one decimal place.
- ***need to address cubed roots more
- 30704** Estimate the reasonableness of calculations.
- Estimate the reasonableness of solutions to word problems.

Grade Algebra I Curriculum Guideline

- 30705** Describe, complete and extend patterns based on linear relationships from or in tables, pictures or equations.
- Analyze patterns using common difference and common ratio.
- Analyze patterns based on linear functions and write as an algebraic expression.
- Recognize patterns to be non-linear.
- Describe, complete and extend recursive patterns given lists of numbers or figures.
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- 30706** Given a basic equation, justify each step by indicating the most appropriate real number property.
- Recognize solutions of equations and inequalities that are infinite, conditional and no solution.
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- 30709** Translate from any representation (verbal, numeric, algebraic or graphic) of a linear function to all other representations.
- Understand slope as a rate of change.
- Determine a line's slope given a verbal description, a graph, an equation, a table or two points on the line.
- Identify positive, negative, zero and undefined slope given any representation of a linear function.
- Determine x and y intercepts given a graph, equation and a table.
- Determine the equation of a line given a verbal description, a graph, a table, two points and a point with slope.
- Write the equation of a line using the slope intercept form ($y=mx+b$) and point-slope
- 30707** Demonstrate an understanding of relations and functions by applying definitions and the vertical line test.
- Identify the domain (input), range (output), dependent (y), and independent (x) variables of functions.

Grade Algebra I Curriculum Guideline

- 30708** Translate between different representations of functions and relations: graphs, equations, sets of points and tables.
- 30710** Recognize the relationship between parallel and perpendicular lines.
- Calculate the slopes of parallel and perpendicular lines.
- Determine the equation of a line parallel/perpendicular to a given line.
- Determine the equation of a line parallel/perpendicular to a given line, through a given point.
- 30711** Apply the rules of exponents (including x to a negative number, x to the zero).
- Add, subtract, and multiply - up to three terms - polynomials.
- Divide polynomials by monomials.
- 30712** Simplify polynomials by combining like terms and applying the distributive property.
- Order polynomials in standard form (descending order).
- Factor polynomial expressions:
- common factoring
 - trinomials with leading coefficient of 1
 - trinomials with leading coefficient not equal to 1
 - difference of two squares.
- Simplify rational expressions:
- reduce
 - add and subtract with like and unlike denominators
 - multiply and divide.
- 30713** Solve quadratic equations by factoring, quadratic formula and taking square roots of both sides.
- Solve equations using inverse operations of squaring and taking square roots.
- Demonstrate that different methods produce the same solution.

Grade Algebra I Curriculum Guideline

- 30714** Solve single variable linear equations.
- Solve and graph solutions to linear inequalities.
- Solve and graph absolute value equations and inequalities of linear expressions.
- 30715** Use mathematical models of linear equations and inequalities to represent relationships using tabular, graphical and symbolic expressions.
- Interpret and validate solutions.
- 30716** Solve systems of linear equations using the elimination (combination) and graphing methods.
- Use mathematical models of systems of linear equations and inequalities to represent relationships.
- Interpret and validate solutions.
- 30717** Collect, organize and display data through:
- scatterplot
 - table
 - stem-and-leaf plots
 - circle, line, bar (histogram) graphs
 - box and whiskers
 - line plot.
- Calculate mean, median and mode.
- Compare, evaluate and make predictions based on the collection of sample data.
- Classify data relationships as positive, negative and no correlation.
- 30718** Classify data relationships as positive, negative and no correlation.
- Determine lines of best fit when appropriate.

Grade Algebra I Curriculum Guideline

- 30719** Describe and explain how the size and selection of a sample of a population affect the validity of predictions from a set of data.
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-
- 30902** Define properties of exponents.
Simplify numerical expressions with powers.
Explain the concept of roots(square, cube, nth roots).
Recognize perfect squares, cubes and 4ths.
Simplify, add, subtract, and multiply roots.
Rationalization of denominators, including conjugates.
Define rational exponents.
Simplify numerical expressions with with powers and roots.
- 30901** Relate the system of complex numbers to the systems of real and rational numbers.
Define complex numbers and their conjugates.
Simplify complex numbers (including imaginary numbers).
Perform complex number operations including addition, subtraction, multiplication, and division.
Explain the meaning of complex solutions in solving quadratic equations.

Grade Algebra II Curriculum Guideline

- 30903** Describe, complete, extend, analyze, generalize, and create a wide variety of patterns. Utilize technology for scatter plots and best fit regressions. Interpolate and extrapolate values. Investigate iterative and recursive patterns such as Pascal's Triangle and Fibonacci's Series.
- 30904** Identify arithmetic and geometric sequences and finite arithmetic and geometric series. Use the properties of such sequences and series to solve problems, including finding the formula for the general term and the sum, recursively and explicitly.
- ****Currently address at honors level - Ask Earle
- 30905** Demonstrate an understanding of the binomial theorem and use it in the solution of problems.
- ****Binomial expansion - ask Earle and Bern
- 30906** Explore and graph exponential growth and decay models. Define an exponential function. Express and graph logarithmic forms as inverses of exponentials. Write and solve logarithmic and exponential equations. Explore logarithmic models and natural log (ln) problems. Utilize scientific calculators to solve problems (both log and natural log).
- 30907** Define functions and use $f(x)$ notation. Define and recognize common functions (linear, quadratic, absolute value, exponential and logarithmic, etc.) and their graphs. Perform operations on functions (add, subtract, multiply, divide) including domain restrictions. Define composite functions. Define and graph functions and their inverses.

Assessment

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Recommended Resources for Grade Algebra II Mathematics: