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## Curriculum Guide: Algebra

### I. Course Description:

This one-year course, 10-unit course gives an overview of the subject of algebra, laying a foundation of facts and concepts necessary to understand functions and equations. It is designed to provide the necessary prerequisites for more advanced study of mathematics, particularly geometry, probability, and statistics, and to give repeated opportunities to use algebraic concepts to solve problems in everyday life. The course will include the study of a textbook, the completion of daily exercises, exploration and extension activities, and chapter tests.

### II. Course Goals and Objectives:

The student will:

- Understand the nature of algebraic equations and how to solve them
- Appreciate the history of the development of algebra and its impact on ancient and modern technology
- Use algebraic processes to solve problems encountered in real life situation
- Use a scientific calculator to solve problems, check answers, and program functions

### III. Course Outline:

First quarter: (Chapters 1-4)

- Variables: sets, domains, intersections and union of sets, uses of variables in formulas, square roots with variables, Pythagorean theorem
- Multiplication of variables: properties of 1 and 0, variables in fractions, rates, reciprocals, mult. of negative numbers,  $ax = b$ , inequalities, factorials, permutations, probability
- Addition with variables: properties of addition, coordinate plane, solving  $ax+b=c$ , distributive property, linear expressions, adding algebraic fractions, solving  $ax+b < c$
- Subtraction with variables: subtraction of negative numbers, solving sentences with subtraction, spreadsheets, solving  $x-y=k$ , the triangle inequality, graphing linear patterns

Second Quarter: (Chapter 5-7)

- Linear sentences: interpreting the coordinate graph in a table, using tables to compare linear expressions, solving  $ax+b=cx+d$ . using graphs to compare linear expressions, solving  $ax+b < cx+d$ , finding equivalent formulas, multiplying through, chunking
- Division in algebra: rates, ratios, relative frequency and probability, size changes, proportions, similar figures
- Slopes and lines: slope, properties of slopes, changes in slope, slope-intercept equations,

equations for lines defined by one point and a given slope, equations for lines through two points, equations for all lines, graphing linear equations

Third Quarter: (Chapters 8-10)

- Exponents and powers: exponential growth, compound interest, constant increase vs. exponential growth, exponential decay, products of powers, powers of powers, negative exponents, quotients of powers, powers of products and quotients
- Quadratic equations and square roots: the quadratic formula, solving the quadratic formula, graphing parabolas, square roots and products, absolute value, distance, and square roots, distances in the plane
- Polynomials: multiplying a polynomial by a binomial, multiplying polynomials, multiplying binomials, special binomial products, investments and polynomials, the Chi-Square statistic

Fourth Quarter: (11-13)

- Linear Systems: what is a system, solving systems using substitution, by using subtraction, by using addition, by using multiplication, systems and parallel lines, always and never situations, systems of inequalities
- Factoring: factoring integers into primes, monomial factoring, factoring by the quadratic formula, rational and irrational numbers in quadratic formulas, determining factorability of a quadratic expression
- Functions: definition, function notation, domain and range, probability functions, polynomial functions, tangent functions, functions on calculator and computer programs.

#### IV. **Instructional Materials**

- Algebra: Integrated Mathematics (Second Ed.), The University of Chicago School Mathematics Project, Scott Foresman Addison Wesley, 1998

#### V. **Teaching Methods**

- Independent and guided textbook reading and note taking
- Mathematical demonstrations and investigations
- Discussion with instructor

#### VI. **Evaluation**

- Tests on written material
- Evaluation of daily class assignments for completeness, neatness, accuracy and correctness
- Teacher evaluation of student's understanding during class discussions

#### VII. **Grading Scale**

100-90% = A

89-80 = B

79- 70 = C

69-60 = D

59 and below = F