935 MATH 9 SM. GROUP

GRADE: 9

LEVEL: Small Group

CREDITS: 10

PREREQUISITE: An Individualized Educational Plan with this component

BASIC TEXT: Pre-Algebra
Prentice-Hall
Algebra One Interactions Course 1,
Holt, Rinehart and Winston, 1998

REQUIRED MATERIALS: notebook, writing utensil, scientific calculator, agenda book, graph paper

COURSE DESCRIPTION:
Students in this Mathematics course are provided with small group instruction which addresses the concepts and factual information in a manner consistent with his/her identified special needs. This full-year course is designed for students who need extra time and practice on algebraic skills. Algebra is presented with real-world applications to make mathematics relevant. This will be accomplished through the use of more manipulatives, activities, and an exploratory approach to learning.

MISSION RELATED GOALS:
This class will provide the student with a variety of opportunities to demonstrate academic excellence and intellectual curiosity by communicating effectively, solving complex problems, and working with others toward a common goal.

STUDENT EXPECTATIONS FOR LEARNING ADDRESSED:
Students will be afforded opportunities to apply mathematical concepts to real-world applications. A variety of teaching methods will be used to foster an environment that promotes self-confidence and respect for others throughout the school and global community.

GENERAL PERFORMANCE OBJECTIVES:
Students will be able to:
1. Identify and describe a wide variety of patterns
2. Represent and describe mathematical relationships using variables
3. Analyze functional relationships
4. Describe and represent relationships with models, tables, graphs and rules
5. Use computations, estimations and proportions to solve problems
6. One and Two step solutions to equations and inequalities with one and two variables

7. Graph linear relationships
8. Identify, simplify, and factor polynomial expressions
9. Develop techniques and problem solving strategies to use in a variety of situations
10. Apply measures of central tendency to interpret data
11. Use simulations to estimate probabilities and determine the likelihood of outcomes using theoretical probabilities

MASSACHUSETTS FRAMEWORK STRANDS:

- Number Sense
- Patterns, Relations, and Algebra
- Geometry
- Measurement
- Data Analysis, Statistics, and Probability

CURRICULUM FRAMEWORK LEARNING STANDARDS:

I. Identify and use the properties of operations on real numbers, including the associative, commutative, and distributive properties. (10.N.1)

II. Simplify numerical expressions, including those involving positive integer exponents or the absolute value and apply such simplifications in the solution of problems. (10.N.2)

III. Find the approximate value for solutions to problems involving square roots and cube roots without the use of a calculator. (10.N.3)

IV. Use estimation to judge the reasonableness of results of computations and of solutions to problems involving real numbers (10.N.4)

V. Describe, analyze, and generalize a wide variety of patterns. (10.P.1)

VI. Demonstrate an understanding of the relationship between various representations of a line. Determine a line's slope and x- and y-intercepts from its graph or from a linear equation that represents the line. Find a linear equation describing a line from a graph or a geometric description of the line, e.g., by using the "point-slope" or "slope y-intercept" formulas. Explain the significance of a positive, negative, zero, or undefined slope. (10.P.2)

VII. Add, subtract, and multiply polynomials. Divide polynomials by monomials. (10.P.3)

VIII. Demonstrate facility in symbolic manipulation of polynomial and rational expressions by rearranging and collecting terms; factoring; identifying and canceling common factors in rational expressions; and applying the properties of positive integer exponents. (10.P.4)

IX. Find solutions to quadratic equations with real roots by factoring, completing the square or using quadratic formula. (10.P.5)

X. Solve equations and inequalities including those involving absolute value of linear expressions and apply to the solution of problems. (10.P.6)

XI. Solve everyday problems that can be modeled using linear, quadratic or exponential functions. (10.P.7)

XII. Solve everyday problems that can be modeled using systems of linear equations or inequalities. (10.P.8)

XIII. Identify figures using properties of sides, angles and diagonals. Identify the types of symmetry. (10.G.1)

XIV. Solve simple triangle problems using the triangle-angle sum theorem and/or the Pythagorean theorem. (10.G.5)

XV. Using rectangular coordinates, calculate midpoints of segments, slopes of lines and segments, and distances between two points and apply the results to solutions of problems. (10.G.7)
XVI. Find linear equations that represent lines, either perpendicular or parallel to a given line and through a given point. (10.G.8)
XVII. Calculate perimeter, circumference and area of common geometric figures. (10.M.1)
XVIII. Select, create, and interpret an appropriate graphical representation (e.g., scatterplot, table, stem-and-leaf plots, box-and-whisker plots, circle graph, line graph, and line plot) for a set of data and use appropriate statistics (e.g., mean, median, range, and mode) to communicate information about the data. Use these notions to compare different sets of data.(10.D.1)
XIX. Approximate a line of best-fit (i.e. trend line) given a set of data. (10.D.2)
XX. Describe and explain how the relative sizes of a sample and the population affect the validity of predictions from a set of data. (10.D.3)

UNITS AND THEMES:

I. Integers and Variables	10.N.1, 10.N.2, 10.P.6, 10.P.7, 10.D.1
II. Rational Numbers	10.N.1, 10.N.2, 10.D.1
III. Algebraic Expressions, Equations and Inequalities	10.P.3, 10.P.4, 10.P.6, 10.P.7
IV. Linear Functions	10.P.1, 10.P.2, 10.P.7, 10.G.8, 10.D.2
V. Systems of Equations and Inequalities	10.P.2, 10.P.6, 10.P.8
VI. Families of Functions	10.P.2, 10.P.7
VII. Introductory Statistics	10.P.1, 10.P.6, 10.D.1, 10.D.2, 10.D.3
VIII. Exponents	10.P.1, 10.P.4, 10.P.7
IX. Polynomials	10.P.3, 10.P.4, 10.P.5
X. Square Roots and Radicals	10.N.3
XI. Introduction to Basic Geometric Concepts	10.M.1
XII. Review MCAS, Midterm, Final Exam	

COURSE OUTLINE:

I. Integers and Variables 10.N.1, 10.N.2, 10.P.6, 10.P.7, 10.D.1

A. Order of Operations
B. Operations with integers
C. Using variables and equations
D. Solving problems using tables and equations

II. Rational Numbers 10.N.1, 10.N.2, 10.D.1

A. Operations with fractions
B. Using ratios, proportions and percents
C. Experimental and theoretical probabilities

III. Algebraic Expressions, Equations and Inequalities 10.P.3, 10.P.4, 10.P.6, 10.P.7

A. Adding and subtracting expressions
B. Solving literal equations
C. One step equations with addition and subtraction
D. Simplifying polynomials by combining like terms

E. Solving inequalities with addition and subtraction
F. Multiplying and dividing expressions
G. One step equations using multiplication and division
H. Solving problems involving percent
I. Solving multi step equations
J. Algebraic and geometric applications
K. Absolute value equations and basic inequalities

IV. Linear Functions 10.P.1, 10.P.2, 10.P.7, 10.G.8, 10.D.2

A. The coordinate plane
B. Graphing linear functions using various methods
C. Direct variations
D. Vertical and horizontal lines
E. Parallel and perpendicular lines
F. Graphing linear inequalities

V. Systems of Equations and Inequalities 10.P.2, 10.P.6, 10.P.8

A. Graphing and identifying intersection point
B. Solving by substitution
C. Solving by elimination
D. Graphing systems of inequalities

VI. Families of Functions 10.P.2, 10.P.7

A. Identity and graph linear functions
B. Identity and graph absolute value functions
C. Identity and graph quadratic functions

VII. Introductory Statistics 10.P.1, 10.P.6, 10.D.1, 10.D.2, 10.D.3

A. Measures of central tendency
B. Interpreting and drawing graphs
C. Circle graphs
D. Scatter plots and line of best fit
E. Stem and Leaf Plots and Box Whisker Plots

VIII. Exponents 10.P.1, 10.P.4, 10.P.7

A. Properties of exponents
B. Multiplying and dividing monomials
C. Scientific notation

IX. Polynomials 10.P.3, 10.P.4, 10.P.5

A. Adding and subtracting polynomials
B. Using the distributive property and foil
C. Factoring out greatest common factor
D. Factoring difference of two squares
E. Factoring trinomials in the form $x^2 + bx + c$
F. Solving quadratic equations in the form $x^2 + bx + c = 0$ by factoring and use of the quadratic formula

X. Square Roots and Radicals 10.N.3

A. Estimating square roots
B. Simplifying square roots
C. Pythagorean Theorem
D. Simplifying radicals
E. Operations with radicals

XI. Introduction to Basic Geometric Concepts 10.M.1

A. Basic geometry terminology
B. Perimeter and area of basic polygons

XII. Review MCAS, Midterm, Final Exam

SUGGESTED INSTRUCTIONAL STRATEGIES:

1. Lecture
2. Written Exercises
3. Group Work
4. Projects
5. Use of Manipulatives
6. Use of a Variety of Questioning Techniques
7. Board work
8. Calculator Activities
9. Games (Math Jeopardy, etc.)
10. Student Presentations
11. A variety of assessment tools (partner quizzes, etc.)
12. As specified by Individualized Educational Plan

SUGGESTED INTEGRATED ACTIVITIES:

1. Scatter Plots
2. Surveys
3. Dice activities for probability
4. Study stock market for percentage of change
5. Using graph paper to determine the maximum area given a fixed perimeter
6. Create 3-dimensional boxes to maximize volume
7. Use food labels to study proportions
8. Study various linear relationships and create the function rule

USE OF TOOLS/TECHNOLOGY:

1. Use of scientific and graphing calculators
2. Overhead projector and transparencies

ASSESSMENT TECHNIQUES:

1. Students will take free-response performance tests
2. Students will answer questions orally
3. Students will do written presentations at the board
4. Students will work in cooperative groups and report their results
5. Students will participate in classroom discussions
6. Students will prepare integrated projects
7. Homework evaluation