



Hamburg School District

Office of Curriculum and Instruction

Our core instructional program for all middle school students, beginning with the 6th grade class of 2009-2010, consists of a three-year integrated sequence of instruction, which covers two years of pre-algebra and one year of Algebra I. These courses are designated as follows: Grade Six Mathematics, Grade Seven Pre-Algebra, and Grade Eight Algebra.

Grade Eight Algebra Topics of Study*

- New Jersey Core Curriculum Mathematics Standards for Grade 8
 - 4.1 Numbers and Numerical Operations
 - 4.2 Geometry and Measurement
 - 4.3 Patterns and Algebra
 - 4.4 Data Analysis, Probability, & Discrete Math
 - 4.5 Problem Solving, Communication, Connections, (Algebraic) Reasoning, Representations, Technology

Visit:

www.nj.gov/education/njcep/standards/revised_standards/math_newstandards/TOC.html for specific cumulative progress indicators for grade eight.

Base Series: *Connected Mathematics 2*

Topic/Concepts include:

Thinking With Mathematical Models (Algebra)

- *Recognize linear and non-linear patterns in contexts, tables and graphs and describe those patterns using words and symbolic expressions;*
- *Write equations to express linear patterns appearing in tables, graphs, and verbal contexts;*
- *Write linear equations when specific information such as two points or a point and a slope, is given for a line;*
- *Approximate linear data patterns with graph and equation models;*
- *Solve linear equations;*
- *Interpret inequalities;*
- *Write equations describing inverse variation; and*
- *Use linear and inverse variation equations to solve problems and to make predictions and decisions.*

Looking For Pythagoras (Algebra)

- *Relate the area of a square to the length of a side of the square;*
- *Estimate square roots;*
- *Develop strategies for finding the distance between two points on a coordinate grid;*
- *Understand and apply the Pythagorean Theorem; and*
- *Use the Pythagorean Theorem to solve a variety of problems.*



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Growing, Growing, Growing (Algebra)

- *Recognize situations where one variable is an exponential function of another variable;*
- *Recognize the connections between exponential equations and growth patterns in tables and graphs of those relations;*
- *Construct equations to express exponential patterns that appear in data tables, graphs, and problem conditions;*
- *Understand and apply the rules for operating on numerical expressions with exponents;*
- *Solve problems about exponential growth and decay in a variety of situations such as science or business; and*
- *Compare exponential and linear relationships.*

Frogs, Fleas, and Painted Cubes (Algebra)

- *Recognize the patterns of change for quadratic relationships in a table, graph, equation, and problem situations;*
- *Construct equations to express quadratic relationships that appear in tables, graphs and problem situations;*
- *Recognize the connections between quadratic equations and patterns in tables and graphs of those relationships;*
- *Use tables, graphs, and equations of quadratic relationships to locate maximum and minimum values of a dependent variable and the x - and y -intercepts and other important features of parabolas;*
- *Recognize equivalent symbolic expressions for the dependent variable in quadratic relationships;*
- *Use the distributive property to write equivalent quadratic expressions in factored form or expanded form;*
- *Use tables, graphs, and equations of quadratic relations to solve problems in a variety of situations from geometry, science, and business; and*
- *Compare properties of quadratic, linear, and exponential relationships.*

Kaleidoscopes, Hubcaps, and Mirrors (Geometry)

- *Understand important properties of symmetry;*
- *Recognize and describe symmetries of figures;*
- *Use tools to examine symmetries and transformations;*
- *Make figures with specified symmetries;*
- *Identify basic design elements that can be used to replicate a given design;*
- *Perform symmetry transformations of figures, including reflections, translations, and rotations;*
- *Examine and describe the symmetries of a design made from a figure and its image(s) under a symmetry transformation;*
- *Give precise mathematical directions for performing reflections, rotations, and translations;*



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- *Draw conclusions about a figure, such as measures of sides and angles, lengths of diagonals, or intersection points of diagonals, based on symmetries of the figure;*
- *Understand that figures with the same shape and size are congruent;*
- *Use symmetry transformations to explore whether two figures are congruent;*
- *Give examples of minimum sets of measures of angles and sides that will guarantee that two triangles are congruent;*
- *Use congruence of triangles to explore congruence of two quadrilaterals;*
- *Use symmetry and congruence to deduce properties of figures;*
- *Write coordinate rules for specifying the image of a general point (x, y) under particular transformations; and*
- *Use transformational geometry to describe motions, patterns, designs, and properties of shapes in the real world.*

Say It With Symbols (Algebra)

- *Model situations with symbolic statements;*
- *Write equivalent expressions;*
- *Determine if different symbolic expressions are mathematically equivalent;*
- *Interpret the information equivalent expressions represent in a given context;*
- *Determine which equivalent expression to use to answer particular questions;*
- *Solve linear equations involving parentheses;*
- *Solve quadratic equations by factoring;*
- *Use equations to make predictions and decisions;*
- *Analyze equations to determine the patterns of change in the tables and graphs that the equation represents; and*
- *Understand how and when symbols should be used to display relationships, generalizations, and proofs.*

The Shapes of Algebra (Algebra)

- *Write and use equations of circles;*
- *Determine lines are parallel or perpendicular by looking at patterns in their graphs, coordinates, and equations;*
- *Find coordinates of points that divide line segments in various ratios;*
- *Write inequalities that satisfy given situations;*
- *Find solutions to inequalities represented by a graph or an equation;*
- *Solve systems of linear equations by graphing, combining equations, and by substitution;*
- *Write linear inequalities in two variables to match constraints in problem conditions; and*
- *Graph linear inequalities and systems of inequalities and use the results to solve problems.*



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Samples and Populations (Data Analysis)

- *Revisit and use the process of statistical investigation to explore problems;*
- *Distinguish between samples and populations and use information drawn from samples to draw conclusions about populations;*
- *Explore the influence of sample size and of random or nonrandom sample selection;*
- *Apply concepts from probability to select random samples from populations;*
- *Compare sample distributions using measures of center (mean or median), measures of dispersion (range or percentiles), and data displays that group data (histograms and box and- whisker plots); and*
- *Explore relationships between paired values of numerical attributes.*

Note ~ for additional practice and information for Grade Eight visit:

www.phschool.com/cmp2/webcodes10/index.cfm?fuseaction=home.gotoWebCode&wcprefix=apk&wcsuffix=0099

**** The grade eight program will also include enrichment and remediation topics to prepare students for differentiated programs of study for success in future course work in mathematics at the high school level.***