The Town School
Mathematics Curriculum Summary

School-wide goals:

To learn problem solving skills.

To recognize mathematical patterns and relationships.

To use math as communication, articulating solutions to problems.

To see math's relationship to life, its use in everyday situations.

To know enjoyment of math.

To acquire basic computational skills.

NURSERY/KINDERGARTEN: Because young children learn best through actively doing, the math curriculum is based on playful activities that emphasize verbal interaction and manipulative materials while laying the groundwork for symbolic understanding. Whenever possible, these activities find their source in the daily classroom routines and have practical applications in the lives of children. The Nursery/Kindergarten classrooms have such materials as Legos, cubes, unit blocks, Cuisenaire rods, geoboards, pegs, and geometric tiles. These materials allow children to engage in both open-ended exploration and more structured, organized activity with teacher suggestions and direction.

Nursery 3: The year is designed to help children build an awareness of the relevance of math in daily life and to support their curiosity and interest in the many areas of mathematical thinking.

- Develop number sense (counting objects, songs, cooking).
- Help children become familiar with one-to-one correspondence, with daily routines (lining up, setting the snack table, taking attendance).
- Introduce mathematical language, through use of unit blocks, puzzles, and art projects, that encourages visual identification of similarities and differences in objects such as size and shape.
- Provide opportunities for sorting and patterning by single attribute (i.e. color or shape) in activities such as stringing beads and tile design.
- Develop spatial concepts and sense of directionality; introduce necessary language (up, down, near, next to, under).

Nursery 4: In this year, children gain more familiarity with basic mathematical concepts, becoming more confident in their problem-solving abilities and skills.

- Increase children's facility with numbers and work on recognizing written numbers.
- Continue to reinforce one-to-one correspndence and encourage independence in solving number problems (sharing materials, setting up snack, taking attendance).
- Encourage comparison of size, shape, quantity and highlight mathematical language.
- Introduce the ideas of estimation and prediction and provide opportunities for children to use these.
- Develop more complex patterning and sorting activities using more than one attribute and using vertical, horizontal, and diagonal planes.
- Introduce simple games for matching and set work.
- Employ the use of graphs, charts, other forms of displaying information, introducing symbolic representation.

Kindergarten: The Kindergarten year builds upon earlier math concepts and encourages children to feel the power and enjoyment of mathematical pursuits. Children work in whole and small groups and individually on specific mathematical tasks. Many activities rely on the use of materials such as unifix cubes, Cuisenaire rods, attribute blocks, geoboards, tangrams, etc. The division follows the curriculum developed by the University of Chicago School Mathematics Project, with additions and revisions made as needed. The Kindergarten faculty and Math Specialist meet regularly to plan for and assess children's progress. Four periods per week are devoted to math.

- Make pattern recognition and description (the foundation of all mathematics) a daily investigation.
- Reinforce and review numbers and number operations; add practice with writing of numbers in context of practical activity (date a picture, work with simple computation, create activities for counting by 5's or 10's).
- Develop extensive opportunities for working on measurement, equivalence, comparison (block building, cooking, graphing); predicting outcomes and solving mathematical problems.
- Introduction of computer and continued use of mathematical tools such as measuring tape, balance scales, and timers.
- Emphasize geometry, symmetry and spatial awareness through more complex block buildings, art projects, pattern block work.
- Engage children in thinking mathematically and finding solutions to practical situations, relying on their knowledge of math concepts.

LOWER SCHOOL: The Lower School math program is one of exploration and discovery. The curriculum is designed to help children reason logically, see mathematical patterns and relationships, and understand the presence of math in everyday life. A strong computational base is taught as the foundation to more complex and abstract mathematical thinking. Teaching tools include the use of manipulatives such as Diene's blocks, Cuisenaire rods, and attribute blocks as well as cooperative learning techniques and math computer software. The division follows the curriculum developed by the *University of Chicago School Mathematics Project*. Four to five periods per week are devoted to math.

First Grade:

- Learn addition and subtraction.
- Work with statements of equality and inequality, money, time, and measurement.
- Introduction of word problems and mental math.
- Use of manipulatives to introduce and reinforce the understanding of number relationships.
- Introduction of calculators to examine number patterns and relationships.

Second Grade:

- Build automatic recall of basic addition and subtraction facts.
- Expand knowledge of addition and subtraction to double-digit numbers.
- Increased emphasis on mental arithmetic, estimation, and approximation.
- Continued study of geometry, probability, money, measurement, and time.
- Introduction to concepts of multiplication and division.
- Emphasis on functions.

Third Grade:

- Introduction to problem solving with multi-digit addition and subtraction.
- Learn the multiplication tables.
- Increased emphasis on automatic recall of math facts.
- Continued use of manipulatives and problem-solving exercises.
- Exploration of relationships among decimals, fractions, and measurement.

Fourth Grade:

- Continuation of mathematical concepts introduced through the Everyday Mathematics program including fractions, decimals, geometry, and basic operations.
- Introduction of multi-digit multiplication, long division, visual patterns and symmetry, and percentages.
- Continued use of manipulatives and problem-solving exercises.
- Use of world geography model to place mathematical concepts in context of everyday life.

UPPER SCHOOL: The Upper School math program builds on the basic content taught in the Lower School. Whole-group instruction, cooperative learning, projects, and extensive use of the computer and manipulative materials are methods of instruction. Continuous reinforcement of real-number operations in combination with geometry, pre-algebra and algebra; problem-solving; and learning to think mathematically are stressed. Classes meet five periods per week. Manipulatives used: Cuisinaire rods, unifex cubes, straw constructions, geoboards, computer simulations, pattern blocks. The Thirteen Strands as defined by the National Council of the Teachers of Mathematics are used throughout the school. They are:

- Math as problem solving
- Math as communication
- Math as reasoning
- Mathematical connections
- Estimation
- Number sense and numeration
- Concepts of whole number operations
- Whole number computation
- Geometry and spatial sense
- Measurement
- Statistics and probability
- Fractions and decimals
- Patterns and relationships

Fifth-Seventh Grades: These topics are introduced in Fifth Grade and expanded through Seventh Grade:

- All operations with whole numbers, place value, estimation, introduction to negative numbers, approximation.
- All operations with decimals, use of exponents, word problems involving whole numbers, fractions, decimals, percents.
- All operations with percents, introduction to simple equations (solving percents), ratios, finding averages, divisibility rules, prime and composite numbers, prime factorizations, finding the least common multiple, finding the greatest common factor.
- All operations with fractions and mixed numbers, decimal equivalents, introduction to probability and statistics.
- Functions and graphing, graphing functions, graphing geometric functions.
- Surface area and volume, polygons, circles, plane figures, angles and their measurement (using the computer software Geometer Sketch Pad for tesselations and patterns).

Eighth Grade: Algebra I, Introduction to Algebra (variables and equations, grouping symbols, problem solving), basic properties of real numbers, solving equations, all operations with polynomials, factoring polynomials, all operations with algebraic fractions, solving problems with fractional equations, linear equations, systems of equations, introduction to functions, rational and irrational numbers, and solving quadratic equations with perfect squares and completing the square.