

Princeton Charter School

5 Mathematics Curriculum

5.1 Mathematics Program Overview

Like English language skills, a strong foundation in mathematics is a prerequisite for success in our increasingly analytical world. Just as PCS is dedicated to early achievement in reading, early mastery of arithmetic skills and basic mathematical problem solving are viewed as essential first steps.

The core PCS mathematics curriculum is based on the 1963 report of the Cambridge Conference on School Mathematics, *Goals for School Mathematics*, and the curricula employed in other high-achieving nations. The curriculum complies with the New Jersey Core Curriculum Content Standards for Mathematics as described in the Charter, and is sufficiently rigorous to challenge all students. It covers a broad range of mathematics and includes applications to motivate students and reveal the utility of mathematics to problems encountered in all fields. A feature of the PCS program is that essential areas such as algebra and geometry are integrated throughout the curriculum, so that students accumulate geometric notions and learn the language of algebra by starting with very simple intuitive concepts and progressing to more formal deductive reasoning. This approach has been carefully researched and developed by an international community of teachers, mathematicians, and pedagogical researchers. As an example, a complete geometry curriculum, including student problems, is available in the book *Geometry in Grades 1-4: Problems in the Formulation of Geometric Conception in Primary Children*, translated from the Russian by the University of Chicago Mathematics Project. This is also the approach adopted in the *New Jersey Mathematics Curriculum Framework*.

The concepts are reinforced by problems and practice materials. The students and teachers have the opportunity to use a variety of appropriate text sequences to accommodate different learning styles and rates of progress. Sufficiently advanced students have the opportunity to study axiomatic geometry by the time they leave eighth grade.

PCS students master the basic mathematical skills identified by the 1977 National Council of Supervisors of Mathematics *Position Paper on Basic Mathematical Skills*, including problem solving; applying mathematics to everyday situations; alertness to the reasonableness of results; estimation and approximation; appropriate computational skills; geometry; measurement; reading, interpreting, and constructing tables, charts, and graphs; using mathematics to predict; and computer literacy. PCS adds to this list a knowledge of probability and statistics, risk, and orders of magnitude. Our students will need these to confront many of the complex social and technical issues facing society.

The hour spent on mathematics each day includes a balance between discovery directed by the exchange of ideas between the teacher and the class, and direct

presentation of material by the teacher. In addition, several hours each month are used for mathematical games, special topics, and experiments. The program is rich in the use of concrete materials and applications to develop concepts and to connect children's intuition to abstract mathematics. Instruction cycles between using problems to motivate knowledge and using the knowledge base to solve problems. The problem-solving activities are carefully selected to challenge children to think creatively and to extend their knowledge. Applications for problem solving are to science, other aspects of the real world, and internal applications to mathematics itself. "Both the internal applications and the external applications must be taught, so that the student understands both the power of mathematics as a scientific method and the unity and beauty of mathematics as a science in its own right" (*Goals for School Mathematics*, p. 21).

The fundamental elements of computer science that underlie all of today's machines and software are incorporated into the mathematics curriculum. These supplement the discrete mathematics in the main curriculum and include modular arithmetic, data representation, boolean logic, the stored program computer, and most importantly, the concept of an algorithm. The student who understands these will adapt easily to changes in computer hardware, languages, and application software. In later grades (6-8) students write computer programs to make concrete the abstract concepts covered and to build their ability to think algorithmically.

The study of mathematics offers many opportunities for the definition of concrete public milestones. In early grades these consist mainly of arithmetic mastery. Older students might be asked to submit an essay analyzing the numbers and graphs presented in a current news story, or write their first rigorous proof of a mathematical theorem.

5.2 New Jersey Core Curriculum Content Standards in Mathematics

The Princeton Charter School Mathematics curriculum complies with the New Jersey Core Curriculum Content Standards in Mathematics. These standards are listed below, together with some examples of activities associated with each standard.

Standard 4.1 Number and Numerical Operations: *All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.*

Number Sense: Kindergarten and first-grade students use numbers for counts, measures, times, dates, and other common uses. Activities include counting up, counting down, and skip counting. Class activities with objects, measurement, and the number line help students develop a sense of the relative sizes of integers and of fractions. Students learn place value concepts through activities such as grouping objects and using number charts. As they progress through the lower grades, students work with fractions, decimals, and whole numbers, and learn equivalent representations of numbers. By the end of grade 4, students understand place values

through many digits, and are able to compare and order integers, commonly used fractions, and decimals. By the end of grade 8, students extend their understanding of numbers to include rational numbers, percents, exponents, roots, absolute values, and scientific notation.

Numerical Operations: By the end of grade 4, PCS students have fluent command of arithmetic operations on whole numbers; apply arithmetic properties to solve problems; and use estimation to judge the reasonableness of solutions. By the end of grade 8, students extend their command of arithmetic operations to fractions, decimals, integers, and rational numbers; solve problems involving percents, proportions and ratios; and use correctly the standard algebraic order of operations.

Estimation: By the end of grade 4, students estimate the number of objects in a group or container without counting; estimate simple measurements; understand the usefulness of estimation in problem solving; and use estimates to judge the reasonableness of solutions. By the end of grade 8, they extend these skills to a wider variety of problems and numbers, including problems of social importance, such as total energy consumption in the U.S. or the rate of propagation of an epidemic.

Standard 4.2 Geometry and Measurement: *All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.*

Geometric Properties, Transforming Shapes, Coordinate Geometry, and Measuring Geometric Objects: In Kindergarten through grade 4, students develop understanding of geometric concepts and spatial sense through work with solids, pattern blocks, templates, geoboards, and computer drawing tools. Students also learn basic geometric vocabulary. By the end of grade 4, students learn to make a perspective drawing of a simple solid; identify symmetries of geometric and natural objects; use transformations such as translation, rotation, reflection, and scaling to create geometric patterns; classify shapes by properties such as number of faces, edges, vertices, and lines of symmetry; use the scale on a map to determine a distance; use geometric measures such as length, perimeter, area and volume; subdivide complex figures into simple shapes; and use tessellations. By the end of grade 8, students characterize geometric figures using a minimum set of properties; are able to predict what the intersections of a plane with a cylinder, cone, or sphere would be; use geometric transformations; select the most efficient strategies for computing geometric measures; use the Pythagorean theorem to solve problems; draw geometric models to solve algebraic and scientific problems such as determining the height of an object from the length of its shadow using similar triangles.

Units of Measurement: By the end of grade 4, students learn and use English and metric units for length, area, volume, weight, time, and temperature; recognize the need for standard units of measure; and use measurements extensively in science experiments. By the end of grade 8, students also learn the need for repeated measurements to improve precision; learn fundamentals of error analysis; test hy-

potheses by measurement and analysis; and understand how a change in an object's linear dimension(s) affects its measures of length, area, and volume.

Standard 4.3 Patterns and Algebra: *All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.*

Patterns, Functions, and Relationships: By the end of grade 4, students construct, recognize, and extend simple geometric and arithmetic patterns such as plus 3, times 5, or the Fibonacci sequence; discover rules for patterns such as successive multiples of eleven; and use an equation with one variable to express a simple arithmetic pattern given in a table. By the end of grade 8, students represent mathematical relationships with tables, graphs, and equations; use functions to represent the dependence of one quantity on another; and use patterns and functions to solve problems. By the end of grade 4, students investigate simple infinite series such as doubling, and understand rates of change such as speed and growth rate. By the end of grade 8, students recognize the difference between linear and exponential growth; explore geometric and arithmetic progressions; and understand that the grid size affects the precision of measurements.

Modeling and Procedures: By the end of grade 4, students represent an arithmetic relationship with an equation or inequality using a variable; translate between a number pattern expressed with objects or a table to a graph, rule, or equation; By the end of grade 8, students solve small systems of linear equations; express laws of probability in algebraic form; understand and use the rectangular coordinate system; use graphs to represent and estimate solutions of equations and inequalities; and use algebraic methods to solve word problems.

Standard 4.4 Data Analysis, Probability, and Discrete Mathematics: *All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.*

Data Analysis, Statistics, and Probability: By the end of grade 4, students correctly use the terms possibly, probably, and certainly; determine the probability of a simple event such as the toss of a coin, throw of a die, or result of a spinner spin; determine the mean and range of a data set; formulate a problem that involves collecting data; and organize data into bar graphs, circle graphs, and pictographs. By the end of grade 8, students recognize the difference between simple and compound events, and dependent and independent events; predict the outcome of an event; determine the probability of a compound event; conduct experiments to learn the difference between theoretical probabilities and actual outcomes; interpret probabilities as fractions, ratios, and percents; accurately and appropriately represent data in tables, charts, and graphs; determine the mean, range, mode, and median of data sets; and make and evaluate inferences based on data analysis.

Discrete Mathematics: By the end of grade 4, students classify and sort objects by attributes such as shape or color; determine the number of combinations through activities such as selecting a lunch from three sandwich and two beverage choices; figure out all possible routes from the classroom to the outdoors; write out

instructions for multiplying out two-digit numbers. By the end of grade 8, students systematically determine the number of possible combinations, permutations, or arrangements in a variety of problems; use tree graphs; use a directed graph to represent a food web; and work with iterative and recursive processes such as compound interest.

Standard 4.5 Mathematical Processes: *All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.*

Problem Solving: By the end of grade 4, PCS students have posed, explored, and solved problems using a variety of strategies, models, and tools. Problems are used to motivate concepts and provide practice and challenge in all the content areas. By the end of grade 8, students have developed strong problem-solving skills including the ability to use appropriate models, to select among multiple approaches, and to develop alternate strategies. All PCS students will be challenged and enabled to go as far mathematically as they can.

Communication: Classroom activities are designed to develop students' skill in communicating mathematical ideas. By the end of grade 4, students are able to present a mathematical problem, strategy, and solution in a variety of forms to their class. By the end of grade 8, students are able to analyze, evaluate, and explain mathematical arguments. They use symbols and mathematical language as tools for understanding.

Connections and Representations: Students use mathematics to enhance their understanding of other subject areas. By the end of grade 4, students have used mathematics to compute the current in a simple circuit, to make a simple map, to find symmetries in art and nature, to check whether a bean plant grows faster in the sun or the shade, and to organize nutritional data they have collected. By the end of grade 8, students have applied mathematical models to deepen their understanding of the relationship between the length of a violin or guitar string and the pitch of the sound it makes, the risks associated with smoking, and the distance to the nearest star.

Reasoning: Students learn how to judge the reasonableness of mathematical results. By the end of grade 4, students make estimates of the results of arithmetic operations, and justify their guess of how many beans are in a jar. By the end of grade 8, students have used an opinion poll to make conjectures about the outcome of an election; proven an algebraic or geometric relationship by deduction or induction; and critiqued a conclusion reported about some data in the newspaper.

Technology: By the end of grade 4, students have regularly used counters and other manipulatives to promote understanding of numerical operations. They use calculators to check estimates and to compute such quantities as the mean of a set of data. They use technology to gather data and display mathematical information. By the end of grade 8, students use computer spreadsheets and graphing programs to display quantitative information. They use computers and calculators to investigate functions and their graphs.

5.3 Student Outcomes in Mathematics

Several general principles apply to all grade levels of the mathematics curriculum:

1. Classroom activities are designed to develop students' skill in communicating mathematical ideas.
2. Students will pose, explore, and solve problems using a variety of strategies, models, symbols, and tools. Students will present a mathematical problem, strategy, and solution in a variety of forms to their class.
3. Students will learn how to judge the reasonableness of mathematical results.
4. Students will use calculators to check estimates and to compute such quantities as the mean of a set of data. They use technology to gather data and display mathematical information.
5. Students will use mathematics to enhance their understanding of other subject areas. Problems are used to motivate concepts and provide practice and challenge in all the content areas.

The following list encapsulates what each student will be able to do at the end of the specified grade level.

Mathematics Outcomes: Grade Three

Number Sense

- count money and make change for a dollar
- read numbers into the thousands
- count by twos, threes, fives, and tens
- draw pictures of regions and sets for commonly used fractions
- locate numbers on a number line
- identify the largest number in a set
- tell time on an analog clock

Geometry and Spatial Sense

- identify three- and four-sided polygons
- identify spheres, cones, cubes, and cylinders
- match congruent figures
- give examples of parallel and intersecting lines
- compare two plane figures
- find right angles in the classroom

Numerical Operations

- add and subtract whole numbers with four places and/or with middle zeroes

- know the multiplication tables
- understand that division is the inverse of multiplication
- do simple division based on multiplication facts

Measurement

- find the perimeter of a plane figure
- tell which of two measurements is the greater
- solve word problems using simple measurements
- tell time in minutes
- find elapsed time in hours
- use a ruler for inches and centimeters
- read a thermometer

Estimation

- round a given number to the nearest ten or hundred
- estimate a problem's sum or difference by rounding
- estimate the answer to a word problem involving money to the nearest dollar

Patterns, Relationships, and Functions

- see and identify patterns in skip counting and in even or odd numbers
- find a pattern in a list of five numbers and predict the next number
- give the output numbers for a function machine when the rule and input are known
- answer questions after reading a bar or line graph

Probability and Statistics

- use number cubes to play games
- tell whether or not they think a game is fair and why
- predict the probability of a certain number on a number cube or spinner

Algebra

- write number sentences with the equal sign, the greater than sign, or the less than sign
- solve a simple one-step open sentence involving a question mark, answer space, or variable

Discrete Mathematics

- count by twos, threes, fives, tens, hundreds, and thousands
- classify objects by color, number of legs, height, etc.
- classify geometric shapes by the number of sides
- classify angles as right, less than right, or greater than right

- classify quadrilaterals as squares, rectangles, or parallelograms

Conceptual Building Blocks of Calculus

- use graph paper to draw or a geoboard to make figures of a certain area
- tell why a pattern of endlessly repeated addition or multiplication never has an exact final number

Mathematics in Science and Other Subjects

- read an inch or centimeter ruler to the nearest whole unit
- use a four-function, arithmetic calculator to check computation results
- read a thermometer to the nearest degree
- read bar, line, circle and pictographs to get information

Computer Science

- use a word-processing program to keyboard paragraphs into a computer
- load a game or program into the computer from a CD-ROM and run it

Mathematics Outcomes: Grade Four

Number Sense

- understand place values through many digits
- compare and order integers, commonly used fractions and decimals

Geometry and Spatial Sense

- make a perspective drawing of a simple solid
- identify symmetries of geometric and natural objects
- use transformations such as translation, rotation, reflection, and scaling to create geometric patterns
- classify shapes by properties such as number of faces, edges, vertices, and lines of symmetry
- use the scale on a map to determine distance
- use geometric measures such as length, perimeter, area, and volume
- subdivide complex figures into simple shapes
- use tessellations

Numerical Operations

- have fluent command of arithmetic operations on whole numbers
- apply arithmetic properties to solve problems
- use estimation to judge the reasonableness of solutions

Measurement

- use English and metric units for length, area, volume, weight, time, and temperature
- recognize the need for standard units of measure
- use measurements extensively in science experiments

Estimation

- estimate the number of objects in a group or container without counting
- estimate simple measurements
- understand the usefulness of estimation in problem solving
- use estimates to judge the reasonableness of solutions

Patterns, Relationships, and Functions

- construct, recognize, and extend simple geometric and arithmetic patterns
- discover rules for patterns such as successive multiples of eleven
- use an equation with one variable to express a simple arithmetic pattern given in a table

Probability and Statistics

- correctly use terms like possibly, probably, and certainly
- determine the probability of a simple event such as the toss of a coin, throw of a die, or result of a spinner
- determine the mean and range of a data set
- formulate a problem that involves collecting data
- organize data into bar graphs and pictographs

Algebra

- represent an arithmetic relationship with an equation using a variable
- translate between a number pattern expressed with objects or a table to a graph, rule, or equation

Discrete Mathematics

- classify and sort objects by attributes such as shape or color
- determine the number of combinations through activities such as selecting a lunch from three sandwich and two beverage choices
- figure out all possible routes from the classroom to the outdoors
- write out instructions for multiplying two-digit numbers

Conceptual Building Blocks of Calculus

- investigate simple infinite series such as doubling
- understand rates of change such as speed and growth rate

Mathematics in Science and Other Subjects

- use mathematics to make a simple map
- to find symmetries in art and nature
- to check whether a bean plant grows faster in the sun or the shade
- to organize nutritional data

Computer Science

- keyboard a paragraph or story into a computer using a word processing program
- run and use different programs for games or exploration
- use a CD-ROM encyclopedia to get information
- improve their keyboarding speed and accuracy by using a typing program
- print from the computer

Mathematics Outcomes: Grade Five

Number Sense

- compare and order common fractions, mixed numbers, integers, and decimals
- explain the relationships between different kinds of numbers: fractions, decimals, percents, rational numbers, integers, whole numbers, etc.
- use the equivalence between common fractions and decimals and between decimals and percents

Geometry and Spatial Sense

- calculate volumes of rectangular prisms
- locate and graph points on a coordinate system
- measure and draw a given angle with a protractor
- find perimeters and areas of plane figures
- name and identify plane figures: triangles, quadrilaterals, pentagons, hexagons, decagons, and dodecagons
- name and identify space figures: prisms, pyramids, cones, and spheres
- describe geometry in nature and in manufactured objects

Numerical Operations

- choose appropriate computational methods from mental math, estimation, pencil and paper, or calculator
- know the meaning of exponents and roots
- use the x square, y to the x and square root keys on their calculators
- use their calculators to solve word problems
- have fluent command of arithmetic operations on decimals

- understand and apply the order of operations
- identify the decimal equivalent to a percent

Measurement

- use a ruler and a protractor accurately
- use estimated and actual measurements to describe and compare geometric shapes
- read and interpret scales on rulers, graphs, number lines, and maps
- use formulas for perimeter and area to solve problems involving measurements
- convert measurement units from one form to another within the English or metric systems
- estimate the relationship of corresponding units between the English and metric systems: yards and meters, centimeters and inches, kilometers and miles, etc.

Estimation

- determine the reasonableness of an answer by rounding and estimating
- determine whether a problem needs an estimated or actual answer
- decide whether to estimate using mental math, pencil and paper, or a calculator
- apply different estimation strategies in problems involving quantities and measurements: rounding, front-end estimation, clustering, and compatible numbers
- determine whether an estimate is an overestimate or an underestimate

Patterns, Relationships, and Functions

- recognize and extend arithmetic and geometric sequences like the Fibonacci sequence
- represent a given arithmetic relationship with a table and a rule
- describe relationships in a pattern or function
- use an equation with one variable to express a simple arithmetic pattern given in a table
- use a pattern to model a situation to solve a problem

Probability and Statistics

- organize data into tables, charts, circle graphs, and line graphs
- calculate range, mean, median, and mode for a list of data
- determine the probability of an event
- interpret a probability of an event as a ratio

Algebra

- represent a number pattern with a table or a verbal rule, and with a variable
- represent an arithmetic or geometric relationship with an equation or inequality using one variable
- read an algebraic expression involving multiplication that has no arithmetic multiplication sign
- interpret simple non-numeric graphs to decide which fits a given situation
- solve a one-step linear equation
- locate points on a rectangular coordinate system

Discrete Mathematics

- use systematic counting and listing to solve problems involving combinations or permutations
- use a calculator to experiment with iterative and recursive processes
- create a flowchart that gives instructions for doing a project
- use triangles to model Koch snowflakes
- send and decode a message in which letters of the message are systematically replaced by other letters

Conceptual Building Blocks of Calculus

- recognize the difference between linear and exponential growth on a graph
- represent and use non-terminating decimals
- explain why pi is an irrational number
- estimate the area of an irregularly shaped object on graph paper by counting squares
- divide a complex figure into parts so that the area can be approximated

Mathematics in Science and Other Subjects

- use a compass, ruler, and protractor accurately
- create a bar or line graph to show the relationship between two variables
- know which metric units are appropriate for measuring length, mass, and capacity
- convert between units of the metric system

Computer Science

- put given information on a spreadsheet and fill down or across
- word process their own work at the minimum of twenty-five words per minute
- run and use mathematical programs for games and exploration
- use a CD-ROM encyclopedia
- use a geometric computer program to do geometric constructions

Mathematics Outcomes: Grade Six

Number Sense

- define the different sets of numbers: whole, natural, rational, integers, irrational, real and imaginary
- use a calculator to find decimal expansions for fractions
- understand the meaning of a number written in exponential form
- find square roots and cube roots
- write numbers in scientific notation
- understand and apply ratios, proportions, and percents in a variety of situations
- recognize and describe patterns in infinite sequences involving whole numbers, rational numbers, and integers like those in Pascal's triangle
- use number-theory concepts to solve problems
- understand the relationships among fractions, decimals, and percents
- identify and use properties of numbers

Geometry and Spatial Sense

- identify, describe, compare, classify, and draw two- and three-dimensional figures
- understand and apply the concepts of symmetry, congruence, and similarity
- understand the properties of lines and planes and the relationships between them, including intersecting, parallel, perpendicular, skew, and the angle of incidence
- use the Pythagorean Theorem
- describe and identify geometric transformations: translations, reflections, rotations, and similarity and congruence
- use formulas and strategies for calculating perimeter, area, surface area, angle measure, and volume
- identify the properties that make a shape a Platonic solid
- use a compass and straightedge to construct a perpendicular bisector, bisect an angle, and draw a congruent angle

Numerical Operations

- have fluent command of arithmetic operations with common fractions and mixed numbers
- explain procedures for computation with negative integers
- solve problems involving proportions and percents
- apply the algebraic order of operations
- master the memorization of square numbers from the squares of 11 to 16, 20, and 25
- explain the differences between arithmetic and scientific calculators

Measurement

- use estimated and actual measurements to describe phenomena
- determine the degree of accuracy needed in a given situation and choose units appropriately
- use formulas to solve problems related to measurement
- understand the impact of the change of an object's linear dimensions on its perimeter, area, or volume
- apply measurement to construct a variety of two- and three-dimensional figures

Estimation

- understand the usefulness of an estimate as distinct from an exact answer
- determine the reasonableness of an answer by estimating the results of operations
- apply a variety of different estimation strategies in problem situations involving quantities and measurements
- determine whether a given estimate is an overestimate or an underestimate
- use common fractions, decimals, percents, and mixed numbers interchangeably when one form of the number makes estimation easier
- master the common fraction equivalents for familiar percentages

Patterns, Relationships, and Functions

- discover and extend arithmetic and geometric patterns
- describe the relationships among various representations of patterns and functions
- use patterns, relationships, and functions to solve problems
- analyze functional relationships to explain how a change in one quantity results in a change in another
- fill in function tables when given the rule
- explain arithmetic sequences

Probability and Statistics

- generate, collect, organize, and analyze data
- represent data in tables, charts, and graphs
- explain the measures of central tendency: mean, median, and mode
- calculate mean, median, and mode and decide which provides the most accurate representation of a situation
- determine whether variables have positive, negative, or no correlation
- express probability as a ratio and percent
- determine the probability of a compound event

Algebra

- write function rules using variables, equations and inequalities
- solve simple linear equations by pencil and paper techniques
- graph linear and quadratic equations by finding points
- solve simple linear equations by graphing
- graph linear and quadratic equations on a graphing calculator
- use number lines to model arithmetic operations and absolute value
- give multiple answers to inequalities

Discrete Mathematics

- sort items using Venn diagrams
- recover hidden information by decoding messages
- determine the number of combinations or permutations by listing, systematic counting, or using factorials
- draw models of a network
- use iteration to draw a repetitive design such as a chess board
- use calculators to compare growths of sequences
- use a clock to model base twelve, days of the week to model base seven, a hand to model base five, and an electric current to model the binary code
- devise a tree diagram to show the dissemination of information
- make a flowchart to give instructions for doing a complex project

Conceptual Building Blocks of Calculus

- use tables and graphs to show the difference between linear and exponential growth
- understand non-terminating decimals
- give an example of an infinite sequence
- give an example of a limit
- define significant digits in regard to the area of a plane figure
- find ways to approximate the surface area of a hand, a leaf, etc.
- explain why there are not twelve square inches in a square foot, 100 square centimeters in a square meter, etc.

Mathematics in Science and Other Subjects

- use a compass, ruler, and protractor accurately
- create a line graph to show the relationship between two variables
- select appropriate metric units for measuring length, mass, and capacity
- convert between units of the metric system accurately

Computer Science

- word process their own writing

- use a computer to get information off a CD-ROM and off the internet
- construct a spreadsheet
- construct a data base and print reports from it
- use computer programs to draw and explore the relationships of geometric figures
- write simple programs

Mathematics Outcomes: Pre-Algebra

Number Sense

- strengthen place value concepts by using numbers in bases other than 10
- have fluent command of arithmetic operations, including both positive and negative rational numbers, percents, exponents, roots, absolute values, and scientific notation

Geometry and Spatial Sense

- characterize geometric figures using a minimum set of properties
- predict what the intersections of a plane with a cylinder, cone, or sphere would be
- use geometric transformations
- select the most efficient strategies for computing geometric measures
- use the Pythagorean theorem to solve problems
- draw geometric models to solve algebraic and scientific problems such as determining the height of an object from the length of its shadow using similar triangles
- use formulas to find surface area and volume of pyramids, prisms, cones, and spheres
- use the relationships in 30-60-90 and 45-45-90 triangles to solve problems

Numerical Operations

- extend their command of arithmetic operations to include all real numbers: both positive and negative decimals, integers, and rational numbers
- apply their knowledge of percents to solve problems on commission, discount, percent of increase and decrease, simple interest, compound interest, etc.
- use proportions and ratios to solve problems
- use the standard algebraic order of operations correctly

Measurement

- understand the need for repeated measurements to improve precision
- learn fundamentals of error analysis
- test hypotheses by measurement and analysis

- understand how a change in an object's linear dimensions affects its measures of length, area, and volume

Estimation

- extend estimation skills to a wider variety of problems and numbers, including problems of social importance, such as total energy consumption in the US and the rate of propagation of an epidemic.

Patterns, Relationships, and Functions

- represent mathematical relationships with tables, graphs, and equations
- use functions to represent the dependence of one quantity on another
- use patterns and functions to solve problems

Probability and Statistics

- recognize the difference between simple and compound events, and dependent and independent events
- predict the outcome of an event
- determine the probability of a compound event
- conduct experiments to learn the difference between theoretical probabilities and actual outcomes
- interpret probabilities as fractions, ratios, and percents
- accurately and appropriately represent data in tables, charts, and graphs
- determine the mean, range, mode, and median of data sets
- make and evaluate inferences based on data analysis

Algebra

- solve small systems of linear equations
- express laws of probability in algebraic form
- understand and use the rectangular coordinate system
- use graphs to represent and estimate solutions of equations and inequalities and
- use algebraic methods to solve word problems

Discrete Mathematics

- systematically determine the number of possible combinations, permutations, or arrangements in a variety of problems
- use tree graphs
- use a directed graph to represent phenomena such as a food web
- work with iterative and recursive processes such as compound interest

Conceptual Building Blocks of Calculus

- approximate quantities with increasing degrees of precision
- recognize the difference between linear and exponential growth
- understand that the grid size affects the precision of measurements

Mathematics in Science and Other Subjects

- apply mathematical models to deepen their understanding of the relationships like that between the length of a violin or guitar string and the pitch of the sound it makes, the risks associated with smoking, and the distance to the nearest star
- use an opinion poll to make conjectures about the outcome of an election
- prove an algebraic or geometric relationship by deduction or induction
- critique a conclusion reported about some data in the newspaper

Computer Science

- use a graphing calculator to graph linear and quadratic functions and to explore the translation, rotation and reflection of graphs
- use computer spreadsheets and graphing programs to display quantitative information

Mathematics Outcomes: Algebra

Number Sense

- understand the differences between the different sets of numbers and be able to identify and classify numbers in the correct sets
- use all real numbers in equations
- identify and use algebraic properties with accuracy
- factor numbers and polynomial expressions

Geometry and Spatial Sense

- use equations or inequalities to solve geometric problems
- graph on a Cartesian plane with pencil and paper and with a graphing calculator
- convert between the geometric graph of a plane figure and its algebraic representation

Numerical Operations

- have fluent command of algebraic operations and properties
- use inverse operations and accurate computational strategies with real numbers to solve multi-step linear equations with one variable
- to solve systems of equations with two or three variables

Measurement

- be precise and use appropriate units to describe and solve various kinds of word problems
- apply their understanding of how a change in an object's linear dimensions affects its area and volume to a wide variety of problem-solving situations

Estimation

- determine whether the solution to an equation or inequality is a reasonable answer to the question asked

Patterns, Relationships, and Functions

- represent mathematical relationships with equations, functions, or inequalities
- use functions to represent the dependence of one quantity on another
- identify functions graphically
- evaluate compound functions
- use patterns to solve algebraic problems

Probability and Statistics

- draw and interpret a histogram and frequency polygon for a given set of data
- determine the statistical averages and standard deviation of a frequency distribution
- calculate experimental probabilities

Algebra

- solve multi-step linear equations and inequalities
- graph linear and quadratic equations
- solve various types of algebraic word problems
- solve systems of two and three equations by linear combination, substitution, or by graphing
- solve systems of equations using matrices, determinants, and Cramer's rule on a graphing calculator
- solve quadratic equations by factoring and the quadratic formula

Discrete Mathematics

- define set vocabulary
- find the intersection and union of sets
- graph intersection or union of sets on a number line

Conceptual Building Blocks of Calculus

- understand the concept of significant digits
- explore geometric and arithmetic progressions
- graphically define the limit of a function

Algebra in Science and Other Subjects

- use equations, inequalities, and graphing as tools to solve problems
- interpret tables and statistics found in newspaper articles

Computer Science

- use a graphing calculator to graph linear and quadratic functions and to explore the translation, rotation and reflection of graphs
- use computer spreadsheets and graphing programs to display quantitative information

5.4 Mathematics: Kindergarten

The goals of the kindergarten mathematics course are for students to:

- develop mathematical reasoning, problem solving, and communication skills;
- develop counting skills; and
- develop spatial sense.

Course Content:

Position and Classification
Comparison and Patterns
Number Readiness and Graphing
Numbers to 31
Geometry, Fractions, Measurement
Money and Time
Addition and Subtraction Readiness

Textbooks:

New Jersey HSP Math, Grade K, Harcourt, Inc.

5.5 Mathematics: Grade One

The goals of the grade-one mathematics course are for students to:

- develop mathematical reasoning, problem solving, and communication skills;
- build fluency in counting, adding, and subtracting with whole numbers;
- describe geometric shapes in terms of their properties;
- use graphs to organize data; and
- build a mathematical vocabulary.

Course Content

Number Sense: Counting forward and backward; skip counting; comparing and ordering whole numbers and simple fractions; number lines; using counters and base-ten blocks to add, subtract and develop place-value concepts; numbers are used for counts, measures, labels, and locations.

Geometry and Spatial Sense: Solid and plane figures; number of sides; symmetry; similar shapes; slides, flips, and turns (rotations, translations, and reflections).

Numerical Operations: Doubling; Addition and subtraction with whole numbers; relationship between addition and subtraction; using addition to check subtraction; two-digit addition and subtraction.

Measurement: Measurement units and rulers; the need for standard units; inches; centimeters; time to five minutes.

Estimation: Estimate the number of objects; estimate results of operations.

Patterns and Functions: Construct, recognize, extend, and describe patterns in geometry and number sequences; function machines (input-output relationships, what's my rule?).

Probability and Statistics: Use data generated by chance devices; simple events; equally likely outcomes; tallies; bar graphs; pictographs.

Algebra: Equality; inequality; missing addends.

Discrete Mathematics: systematic counting to determine the number of combinations, or paths; classification and sorting by attributes;

Textbooks:

New Jersey HSP Math, Grade 1, Harcourt, Inc.

Supplemental Materials: *Primary Mathematics Challenging Work Problems, Level 1*, Joseph D. Lee, Singapore Math.

5.6 Mathematics: Grade Two

The goals of the grade-two mathematics course are:

- to develop mathematical reasoning, problem solving, and communication skills;
- to build fluency in numerical operations with whole numbers;
- to describe geometric shapes in terms of their properties;
- to use graphs to organize data; and
- to build a mathematical vocabulary.

Course Content

Number Sense: Base-10 place value concepts; comparing and ordering numbers; skip counting; rounding to the nearest ten; odd and even numbers; time; money; simple fractions; and negative numbers.

Geometry and Spatial Sense: Identify and see relationships between polygons and space figures; length; width; congruence, similarity, and symmetry; rotation, translation, and reflection; geometric terms.

Numerical Operations: Addition and subtraction with whole numbers; addition and subtraction facts; single-digit multiplication.

Measurement: Measurement units and tools; standard units; estimation.

Estimation: Whole-number estimates; comparisons; when estimation is appropriate or useful.

Patterns and Functions: Construct, recognize, extend, and describe patterns in geometry, number sequences, and computations; function machines (input-output relationships, what's my rule?)

Probability and Statistics: Use data generated by chance devices; simple events; equally likely outcomes; tallies; bar graphs; pictographs.

Algebra: Equality; inequality; open sentences; missing addends.

Discrete Mathematics: systematic counting to determine the number of combinations, or paths (in maps and tree diagrams); classification and sorting by attributes; simple algorithms for addition and subtraction.

Conceptual Building Blocks of Calculus: Patterns that continue indefinitely; area.

Textbooks:

New Jersey HSP Math, Grade 2, Harcourt, Inc.

Supplemental Materials: *Primary Mathematics Challenging Work Problems, Level 2*, Joseph D. Lee, Singapore Math.

Homework: Students have 15 minutes of homework assigned daily to review and practice what they have learned in class.

Tests: Quizzes are given as needed, and tests are given at the end of each unit.

Grading: Quarterly grades are based on homework completion, quizzes, tests, participation in discussions, and any projects assigned.

5.7 Mathematics: Grade Three

The goals of the grade-three mathematics course are:

- to develop mathematical reasoning, problem solving, and communication skills;
- to build fluency in numerical operations with whole numbers;
- to describe and to begin to analyze geometric shapes in terms of their properties;
- to use graphs to organize data; and
- to build a mathematical vocabulary.

Course Content

Number Sense: Base-10 place value concepts; comparing and ordering integers; expanded notation; rounding; time; money; fractions; negative numbers.

Geometry and Spatial Sense: Identify and see relationships between polygons and space figures; length; width; congruence, similarity, and symmetry; rotation, translation, and reflection; geometric terms.

Numerical Operations: Computation with whole numbers; multiplication; division.

Measurement: Measurement units and tools; standard units; estimation.

Estimation: Whole-number estimates; comparisons; when estimation is appropriate or useful.

Patterns and Functions: Construct, recognize, extend, and describe patterns in geometry, tables, and computations; function machines (input-output relationships).

Probability and Statistics: Use data generated by chance devices; simple events; equally likely outcomes; fair and unfair games; predictions; read bar and line graphs.

Algebra: Equality; inequality; use variables in fact problems; (represent an arithmetic relationship with an equation or inequality using a variable; translate between number patterns expressed with objects or tables to graphs, rules, or equations.

Discrete Mathematics: Systematic counting to determine the number of outcomes, combinations, arrangements, or paths; tree diagrams; classification and sorting by attributes; simple algorithms.

Conceptual Building Blocks of Calculus: Patterns that continue indefinitely area; subdividing a complex figure.

Textbooks:

New Jersey HSP Math, Grade 3, Harcourt, Inc.

Supplemental Materials: *Primary Mathematics Challenging Work Problems, Level 3*, Joseph D. Lee, Singapore Math.

Homework: Students have 15-20 minutes daily homework assignments to review and practice what they have learned in class.

Tests: Quizzes are given approximately once per week, and tests are given at the end of each chapter and at the end of the year.

Grading: Quarterly grades are based on homework completion, quizzes, tests, participation in discussions, and any projects assigned.

5.8 Mathematics: Grade Four

The goals of the grade-four course are:

- to develop mathematical reasoning and communication skills;
- to build fluency in numerical operations with whole numbers, commonly used fractions, and decimals;
- to analyze and to describe geometric shapes in terms of their properties;
- to use graphs for data organization and analysis; and
- to build a mathematical vocabulary.

Course Content

Number Sense: Base-10 place value concepts; decimals; expanded notation; rounding; integers; fractions; money; negative numbers; prime numbers and factors.

Geometry and Spatial Sense: Properties of two- and three-dimensional shapes; perimeter; area; congruence, similarity, and symmetry; rotation, translation, and reflection; geometric terms.

Numerical Operations: Properties of operations; computational procedures; inverse operations; operations with commonly used fractions and decimals.

Measurement: Measurement units and tools; standard units; estimation.

Estimation: Computational estimates; comparisons; when estimation is appropriate or useful.

Patterns and Functions: Construct, recognize, extend, and describe patterns using tables, rules, variables, and graphs; input-output relationships.

Probability and Statistics: Analyze data generated by chance devices; simple events; equally likely outcomes; fair and unfair games; sampling; formulate and check hypotheses based on data; create, read, interpret, and translate between different types of graphs.

Algebra: Represent an arithmetic relationship with an equation or inequality using a variable; translate between number patterns expressed with objects or tables to graphs, rules, or equations.

Discrete Mathematics: Systematic counting to determine the number of outcomes, combinations, arrangements, or paths; tree diagrams; classification and sorting by attributes; simple algorithms.

Conceptual Building Blocks of Calculus: Patterns that continue indefinitely; infinity; linear growth; area; volume; subdividing a complex figure.

Textbooks:

New Jersey HSP Math, Grade 4, Harcourt, Inc.

Supplemental Materials: *Primary Mathematics Challenging Work Problems, Level 4*, Joseph D. Lee, Singapore Math.

Homework: Students have daily assignments amounting to 20-30 minutes per night to review and practice what they have learned in class.

Tests: Quizzes are given approximately once per week, and tests are given at the end of each chapter and at the end of the year.

Grading: Quarterly grades are based on homework completion, quizzes, tests, participation in discussions, and any projects assigned.

5.9 Mathematics: Grade Five

The goals of the grade-five course are:

- to develop mathematical reasoning and communication skills;
- to extend arithmetic fluency to operations with decimals and fractions;
- to analyze and two- and three-dimensional geometric figures in terms of their components and relationships among components;
- to use graphs for data organization and analysis; and
- to build a mathematical vocabulary.

Course Content

Number Sense: Decimals; bases other than 10; exponents; prime factorization; greatest common factor and least common multiple; equivalent fractions; mixed numbers; ratios, proportions, and percents.

Geometry and Spatial Sense: Properties of two- and three-dimensional shapes; perspective; projections; perimeter, area, and circumference; congruence, similarity, and symmetry; rotation, translation, and reflection; coordinate geometry; geometric terms.

Numerical Operations: Order of operations; computations with decimals, fractions, mixed numbers, ratios, and percents.

Measurement: Measurement units and tools; standard units; converting units; estimation units; formulas.

Estimation: Computational estimates; comparisons; estimation strategies.

Patterns and Functions: Construct, recognize, extend, and describe patterns using tables, rules, variables, and graphs; input-output relationships.

Probability and Statistics: Analyze data generated by chance devices; experimental probabilities; equally likely outcomes; fair and unfair games; sampling; formulate and check hypotheses based on data; create, read, interpret, and translate between different types of graphs.

Algebra: Represent an arithmetic relationship with an equation or inequality using a variable; translate between number patterns expressed with tables to graphs, rules, or equations.

Discrete Mathematics: Systematic counting to determine the number of outcomes, combinations, arrangements, or paths; tree diagrams; simple algorithms.

Conceptual Building Blocks of Calculus: Patterns that continue indefinitely; infinity; linear and exponential growth; area; volume; subdividing a complex figure.

Textbooks:

New Jersey HSP Math, Grade 5, Harcourt, Inc.

Grade 6 Addison Wesley Mathematics, 1995.

Supplemental Materials: *Primary Mathematics Challenging Work Problems, Level 5*, Joseph D. Lee, Singapore Math.

Homework: Students have daily assignments amounting to 20-30 minutes per night to review and practice what they have learned in class.

Tests: Quizzes are given approximately once per week, and tests are given at the end of every chapter and at the end of the year.

Grading: Quarterly grades are based on homework completion, quizzes, tests, participation in discussions, and any projects assigned.

5.10 Mathematics: Grade Six

The goals of the grade-six mathematics course are:

- to develop mathematical reasoning and communication skills;
- to master arithmetic operations with decimals, fractions, proportions, and percents;
- to analyze and two- and three-dimensional geometric figures and logically interrelate properties and rules by giving or following informal arguments;
- to use graphs for data organization and analysis; and
- to build a mathematical vocabulary.

Course Content

Number Sense: Scientific notation; terminating and repeating decimals; prime factorization; equivalent fractions; mixed numbers; ratios, proportions, and percents.

Geometry and Spatial Sense: Properties of two- and three-dimensional shapes; congruence, similarity, and symmetry; perspective; angle measures; geometric constructions; geometric measures of irregularly shaped figures; coordinate geometry; geometric terms.

Numerical Operations: Order of operations; properties of operations; computations with integers, decimals, fractions, mixed numbers, ratios, proportions, and percents.

Measurement: Measurement units and tools; standard units; precision; converting units; formulas.

Estimation: Computational estimates; mental mathematics; estimation strategies.

Patterns and Functions: Construct, recognize, extend, and describe patterns using tables, rules, variables, and graphs; input-output relationships.

Probability and Statistics: Experimental probabilities; fair and unfair games; sampling; hypothesis checking; create, interpret, and translate between different types of graphs; histograms.

Algebra: Variables, algebraic expressions; operations with equations; graphing equations; inequalities; solving a formula for a variable, two-step equations.

Discrete Mathematics: Combinations, arrangements, or paths; tree diagrams; algorithms; logic.

Conceptual Building Blocks of Calculus: Patterns that continue indefinitely; infinity; linear and exponential growth; rate; speed; area; volume; subdividing a complex figure.

Textbooks:

New Jersey HSP Math, Grade 6, Harcourt, Inc.

Grade 7 Addison Wesley Mathematics, 1995.

UCSMP Transition Mathematics, Prentice Hall.

Problem of the Day: mathematical challenges and puzzles drawn from books by Martin Gardner, Raymond Smullyan, etc.

Homework: Students have nightly assignments amounting to 20-30 minutes per night to review and practice what they have learned in class.

Tests: Quizzes are given approximately once per week, and tests are given at the end of every chapter and at the end of the year.

Grading: Quarterly grades are based on homework completion, quizzes, tests, participation in discussions, and any projects assigned.

5.11 Mathematics: Pre-Algebra and Algebra Topics

The goals of the pre-Algebra course are:

- to make the transition from concrete arithmetic to abstract algebra;
- to develop fluency with algebraic operations and expressions;
- to link coordinate geometry with algebraic equations and inequalities;
- to use graphs for data organization and analysis; and
- to build a mathematical vocabulary.

Course Content

Number Sense: Scientific notation; rational and irrational numbers; uses of prime factorization; proportions, ratios, and percents; bases other than ten.

Geometry and Spatial Sense: Geometric formulas for perimeter, area, circumference, volume, and surface area of two- and three-dimensional figures; congruence, similarity, and symmetry; properties of right triangles; geometric constructions.

Numerical Operations: Order of operations; properties of operations; inverse operations; computations with negative numbers, rational numbers, and percents.

Measurement: Formulas; units; precision.

Estimation: Computational estimates; estimates of geometric measures.

Patterns and Functions: Describe patterns in problems; write rules in algebraic terms; function terminology and evaluation.

Probability and Statistics: Frequency distributions; mean, median, mode, and range; probability of an event; mutually exclusive events; permutations, combinations and arrangements; sampling; hypothesis checking; create, interpret, and translate between different types of graphs; histograms.

Algebra: Variables; solutions of multiple linear equations; graphs of linear and quadratic equations; solutions of inequalities; the use of algebraic equations to solve arithmetic problems.

Discrete Mathematics Combinations, arrangements and permutations; networks; paths; tree diagrams; and Boolean logic.

Conceptual Building Blocks of Calculus: Limits; infinity; linear and exponential growth; change in area or volume with a change in dimension.

Textbooks:

Pre-Algebra: An Accelerated Course, Houghton-Mifflin 1992, M. P. Dolciani, R. H. Sorgenfrey, and J. A. Graham.

A Bridge to Algebra and Geometry, Houghton-Mifflin 2001, F. J. Gardella.
Problem of the Day: mathematical challenges and puzzles drawn from books
by Martin Gardner, Raymond Smullyan, etc.

Homework: Students have approximately 30-minute daily assignments to review and practice what they have learned in class.

Tests: Quizzes are given approximately once per week, and tests are given at the end of every chapter and at the end of the year.

Grading: Quarterly grades are based on homework completion, quizzes, tests, participation in discussions, and any projects assigned.

5.12 Mathematics: Algebra I

The Algebra course provides a rigorous and comprehensive study of first-year algebra during which each student should

- develop algebraic reasoning;
- develop fluency with algebraic operations and expressions;
- use equations, inequalities, or systems of equations to solve problems;
- link coordinate geometry with algebraic equations and inequalities;
- graph equations and inequalities on a coordinate system with pencil and paper, and with a graphing calculator; and
- add terms from algebra to his or her mathematical vocabulary.

Course Content

Number Sense: Variables; real numbers; integers; rational and irrational numbers; exponents; radicals; ratios; proportions; percents; complex numbers; factoring.

Geometry and Spatial Sense: Geometric formulas for perimeter, area, circumference, volume, and surface area of two- and three-dimensional figures; congruence, similarity, and symmetry; properties of right triangles.

Numerical Operations: Order of operations; properties of operations; inverse operations; computations with negative numbers, rational numbers, and percents; polynomial operations;

Measurement: Appropriate units; precision.

Estimation: Reasonable solutions.

Patterns and Functions: Describe patterns in problems; write rules in algebraic terms; function terminology and evaluation; domain and range; linear, quadratic, absolute value, and greatest integer functions.

Probability and Statistics: Experimental probabilities; algebraic equations to solve problems involving probabilities.

Algebra: Multi-step linear equations and inequalities; solutions of multiple linear equations; graphs of linear and quadratic equations; solutions of inequalities; factoring quadratic equations; the use of equations to solve world problems involving various units, arithmetic operations, and types of numbers.

Discrete Mathematics: Combinations, arrangements and permutations; networks; paths; tree diagrams; Boolean logic.

Conceptual Building Blocks of Calculus: Minima and maxima; limits; infinity; linear and exponential growth; change in area or volume with change in dimension.

Textbooks:

Algebra I, M. P. Dolciani, R. Sorgenfrey, and J. Graham, Houghton Mifflin 1989.

Algebra: Structure and Methods Book I, R. Brown, M. P. Dolciani, R. Sorgenfrey, and W. Cole, McDougal Littell.

Problem of the Day: mathematical challenges and puzzles drawn from books by Martin Gardner, Raymond Smullyan, etc.

Homework: Students have daily assignments, approximately 40 minutes long, to review and practice what they have learned in class.

Tests: Quizzes are given approximately once per week, and tests are given at the end of every chapter and at the end of the year.

Grading: Quarterly grades are based on homework completion, quizzes, tests, participation in discussions, and any projects assigned.

5.13 Mathematics: Geometry

The Geometry course provides a rigorous and comprehensive study of geometry during which each student should

- develop geometric reasoning;
- to develop fluency with geometric straight-edge and compass constructions;
- to use equations, inequalities, or systems of equations to solve problems;
- link coordinate geometry with algebraic equations and inequalities;
- learn to use geometric transformations;
- add terms from geometry to the individual's vocabulary.

Course Content

Points, lines, planes, and angles: Points, lines, planes, segments, rays, angles; parallel lines and planes; prove that lines are parallel.

Deductive Proofs: Axioms and theorems; if—then statements; converses.

Polygons: Triangles; angles of a triangle; isosceles triangles; medians, altitudes, and perpendicular bisectors; congruent figures; similar figures; proof of congruence or similarity quadrilaterals; proof that quadrilaterals are parallelograms; trapezoids; ratios, proportions, and similarity.

Right Triangles: The Pythagorean theorem and its converse; tangent ratio; sine and cosine ratios.

Circles: Tangents; arcs and central angles; arcs and chords; inscribed angles; using circles in proofs.

Geometric constructions: Straight-edge and compass constructions; perpendiculars and parallels; concurrent lines; circles: tangents, circumscribed and inscribed figures; proportional constructions; locus and loci; construction of loci.

Areas of plane figures: Rectangles; parallelograms; triangles; rhombuses; trapezoids; regular polygons; circumferences and areas of circles; arc lengths and lengths of sectors; ratios of areas; geometric probability.

Areas and volumes of solids: Prisms; pyramids; cylinders and cones; spheres; areas and volumes of similar solids.

Coordinate geometry: The distance formula; slope of a line; parallel and perpendicular lines; vectors; the midpoint formula; graphing linear equations; writing linear equations; coordinate geometry proofs.

Transformations: Mappings and functions; reflections; translations; rotations; dilations; composite mappings; inverse and identity mappings; symmetry in the plane and in space.

Textbook: *Geometry*, R. Jurgensen, R. Brown, and J. Jurgensen, McDougal Littell.

Homework: Students have daily assignments, approximately 40 minutes long, to review and practice what they have learned in class.

Tests: Quizzes are given approximately once per week, and tests are given at the end of every chapter and at the end of the year.

Grading: Quarterly grades are based on homework completion, quizzes, tests, participation in discussions, and any projects assigned.