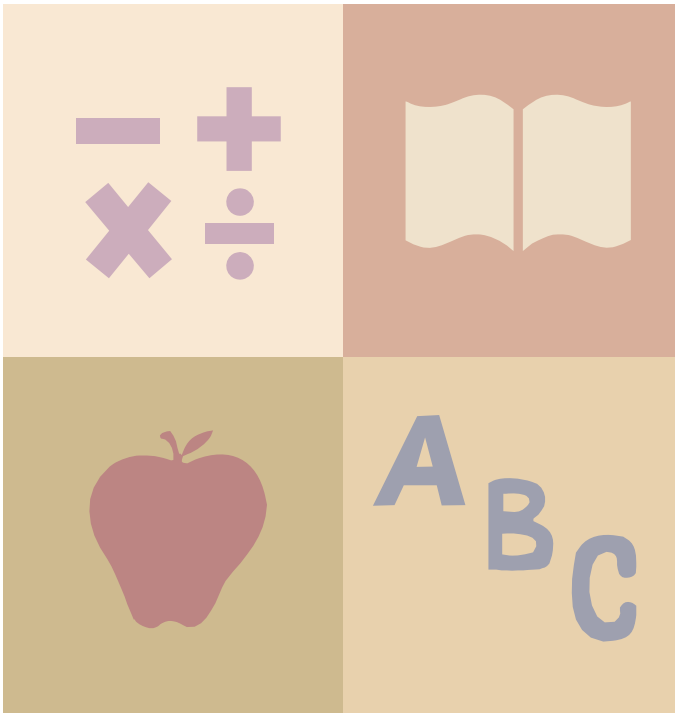
whitehall Math Curriculum K-12

Whitehall School District #4-47-2

Revised fall of 2003



Benchmarks K-12

Table of Contents

Key for Math Curriculum

I= Introduce
D= Develop
M= Master

Kindergarten MATHEMATICS

1. **Content Standard 1 – Students engage in the mathematical processes of problem solving and reasoning, estimation, communication, connections and application, and using appropriate technology.**
   A. Introduction to guess and check, draw a picture, count back and count on. I
2. **Content Standard 2 – Students demonstrate understanding of and an ability to use numbers and operations.**
   A. Recognize and identify the numbers to 20. I/D
   B. Count objects to 20 using one to one correspondence. I/D
   C. Demonstrate the ability to count to 100. I\D
   D. Add and subtract to 10 using manipulatives. I/D
   E. Introduce equal parts and parts of a set. I
3. **Content Standard 3 – Students use algebraic concepts, processes, and language to model and solve a variety of real-world and mathematical problems.**
   A. Introduce aba, aabb and abc patterns. I/D
   B. Create aba, aabb and abc patterns. I/D
   C. Sort and classify objects. I/D
4. **Content Standard 4 – Student demonstrates understanding of shape and an ability to use geometry.**
   A. Introduce plain figures and space figures. I
5. **Content Standard 5 – Students demonstrate understanding of measurable attributes and an ability to use measurement processes.**
   A. Measure time to the hour. I/D
   B. Measure using standard and nonstandard units. I
   C. Understand more and less. I
   D. Introduce coins and their values. I
   E. Introduce weight and measure. I
6. **Content Standard 6 – Students demonstrate understanding of an ability to use data analysis, probability, and statistics.**
   A. Experience collecting data. I
   B. Demonstrate the ability to create a bar and pictograph. I
   C. Demonstrate the ability to read a bar and pictograph. I
7. **Content Standard 7 – Students demonstrate understanding of and an ability to use patterns, relations and functions.**
   A. Introduce \aba, aabb and abc patterns. I
   B. Create aba, aabb and abc patterns I
   C. Sort and classify objects. I/D
   D. Recognize symbols showing relationships. I

1st Grade MATHEMATICS

1. **Content Standard 1 – Students engage in the mathematical processes of problem solving and reasoning, estimation, communication, connections and application, and using appropriate technology.**
   A. Drawing pictures. D
   B. Guess and check. D
   C. Count back. D
   D. Count on. D
   E. Predict and estimate. I
2. **Content Standard 2 – Students demonstrate understanding of and an ability to use numbers and operations.**
   A. Understand numbers to 20 without manipulatives. M
   B. Introduce place value to 100. I/D
   C. Master the understanding of addition of numbers to 10 using manipulatives. M
   D. Master addition of numbers to 10. M
   E. Master understanding of subtraction of numbers to 10 using manipulatives. M
   F. Master an understanding of subtraction of numbers to 10. M
   G. Introduce and develop adding and subtracting two digit numbers without regrouping using manipulative. I/D
   H. Demonstrate recognition, modeling, reading, and writing of fractions. I
3. **Content Standard 3 – Students use algebraic concepts, processes, and language to model and solve a variety of real-world and mathematical problems.**
   A. Introduce commutative, associative and identity properties using manipulatives and fact families. I
   B. Patterning of coins, numbers, and geometric figures. D
4. **Content Standard 4 – Students demonstrate understanding of shape and an ability to use geometry.**
   A. Develop plain and space figures. D
   B. Introduce congruent, open and closed and symmetrical figures. I/D
5. **Content Standard 5 – Students demonstrate understanding of measurable attributes and an ability to use measurement processes.**
   A. Understand measurement in the following areas using manipulatives: length, volume, weight and time. D
   B. Develop understanding of value of penny, nickel, dime, quarter and dollar. D
   C. Develop an understanding of counting combinations of pennies, nickels, and dimes. D
6. **Content Standard 6 – Students demonstrate understanding of an ability to use data analysis, probability, and statistics.**
   A. Experience collecting data. D
   B. Demonstrate the ability to create a bar and pictograph. D
   C. Demonstrate the ability to read a bar and pictograph. D
   D. Formulate a prediction. I
7. **Content Standard 7 – Students demonstrate understanding of and an ability to use patterns, relations and functions.**
   A. Demonstrate patterns using numbers and coins. D
   B. Create aba, aabb and abc patterns. I
   C. Sort and classify objects. I/D
   D. Recognize symbols showing relationships. D

2nd Grade MATHEMATICS

1. **Content Standard 1 – Students engage in the mathematical processes of problem solving and reasoning, estimation, communication, connections and application, and using appropriate technology.**
   A. Introduce calculator for addition and subtraction. I
   B. Draw pictures. M
   C. Guess and check. M
   D. Count back. M
   E. Count on. M
   F. Predict and estimate. M
2. **Content Standard 2 – Students demonstrate understanding of and an ability to use numbers and operations.**
   A. Review addition and subtraction facts to ten. M
   B. Master addition and subtraction facts to eighteen. M
   C. Master two-digit addition and subtraction with and without trading. I/D/M
   D. Introduce three-digit addition and subtraction with and without trading. I
   E. Explore multiplication and division. I
   F. Demonstrate recognition, modeling, reading, and writing of fractions. I
3. **Content Standard 3 – Student use algebraic concepts, processes, and language to model and solve a variety of real-world and mathematical problems.**
   A. Identify patterns of numbers. I/D
   B. Count money. D
4. **Content Standard 4 – Students demonstrate understanding of shape and an ability to use geometry.**
   A. Master plane and space figures. M
   B. Explore perimeter, symmetry, and geometric solids. I/D
5. **Content Standard 5 – Students demonstrate understanding of measurable attributes and an ability to use measurement processes.**
   A. Master time to the hour and half hour. M
   B. Tell time to the quarter hour and to five minutes. D
   C. Measure length, capacity, weight, and temperature using standard and nonstandard units. D
   D. Develop understanding of value of penny, nickel, dime, quarter, half-dollar, and dollar bills.
   E. Tell dollar and use decimal point to identify cents. I/D
6. **Content Standard 6 – Students demonstrate understanding of an ability to use data analysis, probability, and statistics.**
   A. Investigate probability, estimation, graphing and problem solving. D
7. **Content Standard 7 – Students demonstrate understanding of and an ability to use patterns, relations and functions.**
   A. Examine place value of ones, tens, and hundreds. D
   B. Examine relationships with money and visual patterns. D

3rd Grade MATHEMATICS

1. **Content Standard 1 – Students engage in the mathematical processes of problem solving and reasoning, estimation, communication, connections and application, and using appropriate technology.**
   A. Solve simple word problems using estimate and check, applying basic number operations, drawing a picture, and reading a table or graph. D
   B. Introduce knowledge and use of calculators. I
2. **Content Standard 2 – Students demonstrate understanding of and an ability to use numbers and operations.**
   A. Develop addition and subtraction to 18 using related facts. D
   B. Develop regrouping to four digits in addition and subtraction . D
   C. Introduce multiplication facts 0-9 using repeated addition. I
   D. Introduce regrouping with two and three-digit multiplication by a single digit. I
   E. Introduce and develop division facts to 9 applying related multiplication facts. I/D
   F. Introduce division with simple remainders. I
   G. Develop place value to 999,999. D
   H. Develop rounding to ten=s and hundred=s place. D
3. **Content Standard 3 – Students use algebraic concepts, processes, and language to model and solve a variety of real-world and mathematical problems.**
   A. Introduce missing factors. I
   B. Introduce properties of multiplication (associative, commutative). I
   C. Master zero and ones as factors. M
   D. Continue a pattern of geometric figures and or numbers. D
   E. Create a pattern of geometric figures and or numbers. D
   F. Identify special patterns and sequences in skip counting. D
   G. Develop use and understanding of function tables. I
   H. Introduce and develop the graphing of ordered pairs. I/D
   I. Develop the symbols showing relationships (<, >, =). D
4. **Content Standard 4 – Students demonstrate understanding of shape and an ability to use geometry.**
   A. Identify two and three-dimensional shapes. I
   B. Demonstrate understanding of area and volume by counting square and cubic units. I
   C. Recognize congruency and symmetry using manipulatives. D
5. **Content Standard 5 – Students demonstrate understanding of measurable attributes and an ability to use measurement processes.**
   A. Tell time to the minute. M
   B. Identify the passage of time. D
   C. Identify the metric and standard units of measurements for length. I
   D. Demonstrate understanding of money and making change. I
   E. Exhibit connections between the concrete and symbolic representation of fractional models. D
6. **Content Standard 6 – Students demonstrate understanding of an ability to use data analysis, probability, and statistics.**
   A. Read a table or graph. (D)
   B. Make a table or graph. (D)

7. **Content Standard 7 – Students demonstrate understanding of and an ability to use patterns, relations and functions.**
   A. Continue a pattern of geometric figures and or numbers. D
   B. Create a pattern of geometric figures and or numbers. D
   C. Identify special patterns and sequences in skip counting. D
   D. Develop use and understanding of function tables. I
   E. Introduce and develop the graphing of ordered pairs. I/D
   F. Develop use of symbols (<, >, =) to show relationships between numbers. D

4th Grade MATHEMATICS

1. **Content Standard 1 – Students engage in the mathematical processes of problem solving and reasoning, estimation, communication, connections and application, and using appropriate technology.**
   A. Demonstrate understanding of problem solving using a variety of strategies: being able to explain method of acquiring answer. D
   B. Use estimation to determine solution strategies for problem solving. D
   C. Use written and pictorial means to communicate data. D
   D. Demonstrate understanding of real life mathematical applications: buying items, using coupons, percentages off, using fractions in cooking and carpentry. D
   E. Develop knowledge and use of calculators. D
2. **Content Standard 2 – Students demonstrate understanding of and an ability to use numbers and operations.**
   A. Demonstrate understanding of basic facts and number concepts: place value to 1,000,000, addition and subtraction facts to 18 multiplication and division facts through 12. D
   B. Introduce multiplication computation (3 digit by 2 digit) and division computation (1 digit into 3 digit). I
   C. Use models to demonstrate understanding of fractions with like denominators, compare fractions with unlike denominators. D
3. **Content Standard 3 – Students use algebraic concepts, processes, and language to model and solve a variety of real-world and mathematical problems.**
   A. Use symbols to represent numbers in simple addition, multiplication and division problems. I
   B. Solve problems using missing variables. D
   C. Use function tables, patterns, associative, commutative and property of zero to solve problems with missing operations. D
4. **Content Standard 4 – Students demonstrate understanding of slope and an ability to use geometry.**
   A. Model and be able to explain acute and obtuse angles, congruent figures, line, line segment and rays. I
   B. Introduce area, circumference and perimeter of plane figures. I
   C. Demonstrate understanding of slides, flips, turns, and line symmetry. I
   D. Classify two-and-three dimensional shapes. D
5. **Content Standard 5 – Students demonstrate understanding of measurable attributes and an ability to use measurement processes.**
   A. Demonstrate ability to use length, volume, weight, area, time, and temperature. D
   B. Use nonstandard and standard metric units to measure length volume and temperature. D
   C. Select appropriate measurement tools for length and volume. M
   D. Demonstrate understanding of money and making change in problem solving situations. D

6. **Content Standard 6 –Students demonstrate understanding of an ability to use data analysis, probability, and statistics.**
   A. Investigate events of probability and chance. I
   B. Construct model to represent data. D
   C. Read and interpret graphic data in a variety of forms. D
   D. Collect and organize data to solve problems. D
7. **Content Standard 7 – Students demonstrate understanding of and an ability to use patterns, relations and functions.**
   A. Use function tables and patterns to solve problems D
   B. Apply patterns to show relationships in multiplication and division D
   C. Use associative and commutative properties, and the property of zero to solve problems. D

5th Grade MATHEMATICS

1. **Content Standard 1 – Students engage in the mathematical processes of problem solving and reasoning, estimation, communication, connections and application, and using appropriate technology.**
   A. Solve word problems by using appropriate strategies. D
   B. Use estimation strategies to determine solutions. D
   C. Develop knowledge and use of calculators. D
2. **Content Standard 2 – Students demonstrate understanding of and an ability to use numbers and operations.**
   A. Write whole and decimal numbers and give place value for any digit. D
   B. Compare and order whole and decimal numbers. D
   C. Round numbers to the nearest tens, hundreds, thousands, and ten thousands.
   D. Add and subtract whole and decimal numbers. D
   E. Divide by one and two digit divisors to get one, two and three digit quotients. D
   F. Introduce finding averages. I
   G. Multiply whole numbers and decimals. I/D
   H. Add, subtract, multiply and divide fractions. I/D
3. **Content Standard 3 – Students use algebraic concepts, processes, and language to model and solve a variety of real-world and mathematical problems.**
   A. Solve problems by writing equations. D
   B. Find missing factors. D
   C. Develop an understanding of properties of both addition and subtraction. D
   D. Introduce the distributive property. I
   E. Introduce evaluation of reasonableness of solution. I
4. **Content Standard 4 – Students demonstrate understanding of shape and an ability to use geometry.**
   A. Develop understanding of acute and obtuse angles, congruent figures, line, line segment and rays. D
   B. Develop understanding of area, circumference, and perimeter of plane figures. D
   C. Introduce types of triangles (acute, obtuse, and right). I
   D. Introduce area, perimeter, and volume using formulas for rectangle, square, triangle, and a parallelogram. I
   E. Develop knowledge of intersecting, parallel, and perpendicular lines. D

5. **Content Standard 5 – Students demonstrate understanding of measurable attributes and an ability to use measurement processes.**
   A. Develop the knowledge of the customary English and Metric units of length, area, volume, mass, and temperature. D
   B. Demonstrate ability to use length, area, volume, mass, and temperature. D
   C. Demonstrate use of money and use of it with different operations. D
6. **Content Standard 6 –Students demonstrate understanding of an ability to use data analysis, probability, and statistics.**
   A. Introduce median, mode, and range. I
   B. Develop tables and graphs using data collected. D
   C. Develop events of probability and chance. (ie. Tree diagrams) I/D
   D. Introduce ratios, proportions, percents, and fractions and their relationships. I
7. **Content Standard 7 – Students demonstrate understanding of and an ability to use patterns, relations and functions.**
   A. Introduce various graphs and techniques to create them (double bar graph, stem and leaf plots, line graphs, etc.).
   B. Develop knowledge and use of various graphs (D)
   C. Use function tables and patterns to develop and solve problems. D

6th Grade MATHEMATICS

1. **Content Standard 1 – Students engage in the mathematical processes of problem solving and reasoning, estimation, communication, connections and application, and using appropriate technology.**
   A. Select and apply appropriate estimation strategies throughout the problem-solving process D
   B. Use problem solving strategies by making a graph, table, finding a pattern and guessing and checking. D
   C. Develop knowledge and use of calculators. D
2. **Content Standard 2 – Students demonstrate understanding of and an ability to use numbers and operations**
   A. Write numbers, give place value for any digit, and write numbers in expanded notation. D
   B. Compare and order whole numbers, fractions, and decimals. D
   C. Round whole numbers, fractions, and decimals to the nearest place values. D
   D. Add, subtract, multiply, and divide whole numbers, fractions, and decimals. D
   D. Find averages(mean), medians, modes, and range. D
      i) Develop an understanding of ordered pairs, ratios, and proportions. D
      ii) Introduce exponents. I
3. **Content Standard 3 – Students use algebraic concepts, processes, and language to model and solve a variety of real-world and mathematical problems.**
   A. Develop a concept of variables, expressions, and equations D
   B. Develop an ability to determine solution strategies. D
   C. Solve equations using concrete, numerical, and algebraic methods. D
   D. Learn to evaluate reasonableness of a solution. D
4. **Content Standard 4 – Students demonstrate understanding of shape and an ability to use geometry.**
   A. Identify geometric terms such as: line, parallel, perpendicular, and skew. D
   B. Identify and measure angles (obtuse, acute, and right). D
   C. Identify polygons (triangle, quadrilateral, pentagon, hexagon) space figures, and circles I/D
   D. Identify perimeter, area, and volume. I

5. **Content Standard 5 – Students demonstrate understanding of measurable attributes and an ability to use measurement processes.**
   A. Develop the knowledge of the customary English units of length, area, volume, mass, and temperature. D
   B. Develop the knowledge of the Metric units of length, area, volume, mass, and temperature. D
   C. Develop knowledge of elapsed time and time zones. D
6. **Content Standard 6 – Students demonstrate understanding of an ability to use data analysis, probability, and statistics.**
   A. Demonstrate knowledge of ratios, proportions, percents, and fractions, and identify the relatedness of these. D
   B. Develop the ability to find the mean, median, mode, and range. D
   C. Develop the knowledge of data gathering and graphing. D
7. **Content Standard 7 – Students demonstrate understanding of and an ability to use patterns, relations and functions.**
   A. Describe and represent relationships with tables, graphs, and rules. D
   B. Develop an understanding of mathematical properties (commutative, distributive, associative, etc.) D

7th Grade MATHEMATICS

1. **Content Standard 1 – Students engage in the mathematical processes of problem solving and reasoning, estimation, communication, connections and application, and using appropriate technology.**
   A. Engage in mathematical processes by problem solving and reasoning.(inductive/deductive) D
   B. Develop estimation methods. (rounding, front-end method, etc.) M
   C. Using appropriate technology. (calculator, computers, etc.) D
2. **Content Standard 2 – Students demonstrate understanding of and an ability to use numbers and operations**
   A. Develop understanding of the Commutative, Associative, and Distributive Properties of the number systems. D
   B. Develop understanding of the Property of Zero for addition and multiplication. D
   C. Master Standard Order of Operations and their use. M
   D. Develop the use of numbers in variety of equivalent forms (changing from fraction to decimal to percent) and extend to the rational number system. D
3. **Content Standard 3 – Students use algebraic concepts, processes, and language to model and solve a variety of real-world and mathematical problems**
   A. Develop understanding of variables, expressions, equations, patterns, and one and two-step linear equations solved using manipulative and algebraic methods. D
   B. Introduce Addition Properties for equations and the Property of Zero for addition. I
   C. Introduce the Laws of Exponents in multiplication and division of variables. I
   D. Introduce Multiplication Properties for equations and grouping for manipulatives. I
   E. Introduce patterns in problem solving. I

4. **Content Standard 4 – Students demonstrate understanding of shape and an ability to use geometry.**
   A. Develop, identify, and construct plane geometric figures. D
   B. Introduce transformations and rotations. I
   C. Develop one, two, and three-dimensional measurements. D
   D. Introduce the use of geometric formulas including the Pythagorean theorem and appropriate units of measures. I
5. **Content Standard 5 – Students demonstrate understanding of measurable attributes and an ability to use measurement processes.**
   A. Develop standard and Metric System of measurement. M
   B. Develop finding Perimeter, Area, and Volume. M
   C. Develop the relationships and formulas for perimeter, area, and volume. D
   D. Develop units of measure. D
6. **Content Standard 6 – Students demonstrate understanding of an ability to use data analysis, probability, and statistics**
   A. Develop construction of graphs and tables of central tendency. D
   B. Develop methods of collecting and organizing data. D
7. **Content Standard 7 – Students demonstrate understanding of and an ability to use patterns, relations and functions.**
   A. Construct graphs (linear, bar, circle, etc.) D
   B. Introduce independent and dependent variables. I
   C. Develop problem solving and Scientific Methods. D

8th Grade MATHEMATICS

1. **Content Standard 1 – Students engage in the mathematical processes of problem solving and reasoning, estimation, communication, connections and application, and using appropriate technology.**
   A. Develop problem solving, formulate and select appropriate strategies. D
   B. Develop guess and check, make a list, work backwards, simple example, etc. D
   C. Interpret results from graph or table or any other source of information effectively. D
   D. Develop deductive and inductive reasoning to simple problem solving. D
2. **Content Standard 2 – Students demonstrate understanding of and an ability to use numbers and operations**
   A. Master the four operations on whole numbers, decimals, and fractions. M
   B. Develop the four operations on integers include order of operations. D
   C. Develop skills in mental math and estimation to check technology or for use when technology is not available. D
   D. Master solving proportions. M
   E. Develop methods in probability related to basic probability, sample spaces, and multiple event. D
   F. Develop the use of proportions. D
   G. Develop Commutative, Associative, and Distributive Properties. D
   H. Develop the Property of Zero for addition and the Property of One for multiplication. D

3. **Content Standard 3 – Students use algebraic concepts, processes, and language to model and solve a variety of real-world and mathematical problems**
   A. Develop understanding of the concept of variables, expressions, and equations. D
   B. Develop solving of linear equations. D
   C. Solve single and two-step equations involving a single variable. D
   D. Evaluate expressions involving variables in math sentences. D
   E. Find patterns and change them into rules or properties involving commutative, associative, zero, and distributive. D
   F. Develop understanding of the coordinate system. D
4. **Content Standard 4 – Students demonstrate understanding of shape and an ability to use geometry.**
   A. Master the identification of basic two and three-dimensional geometrical figures. M
   B. Develop the ability to use appropriate methods, tools, and units to solve problems involving angle measure, perimeter, circumference, area, and volume. D
   C. Make conjectures about geometric figures based on their knowledge of geometric transformations, congruence, and similarities. D
   D. Develop geometric formulas including the Pythagorean theorem and units of measure in a problem-solving situation. I
5. **Content Standard 5 – Students demonstrate understanding of measurable attributes and an ability to use measurement processes.**
   A. Develop estimation skills and make measurements, select appropriate units, and apply to concepts of perimeter, area, and volume. D
   B. Measure length, weight/mass, capacity, and angular measure in both the standard and the Metric system of measures. D
   C. Develop a measure of two and three-dimensional models using formulas and a variety of tools. D
6. **Content Standard 6 – Students demonstrate understanding of an ability to use data analysis, probability, and statistics**
   A. Develop probability and statistics to analyze given situations and the results of experiments. D
   B. Develop ability to systematically collect, organize, describe, analyze, and represent data using tables, charts, and graphs. D
   C. Develop measures of central tendency for data sets. D
   D. Predict, compare, and calculate probable outcomes of simple experiments or simulations. D
7. **Content Standard 7 – Students demonstrate understanding of and an ability to use patterns, relations and functions.**
   A. Develop types of graphs; line, pie, bar, histogram, stem and leaf plot to describe patters and relationships. D
   B. Develop use of tables and charts to solve problems to analyze functional relationships (Independent/Dependent variables). D
   C. Formulate and select appropriate strategies, solve multi-step problems, interpret and communicate valid arguments, choose correct technology to describe functions. D

Mathematics Content Standard 1

Students engage in the mathematical processes of problem solving and reasoning, estimation, communication, connections and applications, and using appropriate technology.

Rationale These processes are essential to all mathematics and must be incorporated in all other mathematics standards.

Benchmarks

Students will:

End of Kindergarten	End of Grade 1	End of Grade 2
1. solve problems from many contexts using a variety of strategies (e.g., estimate, make a table, look for a pattern, and patterning, guess and check, draw pictures, count on and count backwards.	1. solve problems from many contexts using a variety of strategies (e.g. estimate, make a table, look for a pattern, predict and compare, and draw pictures.) Explain the methods for solving these problems.	1. solve problems from many contexts using a variety of strategies (e.g., predict, estimate, make a table, look for a pattern, draw pictures, and simplify the problem). Explain the methods for solving these problems.
2. communicate mathematical ideas in a variety of ways (e.g. , verbal, concrete, pictorial, and graphical.)	2. communicate mathematical ideas in a variety of ways (e.g. verbal, concrete, pictorial, and graphical).	2. communicate mathematical ideas in a variety of ways (e.g., written, verbal, concrete, pictorial, graphical.)
3. sort and classify by attributes and recognize same and different and what does not belong.	3. recognize and investigate the relevance and usefulness of mathematics through applications, both in and out of school (e.g. by sorting, classifying, determining fair share, and same and different).	3. recognize and investigate the relevance and usefulness of mathematics through applications, both in and out of school. (e.g., sort, classify, recognize same and different.

End of Grade 3	End of Grade 4	End of Grade 5
1.solve problems from many contexts using a variety of strategies (e.g., draw, act it out, estimate, make a table, look for a pattern, and simplify the problem). Explain the methods for solving these problems. 1. communicate mathematical ideas in a variety of ways (e.g., written, verbal, concrete, pictorial, graphical, algebraic, and using drama). 2. recognize and investigate the relevance and usefulness of mathematics, both in and out of school. 3. select and use appropriate technology to enhance mathematical understanding. Appropriate technology may include, but is not limited to , paper and pencil, calculator, and computer.	1. solve problems from many contexts using a variety of strategies (e.g., estimate, make a table, look for a pattern, and simplify the problem). Explain the methods for solving these problems. 2. apply estimation strategies throughout the problem-solving process. 3. communicate mathematical ideas in a variety of ways (e.g., written, verbal, concrete, pictorial, graphical, algebraic). 4. recognize and investigate the relevance and usefulness of mathematics through applications, both in and out of school. 5. select and use appropriate technology to enhance mathematical understanding. Appropriate technology may include, but is not limited to, paper and pencil, calculator, and computer.	1. solve problems from many contexts using a variety of strategies (e.g., estimate, multi-step problems make a table, look for a pattern, and simplify the problem). Explain the methods for solving these problems. Formulate and use multi-step strategies. 2. apply appropriate estimation strategies throughout the problem-solving process. 3. communicate mathematical ideas in a variety of ways (e.g., written, verbal, concrete, pictorial, graphical, and algebraic). 4. recognize and investigate the relevance and usefulness of mathematics through applications, both in and out of school. 5. select and use appropriate technology to enhance mathematical understanding. Appropriate technology may include, but is not limited to, paper, and pencil, calculator, and computer.

End of Grade 6	End of Grade 7	End of Grade 8
1. solve multi-step problems using a variety of strategies. Generalize methods to new problem situations.	1. formulate and solve multi-step and nonroutine problems using a variety of strategies. Generalize methods to new problem situations.	1. formulate and solve multi-step and nonroutine problems using a variety of strategies. Generalize methods to new problem situations.
2. apply appropriate estimation strategies throughout the problem-solving process.	2. select and apply appropriate estimation strategies throughout the problem-solving process.	2. select and apply appropriate estimation strategies throughout the problem-solving process.
3. communicate mathematical ideas in a variety of ways (e.g., written, verbal, concrete, pictorial, graphical, algebraic).	3. interpret and communicate mathematical ideas in terms of mathematical terms and notations.	3. interpret and communicate mathematical ideas and logical arguments using correct mathematical terms and notations.
4. recognize and investigate the relevance and usefulness of mathematics through applications both in and out of school.	4. recognize and investigate the relevance and usefulness of mathematics through applications, both in and out of school.	4. recognize and investigate the relevance and usefulness of mathematics through applications, both in and out of school.
5. select and use appropriate technology to enhance mathematical understanding. Appropriate technology may include, but is not limited to, paper and pencil, calculator, and computer.	5. select and use appropriate technology to enhance mathematical understanding. Appropriate technology may include, but is not limited to, paper and pencil, calculator, computer, and data collection devices.	5. select and use appropriate technology to enhance mathematical understanding . Appropriate technology may include, but is not limited to, paper and pencil, calculator, computer, and data collection devices.

Mathematics Content Standard 2

Students demonstrate understanding of and an ability to use numbers and operations.

Rationale An understanding of numbers and how they are used is necessary in the everyday world. Computational skills and procedures should be developed in context so the learner perceives them as tools for solving problems.

Benchmarks

Students will:

End of Kindergarten	End of Grade 1	End of Grade 2
1. exhibit the concrete representation of a problem. 2. use the number system by counting to 100. 3. model concrete operations of addition and subtraction of whole numbers to 10. 4. model and explain part/whole relationships in everyday situations.	1. exhibit connections between the concrete and symbolic representation of a problem or concept using numbers to 10. 2. use the number system by counting, grouping, and applying place value concepts to 100. 3. model, explain, and use basic facts, the operations of addition and subtraction of whole numbers to 10. 4. model and explain part/whole relationships in everyday situations.	1. exhibit connections between the concrete and symbolic representations of a problem or concept using numbers to 18. 2. use the number system by counting, grouping and applying place value concepts to 100. 3. model, explain, and use basic facts to 18 the operations of addition and subtraction of whole numbers and mental mathematics. 4. model and explain multiplication. 5. model and explain part/whole relationships in everyday situations.

End of Grade 3	End of Grade 4	End of Grade 5
1. exhibit connections between the concrete and symbolic representations of a problem or concept. 2. use the number system by counting, grouping and applying place value concepts. To hundred thousand. 3. model, explain, and use basic facts, the operations of addition and basic facts of subtraction of whole numbers, and mental mathematics. 4. model and explain multiplication and division of whole numbers. 0-9 multiplication and division facts. 5. model and explain part/whole relationships in everyday situations.	1. exhibit connections between the concrete and symbolic representation of a problem or concept. 2. use the number system by counting, grouping and applying place value concepts. 3. model, explain, and use basic facts, the operations of addition and subtraction of whole numbers and mental mathematics. 4. model and explain multiplication and division of whole numbers. 5. model and explain part/whole relationship in everyday situations.	1. use the four basic operations with whole numbers, fractions, and decimals. 2. use mental mathematics and number sense in using order of operations, and order relations for whole numbers, fractions, and decimals. 3. develop number theory concepts (e.g., primes, factors and multiples).

End of Grade 6	End of Grade 7	End of Grade 8
1. use the four basic operations with whole numbers, fractions, and decimals. 2. use mental mathematics and number sense in using order relations for whole numbers, fractions, and decimals. 3. use the relationships and applications of ratio, proportion and percent. 4. develop number theory concepts (e.g., primes, factors, and multiples)	1. use the four basic operations with whole numbers, fractions, decimals, and integers. 2. use mental mathematics and number sense in using order of operations, and order relations for whole numbers, fractions, decimals, and integers. 3. use the relationships and applications of ratio, proportion, percent, and scientific notation. 4. develop and apply number theory concepts (e.g., primes, factors and multiples) in real-world and mathematical problem situations.	1. use the four basic operations with whole numbers, fractions, decimals, and integers. 2. use mental mathematics and number sense in using order of operations, and order relations for whole numbers, fractions, decimals, and integers. 3. use the relationships and applications of ratio, proportion, percent, and scientific notation. 4. develop and apply number theory concepts (e.g., primes, factors and multiples) in real-world and mathematical problem situations

Mathematics Content Standard 3

Students use algebraic concepts, processes, and language to model and solve a variety of real-world and mathematical problems.

Rationale Algebra is the language of mathematics and science. Through the use of variables and operations, algebra allows students to form abstract models from contextual information.

Benchmarks

Students will:

End of Kindergarten	End of Grade 1	End of Grade 2
1. use and continue to use patterns using symbols, letters, or numbers.	1. use letters to represent patterns in simple situations. 2. use inverse operations and other strategies to solve related facts to 10.	1. use letters to represent patterns in a simple situation. 2. explore the use of variables and open sentences to express relationships (e.g., missing addend). 3. use inverse operations and other strategies to solve related facts to 18.

End of Grade 3	End of Grade 4	End of Grade 5
1. use symbols (e.g., boxes) to represent numbers in simple situations. 2. explore the use of variables and open sentences to express relationships (e.g., missing addend). 3. use inverse operations and other strategies to solve number sentences.	1. use symbols (e.g., boxes or letters) to represent numbers in simple situations. 2. explore the use of variables and open sentences to express relationships (e.g., missing addend). 3. use inverse operations and other strategies to solve number sentences.	1. explore the use of variables and open sentences to express relationships (e.g., missing addend) in various operations. 2. represent situations and number patterns using tables, and graphs. 3. recognize and use the general properties of operations. (e.g., the distributive property).

End of Grade 6	End of Grade 7	End of Grade 8
1. develop the concepts of variable, expression and equation. 2. represent situations and number patterns using tables and graphs. 3. recognize and use the general properties of operations (e.g., the distributive property). 4. solve linear equations using concrete, numerical and algebraic methods.	1. understand the concepts of variable, expression and equations. 2. develop situations and number patterns using tables, graphs, verbal rules, equations, and models. 3. develop and use the general properties of operations (e.g., the distributive property). 4. solve linear equations using concrete, numerical and algebraic methods.	1. understand the concepts of variable, expression and equation. 2. represent situations and number patterns using tables, graph, verbal rules, equations, and models. 3. recognize and use the general properties of operations (e.g., the distributive property). 4. solve linear equations using concrete, numerical and algebraic methods. 5. investigate inequalities and nonlinear relationships informally.

Mathematics Content Standard 4

Students demonstrate understanding of shape and an ability to use geometry.

Rationale The study of geometry helps students represent and make sense of the world by discovering relationships and developing spatial sense.

Benchmarks

Students will:

End of Kindergarten	End of Grade 1	End of Grade 2
1. describe and classify plane and space figures.	1. describe, model, and classify plane and space figures. 2. identify lines of symmetry, congruent and similar shapes.	1. describe, model, and classify plane and space figures. 2. identify lines of symmetry, congruent and similar shapes, and positional relationships.

End of Grade 3	End of Grade 4	End of Grade 5
1. describe, model, and classify two- and three-dimensional shapes. 2. identify lines of symmetry, congruent and similar shapes	1. describe, model, and classify two- and three-dimensional shapes. 2. investigate and predict results of combining, subdividing, and changing shapes. 3. identify lines of symmetry, congruent and similar shapes, and positional relationships.	1. identify and compare plane and solid geometric figures. 2. understand geometric properties and relationships. 3. identify lines of symmetry, congruent and similar shapes, and positional relationships.

End of Grade 6	End of Grade 7	End of Grade 8
1. identify, describe, construct, and compare plane and solid geometric figures. 2. understand geometric properties and relationships. 3. identify lines of symmetry, congruent and similar shapes, and positional relationships. 4. represent geometric figures on coordinate grid	1. identify, describe, construct, and compare plane and solid geometric figures. 2. understand and apply geometric properties and relationships (e.g., the Pythagorean Theorem). 3. represent geometric figures on a coordinate grid. 4. introduce properties and transformations. 5. Introduce geometry as a means of describing the physical world.	1. identify, describe, construct, and compare plane and solid geometric figures. 2. understand and apply geometric properties and relationships (e.g., the Pythagorean Theorem). 3. represent geometric figures on a coordinate grid. 4. explore properties and transformations of geometric figures. 5. use geometry as a means of describing the physical world.

Mathematics Content Standard 5

Students demonstrate understanding of measurable attributes and an ability to use measurement processes.

Rationale The first step in scientific investigation is understanding the measurable attributes of objects.

Benchmarks

Students will:

End of Kindergarten	End of Grade 1	End of Grade 2
1. estimate, measure, and investigate length, weight, and time. 2. introduce the process of measuring and concepts related to units of measurement, including standard units (English and metric) and nonstandard units. 3. distinguish between coins and their value to $.25	1. estimate, measure, and investigate length, capacity, weight, and time. 2. develop the process of measuring and concepts related to units of measurement, including standard units(English and metric) and nonstandard units. 3. select and use appropriate tools and techniques. 4. identify value of combinations of coins to $.50.	1. estimate, measure, and investigate length, capacity, weight, time, and temperature. 2. develop the process of measuring and concepts related to units of measurement, including standard units (English and metric) and nonstandard units. 3. apply measurement skills to everyday situations. 4. select and use appropriate tools and techniques. 5. identify value of combinations of coins and bills to $4.99

End of Grade 3	End of Grade 4	End of Grade 5
1. estimate, measure, and investigate length, capacity, weight, area, volume, time and temperature. 2. develop the process of measuring and concepts related to units of measurement, including standard units (English and metric) and nonstandard units. 3. apply measurement skills to everyday situations. 4. select and use appropriate tools and techniques. 5. identify money through making change for small amounts.	1. estimate, measure, and investigate length, capacity, weight, area, volume, time and temperature. 2. develop the process of measuring and concepts related to units of measurement, including standard units (English and metric) and nonstandard units. 3. apply measurement skills to everyday situations. 4. select and use appropriate tools and techniques.	1. estimate, make and use measurements to describe objects in real-world situations. 2. select and use appropriate units and tools to measure in a particular setting. 3. develop the concept of perimeter, area, volume and capacity, weight and mass, angle measure, time and temperature. 4. develop an understanding of the structure and use of systems of measurement. Including English and metric. 5. introduce relationships between procedures for determining area and volumes.

End of Grade 6	End of Grade 7	End of Grade 8
1. estimate, make, and use measurements to describe, compare, and/or contrast objects in real-world situations. 2. select and use appropriate units and tools to measure to a level of accuracy required in a particular setting. 3. develop the concepts of perimeter, area, volume and capacity, weight and mass, angle measure, time, and temperature. 4. demonstrate understanding of systems of measurement, including English and metric 5. develop knowledge of formulas and procedures for determining area and volume.	1. estimate, make, and use measurements to describe, compare, and/or contrast objects in real-world situations. 2. select and use appropriate units and tools to measure to a level of accuracy required in a particular setting. 3. apply the concepts of perimeter, area, volume and capacity, weight and mass, angle measure, time, and temperature. 4. demonstrate understanding of the structure and use of systems of measurement, including English and metric. 5. develop the concepts of rate and other derived and indirect measurements. 6. demonstrate relationships between formulas and procedures of determining area and volume.	1. estimate, make, and use measurements to describe, compare, and/or contrast objects in real-world situations. 2. select and use appropriate units and tools to measure to a level of accuracy required in a particular setting. 3. apply the concepts of perimeter, area, volume and capacity, weight and mass, angle measure, time, and temperature. 4. demonstrate understanding of the structure and use of systems of measurements including English and metric. 5. use the concepts of rates and other derived and indirect measurements. 6. demonstrate relationships between formulas and procedures for determining area and volume.

Mathematics Content Standard 6

The students demonstrate understanding of an ability to use data, analysis, probability, and statistics.

Rationale With society's expanding use of data for prediction and decision making, it is important that students develop an understanding of the concepts and processes used in analyzing data

Benchmarks

Students will:

End of Kindergarten	End of Grade 1	End of Grade 2
1. collect, organize, and display data using bar pictograph or read, and interpret graphs.	1. collect, organize, and display data using bar, pictograph or tally marks. 2. construct, read, and interpret displays of data, including scatter, bar and pictographs. 3. compare and solve problems that involve collecting and analyzing data. 4. demonstrate basic concepts of chance (e.g., equally likely event, simple probabilities).	1. collect, organize, and display data with graphs. 2. construct, read, and interpret displays of data, including graphs. 3. compare and solve problems that involve collecting and analyzing data. 4. demonstrate basic concepts of chance (e.g., equally likely events, simple probabilities).

End of Grade 3	End of Grade 4	End of Grade 5
1. collect, organize, and display data with a graph. 2. construct, read, and interpret displays of data, including graphs. 3. compare and solve problems that involve collecting and analyzing data.	1. collect, organize, and display data. 2. construct, read, and interpret displays of data, including graphs. 3. formulate and solve problems that involve collecting and analyzing data. 4. demonstrate basic concepts of chance (e.g., equally likely events, simple probabilities).	1. collect, organize, and display data. 2. construct, read, and interpret tables, charts, and graphs. 3. formulate and solve problems that involve collecting and analyzing data. 4. demonstrate basic concepts of chance (e.g., equally likely events, simple probabilities).

End of Grade 6	End of Grade 7	End of Grade 8
1. collect, organize, and display data. 2. construct, read, and interpret tables, charts, and graphs. 3. formulate and solve problems that involve collecting and analyzing data. 4. demonstrate basic concepts of chance (e.g., equally likely events, simple probabilities).	1. systematically collect, organize, and describe data. 2. construct, read, and interpret tables, charts, and graphs. 3. draw inferences, construct, and evaluate arguments based on data analysis and measure of central tendency. 4. introduce predictions based on experimental results or probabilities.	1. systematically collect, organize, and describe data. 2. construct, read, and interpret tables, charts, and graphs. 3. draw inferences, construct, and evaluate arguments based on data analysis and measures of central tendency. 4. construct sample spaces and determine the theoretical and experimental probabilities of events. 5. make predictions based on experimental results or probabilities.

Mathematics Content Standard 7

Students demonstrate understanding of and an ability to use patterns, relations and functions.

Rationale One of the central themes of mathematics is the study of patterns, relations, and functions. Exploring patterns helps students develop mathematical power and instills in them an appreciation for the beauty of mathematics.

Benchmarks

Students will:

End of Kindergarten	End of Grade 1	End of Grade 2
1. recognize, describe, extend, and create variables of patterns	1. recognize, describe, extend, and create a variety of patterns using 3 variables.	1. recognize, describe, extend, and create a variety of patterns. 2. describe mathematical and real-world relationships.

End of Grade 3	End of Grade 4	End of Grade 5
1. recognize, describe, extend, and create a variety of patterns. 2. describe mathematical and real-world relationships.	1. recognize, describe, extend, and create a variety of patterns. 2. represent and describe mathematical and real-world relationship.	1. describe, extend, and create a variety of patterns. 2. introduce relationships with tables, graphs, and rules. 3. introduce patterns to represent and solve problems.

End of Grade 6	End of Grade 7	End of Grade 8
1. describe, extend, and create a variety of patterns and functions. 2. identify relationships with tables, graphs, and rules. 3. start to use patterns and functions to represent and solve problems.	1. develop, extend, analyze, and create a variety of patterns and functions. 2. develop and represent relationships with tables, graphs, and rules. 3. develop functional relationships to explain how a change in one quantity results in a change in another. 4. use patterns and functions to represent and solve problems. 5. introduce functions using graphical, numerical, physical, algebraic, and verbal models or representations.	1. describe, extend, analyze, and create a variety of patterns and functions. 2. describe and represent relationships with tables, graphs, and rules. 3. analyze functional relationships to explain how a change in one quantity results in a change in another. 4. use patterns and functions to represent and solve problems. 5. describe functions using graphical, numerical, physical, algebraic, and verbal models or representations.

9-12 Mathematics

Practical Math (Grades 9-10)

1. The students will strengthen skills in the use of whole numbers, decimals, the metric system, fractions, mixed numbers, ratio, percent, probability, statistics, geometry, positive and negative numbers, expressions, and graphing. (CS1) (D)
2. Learn the 5-step problem solving method. (CS2) (D)
    a. Understand
    b. Plan
    c. Solve
    d. Look back
    e. Answer
3. Use consumer and career problem solving applications. (CS1) (D)
4. Use problem-solving strategies for non-routine problems. (CS2) (D)
5. Learn to use a checking account. (CS1) (D)
    a. Reasons for a checking account
    b. Writing checks
    c. Balancing a checkbook
    d. Reconciling bank statements
6. Find the costs of buying and maintaining a car. (CS1) (D)
7. Develop a budget of finding and renting an apartment, paying utility bills and
8. Learn to solve problems involving percent and computing simple and compound interest. (CS2) (D)
9. Learn to read and make a table, find patterns and draw diagrams. (CS1) (D)

Pre Algebra I (Grades 9-10)

1. Engage in mathematical processes: (CS1)
    a. Problem Solving and reasoning. (inductive/deductive) D
    b. Estimation (rounding, front end method, etc.) D
    c. Communication (groups/class) D
    d. Connections and applications. (math and science) D
    e. Using appropriate technology. D

2. Build an understanding of the number systems and their application to the real world by expanding basic arithmetic concepts and connecting with basic algebraic concepts: (CS3)
    a. Commutative, Associative, and Distributive Properties D/M
    b. Property of Zero for addition and multiplication D
    c. Standard Order of Operations D/M
    d. Definition of Operations and their use D
    e. Real numbers system I/D
3. Develop patterns, equations, expressions, and methods of solving multiple step equations using math manipulative and algebraic equation solving methods: (CS7) D
    a. Addition Properties for equations and convenient zero for manipulative. D
    b. Laws of Exponents D
    c. Multiplication Properties for equations and grouping for manipulative. D
    d. Patterns in problem solving D
    e. Addition and Multiplication Properties for inequalities. I
    f. Square roots D
4. Develop understanding of algebra in the real world through the use of word problems dealing with money, age, stock market, etc.: (CS3) D
    a. Patterns showing comparisons I
    b. Relationships/functions D
    c. Independent/dependent variables D
    d. Data taking (graphs, frequency tables, etc.) D
    e. Probability and Statistics D
    f. Construction of graphs and tables
    g. Frequencies and central tendency (mean, median, mode, etc.) I/D
    h. Collect and organize data D
5. Solve equations using basic mathematical operations building from 1 step equation solving to simplifying and factoring polynomials: (CS2)
    a. Solving equations with one unknown D
    b. Solving equations by combining like terms D
    c. Solving equations with unknowns on both sides of equation I/D

Pre Algebra II (Grades 10-11)

1. Engage in mathematical processes: (CS1)
    a. Problem Solving and reasoning (inductive/deductive) D
    b. Estimation (rounding, front end method, etc.) D
    c. Communication (groups/class) D
    d. Connections and applications (math and science) D
    e. Using appropriate technology D
2. Build an understanding of the number systems and their application to the real world by expanding basic arithmetic concepts and connecting with basic algebraic concepts: (CS2, 3)
    a. Commutative, Associative, and Distributive Properties D
    b. Property of Zero for addition and multiplication D
    c. Standard Order of Operations D/M
    d. Definition of Operations and their use D/M
3. Distinguish between the number systems by comparing and contrasting: (CS2)
    a. Real number system I/D
    b. Rational number system I/D
    c. Irrational number system I/D
    d. Integers D
    e. Whole/natural numbers D
4. Patterns, equations, inequalities, expressions, and methods of solving multiple step equations and inequalities by using math manipulative and algebraic equation solving methods: (CS7)
    a. Addition Properties for equations and inequalities D
    b. Laws of Exponents D
    c. Multiplication Properties for equations and inequalities D
    d. Patterns in problem solving D
    e. Square roots D
    f. Rule of Pythagoras and slope intercept formula D
5. Understanding of algebra in the real world through the use of word problems dealing with money, age, stock market, distance, rate, etc.: (CS1)
    a. Patterns showing comparisons I
    b. Relationships/functions developed, Independent/dependent variables D
    c. Data taking (graphs, frequency tables, etc.) D
    d. Construction of graphs and tables D
    e. Frequencies and central tendency (mean, median, mode, etc.) D

Algebra I (Grades 9-10)

1. Ability to solve equations and inequalities (CS3)
    a. Master solving equations with one variable. M
    b. Master solving linear equations with the variables x and y. M
    c. Develop solving inequalities. D
2. Use of tables, graphs, computers and calculators. (CS1)
    a. Introduce the appropriate use of graphing calculators for Algebra. I
    b. Develop the use of tables and graphs together and why it would be appropriate to use both at the same time. D
    c. Develop the use of computer programs to help solve or understand math problems. D
3. Linear equations to include slope-intercept and graphing them. (CS6)
    a. Master graph linear equations by all necessary methods. M
    b. Find the slope and the y intercept given an equation or a pair of points. M
    c. Use two points, slope, and y-intercept to write linear equations. M
    d. Develop an understanding of when to use a linear equation model. D
4. Parabolas and quadratic equations - quadratic equation, graphing and relations. (CS7)
    a. Introduce graphing parabolas. I
    b. Develop the ability to use the quadratic formula to solve equations. D
    c. Solve quadratic equations by graphing, factoring, or by the quadratic formula. D
    d. Develop an understanding of when to use a quadratic equation model to solve a problem. D
5. Concrete situations and number patterns. (CS2)
    a. Be able to use a number pattern to find a rule for a function. D
    b. Develop use of number patterns to solve problems. D
6. Concepts of variables, expressions, and equations. (CS7)
    a. Master the use of variables, expressions, and equations in Algebra.
    b. Master evaluating expressions. M
    c. Master solving equations of all kinds using proper arithmetic and algebra methods. M

7. Square roots, exponents, and powers. (CS2)
    a. Develop the concept of a square root and how to find one. D
    b. Develop the concept of exponents and powers and what their inverses are. D
    c. Use exponents and powers to solve complex math problems. I

Geometry (Grades 9-10-11)

1. Construct, interpret, and draw 2 and 3 dimensional objects used in geometry and mathematics. (CS4)
    a. Develop the use of geometry construction tools to construct both simple and complex figures in geometry. D
    b. Master the identification and drawing or constructing of all the basic geometry figures. M
    c. Develop the names of three-dimensional solids. D
2. Develop classifying geometry figures, their names and definitions, their properties and apply these to their similarities and connections. True for the figures, polygons, circles, and triangles. (CS4) D
3. Understand and use formulas and representations for area, perimeter, and volume of geometrical figures. (CS5) D
    a. Master finding perimeters of all two and three-dimensional figures. M
    b. Master finding of the areas of all basic two-dimensional figures and complex figures made up of multiple figures. M
    c. Master finding of volumes of solids; prisms, cylinders, cones, pyramids, and combinations of. M
4. Develop inductive reasoning, using scientific principles, be able to create hypothesis or conjecture from data collected. (CS3) D
    a. Master the use of inductive reasoning to find rules for Algebra functions. M
    b. Master the process of using the scientific principles to conjecture in a math setting and be able to check conjectures for correctness. M
5. Demonstrate knowledge of the Pythagorean theorem and the ability to apply it to use of solving problems. (CS3) D
    a. Develop the use of the Pythagorean theorem to find any side in a right triangle. D
    b. Develop a working knowledge of the two special right triangles. D
    c. Develop the ability to use the Pythagorean theorem to solve complex problems. D

6. Introduce convergence and similarity and their use in solving problems. (CS4) I
7. Translate from synthetic to coordinate geometry and demonstrate knowledge of transformations and translations. (CS4)
    a. Develop the ability to slide, reflect, glide reflection, and rotate. D
    b. Develop the use transformations to tessellate. D
8. Introduce logical processes for proving different areas of geometry (i.e. proofs) (CS4) I/D

Algebra II (Grades 10-11)

1. Functions to include linear quadratic, exponential and logarithmic. (CS7)
    a. Notations M
    b. Graphs of functions M
    c. Explicit and recursive formulas M
2. Variation and graphs - direct, inverse, fundamental theorem, combined and joint. (CS6)
    a. Graphs of $y=kx$, $y=kx^2$, $y=k/x$, $y=k/x^2$ D
    b. Fitting a model to data D
3. Matrices - addition, multiplication, transformations, rotation, scale and size changes. (CS4)
    a. Rotations and perpendicular lines D
    b. Translations and parallel lines D
4. Systems - solve by tables, graphs, substitution, combinations and matrices. (CS6)
    a. Inequalities and compound sentences M
    b. Graphing inequalities in the coordinate plane M
    c. System of linear inequalities M
    d. Linear programming D
5. Powers - properties, geometric sequences, exponents to include positive and negative. (CS6,7)
    a. Power functions D
    b. Compound interest M
    c. Nth roots D

6. Polynomials - factoring, solving all types of polynomials, modeling data. (CS6)
    a. Polynomials and geometry D
    b. Estimating solutions to polynomial equations d
    c. Factor theorem I
    d. Rational-zero theorem I
    e. Modeling data with polynomials I
7. Inverses and radicals - composition of functions, properties, product and quotients, solving equations with radicals. (CS3)
    a. Radical notation for nth roots I
    b. Powers and roots of negative numbers D

Trigonometry: Functions/Statistics (Grades 11-12)

1. Data - tables and graphs, measure of center, variance, standard deviation and transformation of data. (CS6)
    a. Collecting data M
    b. Quartiles, percentiles, and box plots M
    c. Histograms M
    d. Using statistics package M
2. Functions and models - language, linear, line of best fit, step, quadratic models and polynomial models. (CS6)
    a. Language of functions M
    b. Correlation M
3. Powers - exponential and log functions, rational powers, finding exponential models and log models. (CS7)
    a. E and natural logarithms M
    b. Properties of logarithms M
    c. Solving exponential equations M
    d. Scientific calculation M
4. Trig functions and graphs of circular functions, matrices, and Trig relationships (CS4,5)
    a. Measure of angles and rotation D
    b. Sine, cosine, tangent functions M
    c. Exact values of trigonometric functions M
    d. Law of sines and cosines M

5. Probability and simulation, binomial and normal distribution. (CS6)
    a. Addition and multiplication counting principles M
    b. Permutations M
    c. Probability distribution M
    d. Random numbers M
6. Quadratic relations - ellipse, hyperbola, rotating relationships. (CS4,7)
    a. Geometry of ellipse I
    b. Hyperbola I
    c. General quadratic I

Pre Calculus/AP Calculus (Grade 12)

1. Use technology and graphs to explain and observe local and global behavior of a function. (CS7)
    a. Use graphs to understand functions and calculus at deeper level. Pre-D
    b. Use graphs to help know if an algebraic answer is correct. Pre-M
2. Limits of functions - understand, estimate, and calculate limits and their behavior. (CS7)
    a. Understand behavior of functions. Pre-D
    b. Be able to find where functions are increasing and decreasing. Pre-D
    c. Calculate if a function has a limit and if it does, find what the limit is. Pre-D
3. Derivatives - understand what a derivative is, and be able to manipulate it graphically, numerically, and analytically. (CS3) Pre-C
    a. Graph derivatives. I
    b. Find difference quotients. I
    c. Find derivatives of many different functions. I
    d. Use derivatives to solve real world problems. I
4. Be able to use slopes, rates of change, tangent lines, and derivatives as a function. (CS7) Pre-I
5. Be able to compute and apply derivatives to solve problems. (CS1) Pre-I

6. Interpret and apply the properties of definite integrals and their applications. (CS1,7) AP
    a. Find antiderivatives. D
    b. Mean Value theorem and Rolle′s theorem. I
    c. Riemann sums. I
    d. Ways to apply definite integrals D
7. Be able to find and use techniques of anti-derivatives and how they are applied. (CS3) AP
    a. Apply techniques of calculus to figures, growth and decay, functions, motion, power series, and exponential and log functions. D

Benchmarks for 9-12 Mathematics

Benchmarks for Practical Math

1. Increase skills in the area real number operations, percents, probability, geometry, and graphing.
2. Develop consumer and career problem solving applications.
3. Real life applications of math to include: checking accounts, budgets, borrowing money, and interest.
4. Read a table, finding patterns, and drawing diagrams.

Benchmarks for Pre-Algebra I

1. Engage in mathematical processes like problem-solving, reasoning, connections in applications, and using appropriate technology.
2. Build an understanding of the number system and their application to the real world by expanding basic arithmetic concepts in connecting with basic algebraic concepts.
3. Develop patterns equations expressions, and methods of solving multi-step equations using math manipulative and algebraic equation solving methods.
4. Develop understanding of algebra in real world through the use of word problems dealing with money, age, stock market, etc.
5. Solve basic algebraic equations.

Benchmarks for Pre- Algebra II

1. Engage in mathematical processes like problem-solving, reasoning, connections in applications, and using appropriate technology.
2. Build an understanding of the number system and their application to the real world by expanding basic arithmetic concepts in connecting with basic algebraic concepts.
3. Distinguish between number systems by comparing and contrasting(real, rational, irrational number systems, integers, and natural numbers.
4. Develop patterns equations expressions, and methods of solving multi-step equations using math manipulative and algebraic equation solving methods.
5. Develop understanding of algebra in real world through the use of word problems dealing with money, age, stock market, etc.

Benchmarks for Algebra I

1. Develop the ability to solve equations and inequalities.
2. Apply tables, graphs, and calculators to algebraic situations.
3. Develop problem-solving skills to linear equations to include slope-intercept, graphing, and tables.
4. Understand the relationships between parabolas and quadratic equations.
5. Develop concepts of variables, expressions, and equations.
6. Interpret square roots, exponents, and powers.

Benchmarks for Geometry

1. Construct, interpret, and draw 2and 3 dimensional objects used in geometry and mathematics.
2. Classify geometric figures their names ,definitions, and properties then apply these to their similarities and connections.
3. Understand and use formulas and representations for area, perimeter and volume of geometric figures.
4. Develop inductive reasoning using scientific principles, be able to create hypothesis or conjecture from data collected.
5. Demonstrate knowledge of the Pythagorean theorem and ability to apply it to solving problems.
6. Translate from synthetic to coordinate geometry and demonstrate knowledge of transformations.

Benchmarks for Algebra II

1. Solve functions to include: linear, quadratic, exponential, and logarithmic.
2. Interpret variations in graphs-direct inverse fundamental theorem combined and joint.
3. Apply matrices, properties, additions, multiplications, transformations, rotations, and scale and size changes.
4. Solve systems of equations by tables, graphs, substitutions, combinations, and matrices.
5. Factor and solve all types of polynomial equations
6. Apply powers, properties, geometric sequences, exponents to include positive and negatives.

Benchmarks for Trig functions/Stats

1. Interpret data to include; tables and graphs, measure of center, variance, standard deviation, and transformation of data..
2. Develop use of function and models-language, linear, line of best fit, step, quadratic models, and polynomial models.
3. Use of powers for exponential and log functions, rational powers, finding exponential and log models.
4. Develop trig functions and graphs of circular functions, matrices, and trig relationships.
5. Use of quadratic relations- ellipse, hyperbola, and rotating relationships.

Benchmarks for Pre-Calculus

1. Use technology and graphs to explain and observe local and global behavior of a function.
2. Understand, estimate, and calculate limits of functions and their behavior.
3. Recognize and understand what a derivative is and be able to manipulate it graphically, numerically, and analytically.
4. Be able to use slopes, rates of change, tangent lines, and derivatives as a function.
5. Be able to compute and apply derivatives to solve problems.

Benchmarks for Calculus

1. Interpret and apply the properties of definite integrals and their applications.
2. Be able to find and use techniques of anti-derivatives and how they are applied.
3. Use technology and graphs to explain and observe local and global behavior of a function.
4. Understand, estimate, and calculate limits of functions and their behavior.
5. Recognize and understand what a derivative is and be able to manipulate it graphically, numerically, and analytically.
6. Be able to use slopes, rates of change, tangent lines, and derivatives as a function.
7. Be able to compute and apply derivatives to solve problems.