MATHEMATICS CURRICULUM
PHILOSOPHY

The Mathematics Curriculum Objectives outline the essential components of the Math curriculum for each grade level (K-8) for Diocese of Arlington Catholic Schools. Additionally, the overall academic, personal, spiritual and physical development of the child is an integral part of these objectives.

At each grade level, students are expected to recognize and make meaningful connections with the seven Principles of Catholic Social Teaching: *Life and Dignity of the Human Person; Call to Family, Community, and Participation; Rights and Responsibilities; Option for the Poor and Vulnerable; Dignity of Work and the Rights of Workers; Solidarity; Care for God's Creation.* The incorporation of these principles at each grade-level curriculum is accomplished by references to them throughout the school year in word problems, cooperative learning tasks, and teacher commentary, thereby providing our students with additional contexts for developing a deep appreciation for them.

Mathematics is recognized as a great example of the expansion of God's gift of the human mind for the betterment of all mankind. In today's global society, we are challenged to fully understand and expand mathematical accomplishments to assure a peaceful, productive and more equitable world. Everyday lives are increasingly mathematical and technological. Understanding and applying quantitative skills and solving real-life problems are essential educational goals for all students, regardless of heritage, language, aptitude, talents, needs, or interests. Therefore, all students must be given the opportunity to learn and understand mathematical concepts. Teaching strategies and learning experiences must be varied, meaningful and engaging to students.

In our increasingly technological world, students need to be exposed to and know how to correctly use new tools, communication media and technology to solve cross-curricular mathematical problems. Technology, however, should not be a substitute for the understanding of concepts. Mastery of computational skills should be accomplished at the appropriate grade level as outlined in these objectives. Development of critical thinking, reasoning, and problem-solving skills is recommended in accordance with age-appropriate development of such higher-level thinking skills. It is through communication and collaboration that we will advance our students towards a deeper appreciation and knowledge of mathematics.

Guidelines for the Math Curriculum Updates

The committee has re-formatted the curriculum to include three main sections:

Mastery of Skills: These are the skills that a student should come into your classroom having learned the year prior. We realize our students come to us at various levels of knowledge, but for the most part, the mastery sections contains items they should be familiar with and, ideally, have mastered so that you can move on in your curriculum.

Application of Skills: This section contains the current grade level objectives. While the committee did not make dramatic changes, there are adjustments to the content. Please read through your grade level carefully and make note of changes. We also highly recommend that you review the grade level above and below your own to see how concepts build upon one another each year.

Enrichment: Although not an official section in each grade level, we do want to address the fact that often you have students who are ready to delve deeper into the curriculum. We do not recommend that these students be pushed into the grade level objectives above them, but rather that they go deeper into their current grade level objectives. Some suggestions for doing this include:

> **Reversibility & Generalization Questions:** A simple way teachers can enrich any concept is to provide students the answer or result and ask them for the corresponding question or initial conditions (*reversibility*) or ask them questions with broad constraints (*generalization*). Several benefits of these techniques are that they [1] introduce/encourage algebraic thinking, [2] generate open ended responses that allow students to utilize their creativity and/or untapped potential, and [3] promote student discussion, not only in sharing innovative problem solving techniques, but also in articulating a rule or model to describe the pattern among the potential solutions. For more resources, Google "NCTM and Reversibility." Examples:
>
>> Typical questions:
>>
>> What is the perimeter of a rectangle with the dimensions of 4" x 5"?
>>
>> Reversibility Question:
>>
>> What are the dimensions of a rectangle with a perimeter of 18"?
>>
>> Generalization Questions:
>>
>> Find the perimeter of a square with whole number side lengths. OR Find the side lengths of a square with an odd perimeter. What do you notice about your answers?

"Real" Math Questions, Modeling, and Responses: Provide real world questions or curiosities without initial values or 'scaffolding'. This would require students to [1] make logical estimates about the starting values, [2] gather data and research to find these values, or [3] provide several answers for each potential condition. Seeing that there is not one exact answer to these real situations, students would need to articulate and justify their problem solving process to convince others that their solution is reasonable. Not only do these opportunities allow students to apply past math concepts and background knowledge in atypical and creative ways, but they also reveal and enhance students' math sense and communication skills. For more resources see:

1. Dan Meyers *3-Act Math*: http://blog.mrmeyer.com/
2. Dr. Jennifer Suh's *Math Happenings:* http://mathhappenings.onmason.com/
3. Margaret Smith & Mary Stein's article in *Mathematics Teaching in the Middle School (Feb 1998)* "Selecting and Creating Mathematical Tasks" (Google the title).
4. Tim Erickson's *United We Solve*. (geared for 5th - 8th)

Example Problem:

How many vehicles would there be in a 2-mile long traffic jam? Explain your thinking, show all your calculations, and write down any assumptions you made. *(What the students would need to consider: number of lanes; types of vehicles; length of average vehicle; average distance between each vehicle…)*

MATH CURRICULUM COMMITTEE

The math committee worked over a two year period to make sure we have a strong curriculum. Members reviewed each grade level and worked to make sure that our curriculum is aligned vertically. In addition, drafts were sent to various math teachers across the diocese for feedback. The result is a strong curriculum that will meet the needs of our students. The Office of Catholic Schools would like to thank the following committee members:

Tricia Crone – Holy Spirit School	Corinna Schwartz – Holy Spirit School
Megan Eny – St. Patrick School	Laura Stio – Queen of Apostles
Maureen Long – St. Bernadette School	Kathryn Virusky – Holy Spirit School
Tom Marino – Sacred Heart Academy	Jessica Walker – Corpus Christi School
Kim Reineberg – St. Mark School	Debbie Woolfrey – All Saints School

MATHEMATICS
KINDERGARTEN

Overview

The kindergarten math curriculum provides the initial building blocks with a focus on developmental readiness. Emphasis is placed on the following skills:

- Developing the concept of number by counting;

- Combining sorting and comparing sets of objects;

- Recognizing and describing simple repeating patterns;

- Recognizing shapes and sizes of figures and objects;

- Investigating nonstandard measurement, collecting data, and creating graphs.

MASTERY OF SKILLS

Students will develop introductory mathematical skills through manipulatives, exploratory, and teacher directed learning.

MATHEMATICS
APPLICATION OF SKILLS

Standard 1 – Number Sense and Estimation

M.K.1   Apply the following strategies to solve real-life problems:

      a.   Trial and error;

      b.   Picture or object graphs;

      c.   Diagrams;

      d.   Patterns;

      e.   Role playing;

      f.   Use manipulatives;

      g.   Story telling.

M.K.2   Explain answers.

M.K.3   Problem solve in each math area as well as in other curriculum areas.

M.K.4   Create his/her own problems from every-day situations.

M.K.5   Express mathematical ideas orally and in writing, using proper vocabulary terms.

M.K.6   Recognize and write numerals 1 to 31.

M.K.7   Count numbers:

      a.   Count to 50;

      b.   Count backwards from 10.

M.K.8   Identify ordinals to fifth.

M.K.9   Match in one-to-one correspondence.

M.K.10   Recognize sets through 31 and identify corresponding numerals.

M.K.11   Recognize zero quantity.

MATHEMATICS

Standard 2 - Computation and Fluency

M.K.12   Recognize the use of the calculator.

M.K.13   Name the number of a new set after two sets are joined.

M.K.14   Add and subtract whole numbers using up to ten concrete objects.

MATHEMATICS

Standard 3 - Measurement

M.K.15   Indicate the ordered position of three objects and/or pictures from left-to-right, top-to-bottom, and/or bottom-to-top.

M.K.16   Understand and use directional words (over-under, above-below, before-after, and between).

M.K.17   Explore the meaning of inside and outside.

M.K.18   Recognize the concept of time for hour and half-hour using analog and digital clock.

M.K.19   Locate numbers on calendar (day, month, and year).

M.K.20   Name and sequence the days of the week and the months of the year.

M.K.21   Recognize penny, nickel, dime, and quarter from either side of the coins.

M.K.22   Utilize coins to develop counting skills and money awareness.

M.K.23   Compare lengths and heights (long, short, and tall), using non-standard units.

M.K.24   Compare weight (light and heavy), using scales and balances.

M.K.25   Recognize the use of the thermometer to measure and compare temperatures.

MATHEMATICS

Standard 4 - Geometry

M.K.26   Recognize one-half.

M.K.27   Identify, describe, and draw rectangles, squares, triangles, circles, and ovals.

M.K.28   Connect line segments to form basic figures using numbers up to 31.

MATHEMATICS

Standard 5 - Data Analysis and Probability

M.K.29   Relate physical materials, pictures, and diagrams to mathematical ideas.

M.K.30   Compare sets of objects (more, fewer, and equal).

M.K.31   Understand and use the concept of estimation.

M.K.32   Select a reasonable magnitude given a 1-digit numeral, a 2 digit numeral, and a 3-digit numeral (e.g. 5, 50, and 500) and explain reasonableness of choice.

M.K.33   Collect, organize, and describe data by counting and tallying.

M.K.34   Read and interpret displays of data (bar graphs, pictographs and tables).

M.K.35   Understand the concept of chance (i.e. by investigating and describing the result of dropping a two-colored counter or using a multi-colored spinner).

Standard 6 - Patterns, Functions and Algebra

M.K.36   Sort and classify objects according to similar attributes (size, shape, color).

M.K.37   Identify, describe, and extend a repeating relationship (pattern) found in common objects, sounds, and movements.

MATHEMATICS
FIRST GRADE

Overview

The first grade math curriculum is based on skills introduced in kindergarten, which will spiral to the second grade. Emphasis is placed on the following skills:

- Counting, sorting, and comparing sets of up to 100 objects;

- Recognizing and describing simple repeating and growing patterns;

- Drawing, sorting and describing certain two-dimensional figures;

- Applying the basic addition facts through the fives table;

- Applying the corresponding subtraction facts;

- Using non standard units to measure;

- Organizing and interpreting data;

- Recognizing fractions.

MATHEMATICS
APPLICATION OF SKILLS

Standard 1 – Number Sense

M.1.1   Apply the following strategies to solve real-life problems:
   a. Trial and error;
   b. Lists and tables;
   c. Diagrams;
   d. Patterns;
   e. Role playing;
   f. Guess and test;
   g. Use manipulatives;
   h. Simplify the problem;
   i. Write an equation/number sentence.

M.1.2   Explain and justify answers.

M.1.3   Problem solve in each math area as well as other curriculum areas.

M.1.4   Create his/her own problems from every-day situations

M.1.5   Relate physical materials, pictures, and diagrams to mathematical ideas.

M.1.6   Express mathematical ideas orally and in writing, using proper vocabulary terms.

M.1.7   Relate every-day language to mathematical language and symbols.

M.1.8   Recognize and write numerals 0 through 100.

M.1.9   Identify number words from zero to twenty.

M.1.10   Count by 2, 5, and 10 to 100.

M.1.11   Compare numbers using great than, less than, equal to.

M.1.12   Identify equivalent and non-equivalent sets.

M.1.13   Count objects in a set containing between ten and one hundred objects and name the corresponding numeral.

M.1.14   Identify numbers before, after, and between to 100.

M.1.15   Recognize zero quantity and use in number sentences, (ex. 3+0=3).

M.1.16   Group concrete objects by ones and tens to develop the idea of place value.

M.1.17   Recognize place value through hundreds.

MATHEMATICS

Standard 2 - Computation and Fluency

M.1.18   Understand the use of the calculator and computer for appropriate activities.

M.1.19   Count a group of pennies, nickels, dimes, and quarters with total value of $1.00 or less.

M.1.20   Understand the basic relationship between addition and subtraction.

M.1.21   Master basic facts, sums to 12 or less, and the corresponding subtraction facts.

M.1.22   Use manipulatives to show addition and subtraction problems through 10.

M.1.23   Use horizontal and vertical notation.

M.1.24   Rename numbers by addition or subtraction.

M.1.25   Understand the concept of missing numerals in addition and subtraction problems having sums or differences no greater than 9.

M.1.26   Solve one-step story and picture problems using basic addition and subtraction facts.

MATHEMATICS

Standard 3 - Measurement

M.1.27   Describe the proximity of objects in space (near, far close by, below, up, down, beside, next to).

M.1.28   Tell time by hour, half hour using analog or digital clock.

M.1.29   Identify days, weeks, months on calendar.

M.1.30   Identify number of pennies equivalent to a nickel, a dime, and a quarter.

M.1.31   Count collections of coins up to $1.00 and compare value.

M.1.32   Use standard and nonstandard units to measure length.

M.1.33   Use standard and nonstandard units to measure weight.

M.1.34   Measure temperature in degrees Fahrenheit.

M.1.35   Measure length to the nearest inch and nearest centimeter and measure volume capacity to the nearest pint, quart, liter.

M.1.36   Compare the volume capacities of two given containers by using concrete materials (e.g. jelly beans, sand, water, rice).

M.1.37   Compare the weight of two objects using a balance scale.

MATHEMATICS

Standard 4 - Geometry

M.1.38   Identify and represent concepts of one-fourth, one-third, and one half using appropriate materials or a drawing.

M.1.39   Identify and describe triangles, squares, rectangles and circles according to number of sides, sides with the same length, corners and square corners.

M.1.40   Identify and describe objects in the environment that depict geometric figures (triangle, rectangle, square and circle)

M.1.41   Identify geometric solids (pyramid, sphere, cone, cylinder, cube, rectangular solid).

M.1.42   Recognize symmetry in two-dimensional objects.

M.1.43   Connect line segments to form basic figures using numbers up to 100.

MATHEMATICS

Standard 5 - Data Analysis and Probability

M.1.44   Use estimation with quantities, measurement and problem solving.

M.1.45   Investigate, identify, and describe various forms of data collection in real world (e.g. recording daily temperature, lunch count, attendance, favorite foods).

M.1.46   Create and interpret line graphs, bar graphs, pictographs.

M.1.47   Interpret information displayed in a picture or object graph using vocabulary: more, less, fewer, greater than, less than.

M.1.48   Understand the concept of chance at a basic level.

MATHEMATICS

Standard 6 - Patterns, Functions and Algebra

M.1.49   Sort and classify concrete objects according to one or more attributes, including color, size, shape, and thickness.

M.1.50   Recognize, describe, extend, and create various patterns including rhythmic, color, shape and numeric using concrete materials.

MATHEMATICS
Second Grade

Overview

Emphasis is placed on the following skills:

- Extending the study of number and spatial sense to include three-digit numbers and three dimensional figures;

- Continuing to learn, use, and gain proficiency in the basic addition facts through 20 and the corresponding subtraction facts;

- Using standard U.S. customary and metric units of measurement;

- Predicting and using simple probability;

- Creating and interpreting picture and bar graphs;

- Working with a variety of patterns;

- Developing knowledge of equality by identifying missing numbers in addition and subtraction facts.

MATHEMATICS
Application of skills

Standard 1 – Number Sense and Estimation

M.2.1   Apply the following strategies to solve real-life problems:

  a.   Trial and error;
  b.   List or tables;
  c.   Diagrams;
  d.   Patterns;
  e.   Role playing;
  f.   Guess and test;
  g.   Use manipulatives;
  h.   Simplify the problem;
  i.   Write an equation.

M.2.2   Explain and justify answers.

M.2.3   Use technology for appropriate activities.

M.2.4   Problem solve in each math area as well as in other curriculum areas.

M.2.5   Create his/her own problems from every-day situations.

M.2.6   Express mathematical ideas orally and in writing, using proper vocabulary terms.

M.2.7   Relate every-day language to mathematical language and symbols.

M.2.8   Read, write, and understand the magnitude of numbers through 1,000.

M.2.9   Skip count by 2s, 3s, 4s, 5s, and 10s up to 100.

M.2.10   Read and understand the meaning of ordinal numbers to 50

M.2.11   Compare two whole numbers using symbols ("**>**", "**<**", "**=**"), and words ("greater than", "less than", or "equal to").

M.2.12   Identify part of a set and/or region that represents ½, ⅓, ¼, ⅕, ⅛, $^1/_{10}$ and write the corresponding fraction. divide shapes into fractional parts (½, ⅓, ¼, ⅕ , ⅛, $^1/_{10}$).

M.2.13   Identify the place value of each digit in a 3-digit numeral, using a numeration system.

M.2.14   Recognize odd and even numbers.

M.2.15   Estimate the sum or difference of two whole numbers, each 999 or less.

MATHEMATICS

Standard 2 - Computation and Fluency

M.2.16   Master basic addition facts, sums to 20 or less, and the corresponding subtraction facts.

M.2.17   Add and subtract multiples of 100.

M.2.18   Solve addition and subtraction problems using data from simple charts and picture graphs. Problems will require a one-step solution.

M.2.19   Be given a simple addition or subtraction fact, recognize and describe the inverse relationship between addition and subtraction (e.g.: $3 + \_ = 7$; $\_ + 3 = 7$; $7 - 3 = \_$; $7 - \_ = 3$) through the use of fact families.

M.2.20   Solve addition equations up to three two digit numbers.

M.2.21   Find the sum and difference of two whole numbers, each 999 or less, using various methods of calculation (mental computation, concrete materials, and paper and pencil). Problems involve both regrouping and no regrouping.

M.2.22   Understand and apply zero property of addition.

M.2.23   Show multiplication by joining equivalent sets.

M.2.24   Relate addition to multiplication, and subtraction to division.

M.2.25   Multiply by 2, 3, 4, and 5, products to 25.

M.2.26   Complete a sequence of ten or fewer consecutive whole numbers, 0 through 999 counting both forwards and backwards

M.2.27   Solve problems by completing a numerical sentence involving the basic facts for addition and subtraction. Examples include: $3 + \_\_ = 7$; or $9 - \_\_ = 2$. Students will create story problems using the numerical sentences.

MATHEMATICS

Standard 3 – Measurement, Money, and Time

M.2.28   Tell time to five minute intervals and the quarter hour using analog and digital clocks.

M.2.29   Recognize and explain elapsed time.

M.2.30   Count, compare, and make change, using a collection of coins and one-dollar bills.

M.2.31   Identify the correct usage of the cent symbol (¢), dollar symbol ($), and decimal point.

M.2.32   Determine past and future days of the week and identify specific dates on a calendar.

M.2.33   Estimate and then use a ruler to make linear measurements to the nearest centimeter, meter, inch, and foot, including the distance around a polygon (determine perimeter).

M.2.34   Estimate and then determine weight of familiar objects in pounds using a scale and estimate and then determine mass of familiar objects in grams and kilograms, using a balance.

M.2.35   Estimate and count the number of cubes in a rectangular box (determine volume).

M.2.36   Use measuring devices to compare metric and U. S. customary units (cups, pints, quarts, gallons, and liters) for measuring liquid volume using the concepts of more, less, and equivalent.

M.2.37   Measure temperature in degrees Fahrenheit and degrees Celsius.

M.2.38   Use grid paper to estimate, and then count, the number of square units needed to cover a given surface (determine area).

MATHEMATICS

Standard 4 - Geometry

M.2.39   Relate physical materials, pictures, and diagrams to mathematical ideas.

M.2.40   Identify and describe a cube, rectangular solid, sphere, cylinder, pyramid, and cone, according to the number and shape of faces, edges, bases and corners by using models and/or geoboards.

M.2.41   Compare and contrast plane and solid geometric shapes (circle/sphere, square/cube, triangle/pyramid, and rectangle/rectangular solid) by using models and/or geoboards.

M.2.42   Identify and create symmetrical figures, using various concrete materials.

M.2.43   Demonstrate, using concrete models, how an object can slide, flip, or turn.

MATHEMATICS

Standard 5 - Data Analysis and Probability

M.2.44   Read, construct, and interpret displays of data (bar graphs, pictographs, line graphs and tables).

M.2.45   Explore and record concepts of chance using spinners and colored tiles/cubes, and use the data to predict which of two events is more likely to occur if the experiment is repeated.

MATHEMATICS

Standard 6 - Patterns, Functions and Algebra

M.2.46   Recognize number patterns in sequence.

M. 2.47   Identify, create, and extend a wide variety of patterns, using symbols and objects.

MATHEMATICS
THIRD GRADE

Overview

The third grade math curriculum encompasses several essential foundation-building skills that are prerequisite to the fourth grade curriculum. Students entering third grade are expected to have mastered basic addition and subtraction facts, as well as addition and subtraction with regrouping. Rising third graders should grasp the basic concept of multiplication and division. Emphasis is based on the following skills:

- Read and write decimals expressed as tenths and hundredths;

- Compare two fractions with like or unlike denominators using concrete materials;

- Master multiplication and division facts for products and dividends through 144, and recognize the correct operational signs for each operation;

- Multiply three single-digit factors with products up to 144;

- Multiply 1, 2, 3, and 4-digit factors by 1-digit factors, with and without regrouping;

- Compute long division problems with 1-digit divisors;

- Add and subtract proper fractions with like denominators of 10 or less;

- Add and subtract decimals expressed as tenths;

- Use circle graphs and Venn diagrams in addition to pictographs, bar graphs, and line graphs to collect, organize, read, and interpret data;

- Identify, draw and label points, lines, line segments, angles, and diagonals, using a ruler or straight edge.

MASTERY OF SKILLS

- Students will master basic math facts, addition and subtraction to 20

- Students will master time to the half hour, quarter hour and five minute intervals using analog and digital clocks.

MATHEMATICS

APPLICATION OF SKILLS

Standard 1 – Number Sense and Estimation

M.3.1   Problem solve in each math area as well as in other curriculum areas.

M.3.2   Create his/her own problems from every-day situations

M.3.3   Relate physical materials, pictures, and diagrams to mathematical ideas.

M.3.4   Express mathematical ideas orally and in writing, using proper vocabulary terms.

M.3.5   Read and write 6-digit numerals and identify the place value of each digit.

M.3.6   Round 2 and 3-digit numbers to the nearest ten, and round 3-digit numbers to the nearest hundred and nearest thousand.

M.3.7   Compare whole numbers through hundred thousand utilizing symbols ">", "<", "="and words "greater than", "less than," and "equal to."

M.3.8   Recognize and use the inverse relationships of addition/subtraction and multiplication/division to complete basic fact sentences.

MATHEMATICS

Standard 2 - Computation and Fluency

M.3.9   Use estimation strategies by rounding to nearest ten, hundred, and thousand for all four operations.

M.3.10   Use 0 as a placeholder.

M.3.11   Find the sums and differences of two whole numbers (9,999 or less), with and without regrouping, using paper and pencil, estimation, and mental computation. Technology is to be used, at times, to check answers.

M.3.12   Solve addition equations with three or more addends.

M.3.13   Use word clues to determine which of the four operations to use in problem solving

M.3.14   Solve one and two step word problems.

M.3.15   Determine, by counting, the value of a group of bills and coins up to five dollars, compare the value of coins and bills and make change.

M.3.16   Express monetary values using cent (¢), dollar ($), and decimal points.

M.3.17   Use mental computation for all four operations.

M.3.18   Identify and investigate the identity and the commutative properties for addition and multiplication.

M.3.19   Master multiplication and related division facts for products and dividends through 144.

M.3.20   Define and use the terms: factor, product, dividend, divisor and quotient.

M.3.21   Multiply three 1-digit numbers, with products up to 144.

M.3.22   Multiply 1, 2, 3 and 4-digit factors by 1-digit factors, with and without regrouping.

M.3.23   Divide 1, 2, 3 and 4-digit dividends by 1-digit divisors, with and without remainders.

M.3.24   Read, identify and write fractions and mixed numbers.

M.3.25   Express a whole number as a fraction.

M.3.26   Compare the numerical value of two fractions having like and unlike denominators, using concrete materials.

M.3.27   Add and subtract with proper fractions having like denominators of 12 or less, using concrete materials and paper and pencil.

M.3.28   Read and write decimals expressed as tenths and hundredths using concrete materials.

M.3.29   Add and subtract with decimals expressed as tenths, using concrete materials and paper and pencil.

MATHEMATICS

Standard 3 – Measurement

M.3.30   Tell time to one-minute intervals using both analog and digital clocks.

M.3.31   Identify equivalent periods of time, including relationships among days, weeks, months, and years, as well as between minutes, hours, and fractions of an hour.

M.3.32   Calculate elapsed time, expressed in hours and minutes.

M.3.33   Use estimation for quantities and measurement.

M.3.34   Measure:

   a.   Length (½ inch, inches, feet, yards, centimeters, and meters)

   b.   Capacity (cups, pints, quarts, gallons, and liters)

   c.   Weight (ounces, pounds)

   d.   Mass (grams and kilograms)

   e.   Temperature (degrees Fahrenheit and degrees Celsius).

M.3.35   Order (least to greatest and greatest to least) customary and metric units for length, capacity, volume and weight.

MATHEMATICS

Standard 4 - Geometry

M.3.36   Identify and describe congruent and symmetrical two-dimensional figures, using tracing procedures when given appropriate drawings or models.

M.3.37   Use concrete materials to predict and describe the results of sliding, flipping and turning two-dimensional objects.

M.3.38   Recognize and describe plane and solid geometric figures (square, rectangle, triangle, cube, rectangular solid, cone, sphere, and cylinder), using identifying properties (number of corners, square corners, number and shape of faces, number of edges and vertices.

M.3.39   Identify, draw, and label points, lines, line segments, angles, rays and diagonals, using a ruler or straight edge.

M.3.40   Find the perimeter of regular polygons and area of rectangles and squares.

M.3.41   Find the volume of rectangular prisms

MATHEMATICS

Standard 5 - Data Analysis and Probability

M.3.42   Construct, collect, organize, read, and interpret data represented on:

a.   pictographs

b.   bar graphs

c.   line graphs

d.   tables

e.   circle graphs

f.   Venn diagrams

g.   Coordinate grids (ordered pairs)

M.3.43   Investigate and explore the concept of probability as chance, listing possible outcomes of a given situation

MATHEMATICS

Standard 6 - Patterns, Functions and Algebra

M.3.44   Identify and locate missing whole numbers and fractional parts on a number line.

M.3.45   Recognize, describe, and extend patterns formed using concrete materials, tables, and pictures.

M.3.46   Analyze a given pattern formed using concrete objects and pictures, and then create a pattern with the same attributes.

M.3.47   Explore and predict number patterns.

MATHEMATICS
FOURTH GRADE
Overview

Emphasis is placed on the following skills:

- Multiply 2 and 3 digit factors

- Divide by 2 digit divisors

- Using rules of divisibility by 2, 3, 4, 5, 6, 9 and 10

- Estimate by rounding and using compatible numbers

- Adding, Subtracting with both like and unlike denominators

- Compute simple averages, add and subtract decimals

- Converting units within a measurement system

MASTERY OF SKILLS

- Mastering multiplication and division facts for products and dividends through 144

- Find the sums and differences of two whole numbers (9,999 or less), with and without regrouping.

MATHEMATICS

APPLICATION OF SKILLS

Standard 1 – Number Sense and Estimation

M.4.1   Apply the following strategies to solve real-life problems:
   a. Trial and error
   b. Lists or tables
   c. Diagrams
   d. Patterns
   e. Role playing
   f. Guess and test
   g. Use manipulatives
   h. Simplify the problem
   i. Write an equation
   j. Work backwards.

M.4.2   Explain and justify answers.

M.4.3   Understand the use of the calculator and computer for appropriate problem- solving activities.

M.4.4   Problem solve in each math area as well as in other curriculum areas.

M.4.5   Create his/her own problems from everyday situations.

M.4.6   Relate physical materials, pictures and diagrams to mathematical ideas.

M.4.7   Express mathematical ideas orally and in writing using proper vocabulary terms.

M.4.8   Relate every-day language to mathematical language and symbols.

M.4.9   Expand number and operation sense, including an understanding of place value through millions and read and write numbers through millions in standard and expanded form.

M.4.10   Round whole numbers expressed through millions to the nearest thousand, ten thousand and hundred thousand.

M.4.11   Compare whole numbers, expressed through millions.

M.4.12   Develop an awareness of the relative size of fractions having denominators of 12 or less.

M.4.13   Recognize, identify and represent equivalent fractions.

M.4.14   Relate fractions to decimals using concrete objects.

M.4.15   Read, write, represent, identify, compare and order decimals expressed through thousandths and round them to the nearest whole number, nearest tenth and nearest hundredth.

M.4.16   Explore estimation strategies and use them in all four operations.

M.4.17   Develop a range of good estimates which determine the reasonableness of results.

M.4.18   Use estimation with quantities, measurement, computation, and problem solving.

M.4.19   Make mental computations and use estimation in all four operations

MATHEMATICS

Standard 2 - Computation and Fluency

M.4.20   Understand how basic arithmetic operations are related to one another.

M.4.21   Recognize and use properties of an operation (commutative, associative, zero, identity).

M.4.22   Understand and correctly use the terms: prime, composite, factor, and multiple.

M.4.23   Use rules of divisibility by 2, 3, 5, and 10.

M.4.24   Use 0 as a placeholder.

M.4.25   Read and write roman numerals through 3,000 using symbols: I, V, X, L, C, D, M.

M.4.26   Maintain and expand skills of addition and subtraction to include adding and subtracting 5 and 6-digit numbers, with and without regrouping.

M.4.27   Maintain mastery of basic multiplication and division facts and the ability to multiply 3 and 4-digit numbers by 1-digit numbers, with and without regrouping.

M.4.28   Multiply 3-digit numbers by 2-digit numbers, with and without regrouping.

M.4.29   Multiply 3-digit numbers by 3-digit numbers.

M.4.30   Multiply and divide by 10, 100, and 1,000, mentally

M.4.31   Divide 2, 3, and 4-digit dividends by 2-digit divisors.

M.4.32   Divide by 2 and 3-digit divisors, with 0 in the quotients.

M.4.33   Add, subtract, multiply, and divide dollars and cents.

M.4.34   Find the greatest common factor, least common multiple, and least common denominator.

M.4.35   Add and subtract fractions and mixed numbers with like and unlike denominators of 12 or less and 100 and decimals through thousandths and express in simplest form.

M.4.36   Add and subtract decimals through thousandths and express in simplest form.

M.4.37   Multiply and divide fractions by a whole number and express in simplest form.

M.4.38   Create and solve story problems using computation in all operations.

M.4.39   Identify the division statement that represents a fraction.

MATHEMATICS

Standard 3 – Measurement

M.4.40   Measure using customary and metric units

     a.   Length (⅛, ¼, ½ inches; feet; yards; millimeters; centimeters; meters; and kilometers

     b.   Volume (cups, pints, quarts, gallons, milliliters, and liters)

     c.   Weight (ounces, pounds and tons)

     d.   Mass (grams and kilograms)

     e.   Temperature (degrees Fahrenheit and degrees Celsius)

M.4.41   Convert units within a measurement system (either customary or metric).

M.4.42   Make general comparisons between customary and metric measurements.

M.4.43   Use measurement to explore and describe the environment.

M.4.44   Determine and use elapsed time to solve problems.

MATHEMATICS

Standard 4 - Geometry

M.4.45   Recognize and identify three-dimensional figures, including prisms, pyramids, cylinders, cones, spheres, rectangular prisms, triangular prisms and cubes.

M.4.46   Find the perimeter and area of polygons using standard formulas.

M.4.47   Identify and describe the relationship between and among plane, line, line segment, point, ray, circle and angles including end points and vertices.

M.4.48   Identify that angles are measured in degrees. (up to 360 degrees or a full circle)

M.4.49   Estimate angle measures using 45 degrees and 180 degrees as referents and use protractors to measure given angle(s).

M.4.50   Use concrete materials to predict and describe the results of sliding (translation), flipping (reflection), and turning (rotation) two-dimensional objects.

M.4.51   Recognize and identify intersecting, parallel and perpendicular lines.

M.4.52   Recognize properties of quadrilaterals and regular polygons.

M.4.53   Define polygons and identify polygons with 10 and fewer sides.

M.4.54   Recognize congruent and symmetrical figures.

MATHEMATICS

Standard 5 - Data Analysis and Probability

M.4.55   Construct, collect, organize, read and interpret data represented on:

a. pictographs

b. bar graphs

c. line graphs

d. tables

e. circle graphs

f. Venn diagrams

g. Coordinate grids (ordered pairs)

M.4.56   Investigate and explore the concept of probability as chance, listing possible outcomes of a given situation.

M.4.57   Compute simple averages including mean, median, mode and range.

MATHEMATICS

Standard 6 - Patterns, Functions and Algebra

M.4.58   Recognize, describe, and extend a given pattern, using concrete materials and tables.

M.4.59   Understand the concept of a variable and solve a simple equation using a variable to represent a missing number in the equation

M.4.60   Solve problems involving pattern identification and completion of patterns.

MATHEMATICS
Fifth Grade
Overview

The fifth grade Math curriculum is based on the skills introduced and mastered in Kindergarten through fourth grades, which spiral to the fifth grade level. Rising fifth graders should have mastered: 1) Addition/Subtraction of whole numbers, decimals and fractions; 2) Multiplication of three-digit whole numbers and decimals x whole numbers. Emphasis is placed on the following skills:

- Add, subtract, multiply and divide whole numbers with place values to the ten thousands (divisors to the hundreds);

- Add, subtract, multiply and divide decimals with place values to the thousandths;

- Add, subtract, multiply and divide fractions and mixed numbers, expressing answers in simplest form;

- Multiply and divide mentally by 10, 100, and 1,000

- Compare and convert among fractions, decimals, and percentages;

- Multiply two decimals to the thousandths place;

- Find and use the mean, median, mode and range of a given set of numbers;

MASTERY OF SKILLS

- Add, subtract, multiply and divide whole numbers with place values to the ten thousandths (divisors to the hundreds)

- Add, subtract fractions with unlike denominators

- Add, subtract decimals

MATHEMATICS

Standard 1 – Number Sense and Estimation

M.5.1   Apply the following strategies to solve problems, including multi-step, non- routine, and real-life problems:

     a.   Trial and error;

     b. Lists or tables;

     c.   Diagrams;

     d. Patterns;

     e.   Act it out;

     f.   Guess and test;

     g. Use manipulatives;

     h. Simplify the problem;

     i.   Write an equation;

     j.   Work backwards.

M.5.2   Verify that a solution is reasonable with respect to the original problem situation.

M.5.3   Understand the use of technology for appropriate problem- solving activities.

M.5.4   Use mathematics to draw conclusions from concrete situations and to justify mathematical arguments.

M.5.5   Express mathematical ideas in oral, written, pictorial, graphic, and symbolic forms.

M.5.6   Understand the magnitude of whole numbers through millions (reading and writing in word, standard and expanded form).

M.5.7   Apply the following properties when working with addition and multiplication: commutative; associative; zero; identity; and distributive.

M.5.8   Round whole numbers to the nearest million, and decimals to the nearest thousandth.

M.5.9   Read, write, and identify the place values of decimals, through ten-thousandths.

M.5.10   Compare whole numbers, fractions, decimals, and (percents) "E".

M.5.11   Use 0 as a placeholder in decimals.

MATHEMATICS

M.5.12   Read and locate negative integers on a number line

M.5.13   Understanding negative integers through familiar applications such as temperatures below zero, yards lost and gained in football, etc

Standard 2 - Computation and Fluency

M.5.14   Create and solve problems using the order of operations involving addition, subtraction, multiplication, and division of whole numbers and decimals, using paper and pencil, estimation, mental computation, and calculators.

M.5.15   Given a dividend of four digits or less and a divisor of three digits or less, find the quotient and remainder.

M.5.16   Find the product of two numbers expressed as decimals through thousandths, using an appropriate method of calculation, including paper and pencil, estimation, mental computation, and calculators.

M.5.17   Given a dividend expressed as a decimal through ten-thousandths and a single- digit divisor, find the quotient.

M.5.18   Make equivalent fractions for a given fraction.

M.5.19   Add and subtract fractions and mixed numbers, with and without regrouping, and express answers in simplest form; problems will include like and unlike denominators.

M.5.20   Multiply and divide fractions and mixed numbers.

M.5.21   Use short division to divide 1, 2, 3, and 4-digit dividends by 1-digit divisors, with and without a remainder.

MATHEMATICS

Standard 3 – Measurement, Time, and Money

M.5.22   Use appropriate measuring devices and units of measurement (customary and metric) to solve problems involving:

     a.   Length (inches, feet, yards, centimeters, and meters);

     b.   Capacity (cups, pints, quarts, gallons, and liters);

     c.   Weight (ounces, pounds, and tons);

     d.   Mass (grams and kilograms); and

     e.   Temperature (degrees Fahrenheit and degrees Celsius).

M.5.23   Develop strategies for estimating the perimeters, areas, and volumes of irregular shapes.

M.5.24   Determine and use elapsed time to solve problems.

M.5.25   Estimate the conversion of Fahrenheit and Celsius units relative to familiar situations (freezing and boiling points of water, normal body temperature, etc.).

M.5.26   Identify and describe the diameter, radius, chord, and circumference of a circle.

M.5.27   Describe and determine the perimeter of regular and irregular polygons, and find the area of squares, rectangles, parallelograms and triangles.

M.5.28   Explore what happens to measurements of a two-dimensional figure, such as perimeter and area, when the shape is changed in some way.

M.5.29   Develop strategies to determine the surface area (square units) and volume (cubic units) of rectangular solids.

M.5.30   Use measurement to explore and describe the environment.

MATHEMATICS

Standard 4 - Geometry

M.5.31	Recognize, draw and construct three-dimensional geometric figures from two- dimensional representations, or from nets.
M.5.32	Identify, define, and represent points, lines, line segments, rays, angles, and planes.
M.5.33	Identify the ordered pair for a point, and locate the point for an ordered pair in all four quadrants of a coordinate plane.
M.5.34	Find the distance between points along horizontal and vertical lines of a coordinate graph.
M.5.35	Identify, measure and draw acute, right, obtuse, and straight angles, using appropriate tools.
M.5.36	Classify triangles by sides (scalene, isosceles, equilateral) and angles (acute, right and obtuse).
M.5.37	Use geometrical figures to solve problems involving numbers and number sense, measurement, and real-life problem-solving situations.

MATHEMATICS

Standard 5 - Data Analysis and Probability

M.5.38   Construct, collect, organize, read, and interpret data represented on bar graphs, line graphs, circle graphs, Venn diagrams, tables and coordinate graphs.

M.5.39   Find and use the mean, median, mode and range of a data set.

M.5.40   Understand that the measure of the likelihood of an event can be represented as a fraction or a decimal.

MATHEMATICS

Standard 6 - Patterns, Functions and Algebra

M.5.41   Investigate, describe, and extend numerical and geometric patterns formed by:

   a.   Powers of 10

   b.   Perfect squares

   c.   Triangular numbers

   d.   Arithmetic sequences.

M.5.42   Investigate, describe, and apply the concept of variables.

M.5.43   Use a variable to represent a given verbal quantitative expression, involving one operation.

M.5.44   Solve problems involving pattern identification and completion of patterns.

M.5.45   Write an open sentence with addition, subtraction, multiplication and division, using a variable to represent a missing number.

M.5.46   Create a problem situation, based on a given open sentence using a single variable.

M.5.47   Investigate how changes in one variable affect a second variable.

MATHEMATICS
SIXTH GRADE
Overview

The sixth grade math curriculum is based on the skills introduced and mastered in Kindergarten through fifth grades. For sixth grade, emphasis is placed on the following skills:

- Solve single-step and multi-step problems that involve addition, subtraction, multiplication, and division of fractions, mixed numbers, and decimals, expressing answer either in simplest form or rounded to the nearest given place value; check solution by comparing it with the estimation resulting from rounding the original numbers.
- Add, subtract, multiply, and divide integers.
- Round, compare, order, and graph (on a number line) positive rational numbers (whole numbers, fractions, mixed numbers, terminating and repeating decimals); convert between positive fractions (including improper fractions and mixed numbers), decimals, percents, numbers written in scientific notation, and points on a number line.
- Find and interpret the percent of a number in a real world context (ex. compute 5%, 10%, 15%, or 20% in practical situations such as tips, tax, and discounts).
- Write simple variable expressions, equations, and inequalities that model verbal phrases, patterns, and real world contexts; write and solve one-step linear equations with one variable, including proportions, by applying the Properties of Equality; write, interpret, and graph inequalities with one variable.
- Write the ordered pair of a given point; graph an ordered pair onto a coordinate plane; determine the location of an ordered pair (axis or quadrant); find the distance between two point on the same horizontal or vertical line.
- Find the perimeter and area of rectangles, triangles, parallelograms, and trapezoids; find the circumference and area of circles, approximating for π (pi) or writing in π (pi) notation as necessary; find the volume and surface area of cubes and prisms (rectangular and triangular) using unit cubes, nets, and formulas.

MASTERY OF SKILLS

- Apply rules of divisibility for 2, 3, 4, 5, 6, 9, and 10 (ex. simplify fractions; identify prime and composite numbers).
- Mentally multiply or divide whole numbers or decimals by 10, 100, and 1000.
- Round whole numbers and decimals to nearest place value; round proper fractions and mixed numbers to the nearest whole number.
- Add, subtract, multiply, and divide whole numbers (up to two-digit divisors), decimals, and proper fractions (expressing answer in either simplest form or rounded to the nearest given place value).

MATHEMATICS

APPLICATION OF SKILLS

Standard 1 – Number Sense and Estimation

M.6.1   Identify, compare, and order integers; represent values from real world contexts with integers; interpret and apply the absolute value of an integer.

M.6.2   Round, compare, order, and graph (on a number line) positive rational numbers (whole numbers, fractions, mixed numbers, terminating and repeating decimals).

M.6.3   Convert between positive fractions (including improper fractions and mixed numbers), decimals, percents, numbers written in scientific notation (positive exponents), and points on a number line.

M.6.4   Find the prime factorization of a composite number using exponents (if applicable); find and apply the Greatest Common Factor (GCF) and Least Common Multiple (LCM) in real world contexts (ex. making equivalent groups; finding repeated events).

M.6.5   Identify and evaluate square roots of perfect squares from 0 to 256.

MATHEMATICS

Standard 2 - Computation and Fluency

M.6.6   Solve single-step and multi-step problems that involve addition, subtraction, multiplication, and division of fractions or mixed numbers, expressing answer either in simplest form or rounded to the nearest given place value; check solution by comparing it with the estimation resulting from rounding the original fractions or mixed numbers.

M.6.7   Solve single-step and multi-step problems that involve addition, subtraction, multiplication, and division of decimals, expressing answer either precisely [terminating or repeating decimal (using bar notation)] or rounded to the nearest given place value; check solution by comparing it with the estimation resulting from rounding the original decimals.

M.6.8   Add, subtract, multiply, and divide integers.

M.6.9   Find and interpret the percent of a number in a real world context (ex. compute 5%, 10%, 15%, or 20% in practical situations such as tips, tax, and discounts).

MATHEMATICS

Standard 3 – Measurement

M.6.10   Determine reasonable estimates for the measurement of a given object within a given unit of the customary and metric systems (length/distance, mass/weight, and capacity/volume); (ex. verify the solution from a real world context problem).

M.6.11   Compare and convert units of measure within the customary and metric systems (length/distance, mass/weight, and capacity/volume) and time, including compound units (ex. 6 ft 2 in).

M.6.12   Add and subtract compound units of measurement within the customary system (length/distance, weight, and volume) and of time; multiply and divide a compound unit of measure by a whole number.

MATHEMATICS

Standard 4 - Geometry

M.6.13   Derive an approximation for π (pi) (3.14 or 22/7) by gathering data and comparing the circumference to the diameter ratio of various circles.

M.6.14   Find the perimeter and area of rectangles, triangles, parallelograms, and trapezoids; find the circumference and area of circles, approximating for π (pi) or writing in π (pi) notation as necessary.

M.6.15   Find the volume and surface area of cubes and prisms (rectangular and triangular) using unit cubes, nets, and formulas.

M.6.16   Identify, classify, and sketch transformations (translations, reflections, rotations, dilations) of a given figure.

M.6.17   Identify and construct figures with line and/or rotational symmetry.

M.6.18   Recognize and define congruent and similar geometric figures; identify their corresponding sides and angles.

M.6.19   Measure, draw, and classify angles using a protractor.

M.6.20   Write the ordered pair of a given point; graph an ordered pair onto a coordinate plane; determine the location of an ordered pair (axis or quadrant); find the distance between two point on the same horizontal or vertical line.

MATHEMATICS

Standard 5 - Data Analysis and Probability

M.6.21   Investigate and solve problems involving theoretical and experimental probability of a single event (as a decimal, fraction, or percent).

M.6.22   Calculate and interpret measures of central tendency (mean, median, and mode) or range from a set of data (consisting of integers or positive rational numbers).

M.6.23   Determine the effect on the measures of central tendency (mean, median, and mode) or range when data is added, removed, or changed.

M.6.24   Collect, display, and analyze data in bar graphs, line graphs, circle graphs, pictograph, and line plots *(moved from* M.6.21)..

MATHEMATICS

Standard 6 - Patterns, Functions and Algebra

M.6.25   Write, interpret, and compare ratios (part:part and part:whole) or rates given real world context or data; make a table of equivalent ratios to represent a proportional relationship between two quantities when given a ratio or practical situation.

M.6.26   Determine whether a proportional relationship exists between two quantities when given a table of values, verbal description of a practical situation, or graph of ordered pairs; determine missing values in a ratio table that represents a proportional relationship between two quantities using proportional reasoning or writing and solving a proportion *(moved from 7ᵗʰ Grade)*.

M.6.27   Identify and distinguish between expressions, equations, and inequalities; write simple variable expressions, equations, and inequalities that model verbal phrases, patterns, and real world contexts.

M.6.28   Write and solve one-step linear equations with one variable, including proportions, by applying the Properties of Equality.

M.6.29   Write, interpret, and graph inequalities with one variable.

MATHEMATICS
SEVENTH GRADE

Overview

The seventh grade math curriculum is based on the skills introduced and mastered in grades K-6. For seventh grade, emphasis is placed on the following skills:

- Add, subtract, multiply, and divide positive rational numbers (whole numbers, fractions, mixed numbers, decimals), expressing answer in either simplest form or rounded to the nearest given place value; solve real world context problems involving positive rational numbers (decimals, fractions, mixed numbers), using a variety of problem solving strategies.
- Evaluate numerical expressions consisting of integers, absolute values, exponents, and/or negative signs by applying the order of operations and the Properties of Real Numbers.
- Round, compare, order, and graph (on a number line) positive and negative rational numbers (integers, fractions, mixed numbers, terminating and repeating decimals, numbers written in scientific notation).
- Find the percent of a number, what percent one number is of another, and find a number when the percent is known (methods include applying proportional reasoning and writing equations).
- Identify parts of a given variable expression, equation, or inequality (operations, variables, constants, coefficients, exponents, bases, terms, factors); interpret the parts of and write variable expression, equation, or inequality that represents a real world context.
- Solve two-step linear equations with one variable, including those that represent real world contexts, by applying the Properties of Equality; solve, graph, and interpret the solutions of one-step inequalities with one variable, including those that represent real world contexts, by applying the Properties of Inequality.
- Find the perimeter and area of compound figures (composed of rectangles, right triangles, and/or half circles); find the volume and surface area of prisms, cylinders, and spheres.

MASTERY OF SKILLS

- Add, subtract, multiply, and divide whole numbers, decimals, fractions, and mixed numbers (expressing answer in either simplest form or rounded to the nearest given place value).
- Convert between positive fractions (including improper fractions and mixed numbers), decimals, percents, numbers written in scientific notation, diagrams (including a number line), and real world contexts.
- Find the perimeter and area of rectangles, triangles, and parallelograms; find the circumference and area of circles; find the volume and surface area of rectangular prisms.
- Write the ordered pair of a given point; graph an ordered pair on a coordinate plane; determine the location of an ordered pair (axis or quadrant).

MATHEMATICS

APPLICATION OF SKILLS

Standard 1 – Number Sense and Estimation

M.7.1 Evaluate powers with positive, zero, and negative exponents (numerical bases); write equivalent expressions of powers with negative exponents [ex. $2^{-3} = 1/(2^3)$].

M.7.2 Convert values between scientific notation and standard form (positive and negative exponents).

M.7.3 Round, compare, order, and graph (on a number line) positive and negative rational numbers (integers, fractions, mixed numbers, terminating and repeating decimals, numbers written in scientific notation).

MATHEMATICS

Standard 2 - Computation and Fluency

M.7.4   Add, subtract, multiply, and divide positive rational numbers (whole numbers, fractions, mixed numbers, decimals), expressing answer in either simplest form or rounded to the nearest given place value; solve real world context problems involving positive rational numbers (decimals, fractions, mixed numbers) using a variety of problem solving strategies.

M.7.5   Evaluate numerical expressions consisting of integers, absolute values, exponents, and/or negative signs by applying the order of operations and the Properties of Real Numbers.

M.7.6   Find the percent of a number, what percent one number is of another, and find a number when the percent is known (methods include applying proportional reasoning and writing equations).

M.7.7   Find and apply the percent of change (increase or decrease) to solve real world context problem.

MATHEMATICS

Standard 3 – Measurement

M.7.8   Approximate unit conversions between the customary and metric systems (ex. 1 kg ≈ 2.2 lbs).

M.7.9   Write equivalent rates by converting one or both of its units (ex. 1 in/min = 5 ft/hr).

M.7.10   Convert square and cubic units (ex. $1 \text{ ft}^2 = 144 \text{ in}^2$; $1 \text{ cm}^3 = 1000 \text{ mm}^3$).

M.7.11   Construct precise scale drawings and models with appropriate scale factors of real world two-dimensional and three-dimensional objects using rulers and other measuring tools *(moved from 8th grade)*.

MATHEMATICS

Standard 4 - Geometry

M.7.12   Find the perimeter and area of compound figures composed of rectangles, right triangles, and/or half circles.

M.7.13   Find the volume and surface area of prisms, cylinders, and spheres using a formula sheet, nets, and/or calculating the sum of the area of the faces [approximating for π (pi) using a calculator or writing in π (pi) notation as necessary].

M.7.14   Identify properties of triangles (scalene, isosceles, equilateral, acute, right, obtuse) and quadrilaterals (trapezoids, parallelograms, rhombi, rectangles, squares).

M.7.15   Identify special angle pairs and their properties (complementary, supplementary, adjacent, vertical, linear pair), including corresponding, alternate interior, and alternate exterior angles formed by the intersections of a transversal and parallel lines.

M.7.16   Find missing angles of a given diagram or situation (ex. special angle pairs; triangle or quadrilateral).

M.7.17   Find the scale factor of two similar figures and/or missing angles and side lengths (methods include writing proportions and using proportional reasoning.

M.7.18   Identify and graph transformations of ordered pairs on the coordinate plane [translations; reflections over the x-axis and y-axis; 90 or 180 rotations with center (0, 0); dilations of positive scale factors with center (0, 0)].

Diocese of Arlington
Office *of* Catholic Schools

MATHEMATICS

Standard 5 - Data Analysis and Probability

M.7.19   Identify and find the probability of opposite, mutually exclusive, and overlapping events.

M.7.20   Make predictions given a probability (theoretical or experimental) or data display.

M.7.21   Determine the number of possible arrangements or outcomes of a given situation using tree diagrams or the Basic Counting Principle.

M.7.22   Collect, display, and analyze data in frequency tables, stem-and-leaf plots, histograms, and boxplots (i.e. box and whisker diagram; ex. median, interquartile range, percent of data within a given interval) *(moved from M.7.19)*.

MATHEMATICS

Standard 6 - Patterns, Functions and Algebra

M.7.23   Find, interpret, and apply the unit rate of a given real world context, ratio table, or graph that represents a proportional relationship between two quantities (ex. unit conversion, speed, percents, prices).

M.7.24   Identify parts of a given variable expression, equation, or inequality (operations, variables, constants, coefficients, exponents, bases, terms, factors); interpret the parts of and write variable expression, equation, or inequality that represents a real world context.

M.7.25   Evaluate multi-step, multi-operational variable expressions and formulas (given numerical replacement values) including those with exponents (ex. surface area and volume formulas; converting temperatures between Fahrenheit and Celsius).

M.7.26   Solve two-step linear equations with one variable, including those that represent real world contexts, by applying the Properties of Equality.

M.7.27   Solve, graph, and interpret the solutions of one-step inequalities with one variable, including those that represent real world contexts, by applying the Properties of Inequality.

M.7.28   Identify the independent and dependent variables of a given relationship within a real world context, table, graph, or two-variable equation.

M.7.29   Write and graph equations with two variables (i.e. functions) that model a given real world proportional or additive relationship (ex. unit rate).

Diocese of Arlington
Office *of* Catholic Schools ——————————— Academic Standards

MATHEMATICS
EIGHTH GRADE
Overview

The eighth grade math (Pre-Algebra) curriculum is based on the skills introduced and mastered in grades K-7. To ensure a successful transition into Algebra 1 and High School level mathematics, students will need to not only develop mastery and fluency of basic math skills and real world problem solving application (standards 8.4-8.6, 8.8, 8.9, 8.10), but also develop fundamental Algebra sense and skills (standards 8.1-8.3, 8.5, 8.6, 8.10, 8.11, 8.18 – 8.28). For eighth grade (Pre-Algebra), emphasis is placed on the following skills:

- Refine proficiency and fluency of computing basic fraction, decimal, and integer operations.
- Evaluate variable expressions consisting of grouping symbols, exponents, fraction bars, absolute values, negative signs, and/or square roots (given integers as the known values of each variable) by applying the order of operations and the Properties of Real Numbers.
- Solve practical problems involving percents (ex. consumer math; percent of change), using a variety of problem solving strategies (with an emphasis writing equations to model real life contexts).
- Use and apply the Pythagorean Theorem to solve for missing side lengths of a right triangle.
- Find the surface area and volume of prisms, cylinders, spheres, pyramids, cones, and compound figures
- Simplify variable expressions (add and subtract like terms; multiply monomials or a monomial by a multi-term expression) by applying the Properties of Real Numbers.
- Factor variable expressions as products by applying the Distributive Property (greatest common factor limited to a whole number).
- Solve multi-step variable equations (ex. combine like terms; apply distributive property), including ones with variables on both sides of the equation, by applying the Properties of Equality; solve, graph, and interpret the solution of two-step inequalities with one variable by applying the Properties of Inequality.

MASTERY OF SKILLS

- Add, subtract, multiply, and divide integers.
- Find the percent of a number, what percent one number is of another, and find a number when the percent is known (methods include applying proportional reasoning and writing equations).
- Solve one-step linear equations with one variable; interpret and graph linear inequalities.
- Write expressions, equations, and inequalities that model verbal phrase, pattern, and real world context.

MATHEMATICS

APPLICATION OF SKILLS

Standard 1 – Number Sense and Estimation

M.8.1   Classify numbers with the subsets of the real number system (whole number, integer, rational number, irrational number, real number).

M.8.2   Approximate square root radicals of non-perfect squares by finding the whole numbers it is between.

M.8.3   Simplify square root radicals (no variables) (ex. $\sqrt{12} = 2\sqrt{3}$).

MATHEMATICS

Standard 2 - Computation and Fluency

M.8.4   Refine proficiency and fluency of computing basic fraction, decimal, and integer operations. *For students that demonstrate mastery in these skill sets, introduce the following standard (as enrichment)*: add, subtract, multiply, and divide with negative fractions (expressing answer in simplest form) and with negative decimals (expressing answer either precisely or rounded to the nearest given place value).

M.8.5   Evaluate variable expressions consisting of grouping symbols, exponents, fraction bars, absolute values, negative signs, and/or square roots (given integers as the known values of each variable) by applying the order of operations and the Properties of Real Numbers.

M.8.6   Solve practical problems involving percents (ex. consumer math; percent of change), using a variety of problem solving strategies (with an emphasis writing equations to model real life contexts).

M.8.7   Add, subtract, multiply, and divide numbers written in scientific notation, expressing answer in scientific notation.

MATHEMATICS

Standard 3 – Measurement

M.8.8   Solve real world context problems involving unit conversion and/or estimation of measurements (length/distance, mass/weight, capacity/volume, area, surface area, temperature, time, angle, rates).

M.8.9   Find, justify, and apply reasonable indirect measurements of an object or event using measuring tools, formulas, and/or proportional reasoning (ex: the approximate height of an object too tall to directly measure; the approximate perimeter, area, surface area, or volume of a real object; the approximate time it would take for you to walk a given distance).

MATHEMATICS

Standard 4 - Geometry

M.8.10   Use and apply the Pythagorean Theorem to solve for missing side lengths of a right triangle, written in either simplest radical form or rounded to the nearest given place value (ex. finding the distance between any two point on the coordinate plane; converting between the height and slant height of a pyramid or cone).

M.8.11   Determine or apply coordinate notation to describe or graph a transformation of ordered pairs or polygons on the coordinate plane [translations; reflections over the x-axis and y-axis; 90 or 180 rotations with center (0, 0); dilations of positive scale factors with center (0, 0)].

M.8.12   Identify regular polygons and determine their individual angle measurements and sum of angle measurements, with an emphasis on investigating and applying the formulas to find measurement of any polygon's angle or sum of angle measurements [i.e. $180(n - 2)/n$ or $180(n - 2)$].

M.8.13   Identify and construct a three-dimensional model, given the top, side, and front views; sketch top, side, and front views of a given three-dimensional object.

M.8.14   Find the surface area of prisms, cylinders, spheres, pyramids, cones, and compound figures using a formula sheet, nets, and/or calculating the sum of the area of the faces [approximating for π (pi) using a calculator or writing in π (pi) notation as necessary].

M.8.15   Find the volume of prisms, cylinders, spheres, pyramids, cones, and compound figures using a formula sheet [approximating for π (pi) using a calculator or writing in π (pi) notation as necessary].

MATHEMATICS

Standard 5 - Data Analysis and Probability

M.8.16   Identify and find the probability of independent and dependent events.

M.8.17   Determine one or more missing data values from a set of data given its mean, median, mode, and/or range, including real world context (ex. Find the score a student must earn on their next test to earn an A for their total grade).

M.8.18   Collect, display, and analyze data in scatter plots (on a coordinate plane) [ex. correlation (positive, negative, none); estimate and sketch the line of best fit for the data represented in a scatter plot].

MATHEMATICS

Standard 6 - Patterns, Functions and Algebra

M.8.19   Simplify variable expressions (add and subtract like terms; multiply monomials or a monomial by a multi-term expression) by applying the Properties of Real Numbers.

M.8.20   Factor variable expressions as products by applying the Distributive Property (greatest common factor limited to a whole number) [ex. $8x - 12 = 4(2x - 3)$].

M.8.21   Simplify and write equivalent exponential expressions (both numerical and variable) with integer exponents [ex. $(12x)/4x^2 \rightarrow 3/x$ or $3x^{-1}$].

M.8.22   Solve simple quadratic and absolute value equations (involving positive rational numbers) (ex: $x^2 = 16 \rightarrow x = -4$ and 4; $|x| = 16 \rightarrow x = -16$ & 16).

M.8.23   Solve multi-step variable equations (ex. combine like terms; apply distributive property), including ones with variables on both sides of the equation, by applying the Properties of Equality.

M.8.24   Solve, graph, and interpret the solution of two-step inequalities with one variable by applying the Properties of Inequality.

M.8.25   Determine if a relation is a function given a set of ordered pairs, table, or mapping diagram; find the domain and range of a function.

M.8.26   Classify variable expression (i.e. polynomials) by its terms (monomial, binomial, trinomial) and degree (constant, linear, quadratic).

M.8.27   Interpret and find the y-intercept and slope of a line on the coordinate plane, including graphs that represent a real world context.

M.8.28   Convert the form of linear functions between equations, tables, graphs, and real world context or relationships (with an emphasis on investigating and applying slope intercept form, $y = mx + b$).

ALGEBRA I REVIEW

Prior to entering Algebra I as an eighth grader, the student will have mastered all Diocesan Mathematics Curriculum for students in grades kindergarten through pre-algebra.

Students should have mastered the objectives listed in the Review Section; while the Core Section of the curriculum is new material presented to the students and is the primary focus of Algebra I instruction.

Use of a graphing calculator is **not** part of the Algebra I Diocesan Mathematics Curriculum. Graphing calculators may be used for enrichment only, after all other curriculum have been mastered.

<div align="center">

REVIEW SECTION

</div>

A.I.R.1   "R"   The student will perform all computational skills without a calculator.

A.I.R.2   "R"   The student will comprehend and apply the concepts of greater than, less than, absolute value.

A.I.R.3   R"   The student will simplify and compute numerical expressions involving fractions, negatives, decimals, absolute value, percents, etc.

A.I.R.4   "R"   The student will apply the order of operations to the simplification of complicated expressions, with and without grouping symbols.

A.I.R.5   R"   The student will translate verbal statements into equations.

A.I.R.6   The student will replace variables with numbers and evaluate expressions, including those with exponents; define base and exponent.

A.I.R.7   R"   The student will use matrices to organize and manipulate data.

A.I.R.8   The student will find the probability of an event given a sample space.

A.I.R.9   The student will use data to find mean, median, and mode and will represent the data graphically.

A.I. R.10   The student will identify, distinguish among, and use various subsets of the real numbers:
      a.   Real numbers
      b.   Irrational numbers
      c.   Rational numbers
      d.   Integers
      e.   Whole numbers
      f.   Natural or counting numbers.

A.I.R.11   The student will graph real numbers on the number line.

A.I.R.12   The student will graph real number ordered pairs on coordinate planes.

A.I.R.13   The students will learn and apply correct terminology.

A.I.R.14   The student will apply real number properties to solve equations in one variable.

A.I.R.15   "R"   The student will solve simple application problems.

A.I.R.16   The student will solve equations involving percents and proportions.

A.I.R.17   The student will factor integers (including prime factorization), find greatest common factor and least common multiple of several integers.

A.I.R.18   "R"   The student will use scientific notation and expanded form.

A.I.R.19   The student will review the concept of order of real numbers and graph inequalities in one variable.

A.I.R.20   The student will transform inequalities in order to solve them.

A.I.R.21   The student will learn and apply properties of rational numbers.

A.I.R.22   The student will express rational numbers as decimals or fractions.

A.I.R.23   The student will learn and memorize the square of numbers from 1 to 12.

A.I.R 24   The student will find square roots of numbers that have rational and irrational square roots.

A.I.R.25   The student will use Pythagorean Theorem and its converse to solve geometric problems.

A.I.R.26   The student will compare and simplify with rational and irrational numbers.

ALGEBRA I CORE

A.I.C.1   The student will understand and be able to identify basic algebraic properties and use them efficiently to simplify algebraic expressions.

A.I.C.2   The student will understand and correctly apply the distributive property.

A.I.C.3   The student will simplify expressions involving variables raised to powers, including negative and zero (0) powers.

A.I.C.4   The student will understand, correctly interpret and apply scientific notation.

A.I.C.5   The student will solve literal equations for any variable.

A.I.C.6   The student will solve all types of one variable equations and problems, including those with the variable on both sides.

A.I.C.7   The student will solve application problems using the multi-step plan or charts.

A.I.C.8   The student will define and use vocabulary:
   a. Monomial, binomial, trinomial, polynomial
   b. Constant, coefficient, similar or like terms
   c. Degree of a monomial
   d. Degree of a polynomial.

A.I.C.9   The student will perform operations with polynomials.
   a. Add and subtract polynomials
   b. Multiply polynomials by monomials and polynomials
   c. Find powers of monomials using rule of exponents for a power of a power and rule of exponents for power of a product
   d. Divide polynomials by monomials and divide polynomials by polynomials using long division (Remainder Theorem).

A.I.C.10   The student will solve application problems involving polynomials:
   a. Rate-time-distance problems
   b. Area problems.

A.I.C.11   The student will find quotients and factors, as follows:
   a. Simplify quotients of monomials and find the greatest common factor of several monomials
   b. Find monomial factors of polynomials.

A.I.C.12   The student will find products and factor as follows:
   a. Find products of two binomials mentally (using FOIL or similar method)
   b. Simplify products of the form $(a+b)(a-b)$ and factor difference of two squares
   c. Find the squares of binomials and factor perfect square trinomials.

A.I.C.13   The student will apply basic factoring techniques to second and simple third degree polynomials. These techniques include finding a common factor for all terms in a polynomial, recognizing the difference of two squares, recognizing perfect square trinomials, factoring general trinomials and factoring by grouping.

A.I.C.14   The student will solve polynomial equations by factoring and using the zero (0) product property.

A.I.C.15   The student will simplify rational expressions.

A.I.C.16	The student will multiply and divide rational expressions.

A.I.C.16 The student will multiply and divide rational expressions.

A.I.C.17 The student will add and subtract rational expressions with like and unlike denominators.

A.I.C.18 The student will solve problems involving ratios and proportions.

A.I.C.19 The student will solve equations with rational expressions and corresponding application problems.
  a. Mixture
  b. Work
  c. Percent

A.I.C.20 The student will graph ordered pairs and linear equations in two variables:
  a. Identify coordinate axes, origin, and quadrants.

A.I.C.21 The student will find slope of a line as a rate of change and as rise over run.

A.I.C.22 The student will use slope-intercept form of a linear equation and standard form to find the x and y intercepts.

A.I.C.23 The student will find an equation of a line given the slope and one point on the line, or given two points on the line using point-slope form.

A.I.C.24 The student will find equations of lines through a given point with a zero or undefined slope.

A.I.C.25 The student will find an equation of a line that is parallel or perpendicular to a given line through a given point.

A.I.C.26 The student will solve linear equations by graphing.

A.I.C.27 "R" The student will understand what a function is and define a function by using tables, graphs, mapping and ordered pairs.

A.I.C.28 The student will define a function using functional notation and identifying domain and range of the function.

A.I.C.29 The student will graph linear and quadratic functions.

A.I.C.30 The student will solve systems of linear equations in two variables by:
  a. Graphing
  b. Substitution
  c. Addition-or-subtraction method with multiplication.

A.I.C.31 The student will solve application problems using systems of linear equations:
  a. Wind and water current problems
  b. Age, digit and fraction problems
  c. Other types of applicable problems.

A.I.C.32 "R" The student will express the square roots and cube roots of whole numbers.

A.I.C.33 "R" The student will find the square roots of variable expressions and use them to solve equations and application problems.

A.I.C.34 The student will work with square-root radical expressions:

a. Simplify products and quotients of radicals
b. Simplify sums and differences of radicals
c. Multiply binomials containing square-root radicals and rationalize binomial denominators that contain square-root radicals.

A.I.C.35   The student will solve simple square-root radical equations and corresponding application problems.

A.I.C.36   The student will solve application problems that involve inequalities.

A.I.C.37   The student will combine open sentences:
a. Find union and intersection of sets, using set notation
b. Find solution sets of combined inequalities and graph them on a number line
c. Solve equations and inequalities involving absolute value and graph the solution on a number line.

A.I.C.38   The student will graph linear inequalities in two variables on a coordinate plane.

A.1.C.39   The student will graph the solution set of a system of two linear inequalities in two variables on a coordinate plane.

A.I.C.40   The student will solve quadratic equations involving perfect squares.

A.I.C.41   The student will solve quadratic equations by completing the square.

A.I.C.42   The student will learn the quadratic formula and use it to solve quadratic equations such as motion of an object under the force of gravity.

A.I.C.43   The student, given a situation in a real-world context, will analyze a relation to determine whether a direct or inverse variation exists, and represent a direct variation algebraically and graphically and an inverse variation algebraically.

A.I.C.44   The student, given a set of data, will interpret variation in real-world contexts and calculate and interpret mean absolute deviation, standard deviation, and z-scores.

A.I.C.45   The student will compare and contrast multiple univariate data sets, using box-and-whisker plots.

A.I.C.46   The student will collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve real-world problems, using mathematical models. Mathematical models will include linear and quadratic functions.

Excellent Resource:
    Ask Dr. Math
    http://mathforum.org/library/drmath/drmath.high.html

GEOMETRY

OVERVIEW
The Geometry course balances theory and application. Students learn the process of writing formal proofs through inductive and deductive reasoning. The course integrates concepts of space and plane geometry and reinforces algebra skills. It emphasizes logical thinking and the application of special relationships to plane and solid figures. It also explores parallel lines and planes, congruent triangles, quadrilaterals, inequalities, similar polygons, right triangles, circles, constructions, areas of plane figures, areas and volumes of solids and coordinate geometry.

PRIMARY TEXT: Geometry, Jurgensen, Brown. Jurgenson; Houghton Mifflin Company, Boston, 2000.

COURSE OBJECTIVES:
- A. To learn the concept and methods of deductive reasoning to solve problems
- B. To integrate the concepts of space and plane geometry and to reinforce algebra skills
- C. To emphasize logical thinking and the application of special relationships to plane and solid figures
- D. To relate the concepts of geometry to today's world

G.1 Language of Geometry
- G.1.A Points, Lines and Planes
  - G.1.A.1 "R" To use the undefined terms point, line and plane
  - G.1.A.2 "R" To draw representations of points, lines, and planes
  - G.1.A.3 "R" To use the terms collinear, coplanar, and intersection
- G.1.B Segments, Rays and Distance
  - G.1.B.1 "R" To use symbols of lines, segments, rays, distances
  - G.1.B.2 "R" To find distances
  - G.1.B.3 "R" To state and use the Ruler Postulate and the Segment Addition Postulate
- G.1.C Angles
  - G.1.C.1 "R" To name angles and find their measures
  - G.1.C.2 "R" To state and use the Angle Addition Postulate
  - G.1.C.3 "R" To recognize what can be concluded from a diagram
- G.1.D Postulates and Theorems Relating Points, Lines, and Planes
  - G.1.D.1 "R" To use postulates and theorems relating points, lines and planes
- G.1.E Review of Algebraic Properties
  - G.1.E.1 "R" To review properties from Algebra

G.2 Deductive Reasoning
- G.2.A If-Then Statements; Converse
  - G.2.A.1 "R" To recognize the hypothesis and the conclusion of an if-then statement
  - G.2.A.2 "R" To state the converse of an if-then statement
  - G.2.A.3 "R" To use a counterexample to disprove an if-then statement
  - G.2.A.4 "R" To understand the meaning of "if and only if"
- G.2.B Properties from Algebra
  - G.2.B.1 To use properties from Algebra and properties of congruence in proofs
- G.2.C Proving Theorems
  - G.2.C.1 "R" To use the Midpoint Theorem and the Angle Bisector Theorem
  - G.2.C.2 "R" To know the kinds of reasons that can be used in proofs
- G.2.D Special Pairs of Angles
  - G.2.D.1 To apply the definitions of complementary and supplementary angles
  - G.2.D.2 To state and use the theorem about vertical angles
- G.2.E Perpendicular Lines
  - G.2.E.1 To apply the definition and theorems about perpendicular lines
- G.2.F. Planning a Proof
  - G.2.F.1 To state and apply the theorems about angles supplementary to, or complementary to, congruent angles

G.2.F.2   "R"   To plan proofs and then write them in two-column form

G.3   Parallel Lines and Planes
- G.3.A   Definitions
  - G.3.A.1   "R"   To distinguish between intersecting lines, parallel lines, and skew lines
  - G.3.A.2   "R"   To state and apply the theorem about the intersection of two parallel planes by a third plane
  - G.3.A.3   To identify the angles formed when two lines are cut by a transversal
- G.3.B   Properties of Parallel Lines
  - G.3.B.1   To state and apply a postulate and theorems about parallel lines and about a parallel and perpendicular to a given line through a point outside the line
- G.3.C   Angles of a Triangle
  - G.3.C.1   "R"   To classify triangles according to sides an to angles
  - G.3.C.2   "R"   To state and apply the theorem and the corollaries about the sum of the measures of the angles of a triangle
- G.3.D   Angles of a Polygon
  - G.3.D.1   "R"   To recognize and name convex and regular polygons
  - G.3.D.2   "R"   To find the measures of interior angles and exterior angles of convex polygons
- G.3.E   Inductive Reasoning
  - G.3.E.1   "R"   To understand and use inductive reasoning
- G.3.F   Proofs
  - G.3.F.1   To plan and write proofs pertaining to parallel lines

G.4   Congruent Triangles
- G.4.A   Congruent Figures
  - G.4.A.1   To identify the corresponding parts of congruent figures
- G.4.B   Some Ways to Prove Triangles Congruent
  - G.4.B.1   To prove two triangles congruent by using the SSS, SAS, and ASA postulates
- G.4.C   Using Congruent Triangles
  - G.4.C.1   To deduce information about segments and angles after proving that two triangles are congruent
- G.4.D   The Isosceles Triangle Theorems
  - G.4.D.1   To apply the theorems and corollaries about isosceles triangles
- G.4.E   Other Methods of Proving Triangles Congruent
  - G.4.E.1   To use the AAS Theorem to prove two triangles congruent
  - G.4.E.2   To use the HL Theorem to prove two triangles congruent
  - G.4.E.3   To prove that two overlapping triangles are congruent
- G.4.F   Using More than One Pair of Congruent Triangles
  - G.4.F.1   To prove two triangles congruent by first proving two other triangles congruent
- G.4.G   Medians, Altitudes, and Perpendicular Bisectors
  - G.4.G.1   To apply the definitions of the median and the altitude of a triangle and the perpendicular bisector of a segment
  - G.4.G.2   To state and apply the theorem about a point on the perpendicular bisector of a segment, and the converse
  - G.4.G.3   To state and apply the theorem about a point on the bisector of an angle, and the converse
- G.4.H   Proofs
  - G.4.H.1   To plan and write proofs pertaining to congruent triangles

G.5   Quadrilaterals
- G.5.A   Properties of Parallelograms
  - G.5.A.1   To apply the definition of a parallelogram and the theorems about properties of a parallelogram
- G.5.B   Ways to Prove that Quadrilaterals are Parallelograms
  - G.5.B.1   To prove that certain quadrilaterals are parallelograms

"E" indicates enrichment   edited June 2014
"R" indicates standard is reviewed at this grade level

G.5.C   Theorems Involving Parallel Lines
     G.5.C.1   To apply theorems about parallel lines
     G.5.C.2   "R"   To apply the midpoint theorems for triangles
G.5.D   Special Parallelograms
     G.5.D.1   To apply the definitions and identify the special properties of a rectangle, a rhombus, and a square
     G.5.D.2   To determine when a parallelogram is a rectangle, a rhombus or a square
G.5.E   Trapezoids
     G.5.E.1   To apply the definitions and identify the properties of a trapezoid and an isosceles trapezoid
G.5.F   Proofs
     G.5.F.1   To plan and write proofs pertaining to quadrilaterals

G.6   Inequalities in Geometry
G.6.A   Inequalities
     G.6.A.1   To apply properties of inequalities to positive numbers, lengths of segments, and measures of angles
     G.6.A.2   To state and use the Exterior Angle Inequality Theorem
G.6.B   Inverses and Contrapositives
     G.6.B.1   To state the contrapositive and inverse of an if-then statements
     G.6.B.2   To understand the relationship between logically equivalent statements
     G.6.B.3   To draw correct conclusions for given statements
G.6.C.   Indirect Proof
     G.6.C.1   To write indirect proofs in paragraph form
G.6.D.   Inequalities in One Triangle
     G.6.D.1   To state and apply the inequality theorems and corollaries for one triangle

G.7   Similar Polygons
G.7.A   Ratio and Proportion
     G.7.A.1   To express a ratio in simplest form
G.7.B   Properties of Proportions
     G.7.B.1   To solve for an unknown term in a given proportion
     G.7.B.2   To express a given proportion in an equivalent form
G.7.C   Similar Polygons
     G.7.C.1   To state and apply the properties of similar polygons
G.7.D   A Postulate for Similar Triangles
     G.7.D.1   To use the AA Similarity Postulate to prove triangles similar
     G.7.D.2   To use similar triangles to deduce information about segments or angles
G.7.E   Theorems for Similar Triangles
     G.7.E.1   To use the SAS Similarity Theorem and the SSS Similarity Theorem to prove triangles are similar
G.7.F   Proportional Lengths
     G.7.F.1   To apply the Triangle Proportionality Theorem and its corollary
     G.7.F.2   To state and apply the Triangle Angle-Bisector Theorem
G.7.G   Proofs
     G.7.G.1   To plan and write proofs pertaining to similar polygons

G.8   Algebra Unit on Radicals and Radical Equations
G.8.A   Simplifying Radicals
     G.8.A.1   "R"   To simplify radicals
     G.8.A.2   "R"   To simplify sums, differences, and products of radicals
G.8.B   Multiplication of Binomials Containing Radicals
     G.8.B.1   "R"   To multiply binomials containing square-root radicals
     G.8.B.2   "R"   To rationalize binomial denominators that contain square-root radicals
G.8.C   Simple Radical Equations

"E" indicates enrichment   edited June 2014
"R" indicates standard is reviewed at this grade level

G.8.C.1   "R"   To solve simple radical equations

G.9   Right Triangles
      G.9.A   Similarity in Right Triangles
          G.9.A.1   To determine the geometric mean between two numbers
          G.9.A.2   To state and apply the relationships that exist when the altitude is drawn to the hypotenuse of a right triangle
      G.9.B   The Pythagorean Theorem
          G.9.B.1   To state and apply the Pythagorean Theorem
      G.9.C   The Converse of the Pythagorean Theorem
          G.9.C.1   To state and apply the converse of the Pythagorean Theorem and related theorems about obtuse and acute triangles
      G.9.D   Special Right Triangles
          G.9.D.1   To determine the lengths of two sides of a 45° - 45° - 90° or a 30° - 60° - 90° triangle when the length of the third side is known
      G.9.E   Trigonometry
          G.9.E.1   To define the tangent, sine, and cosine ratios for an acute angle
          G.9.E.2   To solve right triangle problems by correct selection and use of the tangent, sine, and cosine ratios

G.10   Circles
      G.10.A   Basic Terms
          G.10.A.1   To define a circle, sphere, and related terms
          G.10.A.2   To recognize inscribed polygons and circumscribed circles
      G.10.B   Tangents
          G.10.B.1   To apply theorems that relate tangents and radii
          G.10.B.2   To recognize circumscribed polygons and inscribed circles
      G.10.C   Arcs and Central Angles
          G.10.C.1   To define and apply properties of arcs and central angles
      G.10.D   Arcs and Chords
          G.10.D.1   To apply theorems about the chords of a circle
      G.10.E   Inscribed Angles
          G.10.E.1   To solve problems and prove statements involving inscribed angles
          G.10.E.2   To solve problems and prove statements involving angles formed by chords, secants, and tangents
      G.10.F   Other Angles
          G.10.F.1   To solve problems and prove statements involving angles formed by chords, secants, and tangents
      G.10.G   Circles and Lengths of Segments
          G.10.G.1   To solve problems involving lengths of chords, secant segments, and tangent segments

G.11   Areas of Plane Figures
      G.11.A   Areas of Rectangles
          G.11.A.1   "R"   To understand what is meant by the area of a polygon
          G.11.A.2   "R"   To understand the area postulates
          G.11.A.3   "R"   To know and use the formula for the area of a rectangle
      G.11.B   Areas of Parallelograms, Triangles, and Rhombuses
          G.11.B.1   "R"   To know and use the formulas for the areas of parallelograms, triangles, and rhombuses
      G.11.C   Areas of Trapezoids
          G.11.C.1   "R"   To know and use the formula for the area of a trapezoid
      G.11.D   Areas of Regular Polygons
          G.11.D.1   "R"   To know and use the formula for the areas of regular polygons
      G.11.E   Circumferences and Areas of Circles

G.11.E.1 "R" To know and use the formulas for the circumferences and areas of circles that are derived from the perimeter and area formulas for regular polygons

G.11.F   Arc Lengths and Areas of Sectors

G.11.F.1   To know and use the formulas for arc length and the areas of sectors of a circle

G.11.G   Ratios of Areas

G.11.G.1   To find the ratio of the areas of two triangles

G.11.G.2   To understand and apply the relationship between scale factors, perimeters, and the areas of similar figures

G.12   Areas and Volumes of Solids

G.12.A   Prisms

G.12.A.1   To identify the parts of prisms

G.12.A.2   To find the lateral areas, total areas, and volumes of right prisms

G.12.B   Pyramids

G.12.B.1   To identify the parts of pyramids

G.12.B.2   To find the lateral areas, total areas, and volumes of pyramids

G.12.C   Cylinders and Cones

G.12.C.1   To find the lateral areas, total areas, and volumes of right cylinders and right cones

G.12.D   Spheres

G.12.D.1   To find the area and volume of a sphere

G.12.E   Areas and Volumes of Similar solids

G.12.E.1   To state and apply the properties of similar solids

G.13   Coordinate Geometry

G.13.A   The Distance Formula

G.13.A.1   To state and apply the distance formula

G.13.B   The Slope of a Line

G.13.B.1   "R" To state and apply the slope formula

G.13.C   Parallel and Perpendicular Lines

G.13.C.1   "R" To determine whether two lines are parallel, perpendicular, or neither

G.13.D   The Midpoint Formula

G.13.D.1   "R" To state and apply the midpoint formula

G.13.E   Organizing Coordinate Proofs

G.13.E.1   To choose a convenient placement of coordinate axes and assign appropriate coordinates, given a polygon

G.14   Constructions to construct and justify the constructions of:

G.14.A   a line segment congruent to a given line segment

G.14.B   the perpendicular bisector of a line segment

G.14.C   a perpendicular to a given line from a point not on the line

G.14.D   a perpendicular to a given line at a given point on the line

G.14.E   the bisector of a given angle

G.14.F   an angle congruent to a given angle

G.14.G   a line parallel to a given line through a point not on the given line

G.14.H   medians of triangles

G.14.I   altitudes of triangles