

# **Mathematics Curriculum For Emmanuel Lutheran School**

In the study of mathematics, it is necessary to include experiences that will lead to new knowledge, positive attitudes, and desirable conducts and skills. Mathematics is an integral part of all life. It is the language needed to function competently in our technological world. Therefore, the knowledge, attitudes, and skills nurtured in the mathematics classroom will help students to grow and succeed in the life God has given them to live.

Each of us lives in relationships: with God, ourselves, with those around us, and with nature. Mathematics approached from a Christian perspective seeks to help students better understand these relationships and to enhance them. Through a reasoned use of mathematical ideas and relationships, students can discover much about themselves and the world into which God has placed them.

A study of mathematics enables us to appreciate the orderliness and wisdom of God's creation. To each of His creatures, He has given certain attributes and abilities. To the one created in "His own image" He has given the ability to reason. The extensive nature of mathematical development-a purely human endeavor- is evidence of the depth of this ability and the greatness of God's creation.

## **Strands**

Number and Operations, Measurement, Geometry, Data Analysis and Probability, Algebra

**All standards and strands are based on the North Carolina Standard Course of Study and National Standards. All standards marked with an \* denote a cross-reference to Integrating the Faith (1997) Concordia Publishing House. All standards marked with a # denote original standards from Saxon Mathematics.**

# MATHEMATICS CURRICULUM

## MATHEMATICS :: CURRENT K-8 :: KINDERGARTEN KINDERGARTEN

- Number sense 0 - 30
- Calendar time
- Recognize basic shapes
- Create and extend patterns
- Sort and classify

### **Strands: Number and Operations, Measurement, Geometry, Data Analysis and Probability, Algebra**

**COMPETENCY GOAL 1:**      **The learner will recognize, model, and write whole numbers through 30.**

#### **Objectives**

**1.01**    Develop number sense for whole numbers through 30.\*

- a. Connect model, number word (orally), and number, using a variety of representations.\*
- b. Count objects in a set.\*
- c. Read and write numerals.\*
- d. Compare and order sets and numbers.\*
- e. Use ordinals (1st-10th).\*
- f. Estimate quantities fewer than or equal to 10.\*
- g. Recognize equivalence in sets and numbers 1-10.\*

**1.02**    Share equally (divide) between two people; explain.

**1.03**    Solve problems and share solutions to problems in small groups.

**COMPETENCY GOAL 2:**      **The learner will explore concepts of measurement.**

#### **Objectives**

**2.01**    Compare attributes of two objects using appropriate vocabulary (color, weight, height, width, length, texture).\*

**COMPETENCY  
GOAL 3:**

**2.02** Recognize concepts of calendar time using appropriate vocabulary (days of the week, months of the year, seasons).\*

**The learner will explore concepts of geometry.**

**Objectives**

**3.01** Identify, build, draw, and name triangles, rectangles, and circles; identify, build, and name spheres and cubes.\*

**3.02** Compare geometric shapes (identify likenesses and differences).\*

**3.03** Model and use directional and positional vocabulary.

**3.04** Complete simple spatial visualization tasks and puzzles.\*

**COMPETENCY  
GOAL 4:**

**The learner will collect, organize and display data.**

**Objectives**

**4.01** Collect and organize data as a group activity.\*

**4.02** Display and describe data with concrete and pictorial graphs as a group activity.\*

**COMPETENCY  
GOAL 5:**

**The learner will model simple patterns and sort objects.**

**Objectives**

**5.01** Sort and classify objects by one attribute.\*

**5.02** Create and extend patterns with actions, words, and objects.\*

**MATHEMATICS:: CURRENT K-8 :: GRADE 1  
GRADE 1**

**Major Concepts/Skills**

- Number sense 0-99

**Concepts/Skills to Maintain**

- Basic geometric shapes

- Single digit addition and subtraction
- Sort and classify
- Time
- Non-standard measurement
- Collect and display data
- Create and extend patterns

<b>Strands:</b>	<b>Number and Operations, Measurement, Geometry, Data Analysis and Probability, Algebra</b>
<b>COMPETENCY GOAL 1:</b>	<b>The learner will read, write, and model whole numbers through 99 and compute with whole numbers.</b>
	<p><b>Objectives</b></p> <p><b>1.01</b> Develop number sense for whole numbers through 99.</p> <ul style="list-style-type: none"> <li>a. Connect the model, number word, and number using a variety of representations.*</li> <li>b. Use efficient strategies to count the number of objects in a set.*</li> <li>c. Read and write numbers.*</li> <li>d. Compare and order sets and numbers.*</li> <li>e. Build understanding of place value (ones, tens).*</li> <li>f. Estimate quantities fewer than or equal to 100.*</li> <li>g. Recognize equivalence in sets and numbers 1-99.*</li> </ul> <p><b>1.02</b> Use groupings of 2's, 5's, and 10's with models and pictures to count collections of objects.*</p> <p><b>1.03</b> Develop fluency with single-digit addition and corresponding differences using strategies such as modeling, composing and decomposing quantities, using doubles, and making tens.</p> <p><b>1.04</b> Create, model, and solve problems that use addition, subtraction, and fair shares (between two or three).*</p>
<b>COMPETENCY GOAL 2:</b>	<b>The learner will use non-standard units of measure and tell time.*</b>

	<p><b>Objectives</b></p> <p><b>2.01</b> For given objects:</p> <ul style="list-style-type: none"> <li>a. Select an attribute (length, capacity, mass) to measure (use non-standard units).*</li> <li>b. Develop strategies to estimate size.*</li> <li>c. Compare, using appropriate language, with respect to the attribute selected.</li> </ul> <p><b>2.02</b> Develop an understanding of the concept of time.*</p> <ul style="list-style-type: none"> <li>a. Tell time at the hour and half-hour.*</li> <li>b. Solve problems involving applications of time (clock and calendar).*</li> </ul>
<b>COMPETENCY GOAL 3:</b>	<b>The learner will identify, describe, draw, and build basic geometric figures.*</b>
	<p><b>Objectives</b></p> <p><b>3.01</b> Identify, build, draw and name parallelograms, squares, trapezoids, and hexagons.*</p> <p><b>3.02</b> Identify, build, and name cylinders, cones, and rectangular prisms.*</p> <p><b>3.03</b> Compare and contrast geometric figures.*</p> <p><b>3.04</b> Solve problems involving spatial visualization.*</p>
<b>COMPETENCY GOAL 4:</b>	<b>The learner will understand and use data and simple probability concepts.</b>
	<p><b>Objectives</b></p> <p><b>4.01</b> Collect, organize, describe and display data using line plots and tallies.*</p> <p><b>4.02</b> Describe events as certain, impossible, more likely or less likely to occur.*</p>
<b>COMPETENCY GOAL 5:</b>	<b>The learner will demonstrate an understanding of classification and patterning.</b>
	<p><b>Objectives</b></p> <p><b>5.01</b> Sort and classify objects by two attributes.</p> <p><b>5.02</b> Use Venn diagrams to illustrate similarities and differences in two sets.</p>

	<b>5.03</b> Create and extend patterns, identify the pattern unit, and translate into other forms.*
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**MATHEMATICS :: CURRENT K-8 :: GRADE 2  
GRADE 2**

**Major Concepts/Skills**

- Number sense 0-999
- Place value
- Addition and subtraction of multi-digit numbers
- Length, time
- Symmetry and congruence
- Pictographs
- Probability experiments
- Number sentences
- Students will solve relevant and authentic problems using appropriate technology and apply these concepts as well as those developed in earlier years

**Concepts/Skills to Maintain**

- Patterns
- Sort and classify
- Line plots, tallies

<b>Strands:</b>	<b>Number and Operations, Measurement, Geometry, Data Analysis and Probability, Algebra</b>
<b>COMPETENCY GOAL 1:</b>	<b>The learner will read, write, model and compute with whole numbers through 999.*</b>
	<p><b>Objectives</b></p> <p><b>1.01</b> Develop number sense for whole numbers through 999.*</p> <ul style="list-style-type: none"> <li>a. Connect model, number word, and number using a variety of representations.</li> <li>b. Read and write numbers.*</li> <li>c. Compare and order.*</li> <li>d. Rename.</li> <li>e. Estimate.*</li> <li>f. Use a variety of models to build understanding of</li> </ul>

	<p>place value (ones, tens, hundreds).*</p> <p><b>1.02</b> Use area or region models and set models of fractions to explore part-whole relationships in contexts.*</p> <ol style="list-style-type: none"> <li>a. Represent fractions (halves, thirds, fourths) concretely and symbolically.*</li> <li>b. Compare fractions (halves, thirds, fourths) using models.*</li> <li>c. Make different representations of the same fraction.*</li> <li>d. Combine fractions to describe parts of a whole.*</li> </ol> <p><b>1.03</b> Create, model, and solve problems that involve addition, subtraction, equal grouping, and division into halves, thirds, and fourths (record in fraction form).*</p> <p><b>1.04</b> Develop fluency with multi-digit addition and subtraction through 999 using multiple strategies.*</p> <ol style="list-style-type: none"> <li>a. Strategies for adding and subtracting numbers.*</li> <li>b. Estimation of sums and differences in appropriate situations.*</li> <li>c. Relationships between operations.</li> </ol> <p><b>1.05</b> Create and solve problems using strategies such as modeling, composing and decomposing quantities, using doubles, and making tens and hundreds.*</p> <p><b>1.06</b> Define and recognize odd and even numbers.</p>
<b>COMPETENCY GOAL 2:</b>	<b>The learner will recognize and use standard units of metric and customary measurement.</b>
	<p><b>Objectives</b></p> <p><b>2.01</b> 2.01 Estimate and measure using appropriate units.*</p> <ol style="list-style-type: none"> <li>a. Length (meters, centimeters, feet, inches, yards).*</li> <li>b. Temperature (Fahrenheit)</li> </ol> <p><b>2.02</b> Tell time at the five-minute intervals.*</p>
<b>COMPETENCY GOAL 3:</b>	<b>The learner will perform simple transformations.</b>
	<p><b>Objectives</b></p> <p><b>3.01</b> Combine simple figures to create a given shape.*</p>

	<p><b>3.02</b> Describe the change in attributes as two- and three-dimensional figures are cut and rearranged.*</p> <p><b>3.03</b> Identify and make:</p> <p>a. Symmetric figures.*</p> <p>b. Congruent figures.*</p>
<b>COMPETENCY GOAL 4:</b>	<b>The learner will understand and use data and simple probability concepts.</b>
	<p><b>Objectives</b></p> <p><b>4.01</b> Collect, organize, describe and display data using Venn diagrams (three sets) and pictographs where symbols represent multiple units (2's, 5's, and 10's).*</p> <p><b>4.02</b> Conduct simple probability experiments; describe the results and make predictions.*</p>
<b>COMPETENCY GOAL 5:</b>	<b>The learner will recognize and represent patterns and simple mathematical relationships.</b>
	<p><b>Objectives</b></p> <p><b>5.01</b> Identify, describe, translate, and extend repeating and growing patterns.*</p> <p><b>5.02</b> Write addition and subtraction number sentences to represent a problem; use symbols to represent unknown quantities.*</p>

**MATHEMATICS ::CURRENT K-8 :: GRADE 3  
GRADE 3**

**Major Concepts/Skills**

- Number sense 0 - 9,999
- Multiplication and division
- Non-negative rational numbers
- Capacity and mass
- Coordinate grids

**Concepts/Skills to Maintain**

- Addition and subtraction of multi-digit numbers
- Length and time
- Symmetry and congruence
- Line plots, tallies, pictographs
- Venn diagrams

- Circle graphs
- Permutations and combinations
- Growing patterns
- Variables
- Students will solve relevant and authentic problems using appropriate technology and apply these concepts as well as those developed in earlier years

<b>Strands:</b>	<b>Number and Operations, Measurement, Geometry, Data Analysis and Probability, Algebra</b>
<b>COMPETENCY GOAL 1:</b>	<b>The learner will model, identify, and compute with whole numbers through 9,999.</b>
	<p><b>Objectives</b></p> <p><b>1.01</b> Develop number sense for whole numbers through 9,999.*</p> <ul style="list-style-type: none"> <li>a. Connect model, number word, and number using a variety of representations.*</li> <li>b. Build understanding of place value (ones through thousands).*</li> <li>c. Compare and order.*</li> </ul> <p><b>1.02</b> Develop fluency with multi-digit addition and subtraction through 9,999 using:*</p> <ul style="list-style-type: none"> <li>a. Strategies for adding and subtracting numbers.</li> <li>b. Estimation of sums and differences in appropriate situations.</li> <li>c. Relationships between operations.</li> </ul> <p><b>1.03</b> Develop fluency with multiplication from 1x1 to 12x12 and division up to two-digit by one-digit numbers using:*</p> <ul style="list-style-type: none"> <li>a. Strategies for multiplying and dividing numbers.</li> <li>b. Estimation of products and quotients in appropriate situations.</li> <li>c. Relationships between operations.</li> </ul>

	<p><b>1.04</b> Use basic properties (identity, commutative, associative, order of operations) for addition, subtraction, multiplication, and division.</p> <p><b>1.05</b> Use area or region models and set models of fractions to explore part-whole relationships.</p> <ul style="list-style-type: none"> <li>a. Represent fractions concretely and symbolically (halves, fourths, thirds, sixths, eighths).*</li> <li>b. Compare and order fractions (halves, fourths, thirds, sixths, eighths) using models and benchmark numbers (zero, one-half, one); describe comparisons.*</li> <li>c. Model and describe common equivalents, especially relationships among halves, fourths, and eighths, and thirds and sixths.*</li> <li>d. Understand that the fractional relationships that occur between zero and one also occur between every two consecutive whole numbers.*</li> <li>e. Understand and use mixed numbers and their equivalent fraction forms.*</li> </ul> <p><b>1.06</b> Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.*</p>
<p><b>COMPETENCY GOAL 2:</b></p>	<p><b>The learner will recognize and use standard units of metric and customary measurement.</b></p>
	<p><b>Objectives</b></p> <p><b>2.01</b> Solve problems using measurement concepts and procedures involving:*</p> <ul style="list-style-type: none"> <li>a. Elapsed time.</li> <li>b. Equivalent measures within the same measurement system.</li> </ul> <p><b>2.02</b> Estimate and measure using appropriate units.*</p> <ul style="list-style-type: none"> <li>a. Capacity (cups, pints, quarts, gallons, liters).</li> <li>b. Length (miles, kilometers)</li> <li>c. Mass (ounces, pounds, grams, kilograms).</li> <li>d. Temperature (Fahrenheit, Celsius).</li> </ul>
<p><b>COMPETENCY GOAL 3:</b></p>	<p><b>The learner will recognize and use basic geometric properties of two- and three-dimensional figures.</b></p>

	<p><b>Objectives</b></p> <p><b>3.01</b> Use appropriate vocabulary to compare, describe, and classify two- and three-dimensional figures.*</p> <p><b>3.02</b> Use a rectangular coordinate system to solve problems.*</p> <p>a. Graph and identify points with whole number and/or letter coordinates.</p> <p>b. Describe the path between given points on the plane.</p>
<b>COMPETENCY GOAL 4:</b>	<b>The learner will understand and use data and simple probability concepts.</b>
	<p><b>Objectives</b></p> <p><b>4.01</b> Collect, organize, analyze, and display data (including circle graphs and tables) to solve problems.*</p> <p><b>4.02</b> Determine the number of permutations and combinations of up to three items.</p> <p><b>4.03</b> Solve probability problems using permutations and combinations.</p>
<b>COMPETENCY GOAL 5:</b>	<b>The learner will recognize, determine, and represent patterns and simple mathematical relationships.</b>
	<p><b>Objectives</b></p> <p><b>5.01</b> Describe and extend numeric and geometric patterns.*</p> <p><b>5.02</b> Extend and find missing terms of repeating and growing patterns.*</p> <p><b>5.03</b> Use symbols to represent unknown quantities in number sentences.</p> <p><b>5.04</b> Find the value of the unknown in a number sentence.</p>

**MATHEMATICS :: CURRENT K-8 :: GRADE 4  
GRADE 4**

**Major Concepts/Skills**

- Number sense 0.01-99,999

**Concepts/Skills to Maintain**

- Whole number computation

- Multiplication and division of multi-digit numbers
- Perimeter and area
- Transformations
- Line graphs
- Median, mode, and range
- Variables in number sentences
- Proportional reasoning
- Students will solve relevant and authentic problems using appropriate technology and apply these concepts as well as those developed in earlier years.
- Non-negative rational numbers
- Length, time, capacity, and mass
- Symmetry and congruence
- Coordinate grids
- Circle graphs
- Permutations and combinations

<b>Strands:</b>	<b>Number and Operations, Measurement, Geometry, Data Analysis and Probability, Algebra</b>
<b>COMPETENCY GOAL 1:</b>	<b>The learner will read, write, model, and compute with non-negative rational numbers.</b>
	<p><b>Objectives</b></p> <p><b>1.01</b> Develop number sense for rational numbers 0.01 through 99,999.*</p> <ul style="list-style-type: none"> <li>a. Connect model, number word, and number using a variety of representations.</li> <li>b. Build understanding of place value (hundredths through ten thousands).*</li> <li>c. Compare and order rational numbers.*</li> <li>d. Make estimates of rational numbers in appropriate situations.*</li> </ul> <p><b>1.02</b> Develop fluency with multiplication and division:</p> <ul style="list-style-type: none"> <li>a. Two-digit by two-digit multiplication (larger numbers with calculator).*</li> <li>b. Up to three-digit by two-digit division (larger numbers with calculator).</li> <li>c. Strategies for multiplying and dividing numbers.*</li> </ul>

	<p>d. Estimation of products and quotients in appropriate situations.*</p> <p>e. Relationships between operations.</p> <p><b>1.03</b> Solve problems using models, diagrams, and reasoning about fractions and relationships among fractions involving halves, fourths, eighths, thirds, sixths, twelfths, fifths, tenths, hundredths, and mixed numbers.*</p> <p><b>1.04</b> Develop fluency with addition and subtraction of non-negative rational numbers with like denominators, including decimal fractions through hundredths. *</p> <p>a. Develop and analyze strategies for adding and subtracting numbers.*</p> <p>b. Estimate sums and differences.*</p> <p>c. Judge the reasonableness of solutions.</p> <p><b>1.05</b> Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.*</p>
<b>COMPETENCY GOAL 2:</b>	<b>The learner will understand and use perimeter and area.</b>
	<p><b>Objectives</b></p> <p><b>2.01</b> Develop strategies to determine the area of rectangles and the perimeter of plane figures.</p> <p><b>2.02</b> Solve problems involving perimeter of plane figures and areas of rectangles.</p>
<b>COMPETENCY GOAL 3:</b>	<b>The learner will recognize and use geometric properties and relationships.*</b>
	<p><b>Objectives</b></p> <p><b>3.01</b> Use the coordinate system to describe the location and relative position of points and draw figures in the first quadrant.*</p> <p><b>3.02</b> Describe the relative position of lines using concepts of parallelism and perpendicularity.*</p> <p><b>3.03</b> Identify, predict, and describe the results of transformations of plane figures.*</p> <p>a. Reflections.*</p>

	<ul style="list-style-type: none"> <li>b. Translations.*</li> <li>c. Rotations.*</li> </ul>
<b>COMPETENCY GOAL 4:</b>	<b>The learner will understand and use graphs, probability, and data analysis.*</b>
	<p><b>Objectives</b></p> <p><b>4.01</b> Collect, organize, analyze, and display data (including line graphs and bar graphs to solve problems.*</p> <p><b>4.02</b> Describe the distribution of data using median, range and mode.*</p> <p><b>4.03</b> Solve problems by comparing two sets of related data.</p> <p><b>4.04</b> Design experiments and list all possible outcomes and probabilities for an event.</p>
<b>COMPETENCY GOAL 5:</b>	<b>The learner will demonstrate an understanding of mathematical relationships.</b>
	<p><b>Objectives</b></p> <p><b>5.01</b> Identify, describe, and generalize relationships in which:</p> <ul style="list-style-type: none"> <li>a. Quantities change proportionally.</li> <li>b. Change in one quantity relates to change in a second quantity.</li> </ul> <p><b>5.02</b> Translate among symbolic, numeric, verbal, and pictorial representations of number relationships.</p> <p><b>5.03</b> Verify mathematical relationships using:</p> <ul style="list-style-type: none"> <li>a. Models, words, and numbers.</li> <li>b. Order of operations and the identity, commutative, associative, and distributive properties.</li> </ul>

**MATHEMATICS ::CURRENT K-8 :: GRADE 5  
GRADE 5**

**Major Concepts/Skills**

- Number sense 0.001-999,999
- Addition and subtraction of non-

**Concepts/Skills to Maintain**

- Whole number computation
- Transformations

negative rational numbers

- Properties of plane figures
- Bar graphs and stem-and-leaf plots
- Rates of change
- Simple equations and inequalities
- Students will solve relevant and authentic problems using appropriate technology and apply these concepts as well as those developed in earlier years
- Perimeter and area
- Coordinate grids
- Line graphs
- Median, mode, and range

<b>Strands:</b>	<b>Number and Operations, Measurement, Geometry, Data Analysis and Probability, Algebra</b>
<b>COMPETENCY GOAL 1:</b>	<b>The learner will understand and compute with non-negative rational numbers.</b>
	<p><b>Objectives</b></p> <p><b>1.01</b> Develop number sense for rational numbers 0.001 through 999,999.*</p> <ul style="list-style-type: none"> <li>a. Connect model, number word, and number using a variety of representations.</li> <li>b. Build understanding of place value (thousandths through hundred thousands).*</li> <li>c. Compare and order rational numbers.*</li> <li>d. Make estimates of rational numbers in appropriate situations.*</li> </ul> <p><b>1.02</b> Develop fluency in adding and subtracting non-negative rational numbers (halves, fourths, eighths; thirds, sixths, twelfths; fifths, tenths, hundredths, thousandths; mixed numbers).*</p> <ul style="list-style-type: none"> <li>a. Develop and analyze strategies for adding and subtracting numbers.*</li> <li>b. Estimate sums and differences.*</li> <li>c. Judge the reasonableness of solutions.</li> </ul> <p><b>1.03</b> Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and</p>

	<p>pencil.*</p> <p><b>1.04</b> Multiply non-negative rational numbers by one-digit and two-digit numbers.#</p> <p><b>1.05</b> Divide non-negative rational numbers by one-digit and two-digits.#</p> <p><b>1.06</b> Develop theory in the use of factors, multiples, [rime factors, and simplifying fractions.#</p> <p><b>1.07</b> Develop the use of ratios and percents to solve problems.#</p>
<b>COMPETENCY GOAL 2:</b>	<b>The learner will recognize and use standard units of metric and customary measurement.</b>
	<p><b>Objectives</b></p> <p><b>2.01</b> Estimate the measure of an object in one system given the measure of that object in another system.</p> <p><b>2.02</b> Identify, estimate, and measure the angles of plane figures using appropriate tools.*</p>
<b>COMPETENCY GOAL 3:</b>	<b>The learner will understand and use properties and relationships of plane figures.</b>
	<p><b>Objectives</b></p> <p><b>3.01</b> Identify, define, describe, and accurately represent triangles, quadrilaterals, and other polygons.*</p> <p><b>3.02</b> Make and test conjectures about polygons involving:</p> <ul style="list-style-type: none"> <li>a. Sum of the measures of interior angles.</li> <li>b. Lengths of sides and diagonals.</li> <li>c. Parallelism and perpendicularity of sides and diagonals.</li> </ul> <p><b>3.03</b> Classify plane figures according to types of symmetry (line, rotational).</p> <p><b>3.04</b> Solve problems involving the properties of triangles, quadrilaterals, and other polygons.</p> <ul style="list-style-type: none"> <li>a. Sum of the measures of interior angles.</li> <li>b. Lengths of sides and diagonals.</li> <li>c. Parallelism and perpendicularity of sides and diagonals.</li> </ul> <p><b>3.05</b> Find points in the coordinate plane.#</p>
<b>COMPETENCY</b>	<b>The learner will understand and use graphs and data</b>

<b>GOAL 4:</b>	<b>analysis.</b>
	<p><b>Objectives</b></p> <p><b>4.01</b> Collect, organize, analyze, and display data (including stem-and-leaf plots) to solve problems.*</p> <p><b>4.02</b> Compare and contrast different representations of the same data; discuss the effectiveness of each representation.*</p> <p><b>4.03</b> Solve problems with data from a single set or multiple sets of data using median, range, and mode.</p> <p><b>4.04</b> Solve problems with data using mean, mode, range, and median.#</p>
<b>COMPETENCY GOAL 5:</b>	<b>The learner will demonstrate an understanding of patterns, relationships, and elementary algebraic representation.</b>
	<p><b>Objectives</b></p> <p><b>5.01</b> Describe, extend, and generalize numeric and geometric patterns using tables, graphs, words, and symbols.*</p> <p><b>5.02</b> Use algebraic expressions, patterns, and one-step equations and inequalities to solve problems.</p> <p><b>5.03</b> Identify, describe, and analyze situations with constant or varying rates of change.</p>

**MATHEMATICS ::CURRENT K-8 :: GRADE 6  
GRADE 6**

**Major Concepts/Skills**

- Negative rational numbers
- Percent
- Transformations in the coordinate plane
- Probability
- Equations and inequalities

**Concepts/Skills to Maintain**

- Addition and subtraction of non-negative rational numbers
- Number properties
- Perimeter and area
- Median, mode, and range
- Bar graphs and leaf plots

- Multiplication and division of non-negative rational numbers
- Students will solve relevant and authentic problems using appropriate technology and apply these concepts as well as those developed in earlier years

<b>Strands:</b>	<b>Number and Operations, Measurement, Geometry, Data Analysis and Probability, Algebra</b>
<b>COMPETENCY GOAL 1:</b>	<b>The learner will understand and compute with rational numbers.</b>
	<p><b>Objectives</b></p> <p><b>1.01</b> Develop number sense for negative rational numbers.</p> <ul style="list-style-type: none"> <li>a. Connect the model, number word, and number using a variety of representations, including the number line.</li> <li>b. Compare and order.</li> <li>c. Make estimates in appropriate situations.</li> </ul> <p><b>1.02</b> Develop meaning for percents.*</p> <ul style="list-style-type: none"> <li>a. Connect the model, number word, and number using a variety of representations.</li> <li>b. Make estimates in appropriate situations.</li> </ul> <p><b>1.03</b> Compare and order rational numbers.*</p> <p><b>1.04</b> Develop fluency in addition, subtraction, multiplication, and division of non-negative rational numbers.</p> <ul style="list-style-type: none"> <li>a. Analyze computational strategies.</li> <li>b. Describe the effect of operations on size.</li> <li>c. Estimate the results of computations.</li> <li>d. Judge the reasonableness of solutions.</li> </ul> <p><b>1.05</b> Develop fluency in the use of factors, multiples, exponential notation, and prime factorization.*</p> <p><b>1.06</b> Use exponential, scientific, and calculator notation to write very large and very small numbers.*</p>

	<p><b>1.07</b> Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.*</p> <p><b>1.08</b> Add, subtract, multiply, and divide negative rational numbers.#</p> <p><b>1.09</b> Develop and use ratios, proportions and percents to solve problems.#</p>
<b>COMPETENCY GOAL 2:</b>	<b>The learner will select and use appropriate tools to measure two- and three-dimensional figures.</b>
	<p><b>Objectives</b></p> <p><b>2.01</b> Estimate and measure length, perimeter, area, angles, weight, and mass of two- and three-dimensional figures, using appropriate tools.*</p> <p><b>2.02</b> Solve problems involving perimeter/circumference and area of plane figures.</p> <p><b>2.03</b> Solve problems involving volume of prisms and cylinders.#</p> <p><b>2.04</b> Solve problems involving surface area of a prism.#</p>
<b>COMPETENCY GOAL 3:</b>	<b>The learner will understand and use properties and relationships of geometric figures in the coordinate plane.</b>
	<p><b>Objectives</b></p> <p><b>3.01</b> Identify and describe the intersection of figures in a plane.*</p> <p><b>3.02</b> Identify the radius, diameter, chord, center, and circumference of a circle; determine the relationships among them.*</p> <p><b>3.03</b> Transform figures in the coordinate plane and describe the transformation.*</p> <p><b>3.04</b> Solve problems involving geometric figures in the coordinate plane.</p>
<b>COMPETENCY GOAL 4:</b>	<b>The learner will understand and determine probabilities.</b>
	<p><b>Objectives</b></p> <p><b>4.01</b> Develop fluency with counting strategies to</p>

	<p>determine the sample space for an event. Include lists, tree diagrams, frequency distribution tables, permutations, combinations, and the Fundamental Counting Principle.*</p> <p><b>4.02</b> Use a sample space to determine the probability of an event.*</p> <p><b>4.03</b> Conduct experiments involving simple and compound events.</p> <p><b>4.04</b> Determine and compare experimental and theoretical probabilities for simple and compound events.*</p> <p><b>4.05</b> Determine and compare experimental and theoretical probabilities for independent and dependent events.*</p> <p><b>4.06</b> Design and conduct experiments or surveys to solve problems; report and analyze results.*</p> <p><b>4.07</b> Determine the chance of an event.#</p>
<p><b>COMPETENCY GOAL 5:</b></p>	<p><b>The learner will demonstrate an understanding of simple algebraic expressions.</b></p>
	<p><b>Objectives</b></p> <p><b>5.01</b> Simplify algebraic expressions and verify the results using the basic properties of rational numbers.</p> <ul style="list-style-type: none"> <li>a. Identity.</li> <li>b. Commutative.</li> <li>c. Associative.</li> <li>d. Distributive.</li> <li>e. Order of operations.</li> </ul> <p><b>5.02</b> Use and evaluate algebraic expressions.</p> <p><b>5.03</b> Solve simple (one- and two-step) equations or inequalities.</p> <p><b>5.04</b> Use graphs, tables, and symbols to model and solve problems involving rates of change and ratios.*</p> <p><b>5.05</b> Collect data and use a frequency table, graphs, and histograms to show information collected.#</p>

**Major Concepts/Skills**

- Computation with rational numbers
- Ratio and proportion
- Factors and multiples
- Volume and surface area
- Measures of central tendency
- Box plots and histograms
- Equations and inequalities
- Students will solve relevant and authentic problems using appropriate technology and apply these concepts as well as those developed in earlier years

**Concepts/Skills to Maintain**

- Number properties
- Percent
- Transformations in the coordinate plane
- Probability

<b>Strands:</b>	<b>Number and Operations, Measurement, Geometry, Data Analysis and Probability, Algebra</b>
<b>COMPETENCY GOAL 1:</b>	<b>The learner will understand and compute with rational numbers.</b>
	<p><b>Objectives</b></p> <p><b>1.01</b> Develop and use ratios, proportions, and percents to solve problems.*</p> <p><b>1.02</b> Develop fluency in addition, subtraction, multiplication, and division of rational numbers.*</p> <ul style="list-style-type: none"> <li>a. Analyze computational strategies.</li> <li>b. Describe the effect of operations on size.</li> <li>c. Estimate the results of computations.</li> <li>d. Judge the reasonableness of solutions.</li> </ul> <p><b>1.03</b> Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.*</p>
<b>COMPETENCY</b>	<b>The learner will understand and use measurement</b>

<b>GOAL 2:</b>	<b>involving two- and three-dimensional figures.</b>
	<p><b>Objectives</b></p> <p><b>2.01</b> Draw objects to scale and use scale drawings to solve problems.</p> <p><b>2.02</b> Solve problems involving volume and surface area of cylinders, prisms, and composite shapes.*</p> <p><b>2.03</b> Solve problems involving area, volume, surface area, and circumference of prisms, cylinders, circles, trapezoids, pyramids, cones, and spheres.#</p>
<b>COMPETENCY GOAL 3:</b>	<b>The learner will understand and use properties and relationships in geometry.</b>
	<p><b>Objectives</b></p> <p><b>3.01</b> Using three-dimensional figures:</p> <ul style="list-style-type: none"> <li>a. Identify, describe, and draw from various views (top, side, front, corner).*</li> <li>b. Build from various views.*</li> <li>c. Describe cross-sectional views.*</li> </ul> <p><b>3.02</b> Identify, define, and describe similar and congruent polygons with respect to angle measures, length of sides, and proportionality of sides.*</p> <p><b>3.03</b> Use scaling and proportional reasoning to solve problems related to similar and congruent polygons.*</p> <p><b>3.04</b> Apply properties and relationships involving the Pythagorean theorem to solve problems.#</p>
<b>COMPETENCY GOAL 4:</b>	<b>The learner will understand and use graphs and data analysis.</b>
	<p><b>Objectives</b></p> <p><b>4.01</b> Collect, organize, analyze, and display data (including box plots and histograms) to solve problems.*</p> <p><b>4.02</b> Calculate, use, and interpret the mean, median, mode, range, frequency distribution, and inter-quartile range for a set of data.</p> <p><b>4.03</b> Describe how the mean, median, mode, range, frequency distribution, and inter-quartile range of a set of data affect its graph.</p>

	<p><b>4.04</b> Identify outliers and determine their effect on the mean, median, mode, and range of a set of data.</p> <p><b>4.05</b> Solve problems involving two or more sets of data using appropriate statistical measures.</p> <p><b>4.06</b> Conduct experiments involving unit price, sales tax, and rates.#</p>
<b>COMPETENCY GOAL 5:</b>	<b>The learner will demonstrate an understanding of linear relations and fundamental algebraic concepts.</b>
	<p><b>Objectives</b></p> <p><b>5.01</b> Identify, analyze, and create linear relations, sequences, and functions using symbols, graphs, tables, diagrams, and written descriptions.*</p> <p><b>5.02</b> Translate among different representations of algebraic expressions, equations and inequalities.*</p> <p><b>5.03</b> Use and evaluate algebraic expressions, linear equations or inequalities to solve problems.*</p> <p><b>5.04</b> Develop fluency in the use of formulas to solve problems.</p> <p><b>5.05</b> Find, identify, and interpret the slope of a linear relation. #</p> <p><b>5.06</b> Write the equation of a linear relationship given two points, and the slope.#</p>

**MATHEMATICS ::CURRENT K-8 :: GRADE 8  
GRADE 8**

**Major Concepts/Skills**

- Real numbers
- Linear functions
- Pythagorean theorem, indirect measurement
- Scatterplots
- Slope

**Concepts/Skills to Maintain**

- Ratio, proportion, and percent
- Factors and multiples
- Box plots and histograms
- Volume and surface area

- Equations and inequalities
- Students will solve relevant and authentic problems using appropriate technology and apply these concepts as well as those developed in earlier years

<b>Strands:</b>	<b>Number and Operations, Measurement, Geometry, Data Analysis and Probability, Algebra</b>
<b>COMPETENCY GOAL 1:</b>	<b>The learner will understand and compute with real numbers.</b>
	<p><b>Objectives</b></p> <p><b>1.01</b> Develop number sense for the real numbers.*</p> <p>a. Define and use irrational numbers.*</p> <p>b. Compare and order.*</p> <p>c. Use estimates of irrational numbers in appropriate situations.</p> <p><b>1.02</b> Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.*</p> <p><b>1.03</b> Find and solve problems involving absolute value.#</p>
<b>COMPETENCY GOAL 2:</b>	<b>The learner will understand and use measurement concepts.</b>
	<p><b>Objectives</b></p> <p><b>2.01</b> Determine the effect on perimeter, area or volume when one or more dimensions of two- and three-dimensional figures are changed.*</p> <p><b>2.02</b> Apply and use concepts of indirect measurement.</p> <p><b>2.03</b> Solve problems involving surface area of prisms, pyramids, spheres, cylinders, and cones.#</p>
<b>COMPETENCY GOAL 3:</b>	<b>The learner will understand and use properties and relationships in geometry.</b>
	<p><b>Objectives</b></p> <p><b>3.01</b> Represent problem situations with geometric models.</p>

	<p><b>3.02</b> Apply geometric properties and relationships, including the Pythagorean theorem, to solve problems.*</p> <p><b>3.03</b> Identify, predict, and describe dilations in the coordinate plane.</p>
<b>COMPETENCY GOAL 4:</b>	<b>The learner will understand and use graphs and data analysis.</b>
	<p><b>Objectives</b></p> <p><b>4.01</b> Collect, organize, analyze, and display data (including scatterplots) to solve problems.*</p> <p><b>4.02</b> Approximate a line of best fit for a given scatterplot; explain the meaning of the line as it relates to the problem and make predictions.</p> <p><b>4.03</b> Identify misuses of statistical and numerical data.*</p> <p><b>4.04</b> Develop and solve problems using permutations and combinations.#</p>
<b>COMPETENCY GOAL 5:</b>	<b>The learner will understand and use linear relations and functions.</b>
	<p><b>Objectives</b></p> <p><b>5.01</b> Develop an understanding of function.</p> <ol style="list-style-type: none"> <li>a. Translate among verbal, tabular, graphic, and algebraic representations of functions.</li> <li>b. Identify relations and functions as linear or nonlinear.*</li> <li>c. Find, identify, and interpret the slope (rate of change) and intercepts of a linear relation.*</li> <li>d. Interpret and compare properties of linear functions from tables, graphs, or equations.*</li> </ol> <p><b>5.02</b> Write an equation of a linear relationship given: two points, the slope and one point on the line, or the slope and y-intercept.*</p> <p><b>5.03</b> Solve problems using linear equations and inequalities; justify symbolically and graphically.</p> <p><b>5.04</b> Solve equations using the inverse relationships of addition and subtraction, multiplication and division, squares and square roots, and cubes and cube roots.*</p>

## ALGEBRA I

### High School Grades

Algebra 1 continues the study of algebraic concepts. It includes operations with polynomials and matrices, creation and application of linear functions and relations, algebraic representations of geometric relationships, and an introduction to nonlinear functions. Students will be expected to describe and translate among graphic, algebraic, numeric, tabular, and verbal representations of relations and use those representations to solve problems. Appropriate technology, from manipulatives to calculators and application software, should be used regularly for instruction and assessment.

#### Prerequisites

- Operate with the real numbers to solve problems.
- Find, identify, and interpret the slope and intercepts of a linear relation.
- Visually determine a line of best fit for a given scatterplot; explain the meaning of the line; and make predictions using the line.
- Collect, organize, analyze, and display data to solve problems.
- Apply the Pythagorean Theorem to solve problems.

Number and Operations	
Competency Goal 1	The learner will perform operations with numbers and expressions to solve problems.
	<b>Objectives</b> <b>1.01</b> Write equivalent forms of algebraic expressions to solve problems.  a. Apply the laws of exponents. b. Operate with polynomials. c. Factor polynomials.  <b>1.02</b> Use formulas and algebraic expressions, including iterative and recursive forms, to model and solve problems. <b>1.03</b> Model and solve problems using direct variation.
Geometry and Measurement	
Competency Goal 2	The learner will describe geometric figures in the coordinate plane algebraically.

	<p><b>Objectives</b></p> <p><b>2.01</b> Find the lengths and midpoints of segments to solve problems.</p> <p><b>2.02</b> Use the parallelism or perpendicularity of lines and segments to solve problems.</p>
<b>Data Analysis and Probability</b>	
<b>Competency Goal 3</b>	<b>The learner will collect, organize, and interpret data with matrices and linear models to solve problems.</b>
	<p><b>Objectives</b></p> <p><b>3.01</b> Use matrices to display and interpret data.</p> <p><b>3.02</b> Operate (addition, subtraction, scalar multiplication) with matrices to solve problems.</p> <p><b>3.03</b> Create linear models for sets of data to solve problems.</p> <ul style="list-style-type: none"> <li>a. Interpret constants and coefficients in the context of the data.</li> <li>b. Check the model for goodness-of-fit and use the model, where appropriate, to draw conclusions or make predictions.</li> </ul>
<b>Algebra</b>	
<b>Competency Goal 4</b>	<b>The learner will use relations and functions to solve problems.</b>
	<p><b>Objectives</b></p> <p><b>4.01</b> Use linear functions or inequalities to model and solve problems; justify results.</p> <ul style="list-style-type: none"> <li>a. Solve using tables, graphs, and algebraic properties.</li> <li>b. Interpret constants and coefficients in the context of the problem.</li> </ul> <p><b>4.02</b> Graph, factor, and evaluate quadratic functions to solve problems.</p> <p><b>4.03</b> Use systems of linear equations or inequalities in two variables to model and solve problems. Solve using tables, graphs, and algebraic properties; justify results.</p> <p><b>4.04</b> Graph and evaluate exponential functions to solve problems.</p>