MATHEMATICS Fourth Grade

VALUES AND ATTITUDES	The student will: Understand that there is a definite sense of order in God's world. Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Realize God's universe is composed of appropriate spacing, measurement and geometric designs. Use visualization, spatial reasoning, and geometric modeling. Understand patterns, relations, and functions. Use varied methods for analyzing data. Use our ability to reason with our mind. Develop mathematical knowledge through problem solving.

STRAND A Number Sense, Numeration, and Numerical Operations

OBJECTIVES

Rational numbers

- Read and write whole numbers in the millions using standard and expanded notation.
- Use estimation techniques to determine solutions to problems.
- Model, identify, and compare rational numbers: fractions and mixed numbers.
- Use models and pictures to add and subtract decimals.
- Use models and pictures to add and subtract rational numbers with like denominators.
- Model and explain associative and distributive properties.
- Memorize division facts related to the multiplication facts through 10.
- Identify missing factors.
- Round rational numbers to the nearest whole number.
- Estimate solutions to problems.
- Multiply and solve 2- or 3- digit numbers by 1-digit numbers or 2-digit multiples of 10.
- Divide using single-digit divisors, with and without remainders.
- Use order of operations with addition, subtraction, multiplication, and division.
- Solve multi-step problems; determine if there is sufficient data given, then select additional strategies, using calculators as appropriate.
- Verify and interpret results.
- Solve complex single step problems that require addition, subtraction, multiplication and division using a calculator.
- Identify the application of place value on a calculator.
- Use concept of negative numbers, e.g., on a number line, in counting, in temperature.
- Find the average of 2- and 3-digit numbers.

Place value of whole numbers and decimals

- Model and identify the place value of each digit in a multi-digit numeral to the hundredths.
- Identify and compare rational numbers in decimal form to tenths and hundredths.
- Relate decimals and fractions in tenths and hundredths to each other.
- Find the fractional part of a whole number.

- Explain different interpretations of fractions, e.g., parts of a whole, parts of a set and division of whole numbers by whole numbers.
- Understand parts of regions and sets.
- Write tenths and hundredths in decimal and fraction notations and know the fraction and decimal equivalents for halves and fourths, e.g., ½ = 0.5 = 0.50.
- Compare and order fractions.
- Understand equivalent fractions.
- Write the fraction by drawing parts of a figure; relate fraction to a simple decimal on a number line.
- Identify on a number line the relative position of positive fractions, positive mixed numbers, and positive decimals to two decimal places.
- Know how to add and subtract fractions and mixed numbers.
- Understand the concept of multiples.

Addition and subtraction of simple decimals

- Estimate and compute the sum or difference of whole numbers and positive decimals to two places.
- Round two-place decimals to one decimal or the nearest whole number and judge reasonableness.
- Know how to estimate the addition and subtraction of decimals.

Factor small whole numbers

- Know that numbers such as 2, 3, 5, 7 and 11 do not have any factors except 1 and themselves and are prime numbers.
- Define and recognize prime numbers and composite numbers.

STRAND B Spatial Sense, Measurement, and Geometry

OBJECTIVES

Properties and relationships in geometry, and standard units of metric and customary measurement

- Identify points, lines, line segments, rays and angles: acute, right, and obtuse.
- Identify properties of plane figures using manipulatives, pictorial representations, and appropriate vocabulary, e.g., sides, angles, and vertices.
- Identify properties of polyhedra, solid figures, using manipulatives, pictorial representations, and appropriate vocabulary, e.g., faces, edges, and vertices.
- Estimate and measure length, capacity and mass using these additional units: inches, miles in feet and yards, centimeters, millimeters and kilometers, decimeters and meters; milliliters, kiloliters, liters, fluid ounces, cups, and pints quarts and gallons; kilograms and tons.
- Write, solve and verify reasonableness of answers to meaningful, multi-step problems involving money, elapsed time, and temperature.
- Know four basic reference temperatures in both scales: boiling and freezing points of water; average room temperature; body temperature.
- Use models to develop the relationship between the total number of square units in a rectangle and the length and width of the figure.
- Measure the perimeter of rectangles and triangles.
- Determine the area of rectangles and squares using grids.
- Find area of other regular and irregular figures using grids.
- Define circles.
- Define polygons by name, to include 5-10 sided figures.

Two-dimensional coordinate grids

- Draw the points corresponding to linear relationships on graph paper, e.g., draw 10 points on the graph of the equation y=3x and connect them by using a straight line.
- Understand that the length of a horizontal line segment equals the difference of the x-coordinates.
- Understand that the length of a vertical line segment equals the difference of the y-coordinates.

Plane and solid geometric objects
- Identify the radius and diameter of a circle.
- Identify intersecting, parallel, perpendicular lines and line segments and their midpoints.
- Recognize congruent plane figures after geometric transformations such as rotations (turns), reflections (flips), and translations (slides).
- Understand the concepts of similarity and congruency.
- Use designs, models, and computer graphics to illustrate reflections, rotations, and translations of plane figures.
- Know the definitions of different triangles, e.g., equilateral, isosceles, scalene, and identify their attributes.
- Know the definition of different quadrilaterals, e.g., rhombus, square, rectangle, parallelogram, trapezoid.
- Create two- and three-dimensional shapes.

STRAND C Patterns, Algebra, and Functions

OBJECTIVES

Patterns and relationships
- Identify numerical and geometric patterns by stating their rules.
- Extend patterns, generalize, and make predictions.
- Identify a pattern by stating the rule.
- Extend a pattern, generalize the rule for the pattern, and make predictions when given a table of number pairs or a set of data.
- Construct and order a table of values to solve problems associated with a given relationship.
- Use non-numeric symbols to represent quantities in expressions, open sentences, and descriptions of relationships.
- Determine solutions to open sentences.
- Use addition, subtraction, multiplication and division to continue a number pattern.

STRAND D Data, Probability, and Statistics

OBJECTIVES

Graphing, probability, and data analysis
- Construct and interpret stem-and-leaf plots.
- Display data in a variety of ways including circle, bar and line graphs.
- Collect, organize, and display data from surveys, research, and classroom experiments, including data collected over time. Include data from other disciplines.
- Interpret information from charts, tables, tallies, and graphs.
- Describe a set of data using range, median, and mode.
- Investigate and discuss probabilities by experimenting with devices that generate random outcomes such as coins, number cubes, spinners.

- Plot points that represent ordered pairs of data from many different sources such as science experiments.
- Use a fraction to describe the probability of an event .
- Report the outcome of an experiment.

STRAND E Mathematical Reasoning

OBJECTIVES

Problem solving

- Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.
- Determine when and how to break a problem into simpler parts.
- Identify missing information needed to find a solution to a given problem.
- Use estimation to verify the reasonableness of calculated results.
- Apply strategies and results from simpler problems to more complex problems.
- Use a variety of methods, e.g., words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
- Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.
- Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.
- Make precise calculations and check the validity of the results from the context of the problem.
- Evaluate the reasonableness of the solution in the context of the original situation.
- Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.
- Develop generalizations of the results obtained and apply them in other circumstances.