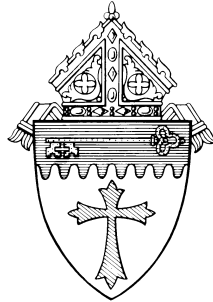


Elementary Mathematics Curriculum Guidelines



Catholic Schools Office
Diocese of Erie
Revised September 1996

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Our sincere thank you to:

Roberta Bucci,

Chairperson

Blessed Sacrament School, Erie

Mary Lou Cartwright,

Co-Chairperson

Queen of the World School, Saint Marys

Lori Azzato

Saint Joseph School, Erie

Gina Brennan

Saint James School, Erie

Pat Brickner

Act 89 Math Specialist, IU#5

Our Lady of Mount Carmel School, Erie

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Sue Drabant

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Sincerely,

Janice M. Whiteman

Director of Curriculum

Introduction

“Knowing mathematics means being able to use it in purposeful ways. To learn mathematics, students must be engaged in exploring, conjecturing, and thinking, rather than only in rote learning of rules and procedures. Mathematics learning is not a spectator sport. When students construct personal knowledge derived from meaningful experiences, they are much more likely to retain and use what they have learned. This fact underlies teachers’ new roles in providing experiences that help students make sense of mathematics; to view and use it as a tool for reasoning and problem solving.”

**Curriculum and Evaluation Standards for School Mathematics:
Executive Summary, National Council of Teachers of Mathematics,
March, 1989, page 5.**

CURRICULUM FOUNDATION

The foundation of this Algebra through Kindergarten Mathematics Curriculum is built upon the standards developed by the National Council of Teachers of Mathematics (NCTM). Note that the four standards: **Mathematics as Problem Solving, Mathematics as Communication, Mathematics as Reasoning, and Mathematical Connections** underlie this entire mathematics curriculum rather than being topics unto themselves.

This curriculum has been organized under five main groupings:

- I. **Themes That Cut Across Mathematics**
- II. **Number**
- III. **Space and Dimension**
- IV. **Data Collection and Interpretation**
- V. **Patterns, Relations, Functions, and Algebra**

Objectives listed under these five groupings may overlap. This will vary in respect to individual teaching styles and resources. Please note, the mathematics textbook is merely one resource available for implementing this curriculum. A wide variety of resources should be considered and utilized. The teacher is always the instructional force behind the curriculum.

While the Algebra Through Kindergarten Mathematics Curriculum is divided into grade levels and lists student performance objectives for each grade level, individual students and groups of students may be ready to go beyond the grade-level requirements and others may have difficulty in obtaining mastery of given performance objectives. Algebra should be offered to all students who are ready to handle the demands. Keeping in mind the recommendations of the NCTM Standards, each school will need to determine strategies to deal with individual differences.

In addition to the student performance objectives, the “Themes That Cut Across Mathematics” section of the curriculum is directed to teachers and their instruction of mathematics. Also note, the use of the abbreviations **i.e.** to signify **that is** and **e.g.** to signify **for example**.

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS
CURRICULUM STANDARDS FOR GRADES 5-8

OVERVIEW

The thirteen curriculum standards for grades 5-8:

- 1. Mathematics as Problem Solving**
- 2. Mathematics as Communication**
- 3. Mathematics as Reasoning**
- 4. Mathematical Connections**
- 5. Number and Number Relationships**
- 6. Number Systems and Number Theory**
- 7. Computation and Estimation**
- 8. Patterns and Functions**
- 9. Algebra**
- 10. Statistics**
- 11. Probability**
- 12. Geometry**
- 13. Measurement**

STANDARD 1

MATHEMATICS AS PROBLEM SOLVING

In grades 5-8, the mathematics curriculum should include numerous and varied experiences with problem solving as a method of inquiry and application so that students can:

- use problem-solving approaches to investigate and understand mathematical content;
- formulate problems from situations within and outside mathematics;
- develop and apply a variety of strategies to solve problems, with emphasis on multistep and nonroutine problems;
- verify and interpret results with respect to the original problem situation;
- generalize solutions and strategies to new problem situations;
- acquire confidence in using mathematics meaningfully.

STANDARD 2

MATHEMATICS AS COMMUNICATION

In grades 5-8, the study of mathematics should include opportunities to communicate so that students can:

- model situations using oral, written, concrete, pictorial, graphical, and algebraic methods;
- reflect on and clarify their own thinking about mathematical ideas and situations;
- develop common understandings of mathematical ideas, including the role of definitions;
- use the skills of reading, listening, and viewing to interpret and evaluate mathematical ideas;

- discuss mathematical ideas and make conjectures and convincing arguments;
- appreciate the value of mathematical notation and its role in the development of mathematical ideas.

STANDARD 3

MATHEMATICS AS REASONING

In grades 5-8, reasoning shall permeate the mathematics curriculum so that students can:

- recognize and apply deductive and inductive reasoning;
- understand and apply reasoning processes, with special attention to spatial reasoning and reasoning with proportions and graphs;
- make and evaluate mathematical conjectures and arguments;
- validate their own thinking;
- appreciate the pervasive use and power of reasoning as a part of mathematics.

STANDARD 4

MATHEMATICAL CONNECTIONS

In grades 5-8, the mathematics curriculum should include the investigation of mathematical connections so that students can:

- see mathematics as an integrated whole;
- explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models or representations;
- use a mathematical idea to further their understanding of other mathematical ideas;

- apply mathematical thinking and modeling to solve problems that arise in other disciplines, such as art, music, psychology, science, and business;
- value the role of mathematics in our culture and society.

STANDARD 5

NUMBER AND NUMBER RELATIONSHIPS

In grades 5-8, the mathematics curriculum should include the continued development of number and number relationships so that students can:

- understand, represent, and use numbers in a variety of equivalent forms (integer, fraction, decimal, percent, exponential, and scientific notation) in real-world and mathematical problem situations;
- develop number sense for whole numbers, fractions, decimals, integers, and rational numbers;
- understand and apply ratios, proportions, and percents in a wide variety of situations;
- investigate relationships among fractions, decimals, and percents;
- represent numerical relationships in one- and two-dimensional graphs.

STANDARD 6

NUMBER SYSTEMS AND NUMBER THEORY

In grades 5-8, the mathematics curriculum should include the study of number systems and number theory so that students can:

- understand and appreciate the need for numbers beyond the whole numbers;
- develop and use order relations for whole numbers, fractions, decimals, integers, and rational numbers;

- extend their understanding of whole number operations to fractions, decimals, integers, and rational numbers;
- understand how the basic arithmetic operations are related to one another;
- develop and apply number theory concepts (e.g., primes, factors, and multiples) in real-world and mathematical problem situations.

STANDARD 7

COMPUTATION AND ESTIMATION

In grades 5-8, the mathematics curriculum should develop the concepts underlying computation and estimation in various contexts so that students can:

- compute with whole numbers, fractions, decimals, integers, and rational numbers;
- develop, analyze, and explain procedures for computation and techniques for estimation;
- develop, analyze, and explain methods for solving proportions;
- select and use an appropriate method for computing from among mental arithmetic, paper-and-pencil, calculator, and computer methods;
- use computation, estimation, and proportions to solve problems;
- use estimation to check the reasonableness of results.

STANDARD 8

PATTERNS AND FUNCTIONS

In grades 5-8, the mathematics curriculum should include explorations of patterns and functions so that students can:

- describe, extend, analyze, and create a wide variety of patterns;

- describe and represent relationships with tables, graphs, and rules;
- analyze functional relationships to explain how a change in one quantity results in a change in another;
- use patterns and functions to represent and solve problems.

STANDARD 9

ALGEBRA

In grades 5-8, the mathematics curriculum should include explorations of algebraic concepts and processes so that students can:

- understand the concepts of variable, expression, and equation;
- represent situations and number patterns with tables, graphs, verbal rules, and equations and explore the interrelationships of these representations;
- analyze tables and graphs to identify properties and relationships;
- develop confidence in solving linear equations using concrete, informal, and formal methods;
- investigate inequalities and nonlinear equations informally;
- apply algebraic methods to solve a variety of real-world and mathematical problems.

STANDARD 10

STATISTICS

In grades 5-8, the mathematics curriculum should include exploration of statistics in real-world situations so that students can:

- systematically collect, organize, and describe data;
- construct, read, and interpret tables, charts, and graphs;

- make inferences and convincing arguments that are based on data analysis;
- evaluate arguments that are based on data analysis;
- develop an appreciation for statistical methods as powerful means for decision making.

STANDARD 11

PROBABILITY

In grades 5-8, the mathematics curriculum should include explorations of probability in real-world situations so that students can:

- model situations by devising and carrying out experiments or simulations to determine probabilities;
- model situations by constructing a sample space to determine probabilities;
- appreciate the power of using a probability model by comparing experimental results with mathematical expectations;
- make predictions that are based on experimental or theoretical probabilities;
- develop an appreciation for the pervasive use of probability in the real world.

STANDARD 12

GEOMETRY

In grades 5-8, the mathematics curriculum should include the study of the geometry of one, two, and three dimensions in a variety of situations so that students can:

- identify, describe, compare, and classify geometric figures;
- visualize and represent geometric figures with special attention to developing spatial sense;

- explore transformations of geometric figures;
- represent and solve problems using geometric models;
- understand and apply geometric properties and relationships;
- develop an appreciation of geometry as a means of describing the physical world.

STANDARD 13

MEASUREMENT

In grades 5-8, the mathematics curriculum should include extensive concrete experiences using measurement so that students can:

- extend their understanding of the process of measurement;
- estimate, make, and use measurements to describe and compare phenomena;
- select appropriate units and tools to measure to the degree of accuracy required in a particular situation;
- understand the structure and use of systems of measurement;
- extend their understanding of the concepts of perimeter, area, volume, angle measure, capacity, and weight and mass;
- develop the concepts of rates and other derived and indirect measurements;
- develop formulas and procedures for determining measures to solve problems.

SUMMARY OF CHANGES IN CONTENT AND EMPHASIS IN 5-8 MATHEMATICS

INCREASED ATTENTION

PROBLEM SOLVING

- Pursuing open-ended problems and extended problem-solving projects
- Investigating and formulating questions from problem situations
- Representing situations verbally, numerically, graphically, geometrically, or symbolically

COMMUNICATION

- Discussing, writing, reading, and listening to mathematical ideas

REASONING

- Reasoning in spatial contexts
- Reasoning with proportions
- Reasoning from graphs
- Reasoning inductively and deductively

CONNECTIONS

- Connecting mathematics to other subjects and to the world outside the classroom
- Connecting topics within mathematics
- Applying mathematics

NUMBER/OPERATIONS/COMPUTATION

- Developing number sense
- Developing operation sense
- Creating algorithms and procedures
- Using estimation both in solving problems and in checking the reasonableness of results
- Exploring relationships among representations of, and operations on, whole numbers, fractions, decimals, integers, and rational numbers
- Developing an understanding of ratio, proportion, and percent

PATTERNS AND FUNCTIONS

- Identifying and using functional relationships
- Developing and using tables, graphs, and rules to describe situations
- Interpreting among different mathematical representations

ALGEBRA

- Developing an understanding of variables, expressions, and equations
- Using a variety of methods to solve linear equations and informally investigate inequalities and nonlinear equations

STATISTICS

- Using statistical methods to describe, analyze, evaluate, and make decisions

PROBABILITY

- Creating experimental and theoretical models of situations involving probabilities

GEOMETRY

- Developing an understanding of geometric objects and relationships
- Using geometry in solving problems

MEASUREMENT

- Estimating and using measurement to solve problems

INSTRUCTIONAL PRACTICES

- Actively involving students individually and in groups in exploring, conjecturing, analyzing, and applying mathematics in both a mathematics and a real-world context
- Using appropriate technology for computation and exploration
- Using concrete materials
- Being a facilitator of learning
- Assessing learning as an integral part of instruction

NCTM Standards/Grades 5-8

SUMMARY OF CHANGES IN CONTENT AND EMPHASIS IN 5-8 MATHEMATICS

DECREASED ATTENTION

(Does Not Mean Eliminate)

PROBLEM SOLVING

- Practicing routine, one-step problems
- Practicing problems categorized by types (e.g., coin problems, age problems)

COMMUNICATION

- Doing fill-in-the-blank worksheets
- Answering questions that require only yes, no, or a number as responses

REASONING

- Relying on outside authority (teacher or an answer key)

CONNECTIONS

- Learning isolated topics
- Developing skills out of context

NUMBER/OPERATIONS/COMPUTATION

- Memorizing rules and algorithms
- Practicing tedious paper-and-pencil computations
- Finding exact forms of answers
- Memorizing procedures, such as cross-multiplication, without understanding
- Practicing rounding numbers out of context

PATTERNS AND FUNCTIONS

- Topics seldom in the current curriculum

ALGEBRA

- Manipulating symbols
- Memorizing procedures and drilling on equation solving

STATISTICS

- Memorizing formulas

PROBABILITY

- Memorizing formulas

GEOMETRY

- Memorizing geometric vocabulary
- Memorizing facts and relationships

MEASUREMENT

- Memorizing and manipulating formulas
- Converting within and between measurement systems

INSTRUCTIONAL PRACTICES

- Teaching computations out of context
- Drilling on paper-and-pencil algorithms
- Teaching topics in isolation
- Stressing memorization
- Being the dispenser of knowledge
- Testing for the sole purpose of assigning grades

NCTM Standards/Grades 5-8

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS
CURRICULUM STANDARDS FOR GRADES K-4

OVERVIEW

The thirteen curriculum standards for grades K-4:

- 1. Mathematics as Problem Solving**
- 2. Mathematics as Communication**
- 3. Mathematics as Reasoning**
- 4. Mathematical Connections**
- 5. Estimation**
- 6. Number Sense and Numeration**
- 7. Concepts of Whole Number Operations**
- 8. Whole Number Computation**
- 9. Geometry and Spatial Sense**
- 10. Measurement**
- 11. Statistics and Probability**
- 12. Fractions and Decimals**
- 13. Patterns and Relationships**

STANDARD 1

MATHEMATICS AS PROBLEM SOLVING

In grades K-4, the study of mathematics should emphasize problem solving so that students can:

- use problems solving approaches to investigate and understand mathematical content
- formulate problems from everyday and mathematical situations;
- develop and apply strategies to solve a wide variety of problems;
- acquire confidence in using mathematics meaningfully.

STANDARD 2

MATHEMATICS AS COMMUNICATION

In grades K-4, the study of mathematics should include numerous opportunities for communication so that students can:

- relate physical materials, pictures, and diagrams to mathematical ideas;
- reflect on and clarify their thinking about mathematical ideas and situations;
- relate their everyday language to mathematical language and symbols;
- realize that representing, discussing, reading, writing, and listening to mathematics are a vital part of learning and using mathematics.

STANDARD 3

MATHEMATICS AS REASONING

In grades K-4, the study of mathematics should emphasize reasoning so that students can:

- draw logical conclusions about mathematics;

- use models, known facts, properties, and relationships to explain their thinking;
- justify their answers and solution processes;
- use patterns and relationships to analyze mathematical situations;
- believe that mathematics makes sense.

STANDARD 4

MATHEMATICAL CONNECTIONS

In grades K-4, the study of mathematics should include opportunities to make connections so that students can:

- link conceptual and procedural knowledge;
- relate various representations of concepts or procedures to one another;
- recognize relationships among different topics in mathematics;
- use mathematics in other curriculum areas;
- use mathematics in their daily lives.

STANDARD 5

ESTIMATION

In grades K-4, the curriculum should include estimation so that students can:

- explore estimation strategies;
- recognize when an estimate is appropriate;
- determine the reasonableness of results;
- apply estimation in working with quantities, measurement, computation, and problem solving.

STANDARD 6

NUMBER SENSE AND NUMERATION

In grades K-4, the mathematics curriculum should include whole number concepts and skills so that students can:

- construct number meanings through real-world experiences and the use of physical materials;
- understand our numeration system by relating counting, grouping, and place-value concepts;
- develop number sense;
- interpret the multiple uses of numbers encountered in the real world.

STANDARD 7

CONCEPTS OF WHOLE NUMBER OPERATIONS

In grades K-4, the mathematics curriculum should include concepts of addition, subtraction, multiplication, and division of whole numbers so that students can:

- develop meaning for the operations by modeling and discussing a rich variety of problem situations;
- relate the mathematical language and symbolism of operations to problem situations and informal language;
- recognize that a wide variety of problem structures can be represented by a single operation;
- develop operation sense.

STANDARD 8

WHOLE NUMBER COMPUTATION

In grades K-4, the mathematics curriculum should develop whole number computation so that students can:

- model, explain, and develop reasonable proficiency with basic facts and algorithms;
- use a variety of mental computation and estimation techniques;
- use calculators in appropriate computational situations;
- select and use computation techniques appropriate to specific problems and determine whether the results are reasonable.

STANDARD 9

GEOMETRY AND SPATIAL SENSE

In grades K-4, the mathematics curriculum should include two- and three-dimensional geometry so that students can:

- describe, model, draw, and classify shapes;
- investigate and predict the results of combining, subdividing, and changing shapes;
- develop spatial sense;
- relate geometric ideas to number and measurement ideas;
- recognize and appreciate geometry in their world.

STANDARD 10

MEASUREMENT

In grades K-4, the mathematics curriculum should include measurement so that students can:

- understand the attributes of length, capacity, weight, mass, area, volume, time, temperature, and angle;
- develop the process of measuring and concepts related to units of measurement;
- make and use estimates of measurement;
- make and use measurements in problem and everyday situations.

STANDARD 11

STATISTICS AND PROBABILITY

In grades K-4, the mathematics curriculum should include experiences with data analysis and probability so that students can:

- collect, organize, and describe data;
- construct, read, and interpret displays of data;
- formulate and solve problems that involve collecting and analyzing data;
- explore concepts of chance.

STANDARD 12

FRACTIONS AND DECIMALS

In grades K-4, the mathematics curriculum should include fractions and decimals so that students can:

- develop concepts of fractions, mixed numbers, and decimals;

- develop number sense for fractions and decimals;
- use models to relate fractions to decimals and to find equivalent fractions;
- use models to explore operations on fractions and decimals;
- apply fractions and decimals to problem situations.

STANDARD 13

PATTERNS AND RELATIONSHIPS

In grades K-4, the mathematics curriculum should include the study of patterns and relationships so that students can:

- recognize, describe, extend, and create a wide variety of patterns;
- represent and describe mathematical relationships;
- explore the use of variables and open sentences to express relationships.

SUMMARY OF CHANGES IN CONTENT AND EMPHASIS IN K-4 MATHEMATICS

INCREASED ATTENTION

NUMBER

- Number sense
- Place-value concepts
- Meaning of fractions and decimals
- Estimation of quantities

OPERATIONS AND COMPUTATION

- Meaning of operations
- Operation sense
- Mental computation
- Estimation and the reasonableness of answers
- Selection of an appropriate computational method
- Use of calculators for complex computation
- Thinking strategies for basic facts

GEOMETRY AND MEASUREMENT

- Properties of geometric figures
- Geometric relationships
- Spatial sense
- Process of measuring
- Concepts related to units of measurement
- Actual measuring
- Estimation of measurements
- Use of measurement and geometry ideas throughout the curriculum

PROBABILITY AND STATISTICS

- Collection and organization of data
- Exploration of chance

PATTERNS AND RELATIONSHIPS

- Pattern recognition and description
- Use of variables to express relationships

PROBLEM SOLVING

- Word problems with a variety of structures
- Use of everyday problems
- Applications
- Study of patterns and relationships
- Problem-solving strategies

INSTRUCTIONAL PRACTICES

- Use of manipulative materials
- Cooperative work
- Discussion of mathematics
- Questioning
- Justification of thinking
- Writing about mathematics
- Problem-solving approach to instruction
- Content integration
- Use of calculators and computers

NCTM Standards/Grades K-4

SUMMARY OF CHANGES IN CONTENT AND EMPHASIS IN K-4 MATHEMATICS

DECREASED ATTENTION

(Does Not Mean Eliminate)

NUMBER

- Early attention to reading, writing, and ordering numbers symbolically

OPERATIONS AND COMPUTATION

- Complex paper-and-pencil computations
- Isolated treatment of paper-and-pencil computations
- Addition and subtraction without renaming
- Isolated treatment of division facts
- Long division
- Long division without remainders
- Paper-and-pencil fraction computation
- Use of rounding to estimate

GEOMETRY AND MEASUREMENT

- Primary focus on naming geometric figures
- Memorization of equivalencies between units of measurement

PROBLEM SOLVING

- Use of clue words to determine which operation to use

INSTRUCTIONAL PRACTICES

- Rote practice
- Rote memorization of rules
- One answer and one method
- Use of worksheets
- Written practice
- Teaching by telling

NCTM Standards/Grades K-4

ALGEBRA

GOAL: To enjoy math. To make sense of math and to use it in purposeful ways. To view and use math as a tool for reasoning: math is problem solving.

I. THEMES THAT CUT ACROSS MATHEMATICS

In order for students to be successful in meeting their performance objectives in this mathematics curriculum, the teacher will need to:

MaA1.1 Communicate with appropriate “MATH LANGUAGE” and require students to do the same.

MaA1.2 Communicate mathematically in oral, written, and pictorial form and require students to do the same.

MaA1.3 Ask open-ended questions that encourage students to think in divergent ways.

MaA1.4 Provide ample opportunities for students to share ideas in whole class discussions and in small collaborative groups.

MaA1.5 Provide ample opportunities for students to work in collaborative group situations.

MaA1.6 Require students to use mental math skills beyond the basic rote memorization of facts.

MaA1.7 Require students to use mental estimation prior to computing problems.

MaA1.8 Expand continually students’ awareness of the base ten number system.

MaA1.9 Provide ample opportunities for students to explore a variety of problem-solving techniques and to apply them to real-life situations.

MaA1.10 Provide ample opportunities for students to discover, explore, and reinforce all concepts through the use of appropriate manipulatives.

MaA1.11 Encourage students to develop a lasting sense of number and number relationships.

MaA1.12 Encourage students to develop logical reasoning and critical thinking.

MaA1.13 Encourage students to develop skills concerning spatial relationships.

MaA1.14 Allow students to use the calculator, NOT TO REPLACE BASIC COMPUTATIONAL SKILLS, but to enhance problem solving and to make mathematical explorations and connections.

MaA1.15 Provide ample opportunities for students to experience a variety of assessment formats.

II. NUMBER

The students will be able to:

MaA2.1 demonstrate an understanding of the base ten number system

MaA2.2 identify the relationship between inverse and reciprocal

MaA2.3 find absolute value and its opposite

MaA2.4 relate integers to the number line

MaA2.5 factor integers and find the greatest common factor (GCF) of two or more integers

MaA2.6 investigate real-life problems involving integers

MaA2.7 explore the use of absolute value and its opposite and apply to problem-solving situations

MaA2.8 identify a rational number

MaA2.9 locate rational numbers on the number line

MaA2.10 compare and order rational numbers

MaA2.11 perform all operations with rational numbers

- MaA2.12** express rational numbers as decimals and fractions
- MaA2.13** write, interpret, and multiply numbers using exponential notation
- MaA2.14** explore and use negative exponents
- MaA2.15** use scientific notation with positive and negative integral powers of ten
- MaA2.16** define squares and square roots
- MaA2.17** find perfect squares and perfect square roots
- MaA2.18** find square roots involving decimal approximations of irrational roots
- MaA2.19** solve all operations with radicals and express in lowest terms
- MaA2.20** identify an irrational number
- MaA2.21** find the decimal equivalent of an irrational number
- MaA2.22** explore the use of exponents that are both positive and negative and solve problems using them
- MaA2.23** solve expressions with rational numbers using the order of operations
- MaA2.24** identify and demonstrate properties
- MaA2.25** use properties (i.e., commutative, associative, and distributive) to simplify expressions
- MaA2.26** perform all operations with real numbers

III. SPACE AND DIMENSION

The students will be able to:

- MaA3.1** demonstrate a proficient use of the metric and customary systems of measurement
- MaA3.2** relate measurement to real-life situations

MaA3.3 convert units within the metric system of measurement

MaA3.4 convert units within the customary system of measurement

MaA3.5 add, subtract, multiply, and divide metric and customary units of measurement

MaA3.6 explore the relationships between the metric and customary systems of measurement in reference to length, weight, capacity, temperature, and mass

MaA3.7 demonstrate the use of a straight edge, a protractor, and a compass in constructing and measuring various geometric figures

MaA3.8 construct and label lines, line segments, parallel lines, perpendicular lines, intersecting lines, circles, rays, and angles

MaA3.9 bisect line segments and angles

MaA3.10 construct geometric figures that involve spatial relationships

MaA3.11 explore and discover the area of trapezoids, polygons, circles, and irregular figures (i.e., simple and compound)

MaA3.12 explore and discover the volume of prisms, pyramids, cylinders, spheres, and cones

MaA3.13 explore and discover the surface area of prisms, pyramids, and curved surfaces (e.g., cylinders, cones, and spheres)

MaA3.14 explore properties of triangles

MaA3.15 solve problems with similar triangles

MaA3.16 discover and demonstrate the use of formulas in problem-solving strategies

MaA3.17 discover rotational and translational symmetry in patterns and geometric figures

MaA3.18 perform flips, slides, rotations, expansions, and contractions of various geometric figures

MaA3.19 show repetition of geometric figures (e.g., tessellation)

MaA3.20 determine elapsed time

MaA3.21 add, subtract, multiply, and divide units of time

MaA3.22 convert from one unit of time to another

MaA3.23 relate time to life circumstances (e.g., bus schedule)

IV. DATA COLLECTION AND INTERPRETATION

The students will be able to:

MaA4.1 collect, sort, and classify data

MaA4.2 select the most appropriate means for displaying data (i.e., charts, diagrams, schedules, tables, pictographs, frequency diagrams, single and multiple bar graphs, single and multiple line graphs, circle graphs, and coordinate graphs)

MaA4.3 depict data on charts, diagrams, schedules, tables, pictographs, frequency diagrams, single and multiple bar graphs, single and multiple line graphs, circle graphs, and coordinate graphs

MaA4.4 demonstrate a solution to an equation on the number line

MaA4.5 locate, name, and plot a point in all of the four quadrants of a coordinate graph
construct a function table

MaA4.6 graph linear and quadratic functions

MaA4.7 solve problems with direct variation

MaA4.8 solve problems with inverse variation

MaA4.9 graph linear equations with one and two variables

MaA4.10 discover the slope of a line

MaA4.11 manipulate the slope-intercept form of a linear equation

MaA4.12 display solutions on a coordinate graph

- MaA4.13** find the equation of a line given the slope and one point on the line
- MaA4.14** find the equation of a line given two points on the line
- MaA4.15** graph inequalities with one and two variables
- MaA4.16** demonstrate the use of a Venn diagram for displaying the solutions to problems
- MaA4.17** graph the solution set of a system of two linear inequalities with two variables
- MaA4.18** graph reflections and rotations on a coordinate plane
- MaA4.19** formulate and record observations from charts, diagrams, graphs, schedules, and tables
- MaA4.20** calculate and apply the mean, median, mode, and range for a set of data
- MaA4.21** analyze the outcomes of a random experiment (i.e., probability)
- MaA4.22** recognize and analyze a frequency distribution
- MaA4.23** construct stem and leaf plots and box and whisker plots
- MaA4.24** draw conclusions and make predictions from data

V. PATTERNS, RELATIONS, FUNCTIONS, AND ALGEBRA

The students will be able to:

- MaA5.1** identify and use attributes of data
- MaA5.2** recognize, describe, extend, analyze, and create a wide variety of patterns
- MaA5.3** identify and discover patterns (e.g., Pascal's triangle and Fibonacci's sequence)
- MaA5.4** identify and record a pattern using variables

MaA5.5 show algebraic relationships using concrete objects, pictures, tables, graphs, and equations

MaA5.6 evaluate algebraic expressions given the value of all the variables (i.e., substitution)

MaA5.7 solve linear equations using concrete, informal, and formal methods for all operations

MaA5.8 find solution sets of equations over a given domain

MaA5.9 translate phrases into variable expressions

MaA5.10 translate English into algebraic expressions and equations

MaA5.11 solve problems based on real-life situations using algebraic expressions

MaA5.12 solve equations using collecting and substituting of terms

MaA5.13 solve equations using the addition and subtraction property of equality

MaA5.14 solve equations using the multiplication and division property of equality

MaA5.15 solve equations using the inverse operation

MaA5.16 solve equations with variables on both sides of the equation

MaA5.17 .prove algebraic statements using theorems and proofs

MaA5.18 add, subtract, and multiply polynomials

MaA5.19 find powers of monomials

MaA5.20 multiply a polynomial by a monomial

MaA5.21 multiply polynomials

MaA5.22 transform a formula to express a particular variable in terms of another variable (e.g., $d = r/t$; $r = d/t$)

MaA5.23 recognize problems that do not have solutions

- MaA5.24** solve problems using estimation to eliminate possibilities
- MaA5.25** simplify quotients of monomials and find the greatest common factor (GCF) of several monomials
- MaA5.26** divide polynomials by monomials and find monomial factors of polynomials
- MaA5.27** find the product of two binomials mentally
- MaA5.28** simplify products of the form $(a + b)(a - b)$ and factor the difference of the two squares
- MaA5.29** find squares of binomials and factor perfect square trinomials
- MaA5.30** factor quadratic trinomials whose quadratic coefficient is 1 and whose constant term is positive
- MaA5.31** factor quadratic trinomials whose quadratic coefficient is 1 and whose constant term is negative
- MaA5.32** factor general quadratic trinomials with integral coefficients
- MaA5.33** factor polynomials completely
- MaA5.34** solve polynomial equations using factoring
- MaA5.35** solve problems by writing and factoring quadratic equations with numbers and words
- MaA5.36** express algebraic fractions in lowest terms
- MaA5.37** multiply and divide algebraic fractions
- MaA5.38** express two or more algebraic fractions with the least common denominator (LCD)
- MaA5.39** add and subtract algebraic fractions
- MaA5.40** write mixed expressions as algebraic fractions in lowest terms
- MaA5.41** divide polynomials

- MaA5.42** solve problems involving algebraic ratios
- MaA5.43** solve problems involving algebraic proportions
- MaA5.44** solve problems with fractional coefficients
- MaA5.45** solve fractional equations
- MaA5.46** explore and solve percents and decimals with variables
- MaA5.47** relate properties of numbers and variables to algebraic expressions
- MaA5.48** find square roots of variable expressions and use them to solve algebraic equations
- MaA5.49** multiply binomials containing square root radicals and rationalize binomial denominators that contain square root radicals
- MaA5.50** solve simple radical equations
- MaA5.51** solve quadratic equations involving perfect squares
- MaA5.52** solve quadratic equations by completing the square
- MaA5.53** explore the quadratic formula and use it to solve equations
- MaA5.54** solve problems with quadratic equations
- MaA5.55** discover the values of trigonometric ratios for given angles
- MaA5.56** discover the measures of angles for given trigonometric ratios
- MaA5.57** explore solving problems using trigonometric ratios
- MaA5.58** formulate word problems to be solved based on real-life situations
- MaA5.59** apply concepts of probability based on real-life situations
- MaA5.60** use patterns and functions to represent and solve problems
- MaA5.61** describe mathematical relationships

GRADE 8

GOAL: To enjoy math. To make sense of math and to use it in purposeful ways. To view and use math as a tool for reasoning: math is problem solving.

I. THEMES THAT CUT ACROSS MATHEMATICS

In order for students to be successful in meeting their performance objectives in this mathematics curriculum, the teacher will need to:

Ma81.1 Communicate with appropriate “MATH LANGUAGE” and require students to do the same.

Ma81.2 Communicate mathematically in oral, written, and pictorial form and require students to do the same.

Ma81.3 Ask open-ended questions that encourage students to think in divergent ways.

Ma81.4 Provide ample opportunities for students to share ideas in whole class discussions and in small collaborative groups.

Ma81.5 Provide ample opportunities for students to work in collaborative group situations.

Ma81.6 Require students to use mental math skills beyond the basic rote memorization of facts.

Ma81.7 Require students to use mental estimation prior to computing problems.

Ma81.8 Expand continually students’ awareness of the base ten number system.

Ma81.9 Provide ample opportunities for students to explore a variety of problem-solving techniques and to apply them to real-life situations.

Ma81.10 Provide ample opportunities for students to discover, explore, and reinforce all concepts through the use of appropriate manipulatives.

Ma81.11 Encourage students to develop a lasting sense of number and number relationships.

Ma81.12 Encourage students to develop logical reasoning and critical thinking.

Ma81.13 Encourage students to develop skills concerning spatial relationships.

Ma81.14 Allow students to use the calculator, NOT TO REPLACE BASIC COMPUTATIONAL SKILLS, but to enhance problem solving and to make mathematical explorations and connections.

Ma81.15 Provide ample opportunities for students to experience a variety of assessment formats.

II. NUMBER

The students will be able to:

Ma82.1 demonstrate an understanding of the base ten number system

Ma82.2 perform all operations with whole numbers, decimals, and fractions

Ma82.3 use base ten operations ranging from place value to scientific notation

Ma82.4 discover the relationship between decimals, fractions, and percents

Ma82.5 identify and solve simple and complex fractions

Ma82.6 identify the relationship between inverse and reciprocal

Ma82.7 identify and write ratios that represent rates

Ma82.8 determine if two ratios form a proportion and solve proportion equations

Ma82.9 set up problems using ratio and proportion and extend into solving percentage problems (e.g., discount, commission, sales tax, and simple and compound interest)

Ma82.10 find the absolute value of integers

Ma82.11 relate integers to the number line

- Ma82.12** perform all operations with integers
- Ma82.13** explore the use of absolute value and apply to problem-solving situations
- Ma82.14** investigate real-life problems involving integers
- Ma82.15** identify a rational number
- Ma82.16** locate rational numbers on the number line
- Ma82.17** compare and order rational numbers
- Ma82.18** perform all operations with rational numbers
- Ma82.19** write, interpret, and multiply numbers using exponential notation
- Ma82.20** define squares and square roots
- Ma82.21** find perfect squares and perfect square roots
- Ma82.22** find square roots involving decimal approximations
- Ma82.23** explore the relationship between the Pythagorean Theorem and the square root of rational numbers
- Ma82.24** identify an irrational number
- Ma82.25** find the decimal equivalent of an irrational number
- Ma82.26** explore the use of exponents that are both positive and negative and solve problems using them
- Ma82.27** solve expressions with rational numbers using the order of operations
- Ma82.28** identify and demonstrate properties

III. SPACE AND DIMENSION

The students will be able to:

- Ma83.1** demonstrate a proficient use of the metric and customary systems of measurement

- Ma83.2** relate measurement to real-life situations
- Ma83.3** convert units within the metric system of measurement
- Ma83.4** convert units within the customary system of measurement
- Ma83.5** add, subtract, multiply, and divide metric and customary units of measurement
- Ma83.6** explore the relationships between the metric and customary systems of measurement in reference to length, weight, capacity, temperature, and mass
- Ma83.7** demonstrate the use of a straight edge, a protractor, and a compass in constructing and measuring various geometric figures
- Ma83.8** construct and label lines, line segments, parallel lines, perpendicular lines, intersecting lines, circles, rays, and angles
- Ma83.9** bisect line segments and angles
- Ma83.10** construct geometric figures that involve spatial relationships
- Ma83.11** explore and discover the area of trapezoids, polygons, circles, and irregular figures (i.e., simple and compound)
- Ma83.12** explore and discover the volume of prisms, pyramids, cylinders, spheres, and cones
- Ma83.13** explore and discover the surface area of prisms, pyramids, and curved surfaces (e.g., cylinders, cones, and spheres)
- Ma83.14** discover and demonstrate the use of formulas in problem-solving strategies
- Ma83.15** discover rotational and translational symmetry in patterns and geometric figures
- Ma83.16** perform flips, slides, rotations, expansions, and contractions of various geometric figures
- Ma83.17** show repetition of geometric figures (e.g., tessellation)
- Ma83.18** determine elapsed time

Ma83.19 add, subtract, multiply, and divide units of time

Ma83.20 convert from one unit of time to another

Ma83.21 relate time to life circumstances (e.g., bus schedule)

IV. DATA COLLECTION AND INTERPRETATION

The students will be able to:

Ma84.1 collect, sort, and classify data

Ma84.2 select the most appropriate means for displaying data (i.e., charts, diagrams, schedules, tables, pictographs, frequency diagrams, single and multiple bar graphs, single and multiple line graphs, circle graphs, and coordinate graphs)

Ma84.3 depict data on charts, diagrams, schedules, tables, pictographs, frequency diagrams, single and multiple bar graphs, single and multiple line graphs, circle graphs, and coordinate graphs

Ma84.4 demonstrate a solution to an equation on the number line

Ma84.5 locate, name, and plot a point in all of the four quadrants of a coordinate graph

Ma84.6 construct a function table

Ma84.7 graph linear equations

Ma84.8 display solutions on a coordinate graph

Ma84.9 explore Venn diagrams for displaying the solutions to problems

Ma84.10 formulate and record observations from charts, diagrams, graphs, schedules, and tables

Ma84.11 calculate and apply the mean, median, mode, and range for a set of data

Ma84.12 analyze random sampling results

Ma84.13 find permutations of objects taken in groups of more than one at a time

Ma84.14 distinguish between permutations and combinations

Ma84.15 explore the probability of a single, compound, independent, and dependent event

Ma84.16 draw conclusions and make predictions from data

V. PATTERNS, RELATIONS, FUNCTIONS, AND ALGEBRA

The students will be able to:

Ma85.1 identify and use attributes of data

Ma85.2 recognize, describe, extend, analyze, and create a wide variety of patterns

Ma85.3 identify and discover patterns (e.g., Pascal's triangle and Fibonacci's sequence)

Ma85.4 identify and record a pattern using variables

Ma85.5 apply patterns of divisibility

Ma85.6 solve for missing terms in an equation

Ma85.7 apply ratio and proportion in solving problems involving real-life situations (e.g., scale drawings)

Ma85.8 show algebraic relationships using concrete objects, pictures, tables, graphs, and equations

Ma85.9 evaluate algebraic expressions given the value of all the variables (i.e., substitution)

Ma85.10 solve linear equations using concrete, informal, and formal methods for all operations

Ma85.11 investigate inequalities and non-linear equations

Ma85.12 solve one-step equations involving integers

Ma85.13 translate English into algebraic expressions

Ma85.14 solve problems based on real-life situations using algebraic expressions

Ma85.15 solve equations using collecting and substituting of terms

Ma85.16 explore factorial notation

Ma85.17 solve problems using estimation to eliminate possibilities

Ma85.18 formulate word problems to be solved based on real-life situations

Ma85.19 apply concepts of probability based on real-life situations

Ma85.20 use patterns and functions to represent and solve problems

Ma85.21 describe mathematical relationships

GRADE 7

GOAL: To enjoy math. To make sense of math and to use it in purposeful ways. To view and use math as a tool for reasoning: math is problem solving.

I. THEMES THAT CUT ACROSS MATHEMATICS

In order for students to be successful in meeting their performance objectives in this mathematics curriculum, the teacher will need to:

Ma71.1 Communicate with appropriate “MATH LANGUAGE” and require students to do the same.

Ma71.2 Communicate mathematically in oral, written, and pictorial form and require students to do the same.

Ma71.3 Ask open-ended questions that encourage students to think in divergent ways.

Ma71.4 Provide ample opportunities for students to share ideas in whole class discussions and in small collaborative groups.

Ma71.5 Provide ample opportunities for students to work in collaborative group situations.

Ma71.6 Require students to use mental math skills beyond the basic rote memorization of facts.

Ma71.7 Require students to use mental estimation prior to computing problems.

Ma71.8 Expand continually students’ awareness of the base ten number system.

Ma71.9 Provide ample opportunities for students to explore a variety of problem-solving techniques and to apply them to real-life situations.

Ma71.10 Provide ample opportunities for students to discover, explore, and reinforce all concepts through the use of appropriate manipulatives.

Ma71.11 Encourage students to develop a lasting sense of number and number relationships.

Ma71.12 Encourage students to develop logical reasoning and critical thinking.

Ma71.13 Encourage students to develop skills concerning spatial relationships.

Ma71.14 Allow students to use the calculator, NOT TO REPLACE BASIC COMPUTATIONAL SKILLS, but to enhance problem solving and to make mathematical explorations and connections.

Ma71.15 Provide ample opportunities for students to experience a variety of assessment formats.

II. NUMBER

The students will be able to:

Ma72.1 demonstrate an understanding of the base ten number system

Ma72.2 perform all operations with whole numbers, decimals, and fractions

Ma72.3 express a standard form number in scientific notation

Ma72.4 identify terminating and repeating decimals

Ma72.5 find the greatest common factor (GCF) and the least common multiple (LCM) of two or more numbers

Ma72.6 identify prime and composite numbers using factorization

Ma72.7 discover the relationship between decimals, fractions, and percents

Ma72.8 express a decimal as a fraction and a percent

Ma72.9 express a fraction as a decimal and a percent

Ma72.10 express a percent as a decimal and a fraction

Ma72.11 explore real-life percent situations (e.g., discount, commission, sales tax, and simple and compound interest)

- Ma72.12** identify and solve simple and complex fractions
- Ma72.13** identify the relationship between inverse and reciprocal
- Ma72.14** identify and express ratios in three different forms
- Ma72.15** identify and write ratios that represent rates
- Ma72.16** find equal ratios and identify two equal ratios as a proportion
- Ma72.17** determine if two ratios form a proportion and solve proportion equations
- Ma72.18** locate integers on the number line
- Ma72.19** find the absolute value of integers
- Ma72.20** perform all operations with integers
- Ma72.21** investigate real-life problems involving integers
- Ma72.22** solve expressions with grouping symbols (e.g., brackets, nested parentheses, and fraction bars) using the order of operations
- Ma72.23** demonstrate knowledge of the identity properties of addition, subtraction, multiplication, and division
- Ma72.24** demonstrate knowledge of commutative, associative, and distributive properties

III. SPACE AND DIMENSION

The students will be able to:

- Ma73.1** use the metric and customary units of measurement for length, weight, capacity, and temperature
- Ma73.2** identify the most appropriate unit of measurement for a real-life situation
- Ma73.3** convert units within the metric system of measurement
- Ma73.4** convert units within the customary system of measurement

Ma73.5 add, subtract, multiply, and divide metric and customary units of measurement

Ma73.6 explore the relationships between the metric and customary systems of measurement in reference to length, weight, capacity, temperature, and mass

Ma73.7 demonstrate the use of a straight edge, a protractor, and a compass in constructing and measuring various geometric figures

Ma73.8 identify and use the symbols for line, line segment, parallel lines, perpendicular lines, circle, ray, and angle

Ma73.9 construct and label lines, line segments, parallel lines, perpendicular lines, intersecting lines, rays, and angles

Ma73.10 bisect line segments and angles

Ma73.11 identify angles (i.e., right, acute, obtuse, and straight)

Ma73.12 determine angles (i.e., complementary, supplementary, interior, and exterior)

Ma73.13 construct geometric figures that involve spatial relationships

Ma73.14 explore the perimeter or circumference, the area, the volume, and the surface area of standard geometric figures to discover their formulas

Ma73.15 show line and point symmetry of geometric figures

Ma73.16 construct congruent geometric figure

Ma73.17 perform flips, slides, rotations, expansions, and contractions of various geometric figures

Ma73.18 show repetition of geometric figures (e.g., tessellation)

Ma73.19 determine elapsed time

Ma73.20 add, subtract, multiply, and divide units of time

Ma73.21 convert from one unit of time to another

Ma73.22 relate time to life circumstances (e.g., bus schedule)

IV. DATA COLLECTION AND INTERPRETATION

The students will be able to:

Ma74.1 collect, sort, and classify data

Ma74.2 select the most appropriate means for displaying data (i.e., charts, diagrams, schedules, tables, pictographs, frequency diagrams, single and multiple bar graphs, single and multiple line graphs, circle graphs, and coordinate graphs)

Ma74.3 depict data on charts, diagrams, schedules, tables, pictographs, frequency diagrams, single and multiple bar graphs, single and multiple line graphs, circle graphs, and coordinate graphs

Ma74.4 demonstrate a solution to an equation on the number line

Ma74.5 locate, name, and plot a point in all of the four quadrants of a coordinate graph

Ma74.6 construct a function table

Ma74.7 graph linear equations

Ma74.8 formulate and record observations from charts, diagrams, graphs, schedules, and tables

Ma74.9 calculate and use the mean, median, mode, and range for a set of data

Ma74.10 draw conclusions and make predictions from data

V. PATTERNS, RELATIONS, FUNCTIONS, AND ALGEBRA

The students will be able to:

Ma75.1 identify and use attributes of data

Ma75.2 recognize, describe, extend, analyze, and create a wide variety of patterns

Ma75.3 identify and discover patterns (e.g., Pascal's triangle and Fibonacci's sequence)

Ma75.4 identify and record a pattern using variables

Ma75.5 explore and apply patterns of divisibility

Ma75.6 solve for missing terms in an equation

Ma75.7 apply ratio and proportion in solving problems involving real-life situations (e.g., scale drawings)

Ma75.8 show algebraic relationships using concrete objects, pictures, tables, graphs, and equations

Ma75.9 evaluate algebraic expressions given the value of all the variables (i.e., substitution)

Ma75.10 solve linear equations using concrete, informal, and formal methods for all operations

Ma75.11 investigate inequalities and nonlinear equations

Ma75.12 solve one-step equations involving integers

Ma75.13 translate English into algebraic expressions

Ma75.14 explore equations using collecting and substituting of terms

Ma75.15 solve problems using estimation to eliminate possibilities

Ma75.16 apply concepts of probability based on real-life situations

Ma75.17 formulate word problems to be solved based on real-life situations

Ma75.18 use patterns and functions to represent and solve problems

Ma75.19 describe mathematical relationships

GRADE 6

GOAL: To enjoy math. To make sense of math and to use it in purposeful ways. To view and use math as a tool for reasoning: math is problem solving.

I. THEMES THAT CUT ACROSS MATHEMATICS

In order for students to be successful in meeting their performance objectives in this mathematics curriculum, the teacher will need to:

Ma61.1 Communicate with appropriate “MATH LANGUAGE” and require students to do the same.

Ma61.2 Communicate mathematically in oral, written, and pictorial form and require students to do the same.

Ma61.3 Ask open-ended questions that encourage students to think in divergent ways.

Ma61.4 Provide ample opportunities for students to share ideas in whole class discussions and in small collaborative groups.

Ma61.5 Provide ample opportunities for students to work in collaborative group situations.

Ma61.6 Require students to use mental math skills beyond the basic rote memorization of facts.

Ma61.7 Require students to use mental estimation prior to computing problems.

Ma61.8 Expand continually students’ awareness of the base ten number system.

Ma61.9 Provide ample opportunities for students to explore a variety of problem-solving techniques and to apply them to real-life situations.

Ma61.10 Provide ample opportunities for students to discover, explore, and reinforce all concepts through the use of appropriate manipulatives.

Ma61.11 Encourage students to develop a lasting sense of number and number relationships.

Ma61.12 Encourage students to develop logical reasoning and critical thinking.

Ma61.13 Encourage students to develop skills concerning spatial relationships.

Ma61.14 Allow students to use the calculator, NOT TO REPLACE BASIC COMPUTATIONAL SKILLS, but to enhance problem solving and to make mathematical explorations and connections.

Ma61.15 Provide ample opportunities for students to experience a variety of assessment formats.

II. NUMBER

The students will be able to:

Ma62.1 demonstrate an understanding of the base ten number system

Ma62.2 express a standard form number in expanded notation

Ma62.3 compare and order whole numbers, decimals, fractions, and mixed numbers

Ma62.4 add, subtract, multiply, and divide whole numbers, fractions, and mixed numbers

Ma62.5 add, subtract, and multiply decimals

Ma62.6 divide decimals by a whole number and a decimal divisor

Ma62.7 identify terminating and repeating decimals

Ma62.8 use short division to divide mentally

Ma62.9 multiply and divide using powers of ten

Ma62.10 identify and apply divisibility rules for 2, 3, 4, 5, 6, 9, and 10 to be able to perform mental math

Ma62.11 find the greatest common factor (GCF) of two or more numbers

- Ma62.12** identify a whole number as prime, composite, or neither
- Ma62.13** write a composite number as a product of prime factors by creating a factor tree
- Ma62.14** express the prime factorization for a composite number using exponents
- Ma62.15** interpret exponential values and express in factor and standard form
- Ma62.16** identify the pattern for expressing a power of ten in standard form
- Ma62.17** apply a simplification process when multiplying and dividing whole numbers, fractions, and mixed numbers
- Ma62.18** find the least common multiple (LCM) of two or more numbers
- Ma62.19** find the least common denominator (LCD) of two or more fractions and mixed numbers
- Ma62.20** express a fraction and a mixed number in equivalent forms (e.g., lowest terms)
- Ma62.21** express a whole number or a mixed number as an improper fraction and vice versa
- Ma62.22** find the reciprocal of a number
- Ma62.23** discover the relationship between decimals, fractions, and percents
- Ma62.24** express a decimal as a fraction and a percent
- Ma62.25** express a fraction as a decimal and a percent
- Ma62.26** express a percent as a decimal and a fraction
- Ma62.27** identify and express ratios in three different forms
- Ma62.28** find equal ratios and identify two equal ratios as a proportion
- Ma62.29** determine if two ratios form a proportion and solve proportion equations
- Ma62.30** define integers

Ma62.31 locate integers on the number line

Ma62.32 compare and order integers

Ma62.33 add and subtract integers

Ma62.34 solve expressions using the order of operations

Ma62.35 use the identity properties of addition, subtraction, multiplication, and division

Ma62.36 use the commutative and associative properties of addition and multiplication

Ma62.37 use the distributive property of multiplication

Ma62.38 use the zero property of multiplication

Ma62.39 identify and use inverse operations

III. SPACE AND DIMENSION

The students will be able to:

Ma63.1 identify and use the metric and customary units of measurement for length, weight, capacity, and temperature

Ma63.2 identify the most appropriate unit of measurement for a real-life situation

Ma63.3 convert units within the metric system of measurement

Ma63.4 convert units within the customary system of measurement

Ma63.5 add, subtract, and multiply metric and customary units of measurement

Ma63.6 demonstrate the use of a straight edge and a protractor

Ma63.7 identify and use two- and three-dimensional geometric figures

Ma63.8 combine geometric figures to form a given geometric figure

Ma63.9 identify and use the symbols for line, line segment, parallel lines, perpendicular lines, circle, ray, and angle

Ma63.10 identify, measure, and construct line segments and lines (i.e., parallel, perpendicular, intersecting, and oblique)

Ma63.11 identify, measure, and construct angles (i.e., right, acute, obtuse, and straight)

Ma63.12 determine complementary and supplementary angles

Ma63.13 identify, measure, and construct triangles (i.e., equilateral, isosceles, scalene, right, acute and obtuse)

Ma63.14 identify parts of a circle (i.e., circumference, diameter, radius, center point and chord)

Ma63.15 identify and show examples of symmetry

Ma63.16 identify and show examples of congruent figures

Ma63.17 find the perimeter of polygons

Ma63.18 find the area of quadrilaterals and triangles

Ma63.19 find the volume of a cube and a rectangular prism

Ma63.20 find the circumference and area of a circle

Ma63.21 identify time as A.M. or P.M.

Ma63.22 determine elapsed time

Ma63.23 add and subtract units of time

Ma63.24 convert from one unit of time to another

Ma63.25 relate time to life circumstances (e.g., bus schedule)

IV. DATA COLLECTION AND INTERPRETATION

The students will be able to:

Ma64.1 collect, sort, and classify data

Ma64.2 interpret and create charts, diagrams, schedules, and tables

Ma64.3 interpret and create pictographs, frequency diagrams, single and multiple bar graphs, single and multiple line graphs, and circle graphs

Ma64.4 locate, name, and plot a point in the first quadrant of a coordinate graph

Ma64.5 formulate and record observations from charts, diagrams, graphs, schedules, and tables

Ma64.6 calculate and use the mean, median, mode, and range for a set of data

Ma64.7 draw conclusions and make predictions from data

V. PATTERNS, RELATIONS, FUNCTIONS, AND ALGEBRA

The students will be able to:

Ma65.1 identify and use attributes of data

Ma65.2 recognize, describe, extend, analyze, and create a wide variety of patterns (e.g., sequencing)

Ma65.3 explore patterns of divisibility

Ma65.4 solve problems using estimation to eliminate possibilities

Ma65.5 formulate word problems to be solved based on real-life situations

Ma65.6 explore and apply concepts of probability based on real-life situations

Ma65.7 solve for missing terms in an equation

Ma65.8 use patterns and functions to represent and solve problems

Ma65.9 describe mathematical relationships

GRADE 5

GOAL: To enjoy math. To make sense of math and to use it in purposeful ways. To view and use math as a tool for reasoning: math is problem solving.

I. THEMES THAT CUT ACROSS MATHEMATICS

In order for students to be successful in meeting their performance objectives in this mathematics curriculum, the teacher will need to:

Ma51.1 Communicate with appropriate “MATH LANGUAGE” and require students to do the same.

Ma51.2 Communicate mathematically in oral, written, and pictorial form and require students to do the same.

Ma51.3 Ask open-ended questions that encourage students to think in divergent ways.

Ma51.4 Provide ample opportunities for students to share ideas in whole class discussions and in small collaborative groups.

Ma51.5 Provide ample opportunities for students to work in collaborative group situations.

Ma51.6 Require students to use mental math skills beyond the basic rote memorization of facts.

Ma51.7 Require students to use mental estimation prior to computing problems.

Ma51.8 Expand continually students’ awareness of the base ten number system.

Ma51.9 Provide ample opportunities for students to explore a variety of problem-solving techniques and to apply them to real-life situations.

Ma51.10 Provide ample opportunities for students to discover, explore, and reinforce all concepts through the use of appropriate manipulatives.

Ma51.11 Encourage students to develop a lasting sense of number and number relationships.

Ma51.12 Encourage students to develop logical reasoning and critical thinking.

Ma51.13 Encourage students to develop skills concerning spatial relationships.

Ma51.14 Allow students to use the calculator, NOT TO REPLACE BASIC COMPUTATIONAL SKILLS, but to enhance problem solving and to make mathematical explorations and connections.

Ma51.15 Provide ample opportunities for students to experience a variety of assessment formats.

II. NUMBER

The students will be able to:

Ma52.1 demonstrate an understanding of the base ten number system

Ma52.2 identify, recognize, and write numbers through the hundred billion place value

Ma52.3 record whole numbers using words

Ma52.4 compare and order whole numbers

Ma52.5 express numbers in expanded form

Ma52.6 develop estimation strategies for all operations

Ma52.7 add and subtract through the hundred thousands place value

Ma52.8 multiply a four digit factor by a one, two, and three digit factor

Ma52.9 divide a whole number by a one and two digit divisor

Ma52.10 use short division to divide mentally

Ma52.11 identify and apply divisibility rules for 2, 3, 4, 5, 6, 9, and 10

Ma52.12 find and list all the factors for a given number

- Ma52.13** find the greatest common factor (GCF) of two or more numbers
- Ma52.14** identify prime and composite numbers
- Ma52.15** write a composite number as a product of prime factors by creating a factor tree
- Ma52.16** identify, recognize, and write decimals
- Ma52.17** record decimals using words
- Ma52.18** find equivalent decimals
- Ma52.19** compare and order decimals
- Ma52.20** add, subtract, and multiply decimals
- Ma52.21** divide decimals by a whole number divisor
- Ma52.22** relate decimals to money
- Ma52.23** identify and define proper fractions, improper fractions, and mixed numbers
- Ma52.24** identify fractional parts
- Ma52.25** write fractions and mixed numbers for a given illustration
- Ma52.26** find equivalent fractions
- Ma52.27** compare and order fractions and mixed numbers with like and unlike denominators
- Ma52.28** express a whole number or a mixed number as an improper fraction and vice versa
- Ma52.29** express a fraction or a mixed number in lowest terms
- Ma52.30** add and subtract fractions, mixed numbers, and whole numbers with like and unlike denominators
- Ma52.31** multiply and divide whole numbers, fractions, and mixed numbers
- Ma52.32** apply a simplification process when multiplying and dividing whole numbers, fractions, and mixed numbers

Ma52.33 write fractions as decimals through the hundredths place value

Ma52.34 write decimals as fractions using tenths and hundredths

Ma52.35 use the identity properties of addition, subtraction, multiplication, and division

Ma52.36 use the commutative and associative properties of addition and multiplication

Ma52.37 use the zero property of multiplication

Ma52.38 identify and use inverse operations

III. SPACE AND DIMENSION

The students will be able to:

Ma53.1 identify and use the metric and customary units of measurement for length, weight, capacity, and temperature

Ma53.2 identify the most appropriate unit of measurement for a real-life situation

Ma53.3 convert units within the metric system of measurement

Ma53.4 convert units within the customary system of measurement

Ma53.5 add and subtract metric and customary units of measurement

Ma53.6 demonstrate the use of a straight edge and a protractor

Ma53.7 identify and use two- and three-dimensional geometric figures

Ma53.8 combine geometric figures to form a given geometric figure

Ma53.9 identify, measure, and construct line segments and lines (i.e., parallel, perpendicular, intersecting, and oblique)

Ma53.10 identify, measure, and construct angles (i.e., right, acute, obtuse, and straight)

Ma53.11 identify parts of a circle (i.e., circumference, diameter, radius, center point, and chord)

Ma53.12 identify and show examples of symmetry

Ma53.13 identify and show examples of congruent figures

Ma53.14 find the perimeter of polygons

Ma53.15 find the area of quadrilaterals

Ma53.16 find the volume of a cube and a rectangular prism

Ma53.17 identify time as A.M. or P.M.

Ma53.18 determine elapsed time

Ma53.19 convert from one unit of time to another

Ma53.20 relate time to life circumstances (e.g., bus schedule)

Ma53.21 convert money values

IV. DATA COLLECTION AND INTERPRETATION

The students will be able to:

Ma54.1 collect, sort, and classify data

Ma54.2 interpret and create charts, diagrams, schedules, and tables

Ma54.3 interpret and create pictographs, frequency diagrams, single and multiple bar graphs, single and multiple line graphs, and circle graphs

Ma54.4 formulate and record observations from charts, diagrams, graphs, schedules, and tables

Ma54.5 calculate the mean, median, mode, and range for a set of data

Ma54.6 draw conclusions and make predictions from data

V. PATTERNS, RELATIONS, FUNCTIONS, AND ALGEBRA

The students will be able to:

Ma55.1 identify and use attributes of data

Ma55.2 recognize, describe, extend, analyze, and create a wide variety of patterns (e.g., sequencing)

Ma55.3 explore patterns of divisibility

Ma55.4 solve problems using estimation to eliminate possibilities

Ma55.5 formulate word problems to be solved based on real-life situations

Ma55.6 explore and apply concepts of probability based on real-life situations

Ma55.7 solve for missing terms in an equation

Ma55.8 use patterns and functions to represent and solve problems

Ma55.9 describe mathematical relationships

GRADE 4

GOAL: To enjoy math. To make sense of math and to use it in purposeful ways. To view and use math as a tool for reasoning: math is problem solving.

I. THEMES THAT CUT ACROSS MATHEMATICS

In order for students to be successful in meeting their performance objectives in this mathematics curriculum, the teacher will need to:

Ma41.1 Communicate with appropriate “MATH LANGUAGE” and require students to do the same.

Ma41.2 Communicate mathematically in oral, written, and pictorial form and require students to do the same.

Ma41.3 Ask open-ended questions that encourage students to think in divergent ways.

Ma41.4 Provide ample opportunities for students to share ideas in whole class discussions and in small collaborative groups.

Ma41.5 Provide ample opportunities for students to work in collaborative group situations.

Ma41.6 Require students to use mental math skills beyond the basic rote memorization of facts.

Ma41.7 Require students to use mental estimation prior to computing problems.

Ma41.8 Expand continually students’ awareness of the base ten number system.

Ma41.9 Provide ample opportunities for students to explore a variety of problem-solving techniques and to apply them to real-life situations.

Ma41.10 Provide ample opportunities for students to discover, explore, and reinforce all concepts through the use of appropriate manipulatives.

Ma41.11 Encourage students to develop a lasting sense of number and number relationships.

Ma41.12 Encourage students to develop logical reasoning and critical thinking.

Ma41.13 Encourage students to develop skills concerning spatial relationships.

Ma41.14 Allow students to use the calculator, NOT TO REPLACE BASIC COMPUTATIONAL SKILLS, but to enhance problem solving and to make mathematical explorations and connections.

Ma41.15 Provide ample opportunities for students to experience a variety of assessment formats.

II. NUMBER

The students will be able to:

Ma42.1 demonstrate an understanding of the base ten number system

Ma42.2 identify, recognize, and write numbers through the hundred million place value

Ma42.3 record whole numbers using words

Ma42.4 identify and use ordinal numbers

Ma42.5 compare and order whole numbers

Ma42.6 demonstrate knowledge of the basic facts for addition, subtraction, multiplication, and division

Ma42.7 express numbers in expanded form

Ma42.8 develop and practice estimation strategies for all operations

Ma42.9 add and subtract through the ten thousands place value

Ma42.10 add three or more addends

Ma42.11 multiply up to a four digit factor by a one and two digit factor

Ma42.12 identify and use divisibility rules for 2, 5, and 10

- Ma42.13** divide up to a three digit dividend by a one and two digit divisor
- Ma42.14** identify, recognize, and write decimals through the hundredths place value
- Ma42.15** record decimals using words
- Ma42.16** find equivalent decimals
- Ma42.17** compare and order decimals
- Ma42.18** add, subtract, and multiply decimals
- Ma42.19** relate decimals to money
- Ma42.20** add, subtract, and multiply money
- Ma42.21** identify equal parts (i.e., halves, thirds, fourths, sixths, eighths, tenths, and twelfths)
- Ma42.22** write fractions for a given illustration
- Ma42.23** find equivalent fractions using the number line
- Ma42.24** compare and order fractions with like denominators
- Ma42.25** add and subtract fractions with like denominators
- Ma42.26** add and subtract fractions with unlike denominators using the number line
- Ma42.27** multiply a fraction by a whole number
- Ma42.28** relate a fractional part to its equivalent decimal
- Ma42.29** explore mixed numbers
- Ma42.30** use the identity properties of addition, subtraction, multiplication, and division
- Ma42.31** use the commutative property of addition and multiplication (i.e., fact families)
- Ma42.32** use the zero property of multiplication
- Ma42.33** identify and use inverse operations

III. SPACE AND DIMENSION

The students will be able to:

Ma43.1 identify and use the metric and customary units of measurement for length, weight, and capacity

Ma43.2 explore the metric and customary units of measurement for temperature (e.g., freezing and boiling of water)

Ma43.3 read temperatures on a scale (i.e., degrees Celsius, °C and degrees Fahrenheit, °F)

Ma43.4 identify the most appropriate unit of measurement for a real-life situation

Ma43.5 demonstrate the use of a straight edge

Ma43.6 identify and draw two-dimensional figures (i.e., square, rectangle, circle, ellipse, and triangle)

Ma43.7 identify three-dimensional figures (i.e., cube, sphere, cylinder, cone, and rectangular prism)

Ma43.8 combine geometric figures to form a given geometric figure

Ma43.9 identify and construct lines, parallel lines, perpendicular lines, intersecting lines, line segments, and rays

Ma43.10 identify and name angles (i.e., right, acute, obtuse, and straight)

Ma43.11 identify parts of a circle (i.e., diameter, radius, and center point)

Ma43.12 identify and show examples of symmetry

Ma43.13 identify and show examples of congruent figures

Ma43.14 find the perimeter of polygons

Ma43.15 measure area using square units

Ma43.16 measure volume using cubic units

Ma43.17 use the calendar effectively

Ma43.18 tell and write time (i.e., hour, half hour, quarter hour, and minute)

Ma43.19 identify conventional and digital time

Ma43.20 identify time as A.M. or P.M. (i.e., midnight or noon)

Ma43.21 determine elapsed time (i.e., hour, half hour, quarter hour, and minute)

Ma43.22 convert from one unit of time to another

Ma43.23 relate time to life circumstances (e.g., bus schedule)

Ma43.24 use appropriate symbols for coins and currency

Ma43.25 identify and use all coins and currency through the one hundred-dollar bill

Ma43.26 select coins and currency for a given money value

Ma43.27 add and subtract coins and currency

Ma43.28 identify equal money values using coins and currency (e.g., five quarters equal \$1.25)

Ma43.29 make change using the least amount of coins and currency

IV. DATA COLLECTION AND INTERPRETATION

The students will be able to:

Ma44.1 collect, sort, and classify data

Ma44.2 read, interpret, and construct charts, diagrams, schedules, and tables

Ma44.3 read, interpret, and construct horizontal and vertical pictographs, single and multiple bar graphs, single and multiple line graphs, and circle graphs

Ma44.4 formulate and record observations from charts, diagrams, graphs, schedules, and tables

Ma44.5 calculate the average (i.e., mean) for a set of data

Ma44.6 draw conclusions and make predictions from data

V. PATTERNS, RELATIONS, FUNCTIONS, AND ALGEBRA

The students will be able to:

Ma45.1 identify and use attributes of data

Ma45.2 recognize, describe, extend, analyze, and create a wide variety of patterns (e.g., sequencing)

Ma45.3 solve problems using estimation to eliminate possibilities

Ma45.4 formulate word problems to be solved based on real-life situations

Ma45.5 explore concepts of probability based on real-life situations

Ma45.6 solve for missing terms in an equation

Ma45.7 use patterns and functions to represent and solve problems

Ma45.8 describe mathematical relationships

GRADE 3

GOAL: To enjoy math. To make sense of math and to use it in purposeful ways. To view and use math as a tool for reasoning: math is problem solving.

I. THEMES THAT CUT ACROSS MATHEMATICS

In order for students to be successful in meeting their performance objectives in this mathematics curriculum, the teacher will need to:

Ma31.1 Communicate with appropriate “MATH LANGUAGE” and require students to do the same.

Ma31.2 Communicate mathematically in oral, written, and pictorial form and require students to do the same.

Ma31.3 Ask open-ended questions that encourage students to think in divergent ways.

Ma31.4 Provide ample opportunities for students to share ideas in whole class discussions and in small collaborative groups.

Ma31.5 Provide ample opportunities for students to work in collaborative group situations.

Ma31.6 Require students to use mental math skills beyond the basic rote memorization of facts.

Ma31.7 Require students to use mental estimation prior to computing problems.

Ma31.8 Expand continually students’ awareness of the base ten number system.

Ma31.9 Provide ample opportunities for students to explore a variety of problem-solving techniques and to apply them to real-life situations.

Ma31.10 Provide ample opportunities for students to discover, explore, and reinforce all concepts through the use of appropriate manipulatives.

Ma31.11 Encourage students to develop a lasting sense of number and number relationships.

Ma31.12 Encourage students to develop logical reasoning and critical thinking.

Ma31.13 Encourage students to develop skills concerning spatial relationships.

Ma31.14 Allow students to use the calculator, NOT TO REPLACE BASIC COMPUTATIONAL SKILLS, but to enhance problem solving and to make mathematical explorations and connections.

Ma31.15 Provide ample opportunities for students to experience a variety of assessment formats.

II. NUMBER

The students will be able to:

Ma32.1 demonstrate an understanding of the base ten number system

Ma32.2 identify, recognize, and write numbers through the hundred thousand place value

Ma32.3 record whole numbers using words

Ma32.4 identify and use ordinal numbers

Ma32.5 compare and order whole numbers

Ma32.6 demonstrate knowledge of the basic facts for addition, subtraction, multiplication, and division

Ma32.7 express numbers in expanded form

Ma32.8 develop and practice estimation strategies for all operations

Ma32.9 add and subtract through the thousands place value

Ma32.10 add three or more addends

Ma32.11 multiply up to a two digit factor by a one digit factor

- Ma32.12** divide up to a two digit dividend by a one digit divisor
- Ma32.13** explore the tenths and hundredths place values
- Ma32.14** relate decimals to money
- Ma32.15** add and subtract money
- Ma32.16** identify equal parts (i.e., halves, thirds, fourths, sixths, and eighths)
- Ma32.17** read fractions
- Ma32.18** write fractions in standard and written form
- Ma32.19** compare fractions with like denominators
- Ma32.20** order fractions using illustrations
- Ma32.21** use the identity properties of addition, subtraction, multiplication, and division
- Ma32.22** use the commutative property of addition and multiplication (i.e., fact families)
- Ma32.23** use the zero property of multiplication
- Ma32.24** identify and use inverse operations

III. SPACE AND DIMENSION

The students will be able to:

- Ma33.1** identify and use the basic metric and customary units of measurement for length, weight, and capacity
- Ma33.2** read temperatures on a scale (i.e., degrees Celsius, °C and degrees Fahrenheit, °F)
- Ma33.3** identify the most appropriate unit of measurement for a real-life situation
- Ma33.4** demonstrate the use of a straight edge

Ma33.5 identify and draw two-dimensional figures (i.e., square, rectangle, circle, ellipse, and triangle)

Ma33.6 identify three-dimensional figures (i.e., cube, sphere, cylinder, cone, and rectangular prism)

Ma33.7 combine geometric figures to form a given geometric figure

Ma33.8 identify and construct lines, line segments, and rays

Ma33.9 identify sides, corners, and square corners of a given geometric shape

Ma33.10 identify a right angle

Ma33.11 identify lines of symmetry

Ma33.12 identify congruent figures

Ma33.13 measure perimeter using square units

Ma33.14 measure area using square units

Ma33.15 use the calendar effectively

Ma33.16 tell and write time (i.e., hour, half hour, quarter hour, and minute)

Ma33.17 identify conventional and digital time

Ma33.18 identify time as A.M. or P.M. (i.e., midnight or noon)

Ma33.19 determine elapsed time (i.e., hour, half hour, quarter hour, and minute)

Ma33.20 convert from one unit of time to another

Ma33.21 relate time to life circumstances (e.g., bus schedule)

Ma33.22 use appropriate symbols for coins and currency

Ma33.23 identify, count, determine value, and make change using coins and currency (i.e., pennies, nickels, dimes, quarters, half dollars, one-dollar bills, five-dollar bills, and a ten-dollar bill)

Ma33.24 select coins and currency for a given money value

Ma33.25 add and subtract coins and currency

Ma33.26 identify equal money values using coins and currency (e.g., five quarters equal \$1.25)

IV. DATA COLLECTION AND INTERPRETATION

The students will be able to:

Ma34.1 collect, sort, and classify data

Ma34.2 read, interpret, and construct charts, diagrams, schedules, and tables

Ma34.3 read, interpret, and construct horizontal and vertical pictographs, bar graphs, line graphs, and circle graphs

Ma34.4 formulate and record observations from charts, diagrams, graphs, schedules, and tables

Ma34.5 draw conclusions and make predictions from data

V. PATTERNS, RELATIONS, FUNCTIONS, AND ALGEBRA

The students will be able to:

Ma35.1 identify attributes of data

Ma35.2 recognize, describe, extend, analyze, and create a wide variety of patterns (e.g., sequencing)

Ma35.3 use skip counting (i.e., repeated addition) by 2, 3, 4, 5, 10, and 100

Ma35.4 solve problems using estimation to eliminate possibilities

Ma35.5 formulate word problems to be solved based on real-life situations

Ma35.6 explore concepts of probability based on real-life situations

Ma35.7 solve for missing terms in an equation

Ma35.8 use patterns and functions to represent and solve problems

Ma35.9 describe mathematical relationships

GRADE 2

GOAL: To enjoy math. To make sense of math and to use it in purposeful ways. To view and use math as a tool for reasoning: math is problem solving.

I. THEMES THAT CUT ACROSS MATHEMATICS

In order for students to be successful in meeting their performance objectives in this mathematics curriculum, the teacher will need to:

Ma21.1 Communicate with appropriate “MATH LANGUAGE” and require students to do the same.

Ma21.2 Communicate mathematically in oral, written, and pictorial form and require students to do the same.

Ma21.3 Ask open-ended questions that encourage students to think in divergent ways.

Ma21.4 Provide ample opportunities for students to share ideas in whole class discussions and in small collaborative groups.

Ma21.5 Provide ample opportunities for students to work in collaborative group situations.

Ma21.6 Require students to use mental math skills beyond the basic rote memorization of facts.

Ma21.7 Require students to use mental estimation prior to computing problems.

Ma21.8 Expand continually students’ awareness of the base ten number system.

Ma21.9 Provide ample opportunities for students to explore a variety of problem-solving techniques and to apply them to real-life situations.

Ma21.10 Provide ample opportunities for students to discover, explore, and reinforce all concepts through the use of appropriate manipulatives.

Ma21.11 Encourage students to develop a lasting sense of number and number relationships.

Ma21.12 Encourage students to develop logical reasoning and critical thinking.

Ma21.13 Encourage students to develop skills concerning spatial relationships.

Ma21.14 Allow students to use the calculator, NOT TO REPLACE BASIC COMPUTATIONAL SKILLS, but to enhance problem solving and to make mathematical explorations and connections.

Ma21.15 Provide ample opportunities for students to experience a variety of assessment formats.

II. NUMBER

The students will be able to:

Ma22.1 demonstrate an understanding of the base ten number system

Ma22.2 identify, recognize, and write numbers through the hundreds place value

Ma22.3 identify odd and even numbers

Ma22.4 identify ordinal numbers through 31 (i.e., calendar) in verbal and written form

Ma22.5 compare and order whole numbers using the number line

Ma22.6 use mathematical symbols (i.e., +, -, =, <, >)

Ma22.7 add and subtract math facts through 18

Ma22.8 explore expanded form of whole numbers

Ma22.9 explore basic multiplication facts (i.e., fact families)

Ma22.10 add and subtract two and three digit numbers

Ma22.11 use estimation strategies in addition and subtraction

Ma22.12 identify and recognize fractional parts (i.e., one-half, one-third, and one-fourth)

Ma22.13 use the identity properties of addition and subtraction

Ma22.14 use the commutative property of addition (i.e., fact families)

Ma22.15 use the zero property of multiplication

III. SPACE AND DIMENSION

The students will be able to:

Ma23.1 recognize and use the basic metric and customary units of measurement for length, weight, and capacity

Ma23.2 model the results of joining and separating units of measurement

Ma23.3 read temperatures on a scale (i.e., degrees Celsius, °C and degrees Fahrenheit, °F)

Ma23.4 identify the most appropriate unit of measurement for a real-life situation

Ma23.5 demonstrate the use of a straight edge

Ma23.6 identify and draw two-dimensional figures (i.e., square, rectangle, circle, ellipse, and triangle)

Ma23.7 identify three-dimensional figures (i.e., cube, sphere, cylinder, and cone)

Ma23.8 combine shapes to form a given shape

Ma23.9 identify and construct lines and simple closed curves

Ma23.10 increase understanding of inside and outside (i.e., interior and exterior)

Ma23.11 identify and recognize congruent and symmetrical shapes

Ma23.12 order and relate calendar dates (e.g., complete a blank calendar)

Ma23.13 tell and write time to the hour, half hour, quarter hour, and in five minute intervals using conventional and digital clocks

Ma23.14 recognize and use appropriate symbols for coins and currency

Ma23.15 identify, count, determine value, and make change using coins and currency (i.e., pennies, nickels, dimes, quarters, half dollars, and one-dollar bills)

Ma23.16 determine equivalent coin values (e.g., 5 pennies equal 1 nickel)

Ma23.17 pay for items using pennies, nickels, dimes, quarters, half dollars, and one-dollar bills

Ma23.18 add and subtract coins (i.e., pennies, nickels, dimes, quarters, and half dollars)

IV. DATA COLLECTION AND INTERPRETATION

The students will be able to:

Ma24.1 collect, sort, and classify data

Ma24.2 use the number line

Ma24.3 tally data

Ma24.4 read and construct basic charts, diagrams, schedules, and tables

Ma24.5 read and construct horizontal and vertical pictographs and bar graphs

Ma24.6 recognize and read circle graphs

Ma24.7 formulate and record observations from charts, diagrams, graphs, schedules, and tables

Ma24.8 draw conclusions and make predictions from data

V. PATTERNS, RELATIONS, FUNCTIONS, AND ALGEBRA

The students will be able to:

Ma25.1 identify attributes of data

Ma25.2 extend repeating patterns and sequences of objects and numbers

Ma25.3 explore skip counting (i.e., repeated addition) by 2, 5, 10, and 100

Ma25.4 role play to find solutions to a problem

Ma25.5 predict solutions for a problem situation and check until a solution is found

Ma25.6 select the appropriate procedure for solving problem situations

Ma25.7 describe problem situations and solutions to problems logically

Ma25.8 solve problems using estimation to eliminate possibilities

Ma25.9 formulate word problems to be solved based on real-life situations

Ma25.10 solve for missing terms in addition and subtraction problems

Ma25.11 use patterns and functions to represent and solve problems

Ma25.12 describe mathematical relationships

GRADE 1

GOAL: To enjoy math. To make sense of math and to use it in purposeful ways. To view and use math as a tool for reasoning: math is problem solving.

I. THEMES THAT CUT ACROSS MATHEMATICS

In order for students to be successful in meeting their performance objectives in this mathematics curriculum, the teacher will need to:

Ma11.1 Communicate with appropriate “MATH LANGUAGE” and require students to do the same.

Ma11.2 Communicate mathematically in oral, written, and pictorial form and require students to do the same.

Ma11.3 Ask open-ended questions that encourage students to think in divergent ways.

Ma11.4 Provide ample opportunities for students to share ideas in whole class discussions and in small collaborative groups.

Ma11.5 Provide ample opportunities for students to work in collaborative group situations.

Ma11.6 Require students to use mental math skills beyond the basic rote memorization of facts.

Ma11.7 Require students to use mental estimation prior to computing problems.

Ma11.8 Expand continually students’ awareness of the base ten number system.

Ma11.9 Provide ample opportunities for students to explore a variety of problem-solving techniques and to apply them to real-life situations.

Ma11.10 Provide ample opportunities for students to discover, explore, and reinforce all concepts through the use of appropriate manipulatives.

Ma11.11 Encourage students to develop a lasting sense of number and number relationships.

Ma11.12 Encourage students to develop logical reasoning and critical thinking.

Ma11.13 Encourage students to develop skills concerning spatial relationships.

Ma11.14 Allow students to use the calculator, NOT TO REPLACE BASIC COMPUTATIONAL SKILLS, but to enhance problem solving and to make mathematical explorations and connections.

Ma11.15 Provide ample opportunities for students to experience a variety of assessment formats

II. NUMBER

The students will be able to:

Ma12.1 demonstrate an understanding of the base ten number system

Ma12.2 identify the ones and tens place values

Ma12.3 recognize, identify, and write numbers through the tens place value

Ma12.4 identify ordinal positions through 12 in verbal and written form

Ma12.5 compare and order numbers through 99 using the number line (i.e., before, after, and between)

Ma12.6 recognize and use mathematical symbols (i.e., +, -, =, <, >)

Ma12.7 add and subtract math facts through 12

Ma12.8 write and verbalize a reasonable estimate for addition and subtraction facts

Ma12.9 recognize and identify fractional parts of whole objects (i.e., one-half, one-third, and one-fourth)

III. SPACE AND DIMENSION

The students will be able to:

Ma13.1 demonstrate an understanding of positional terms (i.e., right, left, top, bottom, above, below, over, under, near, far, first, middle, and last)

Ma13.2 recognize the basic metric and customary units of measurement for length, weight, and capacity

Ma13.3 measure lengths of common objects using non-standard units of measurement and a straight edge

Ma13.4 compare and order common objects using non-standard units of measurement and a straight edge

Ma13.5 estimate the approximate length of common objects in centimeters and inches without using a straight edge

Ma13.6 explore and estimate weight using kilograms and pounds

Ma13.7 explore and estimate capacity using liters, cups, pints, and quarts

Ma13.8 model the results of joining and separating units of measurement

Ma13.9 recognize temperatures on a scale (i.e., degrees Celsius, °C and degrees Fahrenheit, °F)

Ma13.10 identify two- and three-dimensional figures in the environment

Ma13.11 recognize and draw two-dimensional figures (i.e., square, rectangle, circle, ellipse, and triangle)

Ma13.12 recognize three-dimensional figures (i.e., cube, sphere, cylinder, and cone)

Ma13.13 combine shapes to form a given shape

Ma13.14 identify lines and simple closed curves

Ma13.15 explore the ideas of inside and outside (i.e., interior and exterior)

Ma13.16 identify and compare calendar dates and seasons of the year

Ma13.17 recognize sequential events of the day

Ma13.18 investigate the concept of time

Ma13.19 identify time of day (i.e., morning, afternoon, and night)

Ma13.20 tell time to the hour and the half hour using conventional and digital clocks

Ma13.21 recognize, identify, and count coins (i.e., pennies, nickels, dimes, and quarters)

Ma13.22 estimate the value of a given group of coins through 99¢

Ma13.23 determine the value of a given group of coins through 99¢

Ma13.24 write money values using the cent symbol through 99¢

Ma13.25 determine equivalent coin values (e.g., 5 pennies equal 1 nickel)

Ma13.26 pay for items using pennies, nickels, dimes, and quarters

Ma13.27 add and subtract coins (i.e., pennies, nickels, dimes, and quarters) through 99¢

IV. DATA COLLECTION AND INTERPRETATION

The students will be able to:

Ma14.1 collect, sort, and classify data

Ma14.2 recognize and use the number line

Ma14.3 recognize and read circle graphs

Ma14.4 tally data by fives and tens

Ma14.5 recognize, read, and construct horizontal and vertical pictographs and bar graphs

Ma14.6 formulate and record observations from graphs

Ma14.7 draw conclusions and make predictions from data

V. PATTERNS, RELATIONS, FUNCTIONS, AND ALGEBRA

The students will be able to:

Ma15.1 recognize, copy, continue, and describe patterns

Ma15.2 sort objects according to single and multiple attributes

Ma15.3 identify and extend missing elements of repeating patterns and sequences of numbers

Ma15.4 explore skip counting (i.e., repeated addition) by 2, 5, and 10

Ma15.5 select concrete objects, pictures, or mathematical symbols to solve problems and understand the solution process

Ma15.6 role play to find solutions to a problem

Ma15.7 predict solutions for a problem situation

Ma15.8 describe problem situations and solutions to problems logically

Ma15.9 use objects, letters, and invented symbols to describe the joining, separating, and comparing of groups of objects

Ma15.10 model a problem situation using a number sentence

Ma15.11 solve problems using estimation to eliminate possibilities

Ma15.12 formulate word problems to be solved based on real-life situations

Ma15.13 use patterns and functions to represent and solve problems

Ma15.14 describe mathematical relationships

KINDERGARTEN

GOAL: To enjoy math. To make sense of math and to use it in purposeful ways. To view and use math as a tool for reasoning: math is problem solving.

I. THEMES THAT CUT ACROSS MATHEMATICS

In order for students to be successful in meeting their performance objectives in this mathematics curriculum, the teacher will need to:

MaK1.1 Communicate with appropriate “MATH LANGUAGE” and require students to do the same.

MaK1.2 Communicate mathematically in oral, written, and pictorial form and require students to do the same.

MaK1.3 Ask open-ended questions that encourage students to think in divergent ways.

MaK1.4 Provide ample opportunities for students to share ideas in whole class discussions and in small collaborative groups.

MaK1.5 Provide ample opportunities for students to work in collaborative group situations.

MaK1.6 Require students to use mental math skills beyond the basic rote memorization of facts.

MaK1.7 Require students to use mental estimation prior to computing problems.

MaK1.8 Expand continually students’ awareness of the base ten number system.

MaK1.9 Provide ample opportunities for students to explore a variety of problem-solving techniques and to apply them to real-life situations.

MaK1.10 Provide ample opportunities for students to discover, explore, and reinforce all concepts through the use of appropriate manipulatives.

MaK1.11 Encourage students to develop a lasting sense of number and number relationships.

MaK1.12 Encourage students to develop logical reasoning and critical thinking.

MaK1.13 Encourage students to develop skills concerning spatial relationships.

MaK1.14 Allow students to use the calculator, NOT TO REPLACE BASIC COMPUTATIONAL SKILLS, but to enhance problem solving and to make mathematical explorations and connections.

MaK1.15 Provide ample opportunities for students to experience a variety of assessment formats.

II. NUMBER

The students will be able to:

MaK2.1 count by memory through 31 (i.e., calendar)

MaK2.2 count objects (i.e., one to one correspondence)

MaK2.3 recognize numbers through 31

MaK2.4 print numbers through 31

MaK2.5 identify ordinal positions through 5

MaK2.6 identify more and less

MaK2.7 compare and order numbers through 12 (i.e., one more, one less, and smallest to largest)

MaK2.8 estimate logically the number of items in a group

MaK2.9 join and separate groups of objects

MaK2.10 discover the meaning of the concepts of simple addition and simple subtraction

MaK2.11 predict whether a collection of objects is less than, the same as, or more than a given number of objects arranged in a pattern

MaK2.12 predict whether a collection of objects is less than, the same as, or more than a given number of objects randomly arranged

MaK2.13 recognize and identify one-half of a whole

III. SPACE AND DIMENSION

The students will be able to:

MaK3.1 demonstrate an understanding of positional terms (i.e., right, left, top, bottom, above, below, over, under, near, far, first, middle, and last)

MaK3.2 recognize, trace, manipulate, draw, fold, and create simple two-dimensional figures (i.e., square, rectangle, circle, ellipse, and triangle)

MaK3.3 recognize three-dimensional figures (i.e., cube, sphere, cylinder, and cone)

MaK3.4 identify two- and three-dimensional figures in the environment

MaK3.5 compare two- and three-dimensional figures (i.e., attributes)

MaK3.6 combine shapes to form a given shape

MaK3.7 compare and order common objects using non-standard and standard units of measurement (i.e., attributes)

MaK3.8 model the results of joining and separating units of measurement

MaK3.9 recognize a thermometer as an instrument that measures weather as hot or cold

MaK3.10 identify the seasons of the year

MaK3.11 identify the days of the week

MaK3.12 compare the days of the week (i.e., today, yesterday, and tomorrow)

MaK3.13 recognize sequential events of the day

MaK3.14 identify calendar dates (i.e., year, month, date, and day of the week)

MaK3.15 investigate the concept of time

MaK3.16 identify time of day (i.e., morning, afternoon, and night)

MaK3.17 tell time to the hour using conventional and digital clocks

MaK3.18 recognize and identify coins (i.e., penny, nickel, and dime)

MaK3.19 count coins (i.e., pennies, nickels, and dimes) through 12¢

MaK3.20 write money values using the cent symbol

MaK3.21 pay for items using pennies, nickels, and dimes

MaK3.22 add and subtract pennies through 9¢

IV. DATA COLLECTION AND INTERPRETATION

The students will be able to:

MaK4.1 collect, sort, and classify objects and pictures according to categories

MaK4.2 recognize and use the number line

MaK4.3 recognize horizontal and vertical pictographs and bar graphs

MaK4.4 draw conclusions and make predictions from data

V. PATTERNS, RELATIONS, FUNCTIONS, AND ALGEBRA

The students will be able to:

MaK5.1 recognize a pattern (i.e., patterns found in rhythms, body movements, drawings, objects, and the environment)

MaK5.2 copy a pattern

MaK5.3 continue a pattern

MaK5.4 describe a pattern verbally using shapes, letters, and numbers

MaK5.5 sort objects according to single and multiple attributes

MaK5.6 use concrete and pictorial models for problem solving

MaK5.7 role play to find solutions to a problem

MaK5.8 predict solutions for a problem situation

MaK5.9 solve a problem situation

MaK5.10 formulate problems to be solved based on real-life situations

MaK5.11 use patterns and functions to represent and solve problems

MaK5.12 describe mathematical relationships

APPENDIX

MATHEMATICS-BASED LITERATURE GUIDE

The books in this guide were recommended by classroom teachers who have used them to enrich their students' mathematics experience. This list was developed by the Everyday Learning Corporation and is by no means comprehensive. Please consult your mathematics textbook for further listings.

* Indicates Out of Print -- please check your library for a copy.

Addition & Subtraction

Adams, Pam - There Was an Old Lady Who Swallowed a Fly

Becker, John - Seven Little Rabbits

Bone, Hildegard - * My 1-2-3 Pop-Up Book

Carle, Eric - Rooster's Off to See the World

Dunrea, Olivier - Deep Down Underground

Gerstein, Mordica - Roll Over

Gisler, David - Addition Annie

Hawkins, Collin & Jacqui Hawkins - I Know an Old Woman

Hawkins, Collin - * Adding Animals and * Take Away Monsters

Hayes, Sara - Nine Ducks Nine

Hindley, Judy - Mrs. Mary Malarky's Seven Cats

Kherdian, David - The Cats' Midsummer Jamboree

Krahn, Fernando - * The Family Minus

Marshall, Ray & Korky Paul - * Pop-Up Numbers # 1 Addition and * Pop-Up Numbers # 2 Subtraction

Nelson, JoAnne - One and One Make Two

Rees, Mary - Ten in a Bed

Schade, Susan & Joe Buller - Hello! Hello!

Westcott, Nadine Bernard - I Know an Old Lady Who Swallowed a Fly

Attributes

Ahlberg, Janet & Alan Ahlberg - The Baby's Catalogue

Anno, Mitsumasa - Anno's Aesop and Anno's Flea Market

Dorros, Arthur - Alligator Shoes

Ehlert, Lois - Color Farm and Color Zoo

Fey, James - Long, Short, High, Low, Thin, Wide

Freeman, Don - Corduroy

Handford, Martin - Find Waldo Now

Hoban, Tana - Exactly the Opposite, Is it Red? Is it Yellow? Is it Blue?, and Of Colors and Things

Hobeman, Mary Ann - A House Is a House for Me

Lobel, Arnold - Frog and Toad Are Friends

Ockenga, Starr - World of Wonder and A Trip through Numbers

Parnall, Peter - Feet!

Reid, Margarette S. - The Button Box

Spier, Peter - CRASH! BANG! BOOM! and People

Young, Ed - Seven Blind Mice

Estimation

Aardema, Verna - Bringing the Rain to Kapiti Plain

Adler, David - Base Five and Roman Numerals

Anno, Mitsumasa - Anno's Counting House

Asch, Frank - Popcorn

Asimov, Isaac - * How Did We Find Out About Numbers?

Carroll, Lewis - The Walrus and the Carpenter

Charosh, Mannis - * Number Ideas through Pictures

Clark, Ann Nolan - Tia Maria's Garden

DePaola, Tomie - Pancakes for Breakfast

Froman, Robert - * Less Than Nothing Is Really Something

Gantschev, Ivan - The Train to Grandma's

Hoban, Tana - Count and See

Hutchins, Pat - One Hunter

Kaufman, Joe - * Big and Little

Keats, Ezra Jack - Apt. 3

Krensky, Stephen - Big Time Bears

Linn, Charles F. - * Estimation

Lobel, Arnold - Ming Lo Moves the Mountain

Martin, Jr., Bill - The Happy Hippopotami

Mason, Lura - A Book of Boxes

McGraw, Sheila & Paul Cline - My Mother's Hands

McKissack, Patricia - A Million Fish . . . More or Less

Munsch, Robert - Something Good

Parker, Tom - In One Day

Rankin, Laura - The Handmade Alphabet

Schenk deRegniers, Beatrice - So Many Cars

Sharmat, Marjorie Weinman - The Three Hundred Twenty-ninth Friend

Shaw, Charles - It Looked Like Spilt Milk

Simon, Leonard & Jeanne Benedict - * The Day the Numbers Disappeared

Tolstoi, Alexie - The Great Big Enormous Turnip

Turkle, Brinton - Do Not Open

Ueno, Noriko - Elephant Buttons

Walsh, Ellen Stoll - Mouse Count

Fractions

Dennis, J. Richard - Fractions Are Parts of Things

Froman, Robert - Angles Are as Easy as Pie

Mathews, Louise - * Gator Pie

McMillan, Bruce - Eating Fractions

Moncure, Jane Belk - How Many Ways Can You Cut a Pie?

Nelson, JoAnne - * Half and Half

Shelby, Anne - Potluck

Silverstein, Shel - Giraffe and a Half

Geometry

Adler, David - * 3D, 2D, 1D

Birch, David - The King's Chessboard

Birmingham, Duncan - M Is for Mirror

Budney, B. - A Kiss Is Round

Carle, Eric - Secret Birthday Message

Charosh, Mannis - Straight Lines, Parallel Lines, Perpendicular Lines and The Ellipse

Eberts, Marjorie & Margaret Gisler - Pancakes, Crackers & Pizza: A Book of Shapes

Ehlert, Lois - Color Zoo

Emberly, Ed - Ed Emberly's Picture Pie: A Book of Circle Art and The Wing on a Flea

Froman, Robert - Angles Are as Easy as Pie, Rubber Bands, Baseballs, and Doughnuts

Gardner, Beau - What Is It?

Greenes, Carole - * The Magic Shapes

Grifalconi, Ann - The Village of Round and Square Houses

Hoban, Tana - * Big Ones, Little Ones, * Circles Around Us, * Circles, Triangles and Squares, and * Shapes Around Us

Jonas, Ann - Round Trip

Juster, Norton - * The Dot and the Line

McDermott, Gerald - Arrow in the Sun

Nesbit, E. - Melisande

Phillips, Jo - Exploring Triangles

Reiss, John J. - Shapes

Srivastava, Jane - * Spaces, Shapes, and Sizes

Sullivan, Janet - * Round as a Pancake

Testa, Fulvio - If You Look Around You

Tompert, Ann - Grandfather Tang's Story

Tucker, Sian - * The Shapes Game

Graphing

Carlson, Nancy - Harriet's Halloween Candy

Caudill, Rebecca - A Pocketful of Crickets

Geringer, Laura - A Three Day Hat

Papy, Frederique - * Graph Games

Rice, Eve - Peter's Pockets

Slobodkina, Esphyr - Cups for Sale

Large Numbers and Place Value

Anno, Mitsumasa - * Socrates and the Three Little Pigs

Base, Graeme - The Eleventh Hour

Birch, David - The King's Chessboard

Gag, Wanda - Millions of Cars

Greene, Carol - The Thirteen Days of Halloween

Kasza, Keiko - The Wolf's Chicken Stew

King, Clive - Me and My Million

MacCarthy, Patricia - Ocean Parade

Martin, Jr., Bill - The Happy Hippopotami

McKissack, Patricia - A Million Fish ... More or Less

Munsch, Robert - Moira's Birthday

Rosenberg, Amye - One to One Hundred Busy Counting Book

Schwartz, David M - How Much is a Million! and If You Made a Million

Trivas, Irene - Emma's Christmas

Logic

Anno, Mitsumasa - Anno's Hat Tricks, Topsy-Turvies, and Upside-Downers

Froman, Robert - Venn Diagrams

Shannon, George - More Stories to Solve: Fifteen Folktales from Around the World and Stories to Solve: Folktales from Around the World

Measurement

Adams, Pan - Ten Beds Tall

Allen, Pan - Who Sank the Boat?

Anno, Mitsumasa - * The King's Flower

Briggs, Raymond - Jim and the Beanstalk

Calmenson, Stephanie - The Principal's New Clothes

Cagle, Kathy - The Biggest Nose

Carle, Eric - Papa, Please Get the Moon for Me and The Very Hungry Caterpillar

Dahl, Roald - Esio Trot

Eastman, Philip D. - Big Dog, Little Dog

Farber, Norma - As I Was Crossing Boston Common

Fujikawa, Gyo - * "The Crow and the Pitcher," "The Sun and the Wind," "The Wonderful Porridge Pot," and "Why Evergreens Keep Their Leaves" in Fairy Tales and Fables

Gachter, Fred - * Little Elephant and Big Mouse

Galdone, Paul - The Three Billy Goats Gruff

Ginsburg, Mirra - Mushroom in the Rain

Grimes, Nikki - Something On My Mind

Hall, Crowell - * Telltime for Rabbit

Kaufman, Joe - * Big and Little

Kellogg, Steven - Much Bigger Than Muran

Kitchen, Bert - Animal Alphabet

Leaf, Munro - The Story of Ferdinand

Lionni, Leo - Inch by Inch

Lopshire, Robert - The Biggest, Smallest, Fastest, Tallest Things You've Ever Heard Of

Lord, John Vernon - The Giant Jam Sandwich

McMillian, Bruce - Super, Super, Superwords

Morimoto, Junko - The Inch Boy

Myller, Rolf - How Big Is a Foot?

Nelson, JoAnne - How Tall Are You?

Nesbit, E. - Melisande

Smith-Moore, J. J. - Sally Small

Tryon, Lesile - Albert's Alphabet

Miscellaneous

Burns, Marilyn - The I Hate Mathematics Book

Gardner, Martin - Aha! Insight

Giganti, Paul - Notorius Numbers

Reimer, Luetta & Wilbert Reimer - * Mathematicians Are People Too

Studio D. - * Crazy Creature Number Puzzles

Money

Day, Alexandra - Frank and Earnest

Hoban, Tana - Twenty-six Letters and Ninety-nine Cents

Leedy, Loreen - The Monster Money Book

Lobel, Arnold & Anita Lobel - On Market Street

Mathis, Sharon Bell - The Hundred Penny Box

Merrill, Jean - The Toothpaste Millionaire

Nelson, Jo-Anne - * The Magic Money Machine

Schwartz, David A. - If You Made a Million

Silverstein, Shel - “Smart” in Where the Sidewalk Ends

Viorst, Judith - Alexander, Who Used to Be Rich Last Sunday

Williams, Vera B. - A Chair for My Mother

Zemach, Harve & Margot Zemach - A Penny a Look

Multiplication and Division

Aker, Suzanne - What Comes in Twos, Threes, and Fours?

Anno, Mitsumasa - Anno’s Mysterious Multiplying Jar

Dubanevich, Arlene - Pigs in Hiding

Hutchins, Pat - The Doorbell Rang

Marshall, Ray & Korky Paul - Pop-Up Numbers #3 Multiplication and Pop-Up Numbers #4 Division

Mathews, Louis - Bunches and Bunches of Bunnies

Williams, Vera B. - A Chair for My Mother

Number Concepts and Relationships

Adler, Irving - Mathematics

Adler, Irving & Ruth Adler - * Numbers Old and New

Anno, Mitsumasa - Anno's Math Games, Anno's Math Games II, and Anno's Math Games III

Bang, Molly - Ten, Nine, Eight

Becker, John - Seven Little Rabbits

Carona, Philip - Numbers

Clark, Ellen - * Understanding Numbers

Dragonwagon, Crescent - I Hate My Brother Harry

Galdone, Paul - The Three Bears

James, Elizabeth & Carol Barkin - * Probability and What Do You Mean By "Average"?

Juster, Norton - The Phantom Tollbooth

Larrick, Nancy - Cats Are Cats

Lottridge, Celia Barker - One Watermelon Seed

Luce, Mamie - * Infinity: What Is It?, * Sets: What Are They?, and * Ten: Why Is It Important?

McGovern, Ann - Stone Soup

Ormerod, Jan - 101 Things to Do with a Baby

Reed, Mary & Edith Osswald - * Numbers

Sitomer, Mindell & Harry Sitomer - How Did Numbers Begin? and Zero Is Not Nothing

Srivastava, Jane - * Number Families

Thornhill, Jan - The Wildlife 1-2-3: A Nature Counting Book

Watson, Clyde - Binary Numbers

Zaslavsky Claudia - Zero: Is It Something? Is It Nothing?

Numeration and Counting

Aker, Suzanne - What Comes in 2s, 3s, and 4s?

Alain, B. - * One, Two, Three, Going to Sea

Anno, Mitsumasa - Anno's Counting Book

Aylesworth, James - One Crow

Baum, Arline & Joseph Baum - * One Bright Morning

Berenstain, Stan & Janice Berenstain - Bears on Wheels

Bishop, Claire Huchet - The Five Chinese Brothers and Twenty-two Bears

Blumenthal, Nancy - Count-A-Saurus

Brown, Marc, ed. - Hand Rhymes

Bucknall, Caroline - One Bear All Alone

Burningham, John - Hey! Get Off Our Train

Calemenson, Stephanie - * Ten Items or Less

Carle, Eric - My Very First Book of Numbers; One, Two, Three to the Zoo; and Rooster's Off to See the World

Carter, David A. - How Many Bugs in a Box?

Cave, Kathryn & Chris Riddel - Out for the Count: A Counting Adventure

Clifton, Lucille - Everett Anderson's 1, 2, 3

Crews, Donald - Ten Black Dots

Christlow, Eileen - Five Little Monkeys Jumping on the Bed and Five Little Monkeys Sitting on a Tree

Crowther, Robert - The Most Amazing Hide-and-Seek Counting Book

Dee, Ruby - Two Way to Count to Ten

Demi - Demi's Count the Animals 1, 2, 3

DuBois, William P. - The Twenty-one Balloons

Dunbar, Joyce - Ten Little Mice

Duvoisin, Roger - * Two Lonely Ducks

Ehlert, Lois - Fish Eyes

Eichenberg, Fritz - Dancing in the Moon

Elkin, Benjamin - Six Foolish Fishermen

Emberly, Barbara - One Wide River to Cross

Estes, Ebanor - Hundred Dresses

Feelings, Muriel - Moja Means One: A Swahili Counting Book

Garne, S. T. & Lisa Erte - One White Sail

Giganti, Paul, Jr. - Each Orange Had Eight Slices and How Many Snails?

Greenes, Carol - Opossums in a Tree

Grossman, Virginia - Ten Little Rabbits

Hague, Kathleen - Numbears: A Counting Book

Hamm, Diane Johnston - How Many Feet in the Bed?

Hammond, Franklin - Ten Little Ducks

Haskins, Jim - Count Your Way Through Africa, Count Your Way Through Canada, Count Your Way Through China, Count Your Way Through Germany, Count Your Way Through India, Count Your Way Through Israel, Count Your Way Through Italy, Count Your Way Through Japan, Count Your Way Through Korea, Count Your Way Through Mexico, Count Your Way Through Russia, and Count Your Way Through the Arab World

Hawkins, Collin & Jacqui Hawkins - When I Was One

Hayes, Sarah - Nine Ducks Nine

Hill, Eric - * S. S. Happiness Crew Book of Numbers

Hindley, Judy - Mrs. Mary Malarky's Seven Cats

Hoban, Russell - * Ten What?

Hooker, Yvonne - One Green Frog

Hooks, William - * The Seventeen Gerbils of Class 4A

Howard, Katherine - I Can Count to One Hundred, Can You?

Harada, Joyce - It's the 0-1-2-3 Book

Hulme, Joy - Sea Squares

Ifrah, George - * From One to Zero: A Universal History of Numbers

Ipcar, Dahlov Zorach - * Brown Cow Farm and * Ten Big Farms

Johnston, Tony - Whale Song

Kahl, Virginia - * How Many Dragons Are Behind the Door?

Keats, Ezra Jack - Over in the Meadow

Kherdian, David - The Cats' Midsummer Jamboree

Kitamura, Satoshi - When Sheep Cannot Sleep

Kitchen, Bert - Animal Numbers

Koelling, Caryl - Cory's Counting Book

Kredenser, Gail & Stanley Mack - One Dancing Drum

LeSieg, Theo - Ten Apples Up on Top!

Lionni, Leo - Frederick

Mack, Stanley - Ten Bears in My Bed: A Goodnight Countdown

Martin, Jr., Bill - * Monday, Monday, I Like Monday and *Ten Little Squirrels

Mathews, Louise - Bunches and Bunches of Bunnies

Mayers, Marianna & Gerald McDemmott - The Bramleberrys' Animal Book of Counting

McFadzean Anita - One Special Star

McKee, Craig and Margaret Holland - The Teacher Who Could Not Count

McLerran, Alice - The Mountain That Loved a Bird

McMillan, Bruce - One, Two, One Pair!

Milne, A. A. - * Pooh's Counting Book

Moncure, Jane - My Six Book

Moore, Inga - Six-Dinner Sid

Moss, Jeffrey - * Five People in My Family

Nelson, JoAnne - Count by Twos

O'Brien, Thomas Clement - Odds and Evens

O'Donnell, Elizabeth Lee - The Twelve Days of Summer

Pallotta, Jerry - The Icky Bug Counting Book

Peek, Merle - Roll Over!: A Counting Song

Peppe, Rodney - Circus Numbers

Pomerantz, Charlotte - One Duck, Another Duck

Quackenbush, Robert M. - * Poems for Counting

Reiss, John J. - Numbers

Rockwell, Norman - * Counting Book

Samton, Sheila White - Moon To Sun: An Adding Book, On the River: An Adding Book, and The World from My Window

Scarry, Richard - Richard Scarry's Best Counting Book Ever

Scott, Ann Herbert - One Good Horse: Cowpuncher's Counting Book

Seignobosc, Françoise - * Jean-Marie Counts Her Sheep

Selfridge, Oliver - * Fingers Come in Fives

Sendak, Maurice - One Was Johnny and Seven Little Monsters

Serfozo, Mary - Who Wants One?

Sesame Street - The Count's Counting Book and * The Counting Book

Seuss, Dr. - One Fish, Two Fish, Red Fish, Blue Fish and The 500 Hats of Bartholomew Cubbins

Sheppard, Jeff - The Right Number of Elephants

Shub, Elizabeth - * The Twelve Dancing Princesses

Slobodkin, Esphyr - Caps for Sale

Slobodkin, Louis - * One Is Good, but Two Are Better

Thaler, Mike - Seven Little Hippos

Thornhill, Jan - The Wildlife 1- 2 - 3: A Nature Counting Book

Trivas, Irene - Emma's Christmas: An Old Song Resung and Pictured

Tudor, Tasha - 1 is One

Wadsworth, Olive - Over in the Meadow

Wahl, John and Stacey Wahl - I Can Count the Petals of a Flower

Watson, Amy - The Folk Art Counting Book

Weiss, Makom - * Six Hundred Sixty-six Jelly-beans! All That?

Wildsmith, Brian - One, Two, Three

Wood, Audrey & Don Wood - Piggies

Woodward, James - One to Ten, Count Again

Wylie, Joanne - A More or Less Fish Story and How Many Monsters?

Zaslavsky, Claudia - Count on Your Fingers, African Style

Ziefert, Harriet - A Dozen Dogs: A Read-and-Count Story and Where's the Halloween Treat?

Zimmerman, H. Werner - Alphonse Knows: Zero It Not Enough

Zolotow, Charlotte - * One Step, Two

Patterns

Carle, Eric - Animals, Animals

Cleveland, David - April Rabbits

Dahl, Roald - Esio Trot

Emberley, Ed - ABC

Hoban, Tana - Look Up, Look Down

Hutchins, Pat - Don't Forget the Bacon! and Rosie's Walk

Kalin, Robert - Jump, Frog, Jump

Mahy, Margaret - 17 Kings and 42 Elephants

Martin, Jr., Bill - Brown Bear, Brown Bear, What Do You See?

McClintock, Mike - A Fly Went By

Provinsen, Alice & Martin - A Peaceable Kingdom: The Shaker ABECEDARIUS

Shaw, Charles Green - It Looked Like Spilt Milk

Silverstein, Shel - A Giraffe and a Half

Xiong, Bila - Nine-In-One Grr! Grr!

Time

Anno, Mitsumasa - All in a Day and Anno's Counting Book

Behn, Harry - * All Kinds of Time

Carle, Eric - The Grouchy Ladybug

Clifton, Lucille - Everett Anderson's Nine Month Long Year

Coleridge, Sara - January Brings the Snow

Combs, Ann - How Old Is Old?

Galdone, Paul - The Little Red Hen

Gibbons, Gail - Clocks and How They Go; Sun Up, Sun Down; and The Seasons of Arnold's Apple Tree

Gray, Nigel - A Country Far Away

Hawkins, Collin - What Time Is It, Mr. Wolf?

Hutchins, Pat - * Clocks and More Clocks

Lloyd, David - The Stopwatch

Provensen, Alice & Martin - The Year at Maple Farm

Sendak, Maurice - Chicken Soup with Rice

Shulevitz, Uri - One Monday Morning

Simon, Carley - Amy the Dancing Bear

Slobodkin, Louis - * The Late Cuckoo

Ungerer, Tomi - Moon Man

Ward, Cindy - Cookie's Week

Williams, Vera B. - Three Days on a River in a Red Canoe

Zolotow, Charlotte - Over and Over

TERMINOLOGY FOR MATHEMATICS

INTRODUCTION

Speaking and writing with appropriate mathematical language are essential to the understanding and communication of mathematical concepts.

The mathematical terminology document is a critical extension of the Diocesan Mathematics Curriculum Guidelines because it identifies essential terms. Students are expected to demonstrate their understanding of these terms. This understanding should be at a level high enough that students are able to answer questions which require recognition and correct application of the terms for problem solving. Teachers are expected to model the use of appropriate terms on a daily basis.

All teachers should refer to page 20 of this document which provides terminology from the kindergarten through Algebra curriculum, as well as, the list(s) designated for their grade level(s). In order that the lists would not become cumbersome, individual terms have not been repeated from one grade level to another. However, students are expected to be able to use all terms from all previous grade levels (e.g., at the conclusion of fifth grade, students are expected to demonstrate understanding and correct application of all terms from kindergarten through grade 5). Teachers are expected to build upon the lists from all previous grade levels and, in some cases, introduce terms from the next grade level.

Essential terms have been compiled by: consulting with classroom teachers; referring to our curriculum guidelines; and referring to a variety of math resources including the Pennsylvania Department of Education standards and assessment materials. Please note, however, that the list is not considered all inclusive.

Math on Call: A Mathematics Handbook, published by Great Source Education Group, copyrighted 1998, is recommended as an excellent resource for easy-to-understand definitions and examples. The vast majority of terms in the K-8 listings are contained in Math on Call.

TERMINOLOGY FOR MATHEMATICS

Kindergarten Teachers

The students will demonstrate understanding and correct application of the following mathematical terminology:

Kindergarten

addition
analog clock
bar graph
calendar
cardinal numbers
circle
classify
coins
conclusions
cube
cylinder
data
dates
difference
digital clock
ellipse
estimate
gallon
horizontal
number
ordinal numbers
pattern
pictograph
predict
rectangle
seasons
sets
solution
square
subtraction
tally
temperature
thermometer
time
triangle
vertical

Grade One

addend
base ten
closed figure
cone
cup
customary system
customary unit
degrees Celsius
degrees Fahrenheit
digit
equal
exterior
fact family
foot
fraction
gram
inch
interior
is greater than ($>$)
is less than ($<$)
length
liter
meter
metric system
metric unit
open figure
ounce
place value
pound
problem-solving
reasonableness
sphere
sum
weight
width
yard

TERMINOLOGY FOR MATHEMATICS

First Grade Teachers

The students will demonstrate understanding and correct application of the following mathematical terminology:

Kindergarten

Addition
analog clock
bar graph
calendar
cardinal numbers
circle
classify
coins
conclusions
cube
cylinder
data
dates
difference
digital clock
ellipse
estimate
gallon
horizontal
number
ordinal numbers
pattern
pictograph
predict
rectangle
seasons
sets
solution
square
subtraction
tally
temperature
thermometer
time
triangle
vertical

Grade One

addend
base ten
closed figure
cone
cup
customary system
customary unit
degrees Celsius
degrees Fahrenheit
digit
equal
exterior
fact family
foot
fraction
gram
inch
interior
is greater than ($>$)
is less than ($<$)
length
liter
meter
metric system
metric unit
open figure
ounce
place value
pound
problem-solving
reasonableness
sphere
sum
weight
width
yard

Grade Two

capacity
centimeter
change
commutative property
congruent
currency
denominator
diagonal
dividend
divisible by
division
divisor
edge
equivalent
even number
expanded notation
face
factor
identity
key
line
missing addend
multiple
multiplication
number line
numeral
numerator
odd number
parentheses
pint
product
quart
quotient
regroup/rename
repeated addition
rounding/round
similar shapes
skip count
standard form

TERMINOLOGY FOR MATHEMATICS

Second Grade Teachers

The students will demonstrate understanding and correct application of the following mathematical terminology:

Grade One

addend
base ten
closed figure
cone
cup
customary system
customary unit
degrees Celsius
degrees Fahrenheit
digit
equal
exterior
fact family
foot
fraction
gram
inch
interior
is greater than ($>$)
is less than ($<$)
length
liter
meter
metric system
metric unit
open figure
ounce
place value
pound
problem-solving
reasonableness
sphere
sum
weight
width
yard

Grade Two

capacity
centimeter
change
commutative property
congruent
currency
denominator
diagonal
dividend
divisible by
division
divisor
edge
equivalent
even number
expanded notation
face
factor
identity
key
line
missing addend
multiple
multiplication
number line
numeral
numerator
odd number
parentheses
pint
product
quart
quotient
regroup/rename
repeated addition
rounding/round
similar shapes
skip count
standard form

Grade Three

2-dimensional figure
A.M.
angle
area
array
Associative Property
decimal
decimal point
elapsed time
endpoint
inequality
intervals on a scale
inverse operations
kilogram
kilometer
line graph
line of symmetry
line segment
octagon
P.M.
pentagon
perimeter
prism
ray
simulation
square unit
time line
variable
vertex

TERMINOLOGY FOR MATHEMATICS

Third Grade Teachers

The students will demonstrate understanding and correct application of the following mathematical terminology:

Grade Two

capacity
centimeter
change
commutative property
congruent
currency
denominator
diagonal
dividend
divisible by
division
divisor
edge
equivalent
even number
expanded notation
face
factor
identity
key
line
missing addend
multiple
multiplication
number line
numeral
numerator
odd number
parentheses
pint
product
quart
quotient
regroup/rename
repeated addition
rounding/round
similar shapes
skip count
standard form

Grade Three

2-dimensional figure
A.M.
angle
area
array
Associative Property
decimal
decimal point
elapsed time
endpoint
inequality
intervals on a scale
inverse operations
kilogram
kilometer
line graph
line of symmetry
line segment
octagon
P.M.
pentagon
perimeter
prism
ray
simulation
square unit
time line
variable
vertex

Grade Four

3-dimensional figure
acute angle
average
axis
center point
common denominator
composite number
diameter
equation
equivalent fraction
fraction bar
height
hexagon
improper fraction
intersecting lines
mixed number
obtuse angle
ordered pairs
parallel lines
perpendicular
plotting points
polygon
quadrilateral
radius
rectangular prism
relation
remainder
rhombus
right angle
square pyramid
tessellations
trapezoid
triangular pyramid
volume

TERMINOLOGY FOR MATHEMATICS

Fourth Grade Teachers

The students will demonstrate understanding and correct application of the following mathematical terminology:

Grade Three

2-dimensional figure
A.M.
angle
area
array
Associative Property
decimal
decimal point
elapsed time
endpoint
inequality
intervals on a scale
inverse operations
kilogram
kilometer
line graph
line of symmetry
line segment
octagon
P.M.
pentagon
perimeter
prism
ray
simulation
square unit
time line
variable
vertex

Grade Four

3-dimensional figure
acute angle
average
axis
center point
common denominator
composite number
diameter
equation
equivalent fraction
fraction bar
height
hexagon
improper fraction
intersecting lines
mixed number
obtuse angle
ordered pairs
parallel lines
perpendicular
plotting points
polygon
quadrilateral
radius
rectangular prism
relation
remainder
rhombus
right angle
square pyramid
tessellations
trapezoid
triangular pyramid
volume

Grade Five

chord
combinations
composite number
cubic unit
factor tree
frequency
greatest common factor
infinite
least common denominator
least common multiple
linear measurement
maximum
mean
median
mile
milliliter
millimeter
minimum
mode
negative numbers
parallelogram
prime number
probability
range
right triangle
sequence
series
simple event
simplest form
tree diagram
triangular prism
Venn diagram

TERMINOLOGY FOR MATHEMATICS

Fifth Grade Teachers

The students will demonstrate understanding and correct application of the following mathematical terminology:

Grade Four

3-dimensional figure
acute angle
average
axis
center point
common denominator
composite number
diameter
equation
equivalent fraction
fraction bar
height
hexagon
improper fraction
intersecting lines
mixed number
obtuse angle
ordered pairs
parallel lines
perpendicular
plotting points
polygon
quadrilateral
radius
rectangular prism
relation
remainder
rhombus
right angle
square pyramid
tessellations
trapezoid
triangular pyramid
volume

Grade Five

chord
combinations
composite number
cubic unit
factor tree
frequency
greatest common factor
infinite
least common denominator
least common multiple
linear measurement
maximum
mean
median
mile
milliliter
millimeter
minimum
mode
negative numbers
parallelogram
prime number
probability
range
right triangle
sequence
series
simple event
simplest form
tree diagram
triangular prism
Venn diagram

Grade Six

absolute value
acute triangle
arc
braces
brackets
commission
coordinate system
corresponding angles
discount
Distributive Property
equilateral triangle
equivalent forms
exponent
exponential form
integer
irrational numbers
isosceles triangle
obtuse triangle
order of operations
ordinal numbers
percent
powers
rational numbers
reciprocal
regular polygons
repeating decimals
scalene triangle
simple interest
surface area
terminating decimals
unit rate

TERMINOLOGY FOR MATHEMATICS

Sixth Grade Teachers

The students will demonstrate understanding and correct application of the following mathematical terminology:

Grade Five

chord
combinations
composite number
cubic unit
factor tree
frequency
greatest common factor
infinite
least common denominator
least common multiple
linear measurement
maximum
mean
median
mile
milliliter
millimeter
minimum
mode
negative numbers
parallelogram
prime number
probability
range
right triangle
sequence
series
simple event
simplest form
tree diagram
triangular prism
Venn diagram

Grade Six

absolute value
acute triangle
arc
braces
brackets
commission
coordinate system
corresponding angles
discount
Distributive Property
equilateral triangle
equivalent forms
exponent
exponential form
integer
irrational numbers
isosceles triangle
obtuse triangle
order of operations
ordinal numbers
percent
powers
rational numbers
reciprocal
regular polygons
repeating decimals
scalene triangle
simple interest
surface area
terminating decimals
unit rate

Grade Seven

angle measurement
bisector
complementary angle
compound interest
flip
function
independent events
open sentence
pi
proportion
random sampling
rate of change
ratio
real numbers
reflection
reliability
rotation
scale model
slide
supplementary angle
transformations
translations
transversal
turn
vertical angles

TERMINOLOGY FOR MATHEMATICS

Seventh Grade Teachers

The students will demonstrate understanding and correct application of the following mathematical terminology:

Grade Six

absolute value
acute triangle
arc
braces
brackets
commission
coordinate system
corresponding angles
discount
Distributive Property
equilateral triangle
equivalent forms
exponent
exponential form
integer
irrational numbers
isosceles triangle
obtuse triangle
order of operations
ordinal numbers
percent
powers
rational numbers
reciprocal
regular polygons
repeating decimals
scalene triangle
simple interest
surface area
terminating decimals
unit rate

Grade Seven

angle measurement
bisector
complementary angle
compound interest
flip
function
independent events
open sentence
pi
proportion
random sampling
rate of change
ratio
real numbers
reflection
reliability
rotation
scale model
slide
supplementary angle
transformations
translations
transversal
turn
vertical angles

Grade Eight

binomial
box-and-whisker plot
coefficients
conjecture
deductive reasoning
domain
factorial
Fibonacci's sequence
inductive reasoning
inverse
irregular polygons
line of best fit
logical reasoning
normal curve
Pascal's triangle
polynomial
proof by contradiction
Pythagorean Theorem
quadrants
scatter plot
scientific notation
square
square root
statistics
stem-and-leaf plots

TERMINOLOGY FOR MATHEMATICS

Eighth Grade Teachers

The students will demonstrate understanding and correct application of the following mathematical terminology:

Grade Seven

angle measurement
bisector
complementary angle
compound interest
flip
function
independent events
open sentence
pi
proportion
random sampling
rate of change
ratio
real numbers
reflection
reliability
rotation
scale model
slide
supplementary angle
transformations
translations
transversal
turn
vertical angles

Grade Eight

binomial
box-and-whisker plot
coefficients
conjecture
deductive reasoning
domain
factorial
Fibonacci's sequence
inductive reasoning
inverse
irregular polygons
line of best fit
logical reasoning
normal curve
Pascal's triangle
polynomial
proof by contradiction
Pythagorean Theorem
quadrants
scatter plot
scientific notation
square
square root
statistics
stem-and-leaf plots

Algebra

cosine
direct variation
exponential function
expression
inverse variation
irrational roots
limit
linear function
linear relationship
mathematical induction
matrix
monomial
permutation
quadratic relationships
quartile
radicals
sine
slope
systems of equations
tangent
trigonometric functions
trinomial
Y-intercept