PERFORMANCE STANDARDS FOR MATH: GRADE 4

A. Mathematical Processes

Content Standard: Students in Wisconsin will draw on a broad body of mathematical knowledge and apply a variety of mathematical skills and strategies, including reasoning, oral and written communication and the use of appropriate technology, when solving mathematical, real-world* and non-routine* problems.

Rationale: In order to participate fully as a citizen and a worker in our contemporary world, a person should be mathematically powerful. Mathematical power is the ability to explore, to conjecture, to reason logically and to apply a wide repertoire of methods to solve problems. Because no one lives and works in isolation, it is also important to have the ability to communicate mathematical ideas clearly and effectively.

Performance Standard

A.4.1 Use reasoning abilities to:

- perceive patterns
- identify relationships
- formulate questions for further exploration
- justify strategies
- test reasonableness of results

A.4.5 Explain solutions to problems clearly and logically in oral and written work and support solutions with evidence.

4th Grade:

1. Create and extend patterns. _____
2. Use comparative vocabulary to express relationships of size, amount and position. _____
3. Use the problem solving process (understand, plan, solve, check). _____
4. Apply the following problem-solving strategies:
   - choose an operation _____
   - use manipulatives _____
   - make a chart/table _____
   - work backwards _____
   - use a calculator _____
   - draw a diagram _____
   - guess and check _____
   - use estimation _____
   - note important information _____
   - identify needed/extra information _____
5. Justify strategies and solution through oral and written explanation. _____
6. Formulate questions for further exploration. _____

Performance Standard

A.4.2 Communicate mathematical ideas in a variety of ways, including words, numbers

symbols, pictures, charts, graphs, tables, diagrams and models*.

A. Mathematical Processes

4th Grade:

1. Communicate mathematical ideas in a variety of ways including: words, numbers, pictures, symbols, graphs, charts, tables, diagrams and models. _____

Performance Standard

A.4.3 Connect mathematical learning with other subjects, personal experiences, current events and personal interests.

- see relationships between various kinds of problems and actual events
- use mathematics as a way to understand other areas of the curriculum (e.g., measurement in science, map skills in social studies)

4th Grade:

1. Connect mathematical learning with personal experiences, personal interests and other subjects. _____
2. Use mathematics as a way to understand other areas of the curriculum (e.g. measurement in science, map skills in social studies). _____
3. See relationships between various kinds of problems and actual events. _____

Performance Standard

A.4.4 Use appropriate mathematical vocabulary, symbols and notation with understanding based on prior conceptual work.

4th Grade:

1. Use and apply appropriate mathematical vocabulary, numerals, notation (number sentences) and symbols. _____

Vocabulary

4th Grade:

_____ formulate questions _____ models

B. Number Operations and Relationships

Content Standard: Students in Wisconsin will use numbers effectively for various purposes, such as counting, measuring, estimating and problem solving.

Rationale: People use numbers to quantify, describe and label things in the world around them. It is important to know the many uses of numbers and various ways of representing them. Number sense is a matter of necessity, not only in one's occupation but also in the conduct of daily life, such as shopping, cooking, planning a budget or analyzing information reported in the media. When computing, an educated person needs to know which operations (e.g., addition, multiplication), which procedures (e.g., mental techniques, algorithms*), or which technological aids (e.g., calculator, spreadsheet) are appropriate.

Performance Standard: Whole Numbers

B.4.1 Represent and explain whole numbers*, decimals and fractions with:

- physical materials
- number lines and other pictorial models*
- verbal descriptions
- place-value concepts and notation
- symbolic renaming (e.g., 43=40+3=30+13)

4th Grade:

1. Use and interpret number lines and pictorial models. _____
2. Identify place value to 1,000,000s. _____
3. Represent and explain whole numbers 0-1,000,000 with physical materials and verbal descriptions. _____
4. Symbolically rename numbers using standard and expanded forms to 1,000,000. _____
5. Read, write and order whole numbers to 1,000,000 numerically and in word form (62,000 and sixty-two thousand). _____
6. Analyze the use of numbers in real-life situations (newspaper articles, cereal box, catalogs.) _____

Performance Standard: Decimals

B.4.1 Represent and explain whole numbers*, decimals and fractions with:

- physical materials
- number lines and other pictorial models*
- verbal descriptions
- place-value concepts and notation
- symbolic renaming (e.g., 43=40+3=30+13)

B.4.7 In problem-solving situations involving money, add and subtract decimals.

B. Number Operations and Relationships

4th Grade:

1. Represent and explain decimals including tenths and hundredths. _____
2. Read, write and order decimals through hundredths (including monetary values). _____
3. Represent monetary decimals with physical materials and in written form to $100.00. _____
4. Calculate the sum or difference of decimals through hundredths. _____
5. Identify real-life examples with a monetary value less than $1,000.00. _____
6. Compare and contrast cost of like items using store fliers and advertisements. _____
7. Locate numbers involving decimals on a number line. _____
8. Calculate monetary decimals up to $1,000.00 utilizing addition and subtraction. _____

Performance Standard: Fractions

B.4.1 Represent and explain fractions.

B.4.3 Read, write and order simple fractions and commonly used decimals.

B.4.4 Identify and represent equivalent fractions for halves, thirds, fourths, fifths, sixths, eighths, tenths, sixteenths.

B.4.6 Add and subtract fractions with like denominators.

4th Grade:

1. Represent and identify fractions and mixed numbers. _____
2. Represent and explain fractional parts (1/2, 1/4, 1/6, 1/8, 1/3). _____
3. Identify equivalent fractions for 1/2, 1/3, 1/4. _____
4. Compare and contrast fractions and mixed numbers. _____
5. Manipulate real-life objects and patterns blocks to show fractional parts. _____
6. Locate and explain the use of fractions in real-life situations. _____
7. Identify numerators and denominators. _____
8. Add and subtract fractions with like denominators. _____
9. Reduce fractions to simplest form. _____
10. Apply fraction skills to solve real-life problems. _____

Performance Standard:

B.4.5 In problem-solving situations involving whole numbers, select and efficiently use appropriate computational procedures such as:

- recalling the basic facts of addition, subtraction, multiplication and division
- using mental math (e.g., 37+25, 40x7)
- estimation
- selecting and applying algorithms* for addition, subtraction, multiplication and division
- using a calculator

B. Number Operations and Relationships

4th Grade:

1. Recall basic facts of addition, subtraction, multiplication and division. _____
2. Use mental math when appropriate. _____
3. Use a calculator for problem-solving situations. _____
4. Solve two- and three-step story problems (addition, subtraction, multiplication and division). _____
5. Write a number sentence to show a solution. _____
6. Estimate when appropriate. _____
7. Solve multi-digit addition and subtraction problems; regrouping when necessary. _____
8. Solve division problems involving long division and remainders.

Performance Standard:

B.4.2 Determine the number of things in a set by:

- grouping and counting (e.g., by threes, fives, hundreds)
- combining and arranging (e.g., all possible coin combinations amounting to thirty cents)
- estimation, including rounding

4th Grade:

1. Determine the number of items in a set by counting and estimating. _____
2. Round to the nearest 10, 100 and 1,000. _____
3. Count by 2s, 3s, 5s, 10s, 100s and 1,000s. _____
4. Combine and arrange various monetary amounts using coins and dollars. _____
5. Employ the proper use of the decimal point, cent and dollar symbols. _____
6. Recognize, extend and create number patterns. _____
7. Apply estimation and rounding skills to solve real-life problems. _____

Vocabulary

4th Grade:

_____ simplest form
_____ reduce

C. Geometry

Content Standard: Students in Wisconsin will be able to use geometric concepts, relationships and procedures to interpret, represent and solve problems.

Rationale: Geometry and its study of shapes and relationships is an effort to understand the nature and beauty of the world. While the need to understand our environment is still with us, the rapid advance of technology has created another need: to understand ideas communicated visually through electronic media. For these reasons, educated people in the 21st century need a well-developed sense of spatial order to visualize and model real world* problem situations.

Performance Standard

C.4.1 Describe two-and three-dimensional figures (e.g., circles, polygons, trapezoids, prisms, spheres) by:

- naming them
- comparing, sorting and classifying them
- drawing and constructing physical models to specifications
- identifying their properties (e.g., number of sides or faces, two- or three-dimensionality, equal sides, number of right angles)
- predicting the results of combining or subdividing two-dimensional figures
- explaining how these figures are related to objects in the environment
- employing appropriate grade level technology

4th Grade:

1. Identify and differentiate polygons, trapezoids, prisms, cubes, spheres, cylinders, cones and pyramids. _____
2. Compare, sort and classify two- and three-dimensional figures. _____
3. Draw and construct physical models to specifications. _____
4. Identify the number of faces, two- or three-dimensionality, equal sides and number of right angles. _____
5. Predict the result of combining or subdividing two-dimensional and three-dimensional figures. _____
6. Analyze, select and present examples of two and three-dimensional figures in real-life settings.

Performance Standard:

C.4.2 Use physical materials and motion geometry (such as slides, flips and turns) to identify properties and relationships, including but not limited to:

- symmetry*
- congruence*
- similarity*

C. Geometry

4th Grade:

1. Identify and draw similar and congruent shapes, figures and segments. _____
2. Identify symmetrical/asymmetrical shapes and locate the line of symmetry if possible. _____
3. Demonstrate properties and relationships using motion geometry (slides, flips and turns). _____
4. Apply knowledge of geometric properties and relations to solve problems and create original tessellations. _____

Performance Standard:

C.4.3 Identify and use relationships among figures, including, but not limited to:

- location (e.g., between, adjacent to, interior of)
- position (e.g., parallel, perpendicular)
- intersection (of two-dimensional figures)

4th Grade:

1. Locate and identify relationships among two- and three-dimensional figures (e.g., adjacent to, between, interior of, exterior of, parallel). _____
2. Identify intersection of two- and three-dimensional figures. _____
3. Identify position of parallel, intersecting and perpendicular lines. _____
4. Construct diagrams to illustrate the use of parallel and perpendicular lines. _____
5. Apply appropriate vocabulary in real-life situations (e.g. mapping skills). _____

Performance Standard:

C.4.4 * Use simple two-dimensional coordinate systems to find locations on maps and to represent points and simple figures.

- Employ technology to place and locate points on a two-dimensional grid where grade appropriate.

4th Grade:

1. State the coordinates (ordered pairs) of locations or objects on simple maps and grids. _____
2. Place or locate points on a two-dimensional grid (including a map). _____
3. Apply knowledge of coordinate systems to read maps and solve real-life problems. _____

Vocabulary

C. Geometry

4th Grade:

_____ vertex
_____ surface
_____ acute angle
_____ radius
_____ ordered pairs
_____ octagon
_____ vertices
_____ cubic
_____ quadrilateral
_____ diameter
_____ decagon
_____tessellations
_____ obtuse angle
_____ parallelogram
_____ ray
_____ pentagon

D. Measurement

Content Standard: Students in Wisconsin will select and use appropriate tools (including technology) and techniques to measure things to a specified degree of accuracy. They will use measurements in problem-solving situations.

Rationale: Measurement is the foundation upon which much technological, scientific, economic and social inquiry rests. Before things can be analyzed and subjected to scientific investigation, or mathematical modeling*, they must first be quantified by appropriate measurement principles. Measurable attributes* include such diverse concepts as voting preferences, consumer price indices, speed and acceleration, length, monetary value, duration of an Olympic race, or probability of contracting a fatal disease.

Performance Standard

D.4.1 Recognize and describe measurable attributes*, such as length, liquid capacity, time, weight (mass), temperature, volume, monetary value and angle size, and identify the appropriate units to measure them.

4th Grade:

1. Develop language skills to compare and contrast liquid capacity, weight, (mass) temperature, time, length, monetary values, volume and angle size (more, less, greater, bigger, smaller, long, short, warm, cool). _____
2. Create real-life problems, predict solutions, and solve problems using length, time, weight (mass), monetary value, temperature, liquid capacity, volume and angle size. _____

Performance Standard

D.4.2 Demonstrate understanding of basic facts, principles and techniques of measurement, including:

- appropriate use of arbitrary* and standard units (metric and US customary)
- appropriate use and conversion of units within a system (such as yards, feet and inches; kilograms and grams; gallons, quarts, pints and cups)
- judging the reasonableness of an obtained measurement as it relates to prior experience and familiar benchmarks
- employment of appropriate grade level technology

4th Grade:

1. Use standard and non-standard units to compare, contrast, and estimate lengths, weights and capacity. _____
2. Apply logical reasoning to solve length, weight and capacity problems. _____
3. Convert customary units (i.e. feet to yards). _____
4. Convert metric measurement (i.e. millimeters to centimeters). _____

D. Measurement

Performance Standard

D.4.3 Read and interpret measuring instruments (e.g., rulers, clocks, thermometers).

D.4.4 Determine measurements directly* by using standard tools to these suggested degrees of accuracy

- length to the nearest half-inch or nearest centimeter
- weight (mass) to the nearest ounce or nearest 5 grams
- temperature to the nearest 5 degrees
- time to the nearest minute
- monetary value to dollars and cents
- liquid capacity to the nearest fluid ounce

4th Grade:

1. Identify and explain the use of measurement tools including ruler, yard/meter stick, scale, thermometer, clock, calendar, currency, ounce, cup, pint, quart, half-gallon, gallon milliliter and liter container. _____
2. Determine measurements to the following degrees of accuracy:
   - length to the nearest quarter, half-inch, foot, yard, centimeter, milliliter, meter_____
   - weight to the nearest pound and kilogram _____
   - temperature to the nearest degree _____
   - time to the nearest minute _____
   - monetary value to $100.00 _____
   - liquid capacity to the nearest ounce, cup, pint, quart, half-gallon, gallon, milliliter and liter _____
3. Apply measurement skills to real-life problems. _____
4. Identify and use time zone maps. _____

Performance Standard

D.4.5 Determine measurements by using basic relationships (such as perimeter and area) and approximate measurements by using estimation techniques.

4th Grade:

1. Estimate, measure, compare, and contrast:
   - weights and liquid capacities _____
   - capacity of containers to cups and liters _____
   - lengths to the nearest half-inch, inch, foot, centimeter, and meter _____
   - perimeter of standard and non-standard shapes to the nearest inch and centimeter_____
   - area of standard and non-standard shapes in square units _____

D. Measurement

2. Formulate the area of a rectangle and square. _____
3. Apply estimation skills to solving real-life problems. _____

Vocabulary

4th Grade:

_____ monetary value _____ cubic _____deci-
_____ deca-

E. Statistics and Probability

Content Standard: Students in Wisconsin will use data collection and analysis, statistics and probability in problem solving situations, employing technology where appropriate.

Rationale: Dramatic advances in technology have launched the world into the Information Age, when data are used to describe past events or predict future events. Whether in the business place or in the home, as producers or consumers of information, citizens need to be well versed in the concepts and procedures of data analysis in order to make informed decisions.

Performance Standard

E.4.1. Work with data in the context of real-world situations by:

- formulating questions that lead to data collection and analysis
- determining what data to collect and when and how to collect them
- collecting, organizing and displaying data
- drawing reasonable conclusions based on data

4th Grade:

1. Collect, organize and record real-world data. _____
2. Conduct surveys, experiments or simulations and display results. _____
3. Formulate questions and determine how to collect and analyze real-world data. _____
4. Draw reasonable conclusions based on real-world data. _____

Performance Standard

E.4.2 Describe a set of a data using

- high and low values and range*
- most frequent value (mode*)
- middle value of a set of ordered data (median*)

4th Grade:

1. Formulate a set of data on the computer, then evaluate the data using:
   - most frequent value (mode)_____
   - high and low values (range)_____
   - middle value of a set of ordered data (median) _____
   - average (mean) _____
2. Summarize the data elements in charts or graphs using the computer. _____
3. Present the results of your data analysis to the class using at least one technology._____

Performance Standard

E.4.3 In problem-solving situations, read, extract and use information presented in graphs, tables or charts.

E. Statistics and Probability

4th Grade:

1. Construct, interpret, and summarize:
   - bar graphs _____
   - pictographs _____
   - tables _____
   - charts _____
   - circle graphs _____
   - line graphs _____
2. Present the results of your data analysis to the class using at least one technology. _____

Performance Standard

E.4.4 Determine if future events are more, less or equally likely, impossible or certain to occur.

4th Grade:

1. Experience the likelihood of future events by:
   - observation of activities _____
   - using manipulatives _____
2. Understand the meaning of the word probability
   - events are more, less, or equally likely to occur _____
   - impossible or certain or occur _____
3. Plan and conduct various probability experiments using various resources. _____

Performance Standard

E.4.5 Predict outcomes of future events and test predictions using data from a variety of sources.

4th Grade:

1. Predict outcomes of future events using a variety of sources. _____
2. Test predictions of outcomes. _____

Vocabulary

4th Grade:

_____ conclusion _____median _____mean
_____mode _____range

F. Algebraic Relationships

Content Standard: Students in Wisconsin will discover, describe and generalize simple and complex patterns and relationships. In the context of real-world problem situations, the student will use algebraic techniques to define and describe the problem to determine and justify appropriate solutions.

Rationale: Algebra is the language of mathematics. Much of the observable world can be characterized as having patterned regularity where a change in one quantity results in changes in other quantities. Through algebra and the use of variables* and functions*, mathematical models* can be built which are essential to personal, scientific, economic, social, medical, artistic and civic fields of inquiry.

Performance Standard

F.4.1 Use letters, boxes or other symbols to stand for any number, measured quantity or object in simple situations (e.g., N+0=N is true for any number).

F.4.2 Use the vocabulary, symbols and notation of algebra accurately (e.g., correct use of the symbol "="; effective use of the associative property of multiplication.

F.4.6 Recognize and use generalized properties and relationships of arithmetic (e.g., commutativity*, addition, inverse relationships of multiplication and division).

4th Grade:

1. Use vocabulary, symbols and notation of algebra correctly (+, -, x,÷, =, <, >). _____
2. Read, write and solve +,÷, x, - number sentences. _____
3. Recognize and use basic properties of arithmetic:
   - Order/Commutative property for +/x. _____
   - Zero property for +/x. _____
   - One/Identity Property for x/÷ _____
   - Inverse property for +/- and x/÷ (12-3=9/9+3=12). _____
   - Property of one for x and ÷. _____
   - Associative property for + and x [5x(3x2) or (5x3)x2]. _____
   - Distributive property _____
4. Provide the missing number in a +, -, x, or ÷ sentence. _____
5. Show the relationship between +/- and x/÷ functions by completing "fact family" equations. _____

Performance Standard

F.4.3 Work with simple linear patterns and relationships in a variety of ways, including:

- recognizing and extending number patterns.
- describing them verbally.
- representing them with pictures, tables, charts, graphs.
- recognizing that different models* can represent the same pattern or relationship.
- using them to describe real-world phenomena.
- employment of appropriate grade level technology.

F. Algebraic Relationships

4th Grade:

1. Represent a pattern in multiple ways (objects, shapes, colors). _____
2. Recognize and extend a basic number pattern. _____
3. Verbally describe a pattern. _____
4. Make and interpret pictures, pictographs, bar graphs, line graphs, circle graphs, tables and charts and note patterns/relationships of the data. _____
5. Formulate questions based on real-life problems and generate solutions utilizing appropriate means (equations, tables, graphs). _____

Performance Standard

F.4.4 Recognize variability in simple functional* relationships by describing how a change in one quantity can produce a change in another (e.g., number of bicycles and the total number of wheels).

4th Grade:

1. Use pictographs where picture represents more than one. _____
2. Determine the rule for addition/subtraction/multiplication/division tables. _____
3. Understand number patterns – counting by 2, 3, 4, 5, 6, etc. and relating that to items that come in groups of that size (ex. number of eyes, sides on a triangle, wheels on a cart, etc.). _____
4. Complete and apply information on a data/function table. _____
5. Use "n" as a simple variable. _____
6. Predict and explain how a change in one variable impacts the final count. _____

Performance Standard

F.4.5 Use simple equations and inequalities in a variety of ways, including:

- using them to represent problem situations
- solving them by different methods (e.g., use of manipulatives, guess and check strategies, recall number facts).
- recording and describing solution strategies

4th Grade:

1. Use simple equations to represent solutions to addition, subtraction, multiplication and division story problems including multi-step problems. _____
2. Use manipulatives to act out problem situations and balance number sentences. _____
3. Understand how to set up simple problems to find an answer in story problems. _____
4. Understand and recognize key words like "in all," "left," and "difference" in order to apply appropriate algebraic operation. _____
5. Explain strategies used to solve a problem._____
6. Differentiate between equal and unequal number equations (<, >, =). _____

F. Algebraic Relationships

Vocabulary

4th Grade:

_____ circle graph
_____ algebra
_____ property of one/identity property
_____ variable
_____ zero property
_____ function table
_____ distributive property
_____inverse property