

# Our Lady Queen of Peace School

## Mathematics Standards

The study of mathematics is a way to investigate and appreciate order in God's creation. Using a wide variety of tools, teachers can guide students in developing a deep conceptual understanding in order to make sense of mathematics. Students will master the specific knowledge necessary for its application to real problems, for the study of related subject matter, and for continued study in mathematics. Students will learn and view mathematics as a way of thinking about and interpreting the wonders of creation.

Teachers and administrators must consciously weave the many threads of our Catholic identity throughout the curriculum. Within the mathematics curriculum, teachers can encourage the Gospel values of cooperation, sharing responsibility, tolerance and patience

### **Standard A. Mathematical Processes**

Catholic school students in Our Lady Queen of Peace School 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.

### **Standard B. Number Operations and Relationships**

Catholic school students in Our Lady Queen of Peace School will use numbers effectively for various purposes, such as counting, measuring, estimating, and problem-solving.

### **Standard C. Geometry**

Catholic school students in Our Lady Queen of Peace School will be able to use geometric concepts, relationships and procedures to interpret, represent, and solve problems.

### **Standard D. Measurement**

Catholic school students in Our Lady Queen of Peace School will select and use appropriate tools (including technology) and techniques to measure things to a specified degree of accuracy. Students will select and use appropriate units of measure in problem solving tasks and convert units of measure as needed.

### **Standard E. Statistics and Probability**

Catholic school students in Our Lady Queen of Peace School will use data collection and analysis, statistics and probability in problem-solving situations, employing technology where appropriate.

### **Standard F. Algebraic Relationships**

Catholic school students in Our Lady Queen of Peace School 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.

### **Links:**

AR	ART	MA	MATHEMATICS
SR	COMMUNITY SERVICE	MU	MUSIC
EE	ENVIRONMENTAL EDUCATION	PE	PHYSICAL EDUCATION
FL	FOREIGN LANGUAGE	RE	RELIGION
HE	HEALTH	SC	SCIENCE
IT	INFORMATIONAL TECHNOLOGIES	SS	SOCIAL STUDIES
LA	LANGUAGE ARTS		

**Note** – Numeric order for the K-8 grade level goals listed in this document aligns with the WI State Academic Standards. Not all grades include each standard sub-category (as indicated by gaps in the numbering system). However, all K-4 goals and 5-8 goals are appropriately addressed by the end of fourth and eighth grades.

# Grade 4 & 8 EXIT LEVEL MATHEMATICS PERFORMANCE STANDARDS

## Goal A Content Standard: Mathematical Processes

Catholic school students in Our Lady Queen of Peace School 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.

### FOURTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:

By the end of grade **Four**, students will:

1. Use reasoning abilities to perceive patterns, identify relationships, formulate questions for further exploration, justify strategies, and test reasonableness of results.
2. Communicate mathematical ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models.
3. Connect mathematical learning with other subjects, personal experiences, current events, and personal interests; see relationships between various kinds of problems and actual events; and use mathematics as a way to understand other areas of the curriculum (e.g., measurement in science, map skills in social studies).
4. Use appropriate mathematical vocabulary, symbols, and notation with understanding based on prior conceptual work.
5. Explain solutions to problems clearly and logically in oral and written work and support solutions with evidence.

### EIGHTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:

By the end of grade **Eight**, students will:

1. Use reasoning abilities to evaluate information; perceive patterns; identify relationship; formulate questions for further exploration; evaluate strategies; justify statements; test reasonableness of results; and defend work.
2. Communicate logical arguments clearly to show why a result makes sense.
3. Analyze non-routine problems by modeling, illustrating, guessing, simplifying, generalizing, shifting to another point of view, etc.
4. Develop effective oral and written presentations that include appropriate use of technology; the conventions of mathematical discourse (e.g., symbols, definitions, labeled drawings); mathematical language; clear organization of ideas and procedures; understanding of purpose and audience.
5. Explain mathematical concepts, procedures, and ideas to others who may not be familiar with them.
6. Read and understand mathematical texts and other instructional materials and recognize mathematical ideas as they appear in other contexts.
7. Explain relationships between variables involved in a function, graph these variables accurately and interpret the relationship for the purpose of problem solving.

## Standard B. Number Operations and Relationships

Catholic school students in Our Lady Queen of Peace School will use numbers effectively for various purposes, such as counting, measuring, estimating, and problem-solving.

### FOURTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:

By the end of grade **Four** students will:

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.,  $43 = 40+3 = 30+13$ ).
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.

3. Read, write, and order whole numbers, simple fractions (e.g., halves, fourths, tenths, unit fractions) and commonly-used decimals (monetary units).
4. Identify and represent equivalent fractions for halves, fourths, eighths, tenths.
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.,  $37 + 25$ ,  $40 \times 7$ ); estimation; selecting and applying algorithms for addition, subtraction, multiplication, and division; using a calculator.
6. Add and subtract fractions with like denominators.
7. In problem-solving situations involving money, add and subtract decimals.

#### **EIGHTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:**

By the end of grade **Eight** students will:

1. Read, represent, and interpret various rational numbers (whole numbers, integers, decimals, fractions, and percents) with verbal descriptions, geometric models and mathematical notation (e.g., expanded, scientific, exponential).
2. Perform and explain operations on rational numbers (add, subtract, multiply, divide, raise to a power, extract a root, take opposites and reciprocals, determine absolute value).
3. Generate and explain equivalencies among fractions, decimals, and percents.
4. Explain place value and use this understanding to apply powers of ten, multiplication and division by powers of ten, and connect this understanding to topics such as, but not limited to metric conversion problems.
5. Express order relationships among rational numbers using appropriate symbols. ( $>$ ,  $<$ ,  $\geq$ ,  $\leq$ ,  $\neq$ ).
6. Apply proportional thinking in a variety of problem situations that include, but are not limited to ratios and proportions (e.g., rates, scale drawings, similarity, circle graph construction); percents, including those greater than 100 and less than one (e.g., discounts, rate of increase or decrease, sales tax, percent change).
7. Model and solve problems involving number-theory concepts such as prime and composite numbers; divisibility and remainders; greatest common factors; least common multiples.
8. In problem-solving situations, select and use appropriate computational procedures with rational numbers such as calculating mentally; creating, using, and explaining algorithms using technology (e.g., scientific calculators, spreadsheets).

### **Standard C. Geometry**

Catholic school students in Our Lady Queen of Peace School will be able to use geometric concepts, relationships and procedures to interpret, represent, and solve problems.

#### **FOURTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:**

By the end of grade **Four**, students will:

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); explaining how these figures are related to objects in the environment.
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.
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).
4. Use simple two-dimensional coordinate systems to find locations on maps and to represent points and simple figures.

#### **EIGHTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:**

By the end of grade **Eight**, students will:

1. Describe special and complex two- and three-dimensional figures (e.g., rhombus, polyhedron, cylinder) and their component parts (e.g., base, altitude, and slant height) by naming, defining, and giving examples; comparing, sorting, and classifying them; identifying and contrasting their properties (e.g., symmetrical,

isosceles, regular); drawing and constructing physical models to specifications; explaining how these figures are related to objects in the environment.

2. Identify and use relationships among the component parts of special and complex two- and three-dimensional figures (e.g., parallel sides, congruent faces).
3. Identify three-dimensional shapes from two-dimensional perspectives and draw two-dimensional sketches of three-dimensional objects preserving their significant features.
4. Perform transformations (translations and reflections) on two-dimensional figures and describe and analyze the effects of the transformations on the figures and their coordinates.
5. Locate objects using the rectangular coordinate system.
6. Use protractors and compasses appropriately for data collection on geometric figures for the purpose of classification and problem solving, as well as in geometric constructions (copy angles, angle bisectors, midpoint of line, center of circles, etc).

## **Standard D. Measurement**

Catholic school students in Our Lady Queen of Peace School 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.

### **FOURTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:**

By the end of grade **Four**, students will:

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.
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.
3. Read and interpret measuring instruments (e.g., rulers, clocks, thermometers).
4. Determine measurements directly by using standard tools to these suggested degrees of accuracy: length to the nearest half-inch or nearest centimeter; (mass) to the nearest ounce or nearest 5 grams; temperature to the nearest 5°; time to the nearest minute; monetary value to dollars and cents; liquid capacity to the nearest fluid ounce.
5. Determine measurements by using basic relationships (such as perimeter and area) and approximate measurements by using estimation techniques.

### **EIGHTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:**

By the end of grade **Eight**, students will:

1. Identify and describe attributes\* in situations where they are not directly or easily measurable (e.g., distance, area of an irregular figure, likelihood of occurrence).
2. Demonstrate understanding of basic measurement facts, principles, and techniques including the following approximate comparisons between metric and US Customary units (e.g., a liter and a quart are about the same; a kilometer is about six-tenths of a mile); knowledge that direct measurement produces approximate, not exact, measures; the use of smaller units to produce more precise measures.
3. Determine measurement directly using standard units (metric and US Customary) with these suggested degrees of accuracy lengths to the nearest mm or 1/16 of an inch; (mass) to the nearest 0.1 g or 0.5 ounce; liquid capacity to the nearest milliliter; angles to the nearest degree; temperature to the nearest C° or F; elapsed time to the nearest second.
4. Determine measurements indirectly using estimation; conversion of units within a system (e.g., quarts to cups, millimeters to centimeters); ratio and proportion (e.g., similarity, scale drawings); geometric formulas to derive lengths, areas, volumes of common figures (e.g., perimeter, circumference, surface area); the Pythagorean relationship; geometric relationships and properties for angle size (e.g., parallel lines and transversals; sum of angles of a triangle; vertical angles).

## Standard E. Statistics and Probability

Catholic school students in Our Lady Queen of Peace School will use data collection and analysis, statistics and probability in problem-solving situations, employing technology where appropriate.

### FOURTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:

By the end of grade **Four**, students will:

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.
2. Describe a set of data using high and low values, and range; most frequent value (mode); value of a set of ordered data (median).
3. In problem-solving situations, read, extract, and use information presented in graphs, tables, or charts.
4. Determine if the occurrence of future events are more, less, or equally likely, impossible, or certain to occur.
5. Predict outcomes of future events and test predictions using data from a variety of sources.

### EIGHTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:

By the end of grade **Eight**, students will:

1. Work with data in the context of real-world situations by formulating questions that lead to data collection and analysis; and conducting a statistical investigation; using technology to generate displays, summary statistics, and presentations.
2. Organize and display data from statistical investigations using appropriate tables, graphs, and/or charts (e.g., circle, bar, or line for multiple sets of data); appropriate plots (e.g., line, stem-and-leaf, box, scatter).
3. Extract, interpret, and analyze information from organized and displayed data by using frequency and distribution, including mode and range; central tendencies of data (mean and median); indicators of dispersion (e.g., outliers).
4. Use the results of data analysis to make predictions; develop convincing arguments; draw conclusions.
5. Compare several sets of data to generate, test, and, as the data dictate, confirm or deny hypotheses.
6. Evaluate presentations and statistical analyses from a variety of sources for credibility of the source; techniques of collection, organization, and presentation of data; missing or incorrect data; inferences; possible sources of bias.
7. Determine the likelihood of occurrence of simple events by using a variety of strategies to identify possible outcomes (e.g., lists, tables, tree diagrams); conducting an experiment; designing and conducting simulations; applying theoretical notions of probability (e.g., that four equally likely events have a 25 percent chance of happening).

## Standard F. Algebraic Relationships

Catholic school students in Our Lady Queen of Peace School 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.

### FOURTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:

By the end of grade **Four**, students will:

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).
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).
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 patterns to describe real-world phenomena.
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).

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., using manipulatives, guess and check strategies, recall of number facts); recording and describing solution strategies.
6. Recognize and use generalized properties and relationships of arithmetic (e.g., commutativity of addition, inverse relationship of multiplication and division).

### **EIGHTH GRADE EXIT LEVEL PERFORMANCE STANDARDS:**

By the end of grade **Eight**, students will:

1. Work with algebraic expressions in a variety of ways, including using appropriate symbolism, including exponents and variables; evaluating expressions through numerical substitution; generating equivalent expressions; and subtracting expressions.
2. Work with linear and nonlinear patterns and relationships in a variety of ways, including representing them with tables, with graphs, and with algebraic expressions, equations, and inequalities describing and interpreting their graphical representations (e.g., slope, rate of change, intercepts); using them as models of real-world phenomena; describing a real-world phenomenon that a given graph might represent.
3. Recognize, describe, and analyze functional relationships by generalizing a rule that characterizes the pattern of change among variables. These functional relationships include exponential growth and decay (e.g., cell division, depreciation).
4. Use linear equations and inequalities in a variety of ways, including writing them to represent problem situations and to express generalizations; solving them by different methods (e.g., informally, graphically, with formal properties, with technology); writing and evaluating formulas (including solving for a specified variable); using them to record and describe solution strategies.
5. Recognize and use generalized properties and relations, including additive and multiplicative property of equations and inequalities; commutative and associative properties of addition and multiplication; identity properties for addition and multiplication; transitive property.

# Grade Level Performance Standards: Kindergarten

**Within our kindergarten mathematics curriculum, students will:**

## **GOAL A MATHEMATICAL PROCESSES**

**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.**

- A.K.1. Use reasoning abilities to:
  - a. Perceive patterns.
    - 1) Find patterns in the environment. AR, LA, MU, PE
    - 2) Describe patterns using color, size, or shape.
    - 3) Copy, create, and extend patterns using concrete objects. AR
  - b. Identify relationships.
    - 1) Use manipulatives to demonstrate the relationships between concrete objects and numerals.
  - d. Justify strategies.
    - 1) Employ the problem-solving strategies of acting out and using manipulatives.
    - 2) Use a "one-to-one" correspondence to solve a problem.
- A.K.2. Communicate mathematical ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models. LA
  - a. Use manipulatives to demonstrate a solution process.
  - b. Write number sentences based on concrete objects.
- A.K.3. Connect mathematical learning with other subjects, personal experiences, current events, and personal interests. SC, SS, LA, MU, PE, AR, FL
  - a. See relationships between various kinds of problems and actual events.
    - 1) Use counting, adding, subtracting, to solve real-life problems.
  - b. Use mathematics as a way to understand other areas of the curriculum (e.g., measurement in science, map skills in social studies, and literature).
- A.K.4. Use appropriate mathematical vocabulary, symbols, and notation with understanding.
- A.K.5. Explain solutions to problems clearly and logically and support solutions. LA

## **GOAL B NUMBER OPERATIONS AND RELATIONSHIPS**

**Use numbers effectively for various purposes, such as counting, measuring, estimating, and problem-solving.**

- B.K.1. Represent and explain whole numbers with:
  - a. Physical materials.
    - 1) Count with one-to-one correspondence.
    - 2) Display addition and subtraction number sentences with concrete objects through 10.
  - b. Number lines and other pictorial models.
  - c. Verbal descriptions. LA
    - 1) Compare groups to determine more, less, same, most, least.
- B.K.2. Determine the number of things in a set by:
  - a. Grouping and counting (e.g., by twos, fives, tens). FL, AR
    - 1) Recognize and count from 0-30.
    - 2) Count to 100 by tens.
- B.K.3. Read, write, and order whole numbers.
  - a. Read and write the numerals from 0-20.
  - b. Determine what comes before and after the number.
- B.K.5. In problem-solving situations involving whole numbers, select and efficiently use appropriate computational procedures such as:
  - a. Recalling the basic facts of addition and subtraction.
    - 1) Add and subtract using concrete objects up to 10.

## **GOAL C GEOMETRY**

**Be able to use geometric concepts, relationships and procedures to interpret, represent, and solve problems.**

- C.K.1. Describe two-dimensional figures by: AR
  - a. Naming them.
    - 1) Identify circles, rectangles, squares, and triangles. SS, AR
  - b. Comparing, sorting, and classifying them.
    - 1) Compare groups of objects.
    - 2) Sort objects into groups.

## **GOAL D MEASUREMENT**

**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.**

- D.K.2. Demonstrate understanding of basic facts, principles, and techniques of measurement, including:
  - a. Appropriate use of non standard and standard units (metric and US Customary). LA, SC
    - 1) Measure and estimate length in nonstandard units.
    - 2) Compare containers using more or less.
    - 3) Compare objects to determine heavier and lighter.
- D.K.3. Read and interpret measuring instruments. (e.g., rulers, clocks, calendars, thermometers). SC, SS
  - a. List days of the week in order.

## **GOAL E STATISTICS AND PROBABILITY**

**Use data collection and analysis, statistics and probability in problem-solving situations, employing technology where appropriate.**

- E.K.1. Work with data in the context of real-world situations by: SC, SS
  - a. Collecting, organizing, and displaying data.
    - 1) Use concrete and picture graphs.
  - b. Drawing reasonable conclusions based on data.

## **GOAL F ALGEBRAIC RELATIONSHIPS** (not at this grade level)

**Note** – Numeric order for the K-8 grade level goals listed in this document aligns with the WI State Academic Standards. Not all grades include each standard sub-category (as indicated by gaps in the numbering system). However, all K-4 goals and 5-8 goals are appropriately addressed by the end of fourth and eighth grades.

# Grade Level Performance Standards: Grade One

**Within our first grade mathematics curriculum, students will:**

## **GOAL A MATHEMATICAL PROCESSES**

**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.**

- A.1.1. Use reasoning abilities to:
  - a. Perceive patterns. AR, LA, MU, PE
    - 1) Recognize and extend patterns having more than one attribute.
    - 2) Copy, create, and extend patterns using concrete objects. AR
  - b. Identify relationships.
    - 1) Use manipulatives to demonstrate the relationship between addition and subtraction.
  - d. Justify strategies.
    - 1) Employ the problem-solving strategies of acting out, using manipulatives, and drawing pictures.
- A.1.2. Communicate mathematical ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models. LA
  - a. Use manipulatives or pictures to demonstrate a solution process to a grade-appropriate math problem.
  - b. Use graphs to represent and interpret data. SS, SC
- A.1.3. Connect mathematical learning with other subjects, personal experiences, current events, and personal interests. SC, SS, LA, MU, PE, AR, FL
  - a. See relationships between various kinds of problems and actual events.
    - 1) Use addition and subtraction to solve real-life problems.
  - b. Use mathematics as a way to understand other areas of the curriculum (e.g., measurement in science, map skills in social studies, and literature).
- A.1.4. Use appropriate mathematical vocabulary, symbols, and notation with understanding based on prior conceptual work.
- A.1.5. Explain solutions to problems clearly and logically and support solutions with evidence. LA

## **GOAL B NUMBER OPERATIONS AND RELATIONSHIPS**

**Use numbers effectively for various purposes, such as counting, measuring, estimating, and problem-solving.**

- B.1.1. Represent and explain whole numbers, and fractions with:
  - a. Physical materials.
    - 1) Display addition and subtraction whole number sentences through 20 with concrete objects.
    - 2) Write and solve whole number sentences to 20 with concrete objects.
    - 3) Divide objects into two or four parts.
    - 4) Determine if objects are divided into equal or unequal parts.
  - b. Number lines and other pictorial models.
    - 1) Write and solve whole number sentences to 10 using pictorial representation.
  - c. Verbal descriptions.
  - d. Place-value concepts and notation: identify tens and ones in 2-digit numbers.
- B.1.2. Determine the number of things in a set by:
  - a. Grouping and counting (e.g., by twos, fives, hundreds). FL, SC
    - 1) Count to 100; count by 2's to 50; count by 5's and 10's to 100.
  - b. Use counting strategies to solve problems (ex: counting forwards, counting backwards).
- B.1.3. Read, write, and order whole numbers.
  - a. Read and write numerals to 100.
  - b. Order numbers before, after, and between.
  - c. Compare 1 and 2-digit numbers to determine greater, less, equal to.
- B.1.5. In problem-solving situations involving whole numbers, select and efficiently use appropriate computational procedures such as:
  - a. Recalling the basic facts of addition and subtraction up to 10.

- b. Estimating quantities.

## **GOAL C GEOMETRY**

**Use geometric concepts, relationships and procedures to interpret, represent, and solve problems.**

- C.1.1. Describe two-dimensional figures (e.g., circles, triangles, squares, and rectangles) by:
  - a. Naming them.
  - b. Comparing, sorting, and classifying them.
    - 1) Sort objects based on size and shape.
  - c. Drawing and constructing physical models to specifications. AR, SS
    - 1) Draw circles, squares, rectangles, and triangles.
  - d. Identifying their properties (e.g., number of sides).
    - 1) Identify number of sides and corners of polygons.
  - e. Explaining how these figures are related to objects in the environment.

## **GOAL D MEASUREMENT**

**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.**

- D.1.1. 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.
- D.1.2. Demonstrate understanding of basic facts, principles, and techniques of measurement, including:
  - a. Appropriate use of non standard and standard units (metric and US Customary). LA, SC
- D.1.3. Read and interpret measuring instruments (e.g., rulers, clocks, thermometers). SC, SS
  - a. Identify the relationships between days of the week using a calendar.
- D.1.4. Determine measurements directly by using standard tools to these suggested degrees of accuracy:
  - a. Length to the nearest inch and nearest centimeter.
  - d. Time to the nearest hour and half-hour.
  - e. Monetary value through identification of coins by name and value (pennies, nickels, dimes, and combinations of these coins).

## **GOAL E STATISTICS AND PROBABILITY**

**Use data collection and analysis, statistics and probability in problem-solving situations, employing technology where appropriate.**

- E.1.1. Work with data in the context of real-world situations by: SC, SS
  - a. Collecting, organizing, and displaying data.
    - 1) Create concrete and picture graphs.
  - b. Drawing reasonable conclusions based on data.
- E.1.3. In problem-solving situations, read, extract, and use information presented in graphs, tables, or Charts: (IT)
  - a. Read and interpret concrete, picture, and bar graphs. SS, SC

## **GOAL F ALGEBRAIC RELATIONSHIPS** (not at this grade level)

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# Grade Level Performance Standards: Grade Two

**Within our second grade mathematics curriculum, students will:**

## **GOAL A MATHEMATICAL PROCESSES**

**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.**

- A.2.1. Use reasoning abilities to:
  - a. Perceive patterns. AR, MU, LA, PE
    - 1) Recognize and describe geometric and numerical patterns.
    - 2) Extend and create grade-appropriate geometric and numerical patterns.
  - b. Identify relationships.
    - 1) Identify fact families through 18.
  - d. Justify strategies.
    - 1) Employ the problem-solving strategies of acting out, using manipulatives, and drawing pictures.
- A.2.2. Communicate mathematical ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models. LA
  - a. Use pictures or manipulatives to demonstrate a solution process to a grade-appropriate problem.
  - b. Use graphs to represent and interpret data. SC, SS
- A.2.3. Connect mathematical learning with other subjects, personal experiences, current events, and personal interests. SC, SS, LA, MU, PE, AR, FL
  - a. See relationships between various kinds of problems and actual events.
  - b. Use mathematics as a way to understand other areas of the curriculum (e.g., measurement in science, map skills and graphs in social studies, and literature).
- A.2.4. Use appropriate mathematical vocabulary, symbols, and notation with understanding based on prior conceptual work.
- A.2.5. Explain solutions to problems clearly and logically in oral and written work and support solutions with evidence. LA

## **GOAL B NUMBER OPERATIONS AND RELATIONSHIPS**

**Use numbers effectively for various purposes, such as counting, measuring, estimating, and problem-solving.**

- B.2.1. Represent and explain whole numbers, and fractions with:
  - a. Physical materials.
  - b. Number lines and other pictorial models. SS, SC
  - c. Verbal descriptions. LA
  - d. Place-value concepts and notation.
    - 1) Identify place value to 3 digits.
- B.2.2. Determine the number of things in a set by:
  - a. Grouping and counting (e.g., by twos, fives, tens, twenty-fives, hundreds). FL, SC
    - 1) Count through 999. AR
  - b. Combining and arranging (sets of coins less than \$1.00). SS, SC
  - c. Estimating and rounding.
- B.2.3. Read and write, and order whole numbers, simple fractions (e.g., halves, thirds, fourths).
  - a. Read and write numerals through 999.
  - b. Compare and order 2- and 3-digit whole numbers.
  - c. Identify objects divided into halves, thirds, and fourths.
- B.2.5. In problem-solving situations involving whole numbers, select and efficiently use appropriate computational procedures such as:
  - a. Recalling the basic facts of addition and subtraction.
    - 1) Memorize addition and subtraction facts to 18.
  - b. Selecting and applying algorithms for addition and subtraction.
    - 1) Add and subtract 2- and 3-digit numbers with and without regrouping.

- 2) Write and solve number sentences using 2- and 3-digit numbers.
- c. Using a calculator to assist and check solutions to problems.

## **GOAL C GEOMETRY**

**Use geometric concepts, relationships and procedures to interpret, represent, and solve problems.**

- C.2.1. Describe two-and three-dimensional figures (e.g., circles, polygons, trapezoids, prisms, spheres) by:
  - a. Naming two-dimensional figures, such as circles, squares, triangles, rectangles, cones, cubes, cylinders, spheres, pyramids, and prisms.
  - b. Comparing, sorting, and classifying them.
    - 1) Identify figures with same shape and size.
  - c. Drawing and constructing physical models to specifications for two-dimensional figures. AR
  - d. Identifying their properties (e.g., number of side and angles).
- C.2.2. Use physical materials to identify properties and relationships, including but not limited to:
  - a. Symmetry: find a line of symmetry of a figure.
  - b. Congruency: draw a congruent figure.

## **GOAL D MEASUREMENT**

**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.**

- D.2.1. Recognize and describe measurable attributes, such as length, liquid capacity, time, weight (mass), temperature, monetary value, and identify the appropriate units to measure them.
- D.2.2. Demonstrate understanding of basic facts, principles, and techniques of measurement, including: LA
  - a. Appropriate use of non standard and standard units (metric and US Customary). SC
- D.2.3. Read and interpret measuring instruments (e.g., rulers, clocks, thermometers). SC, SS
  - a. List days of the week in order.
  - b. List months of the year in order.
- D.2.4. Determine measurements directly by using standard tools to these suggested degrees of accuracy.
  - a. Length to the nearest foot, inch, or cm. PE
  - d. Time to 5-minute intervals.
  - e. Monetary value of dollars and cents to a total of \$5.00.

## **GOAL E STATISTICS AND PROBABILITY**

**Use data collection and analysis, statistics and probability in problem-solving situations, employing technology where appropriate.**

- E.2.1. Work with data in the context of real-world situations by: SS, SC
  - c. Collecting, organizing, and displaying data.
    - 1) Use real, picture and bar graphs to represent data.
    - 2) Record data using tallies. IT
  - d. Drawing reasonable conclusions based on data.
- E.2.3. In problem-solving situations, read, extract, and use information in graphs, tables, or charts. SS, SC

## **GOAL F ALGEBRAIC RELATIONSHIPS**

**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.**

- F.2.1. Use letters, boxes, or other symbols to stand for any number, measured quantity or object in simple situations (e.g.  $\square + 2 = 3$ ).
- F.2.2. Use the vocabulary, symbols, and notation of algebra accurately (<, >, =, +, -).
- F.2.6. Recognize and use generalized properties and relationships of arithmetic (e.g., commutativity of addition).
  - a. Demonstrate the commutative property of addition using whole numbers.

# Grade Level Performance Standards: Grade Three

Within our third grade mathematics curriculum, students will:

## GOAL A MATHEMATICAL PROCESSES

**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.**

- A.3.1. Use reasoning abilities to:
  - a. Perceive patterns. MU, LA, AR, PE
    - 1) Identify the properties or characteristics of patterns.
    - 2) Extend geometric and numerical patterns.
  - b. Identify relationships between addition and multiplication.
  - c. Formulate questions for further exploration.
  - d. Justify strategies.
    - 1) Use a variety of problem-solving strategies.
      - a) Modeling a mathematical problem by creating a physical example.
      - b) Using the four-step problem-solving process.
  - e. Check if results are reasonable.
- A.3.2. Communicate mathematical ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models. LA, SS, SC
- A.3.3. Connect mathematical learning with other subjects, personal experiences, current events, and personal interests. SC, SS, LA, MU, PE, AR, FL
  - a. See relationships between various kinds of problems and actual events.
    - 1) Relate actual time to daily activities.
  - b. Use mathematics as a way to understand other areas of the curriculum (e.g., measurement in science, map skills in social studies, and literature).
- A.3.4. Use appropriate mathematical vocabulary, symbols, and notation with understanding based on prior conceptual work.
- A.3.5. Explain solutions to problems clearly and logically in oral and written work and support solutions with evidence. LA, SC

## GOAL B NUMBER OPERATIONS AND RELATIONSHIPS

**Use numbers effectively for various purposes, such as counting, measuring, estimating, and problem-solving.**

- B.3.1. Represent and explain whole numbers and fractions with:
  - a. Physical materials.
  - b. Number lines and other pictorial models. SS (timelines)
  - c. Verbal descriptions.
  - d. Place-value concepts and notation to one million.
  - e. Symbolic renaming (e.g.,  $43=40+3=30+13$  and expanded notation).
- B.3.2. Determine the number of things in a set by: AR, SC, SS
  - a. Grouping and counting (e.g., by twos, fives, hundreds). FL
    - 1) Use number theory principles: identify and continue numerical patterns, skip count odd and even numbers.
  - b. Combining and arranging (e.g., all possible coin combinations).
    - 1) Compare equivalent and non-equivalent money amounts.
  - c. Estimation, including rounding.
    - 1) Round whole numbers to nearest tens, hundreds, and thousands place.
- B.3.3. Read, write, and order up to 6-digit whole numbers, simple fractions (e.g., halves, fourths, tenths, and unit fractions which have 1 as the numerator).
- B.3.4. Identify and represent equivalent fractions for halves, fourths, and eighths.
- B.3.5. In problem-solving situations involving whole numbers, select and efficiently use appropriate computational procedures such as:

- a. Recalling the basic facts of addition, subtraction, multiplication, and division.
  - 1) Memorize multiplication and division facts from 0-11
    - a. Understand when to use multiplication and division
    - b. Calculate 3 digits by 1 digit
    - c. Learn to divide two and three digit numbers by 1 digit with remainders.
- b. Using mental math.
- c. Estimation.
- d. Selecting and applying algorithms for addition, subtraction, multiplication, and division.
  - 1) Add and subtract 3 and 4-digit numbers with regrouping.
- e. Using a calculator to assist and check solutions to problems.
- f. Using opposite operations to check computation.

## **GOAL C GEOMETRY**

**Use geometric concepts, relationships and procedures to interpret, represent, and solve problems.**

- C.3.1. Describe two-and three-dimensional figures (e.g., circles, polygons, parallelograms, prisms, spheres, hexagons, pentagons, octagons, cylinders, cones, cubes, and pyramids) by:
  - a. Naming them. SS (architecture)
  - b. Comparing, sorting, and classifying them.
  - c. Drawing and constructing physical models to specifications for two-dimensional figures. AR, SS
  - d. Identifying their properties (e.g., number of sides or faces, two- or three-dimensionality, equal sides, number of right angles).
  - f. Explaining how these figures are related to objects in the environment.
- C.3.2. Use physical materials and motion geometry (such as slides, flips, and turns) to identify properties and relationships, including but not limited to:
  - a. Symmetry.
  - b. Congruence.
  - c. Similarity.

## **GOAL D MEASUREMENT**

**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.**

- D.3.1. 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.
- D.3.2. Demonstrate understanding of basic facts, principles, and techniques of measurement, including:
  - a. Appropriate use of non standard and standard units (metric and US Customary). SC, SS
    - 1) Select appropriate unit of measure (mile/foot/inch).
  - b. Appropriate use and conversion of units within a system (such as yards, feet, and inches, kilograms and grams; gallons, quarts, pints, and cups).
  - c. Judging the reasonableness of an obtained measurement as it relates to prior experience and familiar benchmarks.
- D.3.3. Read and interpret measuring instruments (e.g., rulers, clocks, thermometers). SS, SC
- D.3.4. Determine measurements directly by using standard tools to these suggested degrees of accuracy:
  - a. Length to the nearest half-inch or nearest cm.
    - 1) Measure lengths to nearest one-quarter inch, inch and foot. PE
  - c. Temperatures to the nearest 5 degrees.
  - d. Time to the nearest one-minute interval.
  - e. Calculate elapsed time.
  - f. Monetary value of dollars and cents.
  - g. Making change.
  - h. Liquid capacity to the nearest fluid ounce.
- D.3.5. Determine measurements by using basic relationships (such as perimeter and area) and approximate measurements by using estimation techniques.
  - a. Estimate lengths to nearest inch and foot, centimeter and meter.

## **GOAL E STATISTICS AND PROBABILITY**

**Use data collection and analysis, statistics and probability in problem-solving situations, employing technology where appropriate.**

- E.3.1. Work with data in the context of real-world situations by: SC, SS
  - a. Formulating questions that lead to data collection and analysis.
  - b. Determining what data to collect and how to collect it.
  - c. Collecting, organizing, and displaying data.
  - d. Drawing reasonable conclusions based on data. IT
- E.3.3. In problem-solving situations, read, extract, interpret, and use information presented in graphs, tables, or charts. SC, SS, LA
- E.3.5. Predict outcomes of future events and test predictions using data from a variety of sources. SC

**GOAL F ALGEBRAIC RELATIONSHIPS**

**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.**

- F.3.1. 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.3.2. 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.3.3. Work with simple linear patterns and relationships in a variety of ways, including:
  - a. Recognizing and extending number pattern.
  - b. Describing them verbally. LA
  - c. Representing them with pictures, tables, charts, graphs. SS, SC
  - d. Recognizing that different models can represent the same pattern or relationship.
  - e. Using them to describe real-world phenomena. LA, SC
- F.3.4. 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). SC (balance of nature).
- F.3.5. Use simple equations and inequalities in a variety of ways, including:
  - a. Using them to represent problem situations.
    - 1) Write number sentences that model real-life situations.
  - b. Solving them by different methods (e.g., use of manipulatives, guess and check strategies, recall of number facts).
  - c. Recording and describing solution strategies.
- F.3.6. Recognize and use generalized properties and relationships of arithmetic (e.g., commutativity of addition, inverse relationship of multiplication and division).
  - a. Demonstrate the commutative property of multiplication of whole numbers.

**Note** – Numeric order for the K-8 grade level goals listed in this document aligns with the WI State Academic Standards. Not all grades include each standard sub-category (as indicated by gaps in the numbering system). However, all K-4 goals and 5-8 goals are appropriately addressed by the end of fourth and eighth grades.

# Grade Level Performance Standards: Grade Four

**Within our fourth grade mathematics curriculum, students will:**

## **GOAL A MATHEMATICAL PROCESSES**

**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.**

- A.4.1. 1. Use reasoning abilities to:
  - a. Perceive patterns. AR, MU, LA, SC
    - 1) Describe the properties and characteristics of patterns having two or more attributes.
    - 2) Extend simple geometric and numerical patterns.
  - b. Identify relationships between multiplication and division.
  - c. Formulate questions for further exploration.
  - d. Justify strategies.
- 2. Use a variety of problem-solving strategies to:
  - a) Guess and check, model, and look for patterns.
  - b) Draw a picture of the problem.
  - c) Solve 2-step problems.
- 3. Check if results are reasonable using estimation.
- A.4.2. Communicate mathematical ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models. LA
- A.4.3. Connect mathematical learning with other subjects, personal experiences, current events, and personal interests. SC, SS, LA, MU, PE, AR, FL
  - a. See relationships between various kinds of problems and actual events.
  - b. Use mathematics as a way to understand other areas of the curriculum (e.g., measurement in science, map skills in social studies, and literature).
- A.4.4. Use appropriate mathematical vocabulary, symbols, and notation with understanding based on prior conceptual work (+, -, x, /, >, <, =).
- A.4.5. Explain solutions to problems clearly and logically in oral and written work and support solutions with evidence. LA

## **GOAL B NUMBER OPERATIONS AND RELATIONSHIPS**

**Use numbers effectively for various purposes, such as counting, measuring, estimating, and problem-solving.**

- B.4.1. Represent and explain whole numbers, decimals, and fractions with:
  - a. Physical materials.
  - b. Number lines and other pictorial models. SS (timelines)
  - c. Verbal descriptions. LA
  - d. Place-value concepts and notation with whole numbers up to millions; decimals to hundredths.
  - e. Symbolic renaming (e.g.,  $43=40+3=30+13$ ).
- B.4.2. Determine the number of things in a set by: SS, SC
  - a. Grouping and counting (e.g., by threes, fives, tens, hundreds). FL
  - b. Combining and arranging (e.g., all possible coin combinations).
  - c. Estimation, including rounding to nearest thousand (know and be able to apply the rules for rounding of numbers).
- B.4.3. Read, write, and order whole numbers, simple fractions (e.g., halves, fourths, tenths, unit fractions, or any fraction which has 1 as the numerator) and commonly-used decimals (monetary units).
- B.4.4. Identify and represent equivalent fractions for halves, fourths, eighths, tenths. MU
- B.4.5. In problem-solving situations involving whole numbers, select and efficiently use appropriate computational procedures such as:
  - a. Recalling the basic facts of addition, subtraction, multiplication, and division.
  - b. Using mental math.
  - c. Estimation.

- d. Selecting and applying algorithms for addition, subtraction, multiplication, and division.
    - 1) Multiply a 2, 3 or 4-digit number by a 1 digit number with regrouping.
    - 2) Multiply by 10, 100, and 1,000.
    - 3) Divide 3-digit by 1-digit numbers with remainders.
  - e. Using a calculator to assist and check solutions to problems.
  - f. Using opposite operations to check computation.
- B.4.6. Add and subtract fractions with like denominators.
- B.4.7. In problem-solving situations involving money, add and subtract decimals

## **GOAL C GEOMETRY**

**Use geometric concepts, relationships and procedures to interpret, represent, and solve problems.**

- C.4.1. Describe two-and three-dimensional figures (e.g., circles, polygons, trapezoids, prisms, spheres) by:
  - a. Naming them. SS, AR
  - b. Comparing, sorting, and classifying them.
  - c. Drawing and constructing physical models to specifications.
  - d. Identifying their properties (e.g., number of sides or faces, two- or three-dimensionality, equal sides, number of right angles).
  - e. Explaining how these figures are related to objects in the environment.
- 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:
  - a. Symmetry.
  - b. Congruence.
  - c. Similarity.
- C.4.3. Identify and use relationships among figures, including but not limited to:
  - a. Location (e.g., between, adjacent to, interior of).
  - b. Position (e.g., parallel, perpendicular).
  - c. Intersection (of two-dimensional figures).
- C.4.4. Use simple two-dimensional coordinate systems to find locations on maps and to represent points and simple figures. SS (map coordinates).

## **GOAL D MEASUREMENT**

**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.**

- D.4.1. Recognize and describe measurable attributes, such as length, liquid capacity, time, weight (mass), temperature, volume, monetary value, and identify the appropriate units to measure them.
- D.4.2. Demonstrate understanding of basic facts, principles, and techniques of measurement, including: SC
  - a. Appropriate use of non standard and standard units (metric and US Customary). LA
  - b. Appropriate use and conversion of units within a system (such as yards, feet, and inches; kilograms and grams; gallons, quarts, pints, and cups; seconds, minutes, and hours).
  - c. Judging the reasonableness of an obtained measurement as it relates to prior experience and familiar benchmarks.
- D.4.3. Read and interpret measuring instruments (e.g., rulers, clocks, thermometers). SS
- D.4.4. Determine measurements directly by using standard tools (metric and US Customary) to these suggested degrees of accuracy: PE
  - a. Length to the nearest cm and one-fourth inch.
  - b. Weight (mass) to the nearest ounce or nearest 5 grams.
  - d. Time to the nearest minute.
  - e. Monetary value of dollars and cents to a total of \$20.00.
- D.4.5. Determine measurements by using basic relationships (such as perimeter and area) and approximate measurements by using estimation techniques.

## **GOAL E STATISTICS AND PROBABILITY**

**Use data collection and analysis, statistics and probability in problem-solving situations, employing technology where appropriate.**

- E.4.1. Work with data in the context of real-world situations by: SS, SC
  - a. Formulating questions that lead to data collection and analysis.
  - b. Determining what data to collect and how to collect it.
  - c. Collecting, organizing, and displaying data.
  - d. Drawing reasonable conclusions based on data. IT
- E.4.2. Describe a set of data using: LA
  - a. High and low values, and range.
  - b. Most frequent value (mode).
  - c. Middle value of a set of ordered data (median).
- E.4.3. In problem-solving situations, read, extract, interpret and use information presented in graphs, tables, or charts. SS, SC, LA
- E.4.4. Determine if future events are more, less, or equally likely, impossible, or certain to occur. SC
- E.4.5. Predict outcomes of future events and test predictions using data from a variety of sources. SC

## **GOAL F ALGEBRAIC RELATIONSHIPS**

**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.**

- 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.4.3. Work with simple linear patterns and relationships in a variety of ways, including:
  - a. Recognizing and extending number patterns.
  - b. Describing them verbally. LA
  - c. Representing them with pictures, tables, charts, graphs.
  - d. Recognizing that different models can represent the same pattern or relationship.
  - e. Using them to describe real-world phenomena. LA
- 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). SC (balance of nature).
- F.4.5. Use simple equations and inequalities in a variety of ways, including:
  - a. Using them to represent problem situations.
  - b. Solving them by different methods (e.g., use of manipulatives, guess and check strategies, recall of number facts).
  - c. Recording and describing solution strategies.
- F.4.6. Recognize and use generalized properties and relationships of arithmetic (e.g., commutativity of addition, inverse relationship of multiplication and division).

**Note** – Numeric order for the K-8 grade level goals listed in this document aligns with the WI State Academic Standards. Not all grades include each standard sub-category (as indicated by gaps in the numbering system). However, all K-4 goals and 5-8 goals are appropriately addressed by the end of fourth and eighth grades.

# Grade Level Performance Standards: Grade Five

**Within our fifth grade mathematics curriculum, students will:**

## **GOAL A MATHEMATICAL PROCESSES**

**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.**

- A.5.1. Use reasoning abilities to:
  - a. Evaluate information. SC
  - b. Perceive patterns. MU, LA, AR
    - 1) Extend growing numerical and geometric patterns.
  - c. Identify relationships between concepts.
  - d. Formulate questions for further exploration.
  - e. Evaluate strategies.
    - 1) Use a variety of problem-solving strategies including using simpler numbers and making a table.
  - f. Justify statements.
    - 1) Determine if an answer is appropriate for a problem.
    - 2) Use models, known facts and properties to validate thinking.
  - g. Check if results are reasonable.
  - h. Defend work.
- A.5.2. Communicate logical arguments clearly to show why a result makes sense. SC
- A.5.3. Analyze non-routine problems by modeling, illustrating, guessing, simplifying, generalizing, or shifting to another point of view. SS, SC, LA
- A.5.4. Develop effective oral and written presentations that include: LA
  - a. Appropriate use of technology. IT
  - b. The conventions of mathematics (e.g., symbols, definitions, labeled drawings).
  - c. Mathematical language.
    - 1. Read and use mathematical terminology consistent with number sense development, such as factor, multiple, composites, prime.
    - 2. Explain orally a solution process to a problem using appropriate terminology
  - d. Clear organization of ideas and procedures.
  - e. Understanding of purpose and audience.
- A.5.5. Explain mathematical concepts, procedures, and ideas to others who may not be familiar with them.
- A.5.6. Read and understand mathematical texts and other instructional materials and recognize mathematical ideas as they appear in other subject areas.

## **GOAL B NUMBER OPERATIONS AND RELATIONSHIPS**

**Use numbers effectively for various purposes, such as counting, measuring, estimating, and problem-solving.**

- B.5.1. Read, represent, and interpret various rational numbers (whole numbers, decimals and mixed decimals through thousandths, and fractions) with verbal descriptions, geometric models, and mathematical notation (e.g., expanded). SS (timelines), MU (notes), AR, LA
  - a. Identify place value to billions.
  - b. Round numbers to ten thousand.
  - c. Write decimals to thousandths.
  - d. Write improper fractions for numbers.
- B.5.2. Perform and explain operations using rational numbers (add, subtract, multiply, divide, raise to a power, or take opposites and reciprocals).
  - a. Multiply 3-digit numbers.
  - b. Add and subtract fractions having unlike denominators.
  - c. Add, subtract and multiply decimals through thousandths.
- B.5.3. Generate and explain equivalencies among fractions and decimals.
- B.5.4. Express order relationships among rational numbers (decimals) using appropriate symbols ( $>$ ,  $<$ ).

- B.5.6. Model and solve problems involving number-theory concepts such as:
  - a. Prime and composite numbers.
    - 1) Use number theory principles: multiples, factors, prime and composite numbers.
- B.5.7. In problem-solving situations, select and use appropriate computational procedures with rational numbers such as: (SS)
  - a. Calculating mentally.
  - b. Estimating.
  - c. Creating, using, and explaining algorithms.
  - d. Using technology. IT

## **GOAL C GEOMETRY**

**Use geometric concepts, relationships and procedures to interpret, represent, and solve problems.**

- C.5.1. Describe two-dimensional figures (e.g., rhombus) by: AR
  - a. Naming, defining, and giving examples. SS
    - 1) Identify different types of quadrilaterals.
    - 2) Name polygons having 3 to 10 sides.
  - b. Comparing, sorting, and classifying them.
  - c. Drawing and constructing physical models to specifications.
    - 1) Measure and draw angles.
  - d. Explaining how these figures are related to objects in the environment.
- C.5.5. Locate objects using the rectangular coordinate system. SS (map skills)

## **GOAL D MEASUREMENT**

**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.**

- D.5.2. Demonstrate understanding of basic measurement facts, principles, and techniques including the following: SC, LA
  - a. Approximate comparisons between metric and US Customary units (e.g., a liter and a quart are about the same; a kilometer is about six-tenths of a mile).
- D.5.3. Determine measurement directly using standard units (metric and US Customary) with these suggested degrees of accuracy. SS
  - a. Lengths to the nearest one-eighth inch, centimeter, and meter.
- D.5.4. Determine measurements indirectly using. PE
  - a. Estimation.
  - d. Geometric formulas to derive perimeter and area of rectangles and squares.

## **GOAL E STATISTICS AND PROBABILITY**

**Use data collection and analysis, statistics and probability in problem-solving situations, employing technology where appropriate.**

- E.5.2. Organize and display data from statistical investigations using. IT, SC, SS
  - a. Appropriate tables, graphs, and/or charts (e.g., bar or line for multiple sets of data).
- E.5.3. Extract, interpret, and analyze information from organized and displayed data by using. IT, SC, SS
  - a. Central tendencies of data (mean, median, mode, and range).  
happening).

## **GOAL F ALGEBRAIC RELATIONSHIPS**

**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.**

- F.5.1. Work with algebraic expressions in a variety of ways, including: (SC)
  - a. Evaluating expressions through numerical substitution of whole numbers

**Note** – Numeric order for the K-8 grade level goals listed in this document aligns with the WI State Academic Standards. Not all grades include each standard sub-category (as indicated by gaps in the numbering system). However, all K-4 goals and 5-8 goals are appropriately addressed by the end of fourth and eighth grades.

# Grade Level Performance Standards: Grade Six

Within our sixth grade mathematics curriculum, students will:

## GOAL A MATHEMATICAL PROCESSES

**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.**

- A.6.1. Use reasoning abilities to: SC
  - a. Evaluate information.
  - b. Perceive patterns. AR, MU, LA
    - 1) Extend numerical patterns.
  - c. Identify relationships between fractions and decimals.
  - d. Formulate questions for further exploration.
  - e. Evaluate strategies.
    - 1) Use a variety of problem-solving strategies including making lists.
  - f. Justify statements.
    - 1) Analyze a solution to a grade-appropriate problem.
  - g. Check if results are reasonable.
  - h. Defend work.
- A.6.2. Communicate logical arguments clearly to show why a result makes sense. LA, SC
- A.6.3. Analyze non-routine problems by modeling, illustrating, guessing, simplifying, generalizing, or shifting to another point of view. SS, SC, LA
- A.6.4. Develop effective oral and written presentations that include: LA
  - a. Appropriate use of technology. IT
  - b. The conventions of mathematics (e.g., symbols, definitions, labeled drawings).
  - c. Mathematical language
    - 1) Read and use mathematical terminology consistent with number sense development.
    - 2) Explain a problem orally using correct math terminology.
    - 3) Explain a problem in written form using correct mathematical notation.
  - d. Clear organization of ideas and procedures.
  - e. Understanding of purpose and audience.
- A.6.5. Explain mathematical concepts, procedures, and ideas to others who may not be familiar with them.
- A.6.6. Read and understand mathematical texts and other instructional materials and recognize mathematical ideas as they appear in other subject areas.

## GOAL B NUMBER OPERATIONS AND RELATIONSHIPS

**Use numbers effectively for various purposes, such as counting, measuring, estimating, and problem-solving.**

- B.6.1. Read, represent, and interpret various rational numbers (decimals, fractions, and percents) with verbal descriptions, geometric models, and mathematical notation (e.g., expanded, scientific). SS, MU, AR, LA
- B.6.2. Perform and explain operations using rational numbers (add, subtract, multiply, divide, raise to a power, and reciprocals).
  - a. Perform computations pertaining to whole numbers, decimals and fractions by using an appropriate method such as mental math, paper and pencil, or a calculator.
- B.6.3. Generate and explain equivalencies among fractions, decimals, and percents.
- B.6.4. Express order relationships among rational numbers (decimals, fractions) using appropriate symbols ( $>$ ,  $<$ ).
- B.6.5. Apply proportional thinking in a variety of problem situations that include, but are not limited to:
  - a. Ratios and proportions (e.g., rates, scale drawings, similarity). SS (map scale)
- B.6.6. Model and solve problems involving number-theory concepts such as:
  - a. Prime and composite numbers.
  - b. Divisibility and remainders.
  - c. Greatest common factors.

- d. Least common multiples.
- B.6.7. In problem-solving situations, select and use appropriate computational procedures with rational numbers such as: SC
  - a. Mental calculation.
  - b. Estimating.
  - c. Creating, using, and explaining algorithms.
  - d. Using technology. IT

## **GOAL C GEOMETRY**

**Use geometric concepts, relationships and procedures to interpret, represent, and solve problems.**

- C.6.1. Describe two-dimensional figures (e.g., rhombus) by: SS, AR
  - a. Comparing, sorting, and classifying polygons, such as quadrilaterals.
  - b. Identifying and contrasting their properties (e.g., symmetrical, isosceles, regular).
  - c. Drawing and constructing physical models to specifications.
  - d. Explaining how these figures are related to objects in the environment.
- C.6.5. Locate objects using the rectangular coordinate system. SS (map skills)
  - a. Identify coordinates on a grid.
  - b. Plot points on a grid.

## **GOAL D MEASUREMENT**

**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.**

- D.6.2. Demonstrate understanding of basic measurement facts, principles, and techniques including the following: SS, FL (currency), SC
  - a. Approximate comparisons between metric and US Customary units (e.g., a liter and a quart are about the same; a kilometer is about six-tenths of a mile).
    - 1) Name equivalent units of measurement between the customary and metric system.
  - c. The use of smaller units to produce more precise measures.
- D.6.3. Determine measurement directly using standard units (metric and US Customary) with these suggested degrees of accuracy. SS, PE, SC
  - a. Lengths to the nearest mm or 1/16 of an inch.
  - b. Weight (mass) to the nearest 0.1 g or 0.5 ounce.
  - c. Liquid capacity to the nearest ml.
  - d. Angles to the nearest degree.
  - e. Temperature to the nearest C or F.
  - f. Elapsed time to the nearest second.
- D.6.4. Determine measurements indirectly using: SC
  - a. Estimation.
  - b. Conversion of units within a system (e.g., quarts to cups, millimeters to centimeters).
  - c. Ratio and proportion (e.g., similarity, scale drawings).
  - d. Geometric formulas to derive perimeter, circumference, and area of common figures (rectangles, squares, parallelograms, triangles, and circles).

## **GOAL E STATISTICS AND PROBABILITY**

**Use data collection and analysis, statistics and probability in problem-solving situations, employing technology where appropriate.**

- E.6.2. Organize and display data from statistical investigations using: IT, SC, SS
  - a. Appropriate tables, graphs, and/or charts (e.g., line plots).
  - b. Appropriate plots (e.g., line).
- E.6.3. Extract, interpret, and analyze information from organized and displayed data by using: IT, SC, SS
  - a. Frequency and distribution, including mode and range.
  - b. Central tendencies of data (mean and median).

- E.6.4. Use the results of data analysis to: LA, SC, SS
  - a. Make predictions.
  - b. Develop convincing arguments. RE, LA
  - c. Draw conclusions.
  
- E.6.7. Determine the likelihood of occurrence of simple events by: SC
  - a. Using a variety of strategies to identify possible outcomes (e.g., lists, tables, tree diagrams).
  - d. Applying theoretical notions of probability (e.g., that four equally likely events have a 25% chance of happening).

## **GOAL F ALGEBRAIC RELATIONSHIPS**

**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.**

- F.6.1. Work with algebraic expressions in a variety of ways, including: SC
  - a. Using appropriate symbolism, including exponents and variables.
  - b. Evaluating expressions through numerical substitution of whole numbers and/or decimals.
- F.6.2. Work with linear and nonlinear patterns and relationships in a variety of ways, including:
  - a. Representing them with tables and graphs. SC
- F.6.3. Recognize, describe, and analyze functional relationships by generalizing a rule that characterizes the pattern of change among variables. SC
- F.6.4. Use linear equations and inequalities in a variety of ways, including: SC
  - b. Solving by using different methods (e.g., informally, graphically, with formal properties, with technology).
    - 1) Solve one-step linear equations containing decimals.

**Note** – Numeric order for the K-8 grade level goals listed in this document aligns with the WI State Academic Standards. Not all grades include each standard sub-category (as indicated by gaps in the numbering system). However, all K-4 goals and 5-8 goals are appropriately addressed by the end of fourth and eighth grades.

# Grade Level Performance Standards: Grade Seven

**Within our seventh grade mathematics curriculum, students will:**

## **GOAL A MATHEMATICAL PROCESSES**

**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.**

- A.7.1. Use reasoning abilities to:
  - a. Evaluate information. SC
  - b. Perceive patterns. AR, SC, MU, LA
    - 1) Complete sequential patterns by determining missing terms regardless of their location
  - c. Identify relationships including the relationship among fractions, decimals and percents.
  - d. Formulate questions for further exploration.
  - e. Evaluate strategies.
  - f. Justify statements.
    - 1) Analyze a solution to a grade-appropriate problem.
  - g. Check if results are reasonable.
  - h. Defend work.
- A.7.2. Communicate logical arguments clearly to show why a result makes sense. SC, LA)
- A.7.3. Analyze non-routine problems by modeling, illustrating, guessing, simplifying, generalizing, or shifting to another point of view. SS, SC, LA
- A.7.4. Develop effective oral and written presentations that include: LA, IT
  - a. Appropriate use of technology. IT
  - b. The conventions of mathematics (e.g., symbols, definitions, labeled drawings).
  - c. Mathematical language.
    - 1) Read and use mathematical terminology consistent with number sense development.
    - 2) Read numeric and algebraic expressions using correct mathematical language.
    - 3) Explain a problem in written form using correct mathematical notation.
    - 4) Explain a problem orally using correct math terminology.
  - d. Clear organization of ideas and procedures.
  - e. Understanding of purpose and audience.
- A.7.5. Explain mathematical concepts, procedures, and ideas to others who may not be familiar with them. LA
- A.7.6. Read and understand mathematical texts and other instructional materials and recognize mathematical ideas as they appear in other subject areas.

## **GOAL B NUMBER OPERATIONS AND RELATIONSHIPS**

**Use numbers effectively for various purposes, such as counting, measuring, estimating, and problem solving.**

- B.7.1. Read, represent, and interpret various rational numbers (integers) with verbal descriptions, geometric models, and mathematical notation (e.g., scientific notation for whole numbers, exponential). SS, SC, LA, AR
- B.7.2. Perform and explain operations using rational numbers (add, subtract, multiply, divide, raise to a power, extract a root, take opposites and reciprocals).
  - a. Apply computational algorithms with decimals, fractions and integers by using an appropriate method such as mental math, paper and pencil, or a calculator.
- B.7.3. Generate and explain equivalencies among fractions, decimals, and percents.
- B.7.4. Express order relationships among rational numbers (fractions, integers) using appropriate symbols, ( $>$ ,  $<$ ).
- B.7.5. Apply proportional thinking in a variety of problem situations that include, but are not limited to:
  - a. Ratios and proportions (e.g., rates, scale drawings, similarity, circle graph construction). SS
  - b. Percents, including those greater than 100 and less than one (e.g., discounts, rate of increase or decrease, sales tax).
- B.7.6. Model and solve problems involving number-theory concepts such as:
  - a. Prime factorization.
  - b. Prime and composite numbers.

- c. Greatest common factor.
  - d. Least common multiple.
  - e. Perfect square numbers.
- B.7.7. In problem-solving situations, select and use appropriate computational procedures with rational numbers such as. IT, SC
- a. Mental calculation.
  - b. Estimating.
  - c. Creating, using, and explaining algorithms.
  - d. Using technology (e.g., scientific calculators, spreadsheets).

## **GOAL C GEOMETRY**

**Use geometric concepts, relationships and procedures to interpret, represent, and solve problems.**

- C.7.1. Describe 2-and 3-dimensional figures (e.g., rhombus) and their component parts. AR
- a. Naming, defining, and giving examples. AR, SS
  - b. Comparing, sorting, and classifying them.
  - c. Identifying and contrasting two-dimensional figures properties (e.g., symmetrical, isosceles, regular).
  - d. Drawing and constructing physical models to specifications using a variety of tools such as a scale ruler and compass.
  - e. Explain how these figures are related to objects in the environment.
- C.7.2. Identify and use relationships among the component parts of 2-and 3-dimensional figures (e.g., parallel sides).
- C.7.5. Locate objects using the rectangular coordinate system. SS
- C.7.6. Complete transformations and describe changes in graphic relations as a result of transformations.
- C.7.7. Use formulas to determine perimeter, area and of geometric shapes.
- a. Break down complex shapes into pieces that can be used to determine perimeter, area and volume.
  - b. Estimate area and perimeter of irregular shapes.
  - c. Determine Pi through data collection (circumference/diameter), apply in appropriate formulas.

## **GOAL D MEASUREMENT**

**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.**

- D.7.2. Demonstrate understanding of basic measurement facts, principles, and techniques including the following: SC, PE, SS, FL (currency)
- a. Approximate comparisons between metric and US Customary units (e.g., a liter and a quart are about the same; a kilometer is about six-tenths of a mile).
    - 1) Determine relationships between the customary and metric system.
  - b. Knowledge that direct measurement produces approximate, not exact, measures.
  - c. The use of smaller units to produce more precise measures.
- D.7.4. Determine measurements indirectly using: SC
- a. Estimation.
  - b. Conversion of units within a system (e.g., quarts to cups, millimeters to centimeters). LA
  - c. Ratio and proportion (e.g., similarity, scale drawings, circle graph construction). SS
  - d. Geometric formulas to derive perimeter, circumference, area, surface area, and volume of 2-and 3-dimensional figures.
  - e. Pythagorean formula.
  - f. Geometric relationships and properties for angle size (e.g., parallel lines and transversals; sum of angles of a triangle; vertical angles).

## **GOAL E STATISTICS AND PROBABILITY**

**Use data collection and analysis, statistics and probability in problem-solving situations, employing technology where appropriate.**

- E.7.1. Work with data in the context of real-world situations by: SC, SS
- a. Formulating questions that lead to data collection and analysis.

- b. Designing and conducting a statistical investigation.
- c. Using technology to generate displays, summary statistics, and presentations.
- E.7.2. Organize and display data from statistical investigations using: SC, SS, IT
  - a. Appropriate tables, graphs, and/or charts (e.g., bar or line for multiple sets of data).
  - b. Appropriate plots (e.g., line, stem-and-leaf, box, scatter).
- E.7.3. Extract, interpret, and analyze information from organized and displayed data by using. SC, SS, IT
  - a. Frequency and distribution, including mode and range.
  - b. Central tendencies of data (mean and median).
- E.7.4. Use the results of data analysis to: SC, SS, LA
  - a. Make predictions.
  - b. Develop convincing arguments. RE (ethics)
  - c. Draw conclusions.
- E.7.6. Evaluate presentations and statistical analyses from a variety of sources for: SC, LA
  - a. Credibility of the source.
  - b. Techniques of collection, organization, and presentation of data.
  - c. Missing or incorrect data.
  - d. Inferences.
  - e. Possible sources of bias.
- E.7.7. Determine the likelihood of occurrence of simple events by: SC
  - a. Using a variety of strategies to identify possible outcomes (e.g., lists, tables, tree diagrams).
  - d. Applying theoretical notions of probability (e.g., that four equally likely events have a 25% chance of happening).

## **GOAL F ALGEBRAIC RELATIONSHIPS**

**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.**

- F.7.1. Work with algebraic expressions in a variety of ways, including: SC
  - a. Using appropriate symbolism, including exponents and variables.
  - b. Evaluating expressions through numerical substitution of integers.
- F.7.2. Work with linear and nonlinear patterns and relationships in a variety of ways, including: SC
  - a. Representing them with tables, with graphs, and with algebraic expressions, and equations.
  - c. Using them as models of real-world phenomena.
  - d. Describing a real-world phenomenon that a given graph might represent. LA
- F.7.3. Recognize, describe, and analyze functional relationships by generalizing a rule that characterizes the pattern of change among variables. SC
- F.7.4. Use linear equations and inequalities in a variety of ways, including: SC
  - a. Writing them to represent problem situations and to express generalizations.
  - b. Solving them by different methods (e.g., informally, graphically, with formal properties, with technology).
    - 1) Solve and check one-step linear equations containing fractions and/or integers.
    - 2) Solve and check two-step linear equations containing whole numbers and decimals.
  - c. Writing and evaluating formulas (including solving for a specified variable).
  - d. Using them to record and describe solution strategies.

**Note** – Numeric order for the K-8 grade level goals listed in this document aligns with the WI State Academic Standards. Not all grades include each standard sub-category (as indicated by gaps in the numbering system). However, all K-4 goals and 5-8 goals are appropriately addressed by the end of fourth and eighth grades.

# Grade Level Performance Standards: Grade Eight

Within our eighth grade mathematics curriculum, students will:

## GOAL A MATHEMATICAL PROCESSES

**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.**

- A.8.1. Use reasoning abilities to:
  - a. Evaluate information. SC
  - b. Perceive patterns. SC, AR, LA, MU
  - c. Identify relationships among pi, circumference, and the diameter of a circle.
  - d. Formulate questions for further exploration.
  - e. Evaluate strategies.
    - 1) Use a variety of problem-solving strategies (e.g. working backwards, creating a model or diagram, formulating an equation, applying a formula, using estimation or elimination of possibilities.)
  - f. Justify statements.
    - 1) Analyze a solution (via e.g. discussion, analysis of graph, chart, map or diagram)
  - g. Check if results are reasonable.
  - h. Defend work (via e.g. verbal explanation of problem solving strategy, and reasonableness of solution, or use of substitution to check answer)
- A.8.2. Communicate logical arguments clearly to show why a result makes sense. LA, SC
- A.8.3. Analyze non-routine problems by modeling, illustrating, guessing, simplifying, generalizing, or shifting to another point of view. LA, SS, SC
- A.8.4. Develop effective oral and written presentations that include: IT, LA
  - a. Appropriate use of technology. LA (research skills), IT
  - b. The conventions of mathematics (e.g., symbols, definitions, labeled drawings)
  - c. Mathematical language.
    - 1) Read and use numerical and algebraic expressions and equations using correct mathematical language.
    - 2) Explain a problem in written form using correct mathematical notation.
    - 3) Explain a problem orally using correct mathematical terminology.
  - d. Clear organization of ideas and procedures.
  - e. Understanding of purpose and audience.
- A.8.5. Explain mathematical concepts, procedures, and ideas to others who may not be familiar with them. LA
- A.8.6. Read and understand mathematical texts and other instructional materials and recognize mathematical ideas as they appear in other subjects.

## GOAL B NUMBER OPERATIONS AND RELATIONSHIPS

**Use numbers effectively for various purposes, such as counting, measuring, estimating, and problem solving.**

- B.8.1. Read, represent, and interpret various rational numbers with verbal descriptions, geometric models, and mathematical notation. SS (timelines), MU (notes), AR, LA
- B.8.2. Perform and explain operations using rational numbers (add, subtract, multiply, divide, raise to a power, extract a root, take opposites and reciprocals, determine absolute value).
  - a. Apply computational algorithms with fractions, decimals and integers by using an appropriate method such as mental math, paper and pencil, or a calculator.
- B.8.3. Generate and explain equivalencies among fractions, decimals, and percents, and move easily between decimals, fractions, and percents.
- B.8.4. Express order relationships among rational numbers using appropriate symbols ( $<$   $>$ ).
- B.8.5. Apply proportional thinking in a variety of problem situations that include, but are not limited to:
  - a. Ratios and proportions (e.g., rates, scale drawings, similarity, circle graph construction). SS
  - b. Percents, including those greater than 100 and less than one (e.g., discounts, rate of increase or decrease, sales tax).

- B.8.6. Model and solve problems involving number-theory concepts such as:
  - a. Prime factorization.
  - b. Divisibility and remainders.
  - c. Greatest common factors.
  - d. Least common multiples.
  - e. Connect the above concepts to the appropriate tasks (e.g. GCF and its use in reducing fractions, LCM and its use in adding and subtracting fractions, comparing fractions, ordering fractions)
- B.8.7. In problem-solving situations, select and use appropriate computational procedures with rational numbers such as: IT, SC
  - a. Mental calculation.
  - b. Estimating.
  - c. Creating, using, and explaining algorithms.
  - d. Using technology (e.g., scientific calculators, spreadsheets).

## GOAL C GEOMETRY

**Use geometric concepts, relationships and procedures to interpret, represent, and solve problems.**

- C.8.1. Describe special and complex three-dimensional figures (e.g. polyhedron, cylinder) and their component parts (e.g., base, altitude, and slant height) by: AR
  - a. Naming, defining, and giving examples. SS
  - b. Comparing, sorting, and classifying them.
  - c. Identifying and contrasting their properties (e.g., symmetrical, isosceles, regular).
  - d. Drawing and constructing physical models to specifications.
  - e. Create compass constructions (e.g. line segments, angles, angle and line segment bisectors, center of circle).
  - f. Explaining how these figures are related to objects in the environment.
  - g. Use knowledge of geometric figures to break down complex problems into its components.
- C.8.2. Identify and use relationships among the component parts of special and complex two- and three-dimensional figures (e.g., parallel sides, congruent faces).
- C.8.3. Identify three-dimensional shapes from two-dimensional perspectives and draw two-dimensional sketches of three-dimensional objects preserving their significant features.
- C.8.4. Perform transformations on two-dimensional figures and describe and analyze the effects of the transformations on the figures (e.g. describe how coordinates change).
- C.8.5. Locate objects using the rectangular coordinate system. SS

## GOAL D MEASUREMENT

**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.**

- D.8.1. Identify and describe attributes in situations where they are not directly or easily measurable (e.g., distance, area of an irregular figure, likelihood of occurrence). LA, SC
- D.8.2. Demonstrate a comprehensive understanding of the metric system.
  - a. Define connection between the metric system, place value, and powers of ten.
  - b. Use appropriate units in problem solving (e.g.  $\text{cm}^3 = \text{ml}$  used for volume,  $\text{cm}^2$  used for area, cm used for perimeter or length)
  - c. Evaluate units used when applying a formula.
- D.8.3. Demonstrate understanding of basic measurement facts, principles, and techniques including the following: SC, SS, FL (currency), LA
  - a. Approximate comparisons between metric and US Customary units (e.g., a liter and a quart are about the same; a kilometer is about six-tenths of a mile).
    - 1) Apply conversion formulas for the customary and metric systems.
  - b. Knowledge that direct measurement produces approximate, not exact, measures.
  - c. The use of smaller units to produce more precise measures.
- D.8.4. Determine measurements indirectly using: SC
  - a. Estimations.
  - b. Conversion of units within a system (e.g., quarts to cups, millimeters to centimeters).
  - c. Ratio and proportion (e.g., similarity, scale drawings). SS

- d. Geometric formulas to derive perimeter, circumference, area, surface area, and volume of common figures.
  - 1) Calculate area and circumference of a circle.
  - 2) Find surface area and volume of cones, cubes, cylinders, prisms, and pyramids.
- e. The Pythagorean relationship.
- f. Geometric relationships and properties for angle size (e.g., parallel lines and transversals; sum of angles of a triangle; vertical angles).

## **GOAL E STATISTICS AND PROBABILITY**

**Use data collection and analysis, statistics and probability in problem-solving situations, employing technology where appropriate.**

- E.8.1. Work with data in the context of real-world situations by: SS, SC
  - a. Formulating questions that lead to data collection and analysis.
  - b. Designing and conducting a statistical investigation.
  - c. Using technology to generate displays, summary statistics, and presentations.
- E.8.2. Organize and display data from statistical investigations using: SS, SC, IT
  - a. Appropriate tables, graphs, and/or charts (e.g., circle, bar or line for multiple sets of data).
  - b. Appropriate plots (e.g., line, stem-and-leaf, box, scatter).
- E.8.3. Extract, interpret, and analyze information from organized and displayed data by using: SS, SC, IT
  - a. Frequency and distribution, including mode and range.
  - b. Central tendencies of data (mean and median).
  - c. Indicators of dispersion (e.g., outliers).
- E.8.4. Use the results of data analysis to: SS, SC, LA
  - a. Make predictions.
  - b. Develop convincing arguments. RE (ethics)
  - c. Draw conclusions.
- E.8.5. Compare several sets of data to generate, test, and, as the data dictate, confirm or deny hypotheses. SC
- E.8.6. Evaluate presentations and statistical analyses from a variety of sources for: SC, LA (research skills)
  - a. Credibility of the source.
  - b. Techniques of collection, organization, and presentation of data.
  - c. Missing or incorrect data.
  - d. Inferences.
  - e. Possible sources of bias.
- E.8.7. Determine the likelihood of occurrence of simple events by: SC
  - a. Using a variety of strategies to identify possible outcomes (e.g., lists, tables, tree diagrams).
  - b. Conducting an experiment.
  - c. Designing and conducting simulations.
  - d. Applying theoretical notions of probability (e.g., that four equally likely events have a 25% chance of happening).

## **GOAL F ALGEBRAIC RELATIONSHIPS**

**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.**

- F.8.1. Work with algebraic expressions in a variety of ways, including: SC
  - a. Using appropriate symbolism, including exponents and variables.
  - b. Evaluating expressions containing exponents through numerical substitution.
  - c. Generating equivalent expressions.
  - d. Addition and subtraction, multiplication and division of rational expressions.
- F.8.2. Work with linear and nonlinear patterns and relationships in a variety of ways, including: SC
  - a. Representing them with tables, graphs, algebraic expressions, equations, and inequalities.
  - b. Describing and interpreting their graphical representations (e.g., slope, rate of change, intercepts).
  - c. Using them as models of real-world phenomena.
  - d. Describing a real-world phenomenon that a given graph might represent. LA

- F.8.3. Recognize, describe, and analyze functional relationships by generalizing a rule that characterizes the pattern of change among variables (includes application, analysis and graphing of exponential growth and decay, quadratic equations; there inverse and absolute values). SC
- F.8.4. Use linear equations and inequalities in a variety of ways, including: SC
- a. Writing them to represent problem situations and to express generalizations.
  - b. Solving them by different methods (e.g., informally, graphically, with formal properties, with technology).
    - 1) Solve and check multiple-step linear equations containing whole numbers, decimals, fractions and/or integers.
    - 2.) Solve and check systems of linear equations using methods such as substitution, graphing, addition and subtraction of equations.
  - c. Writing and evaluating formulas (including solving for a specified variable).
  - d. Using them to record and describe solution strategies.
- F.8.5. Recognize and use generalized properties and relations, including: SC
- a. Additive and multiplicative properties of equations and inequalities.
  - b. Communitative and associative properties of addition and multiplication.
  - c. Distributive property.
  - d. Inverse and identity properties for addition and multiplication.
  - e. Transitive property.
- F.8.6. Classify variables in problem solving or in a lab setting as independent, dependent and controlled variables.
- a. Graph variables on appropriate axis.
  - b. Determine whether a variable relationship is functional or not (e.g. vertical line test, analysis of relation)

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