

## INTERMEDIATE GRADES 3-5

### **Number and Operations**

Students in the intermediate grades represent whole numbers, fractions, and decimals with concrete objects, pictures, and symbols in a variety of contexts. A firm understanding and use of the place value system and various properties of numbers is developed. Students recognize equivalent rational numbers and explain the basis for the equivalence. Fractions and decimals are compared and ordered.

A variety of tools is used to model operations with whole numbers and fractions, develop and apply different methods of computing, and relate models to standard symbolic expressions and algorithms. Students learn the order of operations, explore various properties of operations, and are able to estimate reasonable answers to computations. Students become fluent operating with whole numbers.

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### **Measurement**

Students estimate and measure temperature, length, mass, and capacity in both customary and metric units. They solve problems involving perimeter of plane figures and area of rectangles and develop the basic formulas for computing these quantities.

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### **Geometry**

In the intermediate grades, students compare, describe, classify, and analyze two- and three- dimensional figures. They investigate basic geometric relationships, such as parallelism, perpendicularity, congruence, and similarity, and recognize geometric transformations. Students plot points and read graphs on a rectangular grid.

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### **Data Analysis and Probability**

Students continue working with the process of statistical investigation, as the techniques for data collection become more sophisticated. The nature and kinds of representations used include tables, bar and circle graphs, and stem-and-leaf plots. Data are described and compared using median, mode, and range. Students design experiments and list all possible outcomes and probabilities.

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## **Algebra**

Students in the intermediate grades continue to identify and describe patterns in many situations. Tools, such as calculators and computers, are used to investigate and discover patterns. Patterns are used in geometry and other mathematics to develop new concepts. Tables and graphs are made to show relationships and then students verbally describe the patterns. Patterns are used to extend student data, suggest rules for relationships, and make predictions. Students begin to use symbols to represent unknown quantities. They use the symbols in expressions and open sentences when describing relationships and solving problems. Students begin to identify, describe, and analyze situations with constant or varying rates of change, and compare them.

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## Grade 3

### Major Concepts/Skills

- Number sense 0 - 9,999
- Multiplication and division
- Non-negative rational numbers
- Capacity and mass
- Coordinate grids
- Circle graphs
- Permutations and combinations
- Growing patterns
- Variables
- Students will solve relevant and authentic problems using appropriate technology and apply these concepts as well as those developed in earlier years

### Concepts/Skills to Maintain

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

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

**COMPETENCY GOAL 1: The learner will model, identify, and compute with whole numbers through 9,999.**

### Objectives

- 1.01 Develop number sense for whole numbers through 9,999.
- a) Connect model, number word, and number using a variety of representations.
  - b) Build understanding of place value (ones through thousands).
  - c) Compare and order.
- 1.02 Develop fluency with multi-digit addition and subtraction through 9,999 using:
- a) Strategies for adding and subtracting numbers.
  - b) Estimation of sums and differences in appropriate situations.
  - c) Relationships between operations.

- 1.03 Develop fluency with multiplication from  $1 \times 1$  to  $12 \times 12$  and division up to two-digit by one-digit numbers using:
  - a) Strategies for multiplying and dividing numbers.
  - b) Estimation of products and quotients in appropriate situations.
  - c) Relationships between operations.
- 1.04 Use basic properties (identity, commutative, associative, order of operations) for addition, subtraction, multiplication, and division.
- 1.05 Use area or region models and set models of fractions to explore part-whole relationships.
  - a) Represent fractions concretely and symbolically (halves, fourths, thirds, sixths, eighths).
  - b) Compare and order fractions (halves, fourths, thirds, sixths, eighths) using models and benchmark numbers (zero, one-half, one); describe comparisons.
  - c) Model and describe common equivalents, especially relationships among halves, fourths, and eighths, and thirds and sixths.
  - d) Understand that the fractional relationships that occur between zero and one also occur between every two consecutive whole numbers.
  - e) Understand and use mixed numbers and their equivalent fraction forms.
- 1.06 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.

**COMPETENCY GOAL 2: The learner will recognize and use standard units of metric and customary measurement.**

**Objectives**

- 2.01 Solve problems using measurement concepts and procedures involving:
  - a) Elapsed time.
  - b) Equivalent measures within the same measurement system.
- 2.02 Estimate and measure using appropriate units.
  - a) Capacity (cups, pints, quarts, gallons, liters).
  - b) Length (miles, kilometers)
  - c) Mass (ounces, pounds, grams, kilograms).
  - d) Temperature (Fahrenheit, Celsius).

**COMPETENCY GOAL 3: The learner will recognize and use basic geometric properties of two- and three-dimensional figures.**

**Objectives**

- 3.01 Use appropriate vocabulary to compare, describe, and classify two- and three-dimensional figures.
- 3.02 Use a rectangular coordinate system to solve problems.
  - a) Graph and identify points with whole number and/or letter coordinates.
  - b) Describe the path between given points on the plane.

**COMPETENCY GOAL 4: The learner will understand and use data and simple probability concepts.**

**Objectives**

- 4.01 Collect, organize, analyze, and display data (including circle graphs and tables) to solve problems.
- 4.02 Determine the number of permutations and combinations of up to three items.
- 4.03 Solve probability problems using permutations and combinations.

**COMPETENCY GOAL 5: The learner will recognize, determine, and represent patterns and simple mathematical relationships.**

**Objectives**

- 5.01 Describe and extend numeric and geometric patterns.
- 5.02 Extend and find missing terms of repeating and growing patterns.
- 5.03 Use symbols to represent unknown quantities in number sentences.
- 5.04 Find the value of the unknown in a number sentence.

## Grade 4

### Major Concepts/Skills

- Number sense 0.01-99,999
- Multiplication and division of multi-digit numbers
- Perimeter and area
- Transformations
- Line graphs
- Median, mode, and range
- Variables in number sentences
- Proportional reasoning
- Students will solve relevant and authentic problems using appropriate technology and apply these concepts as well as those developed in earlier years

### Concepts/Skills to Maintain

- Whole number computation
- Non-negative rational numbers
- Length, time, capacity, and mass
- Symmetry and congruence
- Coordinate grids
- Circle graphs
- Permutations and combinations

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

**COMPETENCY GOAL 1: The learner will read, write, model, and compute with non-negative rational numbers.**

### Objectives

- 1.01 Develop number sense for rational numbers 0.01 through 99,999.
- a) Connect model, number word, and number using a variety of representations.
  - b) Build understanding of place value (hundredths through ten thousands).
  - c) Compare and order rational numbers.
  - d) Make estimates of rational numbers in appropriate situations.
- 1.02 Develop fluency with multiplication and division:
- a) Two-digit by two-digit multiplication (larger numbers with calculator).
  - b) Up to three-digit by two-digit division (larger numbers with calculator).
  - c) Strategies for multiplying and dividing numbers.
  - d) Estimation of products and quotients in appropriate situations.
  - e) Relationships between operations.

- 1.03 Solve problems using models, diagrams, and reasoning about fractions and relationships among fractions involving halves, fourths, eighths, thirds, sixths, twelfths, fifths, tenths, hundredths, and mixed numbers.
- 1.04 Develop fluency with addition and subtraction of non-negative rational numbers with like denominators, including decimal fractions through hundredths.
  - a) Develop and analyze strategies for adding and subtracting numbers.
  - b) Estimate sums and differences.
  - c) Judge the reasonableness of solutions.
- 1.05 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.

**COMPETENCY GOAL 2: The learner will understand and use perimeter and area.**

**Objectives**

- 2.01 Develop strategies to determine the area of rectangles and the perimeter of plane figures.
- 2.02 Solve problems involving perimeter of plane figures and areas of rectangles.

**COMPETENCY GOAL 3: The learner will recognize and use geometric properties and relationships.**

**Objectives**

- 3.01 Use the coordinate system to describe the location and relative position of points and draw figures in the first quadrant.
- 3.02 Describe the relative position of lines using concepts of parallelism and perpendicularity.
- 3.03 Identify, predict, and describe the results of transformations of plane figures.
  - a) Reflections.
  - b) Translations.
  - c) Rotations.

**COMPETENCY GOAL 4: The learner will understand and use graphs, probability, and data analysis.**

**Objectives**

- 4.01 Collect, organize, analyze, and display data (including line graphs and bar graphs) to solve problems.
- 4.02 Describe the distribution of data using median, range and mode.
- 4.03 Solve problems by comparing two sets of related data.
- 4.04 Design experiments and list all possible outcomes and probabilities for an event.

**COMPETENCY GOAL 5: The learner will demonstrate an understanding of mathematical relationships.**

**Objectives**

- 5.01 Identify, describe, and generalize relationships in which:
  - a) Quantities change proportionally.
  - b) Change in one quantity relates to change in a second quantity.
- 5.02 Translate among symbolic, numeric, verbal, and pictorial representations of number relationships.
- 5.03 Verify mathematical relationships using:
  - a) Models, words, and numbers.
  - b) Order of operations and the identity, commutative, associative, and distributive properties.



## Grade 5

### Major Concepts/Skills

- Number sense 0.001-999,999
- Addition and subtraction of non-negative rational numbers
- Properties of plane figures
- Bar graphs and stem-and-leaf plots
- Rates of change
- Simple equations and inequalities
- Students will solve relevant and authentic problems using appropriate technology and apply these concepts as well as those developed in earlier years

### Concepts/Skills to Maintain

- Whole number computation
- Transformations
- Perimeter and area
- Coordinate grids
- Line graphs
- Median, mode, and range

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

**COMPETENCY GOAL 1: The learner will understand and compute with non-negative rational numbers.**

### Objectives

- 1.01 Develop number sense for rational numbers 0.001 through 999,999.
- a) Connect model, number word, and number using a variety of representations.
  - b) Build understanding of place value (thousandths through hundred thousands).
  - c) Compare and order rational numbers.
  - d) Make estimates of rational numbers in appropriate situations.
- 1.02 Develop fluency in adding and subtracting non-negative rational numbers (halves, fourths, eighths; thirds, sixths, twelfths; fifths, tenths, hundredths, thousandths; mixed numbers).
- a) Develop and analyze strategies for adding and subtracting numbers.
  - b) Estimate sums and differences.
  - c) Judge the reasonableness of solutions.

- 1.03 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.

**COMPETENCY GOAL 2: The learner will recognize and use standard units of metric and customary measurement.**

**Objectives**

- 2.01 Estimate the measure of an object in one system given the measure of that object in another system.
- 2.02 Identify, estimate, and measure the angles of plane figures using appropriate tools.

**COMPETENCY GOAL 3: The learner will understand and use properties and relationships of plane figures.**

**Objectives**

- 3.01 Identify, define, describe, and accurately represent triangles, quadrilaterals, and other polygons.
- 3.02 Make and test conjectures about polygons involving:
  - a) Sum of the measures of interior angles.
  - b) Lengths of sides and diagonals.
  - c) Parallelism and perpendicularity of sides and diagonals.
- 3.03 Classify plane figures according to types of symmetry (line, rotational).
- 3.04 Solve problems involving the properties of triangles, quadrilaterals, and other polygons.
  - a) Sum of the measures of interior angles.
  - b) Lengths of sides and diagonals.
  - c) Parallelism and perpendicularity of sides and diagonals.

**COMPETENCY GOAL 4: The learner will understand and use graphs and data analysis.**

**Objectives**

- 4.01 Collect, organize, analyze, and display data (including stem-and-leaf plots) to solve problems.
- 4.02 Compare and contrast different representations of the same data; discuss the effectiveness of each representation.

- 4.03 Solve problems with data from a single set or multiple sets of data using median, range, and mode.

**COMPETENCY GOAL 5: The learner will demonstrate an understanding of patterns, relationships, and elementary algebraic representation.**

**Objectives**

- 5.01 Describe, extend, and generalize numeric and geometric patterns using tables, graphs, words, and symbols.
- 5.02 Use algebraic expressions, patterns, and one-step equations and inequalities to solve problems.
- 5.03 Identify, describe, and analyze situations with constant or varying rates of change.