A Correlation of

SCOTT FORESMAN
Investigations
IN NUMBER, DATA, AND SPACE®



to the

# ARIZONA Mathematics Standard Articulated By Grade Level (2008)

## Grades K-5

PEARSON

M/M-158

# *INTRODUCTION*

This document demonstrates how **Investigations in Number, Data, and Space®**, copyright 2004, integrates with the *Arizona Mathematics Standard Articulated by Grade Level (2008)*. The citations within this correlation provide Investigation Curriculum Unit titles, followed by the Investigation number and Session number or Focus Time/Choice Time title.

***Investigations in Number, Data, and Space®***, a Kindergarten through Grade 5 program, offers a complete and flexible curriculum that aligns with the NCTM principles and Standards for School Mathematics. The main teaching tool is a single resource book, called the *teacher book,* for each unit in a grade level. Students explore the central topics in depth through a series of investigations, gradually encountering and using many important mathematical ideas. ***Investigations*** offers activity-based mathematics that encourages students to think creatively, develop their own strategies, and work together. Students practice skills through games, daily routines, activities, and practice pages.

The program blends concrete materials with appropriate technology. The software provided with several ***Investigations*** units harnesses the power of computers to help students explore mathematical ideas and relationships that cannot be explored in the same way with physical materials. A balanced approach to calculator use is found in the program.

Every unit in the Investigations curriculum offers a list of related children's literature that can be used to support the mathematical ideas presented in the unit. This list of books is found in the materials list located in the front of each unit.

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Investigations in Number, Data, and Space © 2004
To the
Arizona Mathematics Standard Articulated by Grade Level 2008

Kindergarten

| **Strand 1: Number and Operations** | |
|---|---|
| **Concept 1: Number Sense** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Express whole numbers 0 to 20 using and connecting multiple representations | **Mathematical Thinking in Kindergarten**<br>Investigation 1: Focus Time<br>Investigation 2: Focus Time and Choice Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time<br>**Collecting, Counting, and Measuring**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 2: Focus Time and Choice Time<br>Investigation 6: Focus Time and Choice Time<br>**How Many in All?**<br>Investigation 1: Choice Time<br>Investigation 2: Focus Time and Choice Time<br>Investigation 3: Choice Time<br>Investigation 4: Focus Time and Choice Time |
| PO 2. Count forward to 20 and backward from 10 with or without objects using different starting points | **Mathematical Thinking in Kindergarten**<br>Investigation 1: Focus Time<br>Investigation 2: Focus Time and Choice Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time<br>**Pattern Trains and Hopscotch Paths**<br>Investigation 1: Focus Time<br>Investigation 2: Choice Time<br>Investigation 3: Choice Time<br>Investigation 4: Choice Time<br>**Collecting, Counting, and Measuring**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 2: Focus Time and Choice Time<br>Investigation 3: Choice Time<br>Investigation 4: Focus Time and Choice Time<br>Investigation 5: Focus Time and Choice Time<br>Investigation 6: Focus Time and Choice Time<br>**Counting Ourselves and Others**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time<br>**How Many in All?**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 2: Choice Time |

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| PO2 Continued | Investigation 3: Choice Time<br>Investigation 4: Choice Time |
| PO 3. Identify numbers which are one more or less than a given number to 20 | **Mathematical Thinking in Kindergarten**<br>Investigation 4: Focus Time |
| PO 4. Compare and order whole numbers through 20 | **Mathematical Thinking in Kindergarten**<br>Investigation 4: Focus Time<br>**Pattern Trains and Hopscotch Paths**<br>Investigation 4: Choice Time<br>**Collecting, Counting, and Measuring**<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time<br>Investigation 5: Focus Time and Choice Time<br>Investigation 6: Choice Time<br>**Counting Ourselves and Others**<br>Investigation 1: Choice Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time<br>**How Many in All?**<br>Investigation 2: Choice Time<br>Investigation 3: Choice Time<br>Investigation 4: Choice Time |
| PO 5. Recognize and compare the ordinal position of at least five objects. | *Opportunities to address this standard can be found in the following investigation:*<br>**Mathematical Thinking in Kindergarten**<br>Investigation 1: Focus Time |
| **Concept 2: Numerical Operations** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Solve contextual problems by developing, applying, and recording strategies with sums and minuends to 10 using objects, pictures, and symbols | **How Many in All?**<br>Investigation 3: Focus Time |
| PO 2. Develop and use multiple strategies to determine<br>• sums to 10 and | **Collecting, Counting, and Measuring**<br>Investigation 4: Choice Time<br>Investigation 5: Choice Time<br>Investigation 6: Choice Time<br>**How Many in All?**<br>Investigation 1: Choice Time<br>Investigation 2: Choice Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Choice Time |
| • differences with minuends to 10 | **How Many in All?**<br>Investigation 3: Focus Time |

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|---|---|
| PO 3. Create word problems based on sums to 10 and differences with minuends to 10 | *Opportunities to address this standard can be found in the following investigation:*<br>**How Many in All?**<br>Investigation 3: Focus Time |
| **Concept 3: Estimation** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Identify quantities to 20 as more or less than 5 or as more or less than 10. | *Opportunities to address this standard can be found in the following investigations:*<br>**Mathematical Thinking in Kindergarten**<br>Investigation 2: Focus Time<br>Investigation 3: Choice Time<br>Investigation 4: Choice Time |
| **Strand 2: Data Analysis, Probability, and Discrete Mathematics** | |
| **Concept 1: Data Analysis (Statistics)** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Construct simple displays of data using objects or pictures. | **Mathematical Thinking in Kindergarten**<br>Investigation 1: Focus Time<br>Investigation 4: Focus Time<br>**Counting Ourselves and Others**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 2: Focus Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time |
| PO 2. Ask and answer questions by counting, comparing quantities, and interpreting simple displays of data. | **Mathematical Thinking in Kindergarten**<br>Investigation 1: Focus Time<br>Investigation 4: Focus Time<br>**Counting Ourselves and Others**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 2: Focus Time and Choice Time<br>Investigation 3: Choice Time<br>Investigation 4: Choice Time |
| **Concept 2: Probability** | |
| In Grade K, there are no performance objectives in this concept. Performance objectives begin in Grade 3. | |

| **Concept 3: Systematic Listing and Counting** | |
|---|---|
| In Grade K, students sort objects and describe how they sorted them. | |
| PO 1. Sort, classify, count, and represent up to 20 objects and justify the sorting rule | **Mathematical Thinking in Kindergarten**<br>Investigation 1: Focus Time<br>Investigation 2: Focus Time and Choice Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time<br>**Collecting, Counting, and Measuring**<br>Investigation 3: Choice Time<br>Investigation 4: Choice Time<br>**Counting Ourselves and Others**<br>Investigation 1: Choice Time<br>Investigation 2: Focus Time and Choice Time<br>Investigation 3: Choice Time<br>Investigation 4: Choice Time |
| **Concept 4: Vertex-Edge Graphs** | |
| In Grade K, there are no performance objectives in this concept. Performance objectives begin in Grade 2. | |
| **Strand 3: Patterns, Algebra, and Functions** | |
| **Concept 1: Patterns** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Recognize, describe, extend, create, and record simple repeating patterns | **Pattern Trains and Hopscotch Paths**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 2: Focus Time and Choice Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time |
| PO 2. Recognize, describe, extend, and record simple growing patterns. | *Opportunities to address this standard can be found in the following investigations:*<br>**Pattern Trains and Hopscotch Paths**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 2: Focus Time and Choice Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time |
| **Concept 2: Functions and Relationships** | |
| In Grade K, there are no performance objectives in this concept. Performance objectives begin in Grade 2. | |

| **Concept 3: Algebraic Representations** | |
|---|---|
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Record equivalent forms of whole numbers to 10 by constructing models and using numbers | **Mathematical Thinking in Kindergarten**<br>Investigation 2: Choice Time<br>Investigation 4: Choice Time<br>**Collecting, Counting, and Measuring**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 2: Focus Time and Choice Time<br>Investigation 6: Focus Time and Choice Time |
| PO 2. Compare expressions using spoken words and the symbol =. | **Mathematical Thinking in Kindergarten**<br>Investigation 4: Focus Time<br>**Pattern Trains and Hopscotch Paths**<br>Investigation 4: Choice Time<br>**Collecting, Counting, and Measuring**<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time<br>Investigation 5: Focus Time and Choice Time<br>Investigation 6: Choice Time<br>**Counting Ourselves and Others**<br>Investigation 1: Choice Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time<br>**How Many in All?**<br>Investigation 2: Choice Time<br>Investigation 3: Choice Time<br>Investigation 4: Choice Time |
| **Concept 4: Analysis of Change** | |
| In Grade K, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |

| **Strand 4: Geometry and Measurement** | |
|---|---|
| **Concept 1: Geometric Properties** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Identify, analyze, and describe circles, triangles, and rectangles (including squares) in different orientations and environments | **Mathematical Thinking in Kindergarten**<br>Investigation 1: Choice Time<br>Investigation 2: Choice Time<br>Investigation 3: Choice Time<br>Investigation 4: Choice Time<br>**Making Shapes and Building Blocks**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 2: Choice Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time<br>Investigation 5: Focus Time and Choice Time |
| PO 2. Build, draw, compare, describe, and sort 2-dimensional figures (including irregular figures) using attributes. | **Mathematical Thinking in Kindergarten**<br>Investigation 1: Choice Time<br>Investigation 2: Choice Time<br>Investigation 3: Choice Time<br>Investigation 4: Choice Time<br>**Making Shapes and Building Blocks**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 2: Choice Time<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Focus Time and Choice Time<br>Investigation 5: Focus Time and Choice Time |
| **Concept 2: Transformation of Shapes** | |
| In Grade K, there are no performance objectives in this concept. Performance objectives begin in Grade 1. | |
| **Concept 3: Coordinate Geometry** | |
| In Grade K, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Concept 4: Measurement** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Compare and order objects according to observable and measureable attributes. | **Mathematical Thinking in Kindergarten**<br>Investigation 4: Focus Time<br>**Collecting, Counting, and Measuring**<br>Investigation 3: Choice Time<br>Investigation 4: Choice Time |

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| PO 2. Use the attribute of length to describe and compare objects using non-standard units. | **Collecting, Counting, and Measuring**<br>Investigation 3: Focus Time and Choice Time<br>Investigation 4: Choice Time<br>Investigation 5: Focus Time and Choice Time<br>**How Many in All?**<br>Investigation 1: Focus Time and Choice Time<br>Investigation 2: Choice Time |
| **Strand 5: Structure and Logic** | |
| **Concept 1: Algorithms and Algorithmic Thinking** | |
| In Grade K, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Concept 2: Logic, Reasoning, Problem Solving and Proof** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Identify the question(s) asked and any other questions that need to be answered in order to find a solution. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking in Kindergarten**<br>Investigation 4: Focus Time<br>**Pattern Trains and Hopscotch Paths**<br>Investigation 2: Choice Time<br>**Collecting, Counting, and Measuring**<br>Investigation 2: Focus Time and Choice Time<br>**Counting Ourselves and Others**<br>Investigation 1: Focus Time and Choice Time<br>**Making Shapes and Building Blocks**<br>Investigation 5: Focus Time and Choice Time<br>**How Many in All?**<br>Investigation 3: Focus Time |
| PO 2. Identify the given information that can be used to find a solution. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking in Kindergarten**<br>Investigation 4: Focus Time<br>**Pattern Trains and Hopscotch Paths**<br>Investigation 2: Choice Time<br>**Collecting, Counting, and Measuring**<br>Investigation 2: Focus Time and Choice Time<br>**Counting Ourselves and Others**<br>Investigation 1: Focus Time and Choice Time<br>**Making Shapes and Building Blocks**<br>Investigation 5: Focus Time and Choice Time<br>**How Many in All?**<br>Investigation 3: Focus Time |

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| PO 3. Select from a variety of problem-solving strategies and use one or more strategies to arrive at a solution. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking in Kindergarten**<br>Investigation 4: Focus Time<br>**Pattern Trains and Hopscotch Paths**<br>Investigation 2: Choice Time<br>**Collecting, Counting, and Measuring**<br>Investigation 2: Focus Time and Choice Time<br>**Counting Ourselves and Others**<br>Investigation 1: Focus Time and Choice Time<br>**Making Shapes and Building Blocks**<br>Investigation 5: Focus Time and Choice Time<br>**How Many in All?**<br>Investigation 3: Focus Time |
| PO 4. Represent a problem situation using any combination of words, numbers, pictures, physical objects, or symbols. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking in Kindergarten**<br>Investigation 4: Focus Time<br>**Pattern Trains and Hopscotch Paths**<br>Investigation 2: Choice Time<br>**Collecting, Counting, and Measuring**<br>Investigation 2: Focus Time and Choice Time<br>**Counting Ourselves and Others**<br>Investigation 1: Focus Time and Choice Time<br>**Making Shapes and Building Blocks**<br>Investigation 2: Choice Time<br>**How Many in All?**<br>Investigation 3: Choice Time |
| PO 5. Explain and clarify mathematical thinking. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking in Kindergarten**<br>Investigation 4: Focus Time<br>**Pattern Trains and Hopscotch Paths**<br>Investigation 2: Focus Time<br>**Collecting, Counting, and Measuring**<br>Investigation 2: Focus Time<br>**Counting Ourselves and Others**<br>Investigation 1: Focus Time and Choice Time<br>**Making Shapes and Building Blocks**<br>Investigation 4: Focus Time<br>**How Many in All?**<br>Investigation 2: Choice Time |

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| PO 6. Determine whether a solution is reasonable | *Opportunities to address this standard can be found throughout the series. See, for example:*<br>**Mathematical Thinking in Kindergarten**<br>Investigation 4: Focus Time<br>**Pattern Trains and Hopscotch Paths**<br>Investigation 2: Choice Time<br>**Collecting, Counting, and Measuring**<br>Investigation 2: Focus Time and Choice Time<br>**Counting Ourselves and Others**<br>Investigation 1: Focus Time and Choice Time<br>**Making Shapes and Building Blocks**<br>Investigation 5: Focus Time and Choice Time<br>**How Many in All?**<br>Investigation 3: Focus Time |

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# Grade 1

| **Strand 1: Number and Operations** | |
|---|---|
| **Concept 1: Number Sense** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Express whole numbers 0 to 100, in groups of tens and ones using and connecting multiple representations | **Mathematical Thinking at Grade 1**<br>Investigation 1: Sessions 4-6<br>Investigation 4: Sessions 4, 6<br>**Building Number Sense**<br>Investigation 1: Sessions 5-8<br>Investigation 2: Sessions 1-2, 4-9 |
| PO 2. Count forward to 100 and backward from 100 by 1s and 10s using different starting points, and count forward to 100 by 2s and 5s | **Mathematical Thinking at Grade 1**<br>Investigation 1: Sessions 2-4<br>Investigation 2: Sessions 2-3, 5-6<br>Investigation 4: Sessions 1-3, 5-6<br>Investigation 5: Sessions 1-2<br>**Building Number Sense**<br>Investigation 1: Sessions 2-8<br>Investigation 3: Sessions 3-7, 9<br>**Quilt Squares and Block Towns**<br>Investigation 1: Session 2<br>Investigation 3: Sessions 6-7<br>**Number Games and Story Problems**<br>Investigation 1: Sessions 1, 4-5<br>Investigation 2: Sessions 1-8, 10-13<br>**Bigger, Taller, Heavier, Smaller**<br>Investigation 2: Sessions 1-7 |
| PO 3. Identify numbers which are 10 more or less than a given number to 90. | *Opportunities to address this standard can be found in the following investigation:*<br>**Number Games and Story Problems**<br>Investigation 2: Sessions 10-12 |
| PO 4. Compare and order whole numbers through 100 by applying the concepts of place value. | **Mathematical Thinking at Grade 1**<br>Investigation 2: Sessions 2-3, 5-6<br>Investigation 4: Sessions 2-3<br>**Building Number Sense**<br>Investigation 2: Sessions 3-5<br>Investigation 3: Sessions 1-7<br>**Number Games and Story Problems**<br>Investigation 1: Sessions 7-9 |
| PO 5. Recognize and compare ordinal numbers, first through tenth. | *Opportunities to address this standard can be found in the following investigation:*<br>**Mathematical Thinking at Grade 1**<br>Investigation 2: Session 1 |

| **Concept 2: Numerical Operations** | |
|---|---|
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Solve contextual problems using multiple representations for addition and subtraction facts. | **Building Number Sense**<br>Investigation 2: Sessions 1-2<br>Investigation 4: Sessions 1-5, 10<br>**Number Games and Story Problems**<br>Investigation 2: Sessions 1-2<br>Investigation 3: Sessions 1-8, 10-13 |
| PO 2. Demonstrate addition and subtraction of numbers that total less than 100 by using various representations that connect to place value concepts | **Mathematical Thinking at Grade 1**<br>Investigation 2: Sessions 4-6<br>Investigation 4: Sessions 2-4, 6<br>Investigation 5: Session 2<br>**Building Number Sense**<br>Investigation 2: Sessions 1-9<br>Investigation 3: Sessions 5-7<br>Investigation 4: Sessions 1-10<br>**Quilt Squares and Block Towns**<br>Investigation 1: Sessions 2-7<br>Investigation 3: Sessions 6-7<br>**Number Games and Story Problems**<br>Investigation 1: Sessions 1-10<br>Investigation 2: Sessions 1-2, 4-8, 10-13<br>Investigation 3: Sessions 1-8, 10-13 |
| PO 3. Develop and use multiple strategies for addition facts to 10+10 and their related subtraction facts. | **Building Number Sense**<br>Investigation 2: Sessions 1-9<br>Investigation 4: Sessions 1-10<br>**Number Games and Story Problems**<br>Investigation 1: Sessions 1-10<br>Investigation 3: Sessions 1-8, 13 |
| PO 4. Create word problems based on addition and subtraction facts. | **Building Number Sense**<br>Investigation 2: Session 2<br>**Number Games and Story Problems**<br>Investigation 3: Session 9 |
| PO 5. Apply properties to solve addition/subtraction problems<br>• identity property of addition/subtraction and | *Opportunities to address this standard can be found in the following investigation:*<br>**Building Number Sense**<br>Investigation 4: Sessions 6-9 |
| • commutative property of addition. | *Opportunities to address this standard can be found in the following investigation:*<br>**Building Number Sense**<br>Investigation 4: Sessions 6-9 |

| **Concept 3: Estimation** | |
|---|---|
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Use estimation to determine if sums are more or less than 5, more or less than 10, or more or less than 20. | *Opportunities to address this standard can be found in the following investigations:*<br>**Number Games and Story Problems**<br>Investigation 1: Sessions 1-10<br>Investigation 3: Sessions 3-8, 10-12 |
| **Strand 2: Data Analysis, Probability, and Discrete Mathematics** | |
| **Concept 1: Data Analysis (Statistics)** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Collect, record, organize, and display data using tally charts or pictographs. | **Mathematical Thinking at Grade 1**<br>Investigation 5: Sessions 3-6<br>**Survey Questions and Secret Rules**<br>Investigation 2: Sessions 1-6<br>Investigation 4: Sessions 1-5 |
| PO 2. Ask and answer questions by interpreting simple displays of data, including tally charts or pictographs. | **Mathematical Thinking at Grade 1**<br>Investigation 5: Sessions 3-6<br>**Survey Questions and Secret Rules**<br>Investigation 2: Sessions 1-2, 5-6<br>Investigation 4: Sessions 1-5<br>**Bigger, Taller, Heavier, Smaller**<br>Investigation 2: Session 1 |
| **Concept 2: Probability** | |
| In Grade 1, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Concept 3: Systematic Listing and Counting** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Use Venn diagrams to sort, classify, and count objects and justify the sorting rule. | *Opportunities to address this standard can be found in the following investigations:*<br>**Survey Questions and Secret Rules**<br>Investigation 1: Sessions 1-6<br>Investigation 2: Sessions 3-6<br>**Survey Questions and Secret Rules**<br>Investigation 1: Sessions 1-2, 11-12 |

| **Concept 4: Vertex-Edge Graphs** | |
|---|---|
| In Grade 1, there are no performance objectives in this concept. Performance objectives begin in Grade 2. | |
| **Strand 3: Patterns, Algebra, and Functions** | |
| **Concept 1: Patterns** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Recognize, describe, extend, create, and record repeating patterns. | **Mathematical Thinking at Grade 1**<br>Investigation 3: Sessions 1-6<br>Investigation 4: Sessions 2-3<br>**Building Number Sense**<br>Investigation 3: Session 8<br>**Survey Questions and Secret Rules**<br>Investigation 1: Sessions 13-15<br>**Number Games and Story Problems**<br>Investigation 2: Session 9 |
| PO 2. Recognize, describe, extend, create, and record growing patterns. | **Mathematical Thinking at Grade 1**<br>Investigation 3: Session 1<br>Investigation 4: Sessions 5-6<br>**Building Number Sense**<br>Investigation 3: Sessions 1-7<br>**Number Games and Story Problems**<br>Investigation 2: Sessions 2, 6-8 |
| **Concept 2: Functions and Relationships** | |
| In Grade 1, there are no performance objectives in this concept. Performance objectives begin in Grade 2. | |
| **Concept 3: Algebraic Representations** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Record equivalent forms of whole numbers to 100 by constructing models and using numbers. | **Mathematical Thinking at Grade 1**<br>Investigation 1: Sessions 4-6<br>Investigation 4: Sessions 4, 6<br>**Building Number Sense**<br>Investigation 2: Sessions 1-2, 4-9 |

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|---|---|
| PO 2. Compare expressions using spoken words and the symbols = and ≠. | **Mathematical Thinking at Grade 1**<br>Investigation 2: Sessions 2-3, 5-6<br>Investigation 4: Sessions 2-3<br>**Building Number Sense**<br>Investigation 2: Sessions 3-5<br>Investigation 3: Sessions 1-4<br>**Quilt Squares and Block Towns**<br>Investigation 1: Session 7<br>**Number Games and Story Problems**<br>Investigation 1: Sessions 7-9 |
| PO 3. Represent a word problem requiring addition or subtraction facts using an equation | **Number Games and Story Problems**<br>Investigation 1: Session 10<br>Investigation 3: Sessions 1-13 |
| **Concept 4: Analysis of Change** | |
| In Grade 1, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Strand 4: Geometry and Measurement** | |
| **Concept 1: Geometric Properties** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Identify and draw 2-dimensional geometric figures based on given attributes regardless of size or orientation. | **Mathematical Thinking at Grade 1**<br>Investigation 1: Sessions 2-4<br>**Survey Questions and Secret Rules**<br>Investigation 1: Sessions 1-2<br>**Quilt Squares and Block Towns**<br>Investigation 1: Sessions 1, 8-12<br>Investigation 2: Sessions 4-6 |
| PO 2. Compare and sort basic 2-dimensional figures (including irregular figures) using attributes and explain the reasoning for the sorting. | **Survey Questions and Secret Rules**<br>Investigation 1: Sessions 1-2, 11-12 |
| PO 3. Describe the results of composing and decomposing 2-dimensional figures | **Quilt Squares and Block Towns**<br>Investigation 1: Sessions 2-10 |
| **Concept 2: Transformation of Shapes** | |
| In Grade 1, there are no performance objectives in this concept. Performance objectives begin in Grade 2. | |
| **Concept 3: Coordinate Geometry** | |
| In Grade 1, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |

| **Concept 4: Measurement** | |
|---|---|
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Compare and order objects according to length, capacity, and weight. | **Building Number Sense**<br>Investigation 3: Sessions 5-7<br>**Bigger, Taller, Heavier, Smaller**<br>Investigation 1: Sessions 1-6<br>Investigation 2: Sessions 1-7<br>Investigation 3: Sessions 1-5 |
| PO 2. Measure and compare the length of objects using the benchmark of one inch. | *Opportunities to address this standard can be found in the following investigation:*<br>**Bigger, Taller, Heavier, Smaller**<br>Investigation 3: Sessions 1-5 |
| PO 3. Sequence the days of the week and the months of the year. | **Survey Questions and Secret Rules**<br>Investigation 3: Sessions 2-3 |
| **Strand 5: Structure and Logic** | |
| **Concept 1: Algorithms and Algorithmic Thinking** | |
| In Grade 1, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Concept 2: Logic, Reasoning, Problem Solving and Proof** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Identify the question(s) asked and any other questions that need to be answered in order to find a solution. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 1**<br>Investigation 4: Session 6<br>**Building Number Sense**<br>Investigation 4: Sessions 3-5, 7-10<br>**Quilt Squares and Block Towns**<br>Investigation 3: Sessions 6-7<br>**Number Games and Story Problems**<br>Investigation 3: Session 1-8, 10-13<br>**Bigger, Taller, Heavier, Smaller**<br>Investigation 2: Sessions 5-7 |

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| PO 2. Identify the given information that can be used to find a solution. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 1**<br>Investigation 4: Session 6<br>**Building Number Sense**<br>Investigation 4: Sessions 3-5, 7-10<br>**Quilt Squares and Block Towns**<br>Investigation 3: Sessions 6-7<br>**Number Games and Story Problems**<br>Investigation 3: Sessions 1-8, 10-13<br>**Bigger, Taller, Heavier, Smaller**<br>Investigation 2: Sessions 5-7 |
| PO 3. Select from a variety of problem-solving strategies and use one or more strategies to arrive at a solution. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 1**<br>Investigation 4: Session 6<br>**Building Number Sense**<br>Investigation 4: Sessions 3-5, 7-10<br>**Quilt Squares and Block Towns**<br>Investigation 3: Sessions 6-7<br>**Number Games and Story Problems**<br>Investigation 3: Sessions 1-8, 10-13<br>**Bigger, Taller, Heavier, Smaller**<br>Investigation 2: Sessions 5-7 |
| PO 4. Represent a problem situation using any combination of words, numbers, pictures, physical objects, or symbols. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 1**<br>Investigation 2: Session 4<br>Investigation 4: Session 4<br>**Building Number Sense**<br>Investigation 4: Sessions 3-5, 7-10<br>**Quilt Squares and Block Towns**<br>Investigation 3: Sessions 6-7<br>**Number Games and Story Problems**<br>Investigation 3: Sessions 1-13<br>**Bigger, Taller, Heavier, Smaller**<br>Investigation 3: Sessions 2, 4-5 |
| PO 5. Explain and clarify mathematical thinking. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 1**<br>Investigation 4: Session 5<br>**Building Number Sense**<br>Investigation 4: Sessions 3-5, 7-10<br>**Survey Questions and Secret Rules**<br>Investigation 4: Sessions 2-5<br>**Quilt Squares and Block Towns**<br>Investigation 3: Sessions 6-7<br>**Number Games and Story Problems**<br>Investigation 2: Sessions 1-2, 4-5<br>**Bigger, Taller, Heavier, Smaller**<br>Investigation 2: Sessions 1-7 |

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| PO 6. Determine whether a solution is reasonable. | *Opportunities to address this standard can be found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 1**<br>Investigation 4: Session 6<br>**Building Number Sense**<br>Investigation 4: Sessions 3-5, 7-10<br>**Quilt Squares and Block Towns**<br>Investigation 3: Sessions 6-7<br>**Number Games and Story Problems**<br>Investigation 3: Sessions 1-13<br>**Bigger, Taller, Heavier, Smaller**<br>Investigation 2: Sessions 5-7 |

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# Grade 2

| **Strand 1: Number and Operations** | |
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| **Concept 1: Number Sense** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Express whole numbers 0 to 1000, in groups of hundreds, tens and ones using and connecting multiple representations. | **Mathematical Thinking at Grade 2**<br>Investigation 1: Sessions 1-3<br>Investigation 3: Sessions 1-4<br>**Coins, Coupons, and Combinations**<br>Investigation 2: Sessions 1-5 |
| PO 2. Count forward to 1000 and backward from 1000 by 1s, 10s, and 100s using different starting points. | **Mathematical Thinking at Grade 2**<br>Investigation 3: Sessions 1-2<br>Investigation 4: Sessions 1-4<br>Investigation 5: Sessions 1-5 |
| PO 3. Identify numbers which are 100 more or less than a given number to 900. | **Coins, Coupons, and Combinations**<br>Investigation 4: Sessions 2-4 |
| PO 4. Compare and order whole numbers through 1000 by applying the concept of place value. | **Mathematical Thinking at Grade 2**<br>Investigation 3: Session 6<br>Investigation 4: Sessions 1, 5<br>Investigation 5: Sessions 1-3<br>**Putting Together and Taking Apart**<br>Investigation 2: Sessions 3-7<br>Investigation 4: Session 1 |
| PO 5. Count money to $1.00. | **Mathematical Thinking at Grade 2**<br>Investigation 4: Sessions 2-4 |
| PO 6. Sort whole numbers through 1000 into odd and even, and justify the sort. | See Grade 3:<br>**Mathematical Thinking at Grade 3**<br>Investigation 3: Sessions 1-3 |
| **Concept 2: Numerical Operations** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to:<br>PO 1. Solve contextual problems using multiple representations involving<br>• addition and subtraction with one- and/or two-digit numbers, | **Mathematical Thinking at Grade 2**<br>Investigation 4: Sessions 1, 5<br>**Coins, Coupons, and Combinations**<br>Investigation 2: Sessions 7-9<br>Investigation 3: Sessions 1-2<br>Investigation 4: Session 5<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-6<br>Investigation 2: Session 7<br>Investigation 3: Sessions 3-5<br>Investigation 5: Sessions 4-5, 7 |

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| • multiplication for 1s, 2s, 5s, and 10s, and | *Opportunities to address this standard can be found in the following investigation:*<br>**Coins, Coupons, and Combinations**<br>Investigation 2: Sessions 1-5 |
| • adding and subtracting money to $1.00. | **Mathematical Thinking at Grade 2**<br>Investigation 4: Sessions 2-4 |
| PO 2. Demonstrate the ability to add and subtract whole numbers (to at least two digits) and decimals (in the context of money)<br>• with up to three addends and | **Mathematical Thinking at Grade 2**<br>Investigation 4: Sessions 1, 5<br>**Coins, Coupons, and Combinations**<br>Investigation 1: Sessions 2-11<br>Investigation 2: Sessions 7-9<br>Investigation 3: Sessions 1-2<br>Investigation 4: Sessions 2-5<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-6<br>Investigation 2: Sessions 1-4, 7<br>Investigation 3: Sessions 1-5<br>Investigation 5: Sessions 4-5, 7 |
| • to $1.00. | **Mathematical Thinking at Grade 2**<br>Investigation 4: Sessions 2-4 |
| PO 3. Demonstrate fluency of addition and subtraction facts. | *Opportunities to address this standard can be found in the following investigation:*<br>**Mathematical Thinking at Grade 2**<br>Investigation 4: Sessions 1, 5 |
| PO 4. Apply and interpret the concept of addition and subtraction as inverse operations to solve problems. | **Coins, Coupons, and Combinations**<br>Investigation 3: Sessions 3-5<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-2<br>Investigation 3: Session 2 |
| PO 5. Create and solve word problems based on addition and subtraction of two-digit numbers. | **Mathematical Thinking at Grade 2**<br>Investigation 4: Sessions 1, 5<br>**Coins, Coupons, and Combinations**<br>Investigation 3: Session 2<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 5-6<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-6<br>Investigation 2: Session 7<br>Investigation 3: Sessions 3-5<br>Investigation 5: Sessions 4-5, 7 |
| PO 6. Demonstrate the concept of multiplication for 1s, 2s, 5s, and 10s. | *Opportunities to address this standard can be found in the following investigation:*<br>**Coins, Coupons, and Combinations**<br>Investigation 2: Sessions 1-5 |

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| PO 7. Describe the effect of operations (addition and subtraction) on the size of whole numbers. | *Opportunities to address this standard can be found in the following investigations:*<br>**Mathematical Thinking at Grade 2**<br>Investigation 4: Sessions 1, 5<br>**Coins, Coupons, and Combinations**<br>Investigation 1: Sessions 2-11<br>Investigation 2: Sessions 7-9<br>Investigation 3: Sessions 1-2<br>Investigation 4: Sessions 2-5<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-6<br>Investigation 2: Sessions 1-4, 7<br>Investigation 3: Sessions 1-5<br>Investigation 5: Sessions 4-5, 7 |
| PO 8. Apply properties to solve addition/subtraction problems<br>• identity property of addition/subtraction, | **Coins, Coupons, and Combinations**<br>Investigation 1: Session 6 |
| • commutative property of addition, and | **Coins, Coupons, and Combinations**<br>Investigation 1: Session 6 |
| • associative property of addition. | **Coins, Coupons, and Combinations**<br>Investigation 1: Session 6 |
| **Concept 3: Estimation** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Use estimation to determine if sums of two 2-digit numbers are more or less than 20, more or less than 50, or more or less than 100. | *Opportunities to address this standard can be found in the following investigations:*<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-6<br>Investigation 2: Sessions 1-4, 7<br>Investigation 3: Sessions 1-5<br>Investigation 5: Sessions 4-5, 7 |
| **Strand 2: Data Analysis, Probability, and Discrete Mathematics** | |
| **Concept 1: Data Analysis (Statistics)** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Collect, record, organize, and display data using pictographs, frequency tables, or single bar graphs. | **Mathematical Thinking at Grade 2**<br>Investigation 2: Session 6<br>Investigation 5: Sessions 1-6<br>**Does It Walk, Crawl, or Swim?**<br>Investigation 1: Sessions 1-2<br>**How Many Pockets? How Many Teeth?**<br>Investigation 1: Sessions 1-5<br>Investigation 2: Sessions 1-2, 4-6<br>Investigation 3: Sessions 2-4 |

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| PO 2. Formulate and answer questions by interpreting displays of data, including pictographs, frequency tables, or single bar graphs. | **Mathematical Thinking at Grade 2**<br>Investigation 5: Sessions 1-3, 6<br>**Does It Walk, Crawl, or Swim?**<br>Investigation 1: Sessions 1-6<br>Investigation 2: Sessions 1-4<br>Investigation 3: Sessions 1-3<br>Investigation 4: Sessions 2-3<br>**How Many Pockets? How Many Teeth?**<br>Investigation 1: Sessions 1-5<br>Investigation 2: Sessions 1-6<br>Investigation 3: Sessions 2-5 |
| **Concept 2: Probability** | |
| In Grade 2, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Concept 3: Systematic Listing and Counting** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. List all possibilities in counting situations. | *Opportunities to address this standard can be found in the following investigations:*<br>**Mathematical Thinking at Grade 2**<br>Investigation 4: Sessions 1-5 |
| PO 2. Solve a variety of problems based on the addition principle of counting. | *Opportunities to address this standard can be found in the following investigations:*<br>**Mathematical Thinking at Grade 2**<br>Investigation 4: Sessions 1-5 |
| **Concept 4: Vertex-Edge Graphs** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Color simple pictures or maps using the least number of colors and justify the coloring. | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Sessions 3-4 |
| PO 2. Build vertex-edge graphs using concrete materials and explore simple properties of vertex-edge graphs<br>• number of vertices and edges, | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |
| • neighboring vertices, and | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |

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| • paths in a graph. | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |
| PO 3. Construct simple vertex-edge graphs from simple pictures or maps. | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Sessions 3-4 |
| **Strand 3: Patterns, Algebra, and Functions** | |
| **Concept 1: Patterns** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Recognize, describe, extend, create, and find missing terms in a numerical or symbolic pattern. | **Timelines and Rhythm Patterns**<br>Investigation 2: Sessions 1-4 |
| PO 2. Explain the rule for a given numerical or symbolic pattern and verify that the rule works. | *Opportunities to address this standard can be found in the following investigation:*<br>**Timelines and Rhythm Patterns**<br>Investigation 2: Sessions 2-3 |
| **Concept 2: Functions and Relationships** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Describe a rule that represents a given relationship between two quantities using words or pictures. | *Opportunities to address this standard can be found in the following investigations:*<br>**How Many Pockets? How Many Teeth?**<br>Investigation 2: Sessions 3-5 |
| **Concept 3: Algebraic Representations** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Record equivalent forms of whole numbers to 1000 by constructing models and using numbers. | **Mathematical Thinking at Grade 2**<br>Investigation 1: Session 1<br>Investigation 2: Sessions 4-5 |
| PO 2. Compare expressions using spoken words and the symbols =, ≠, <, and >. | **Mathematical Thinking at Grade 2**<br>Investigation 3: Session 6<br>Investigation 4: Sessions 1, 5<br>Investigation 5: Sessions 1-3 |
| PO 3. Represent a word problem requiring addition or subtraction through 100 using an equation. | **Coins, Coupons, and Combinations**<br>Investigation 3: Sessions 3-5<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-6 |

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| PO 4. Identify the value of an unknown number in an equation involving an addition or subtraction fact. | **Putting Together and Taking Apart**<br>Investigation 3: Sessions 3-5 |
| **Concept 4: Analysis of Change** | |
| In Grade 2, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Strand 4: Geometry and Measurement** | |
| **Concept 1: Geometric Properties** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Describe and compare the attributes of polygons up to six sides using the terms side, vertex, point, and length. | **Shapes, Halves, and Symmetry**<br>Investigation 2: Session 1 |
| **Concept 2: Transformation of Shapes** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Identify, with justification, whether a 2-dimensional figure has lines of symmetry. | **Shapes, Halves, and Symmetry**<br>Investigation 4: Sessions 1-2, 5-7 |
| **Concept 3: Coordinate Geometry** | |
| In Grade 2, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Concept 4: Measurement** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Tell time to the nearest minute using analog and digital clocks. | **Timelines and Rhythm Patterns**<br>Investigation 1: Sessions 3-4<br>Investigation 2: Session 4 |
| PO 2. Apply measurement skills to measure the attributes of an object (length, capacity, weight). | **How Long? How Far?**<br>Investigation 1: Sessions 2-7 |
| PO 3. Read temperatures on a thermometer using Fahrenheit and Celsius. | *Not addressed in this series.* |
| PO 4. Demonstrate unit conversions<br>• 1 foot = 12 inches, | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**From Paces to Feet**<br>Investigation 2: Sessions 1-4 |
| • 1 quart = 4 cups, | See Grade 5<br>**Measurement Benchmarks**<br>Investigation 2: Session 4 |

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| • 1 pound = 16 ounces, | See Grade 5<br>**Measurement Benchmarks**<br>Investigation 2: Session 3 |
| • 1 hour = 60 minutes, | *Opportunities to address this standard can be found in the following investigation:*<br>**Timelines and Rhythm Patterns**<br>Investigation 1: Sessions 4-5 |
| • 1 day = 24 hours, | *Opportunities to address this standard can be found in the following investigation:*<br>**Timelines and Rhythm Patterns**<br>Investigation 1: Sessions 4-5 |
| • 1 week = 7 days, and | *Opportunities to address this standard can be found in the following investigation:*<br>**Timelines and Rhythm Patterns**<br>Investigation 1: Sessions 4-5 |
| • 1 year = 12 months. | *Opportunities to address this standard can be found in the following investigation:*<br>**Timelines and Rhythm Patterns**<br>Investigation 1: Sessions 4-5 |
| **Strand 5: Structure and Logic** | |
| **Concept 1: Algorithms and Algorithmic Thinking** | |
| In Grade 2, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Concept 2: Logic, Reasoning, Problem Solving and Proof** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Identify the question(s) asked and any other questions that need to be answered in order to find a solution. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 2**<br>Investigation 1: Sessions 1, 5<br>**Coins, Coupons, and Combinations**<br>Investigation 2: Sessions 7-9<br>**Does It Walk, Crawl, or Swim?**<br>Investigation 3: Sessions 2-3<br>**Shapes, Halves, and Symmetry**<br>Investigation 2: Session 2<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-6<br>**How Long? How Far?**<br>Investigation 2: Sessions 4-5<br>**How Many Pockets? How Many Teeth?**<br>Investigation 2: Session 3 |

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| PO 2. Identify the given information that can be used to find a solution. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 2**<br>Investigation 1: Sessions 1, 5<br>**Coins, Coupons, and Combinations**<br>Investigation 2: Sessions 7-9<br>**Does It Walk, Crawl, or Swim?**<br>Investigation 3: Sessions 2-3<br>**Shapes, Halves, and Symmetry**<br>Investigation 2: Session 2<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-6<br>**How Long? How Far?**<br>Investigation 2: Sessions 4-5<br>**How Many Pockets? How Many Teeth?**<br>Investigation 2: Session 3 |
| PO 3. Select from a variety of problem-solving strategies and use one or more strategies to arrive at a solution. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 2**<br>Investigation 1: Sessions 1, 5<br>**Coins, Coupons, and Combinations**<br>Investigation 2: Sessions 7-9<br>**Does It Walk, Crawl, or Swim?**<br>Investigation 3: Sessions 2-3<br>**Shapes, Halves, and Symmetry**<br>Investigation 2: Session 2<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-6<br>**How Long? How Far?**<br>Investigation 2: Sessions 4-5<br>**How Many Pockets? How Many Teeth?**<br>Investigation 2: Session 3 |
| PO 4. Represent a problem situation using any combination of words, numbers, pictures, physical objects, or symbols. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 2**<br>Investigation 1: Sessions 1, 5<br>**Coins, Coupons, and Combinations**<br>Investigation 2: Sessions 7-9<br>**Does It Walk, Crawl, or Swim?**<br>Investigation 3: Sessions 2-3<br>**Shapes, Halves, and Symmetry**<br>Investigation 2: Session 2<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-6<br>**How Long? How Far?**<br>Investigation 2: Sessions 4-5<br>**How Many Pockets? How Many Teeth?**<br>Investigation 2: Session 3 |

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| PO 5. Explain and clarify mathematical thinking. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 2**<br>Investigation 1: Sessions 1, 5<br>**Coins, Coupons, and Combinations**<br>Investigation 2: Sessions 1, 4-6<br>**Does It Walk, Crawl, or Swim?**<br>Investigation 2: Sessions 1-4<br>**Shapes, Halves, and Symmetry**<br>Investigation 2: Session 1<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-2<br>**How Long? How Far?**<br>Investigation 2: Sessions 4-5<br>**How Many Pockets? How Many Teeth?**<br>Investigation 2: Sessions 4-5 |
| PO 6. Determine whether a solution is reasonable. | *Opportunities to address this standard can be found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 2**<br>Investigation 1: Sessions 1, 5<br>**Coins, Coupons, and Combinations**<br>Investigation 2: Sessions 7-9<br>**Does It Walk, Crawl, or Swim?**<br>Investigation 3: Sessions 2-3<br>**Shapes, Halves, and Symmetry**<br>Investigation 2: Session 2<br>**Putting Together and Taking Apart**<br>Investigation 1: Sessions 1-6<br>**How Long? How Far?**<br>Investigation 2: Sessions 4-5<br>**How Many Pockets? How Many Teeth?**<br>Investigation 2: Session 3 |

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# Grade 3

| **Strand 1: Number and Operations** | |
|---|---|
| **Concept 1: Number Sense** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Express whole numbers through six digits using and connecting multiple representations. | **Mathematical Thinking at Grade 3**<br>Investigation 1: Session 1 |
| PO 2. Compare and order whole numbers through six digits by applying the concept of place value. | **Mathematical Thinking at Grade 3**<br>Investigation 3: Sessions 3-4 |
| PO 3. Count and represent money using coins and bills to $100.00. | **Mathematical Thinking at Grade 3**<br>Investigation 2: Sessions 5-7<br>**Landmarks in the Hundreds**<br>Investigation 1: Sessions 6-7 |
| PO 4. Sort whole numbers into sets and justify the sort. | *Opportunities to address this standard can be found in the following investigation:*<br>**Mathematical Thinking at Grade 3**<br>Investigation 4: Session 1 |
| PO 5. Express benchmark fractions as fair sharing, parts of a whole, or parts of a set. | **Mathematical Thinking at Grade 3**<br>Investigation 4: Session 2<br>**Fair Shapes**<br>Investigation 1: Sessions 1-4<br>Investigation 2: Sessions 1-2, 5-7<br>Investigation 3: Sessions 1-3 |
| PO 6. Compare and order benchmark fractions. | **Fair Shapes**<br>Investigation 2: Session 3 |
| **Concept 2: Numerical Operations** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Add and subtract whole numbers to four digits. | **Mathematical Thinking at Grade 3**<br>Investigation 1: Session 1<br>Investigation 2: Sessions 3-7<br>**Combining and Comparing**<br>Investigation 1: Session 3<br>Investigation 3: Sessions 1-3<br>Investigation 4: Sessions 2-4 |

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| PO 2. Create and solve word problems based on addition, subtraction, multiplication, and division. | **Things That Come In Groups**<br>Investigation 1: Sessions 1-2, 4<br>Investigation 4: Sessions 3-4<br>Investigation 5: Session 2<br>**Landmarks in the Hundreds**<br>Investigation 2: Sessions 5-6<br>**Combining and Comparing**<br>Investigation 3: Sessions 1-2<br>Investigation 4: Sessions 2-4 |
| PO 3. Demonstrate the concept of multiplication and division using multiple models. | **Things That Come In Groups**<br>Investigation 1: Sessions 1-4<br>Investigation 3: Sessions 3-4<br>Investigation 4: Sessions 3-4<br>Investigation 5: Sessions 1-4<br>**Landmarks in the Hundreds**<br>Investigation 2: Sessions 1-3, 5-6 |
| PO 4. Demonstrate fluency of multiplication and division facts through 10. | **Things That Come In Groups**<br>Investigation 1: Sessions 1-4<br>Investigation 3: Sessions 3-4<br>Investigation 4: Sessions 3-4<br>**Landmarks in the Hundreds**<br>Investigation 2: Sessions 5-6 |
| PO 5. Apply and interpret the concept of multiplication and division as inverse operations to solve problems. | **Things That Come In Groups**<br>Investigation 1: Session 3 |
| PO 6. Describe the effect of operations (multiplication and division) on the size of whole numbers. | *Opportunities to address this standard can be found in the following investigations:*<br>**Things That Come In Groups**<br>Investigation 1: Sessions 1-4<br>Investigation 3: Sessions 3-4<br>Investigation 4: Sessions 3-4<br>Investigation 5: Sessions 1-4<br>**Landmarks in the Hundreds**<br>Investigation 2: Sessions 1-3, 5-6 |
| PO 7. Apply commutative, identity, and zero properties to multiplication and apply the identity property to division. | *Opportunities to address this standard can be found in the following investigations:*<br>**Things That Come In Groups**<br>Investigation 2: Sessions 3-4<br>Investigation 3: Sessions 1-2 |

| **Concept 3: Estimation** | |
|---|---|
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Make estimates appropriate to a given situation or computation with whole numbers. | **From Paces to Feet**<br>Investigation 1: Sessions 2, 5-6<br>**Combining and Comparing**<br>Investigation 3: Sessions 1-2 |
| **Strand 2: Data Analysis, Probability, and Discrete Mathematics** | |
| **Concept 1: Data Analysis (Statistics)** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Collect, record, organize, and display data using frequency tables, single bar graphs, or single line graphs. | **Mathematical Thinking at Grade 3**<br>Investigation 3: Sessions 1-2<br>**From Paces to Feet**<br>Investigation 2: Sessions 3-4<br>Investigation 3: Sessions 1-3 |
| PO 2. Formulate and answer questions by interpreting and analyzing displays of data, including frequency tables, single bar graphs, or single line graphs. | **From Paces to Feet**<br>Investigation 1: Session 1<br>Investigation 2: Sessions 3-4<br>Investigation 3: Sessions 1-3<br>**Combining and Comparing**<br>Investigation 1: Session 3<br>Investigation 4: Session 1 |
| **Concept 2: Probability** | |
| In Grade 3, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Concept 3: Systematic Listing and Counting** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Represent all possibilities for a variety of counting problems using arrays, charts, and systematic lists; draw conclusions from these representations. | See Grade 5:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Between Never and Always**<br>Investigation 2: Sessions 1-2 |
| PO 2. Solve a variety of problems based on the multiplication principle of counting. | See Grade 5:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Between Never and Always**<br>Investigation 2: Sessions 1-2 |

| **Concept 4: Vertex-Edge Graphs** | |
|---|---|
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to:<br>PO 1. Color complex maps using the least number of colors and justify the coloring. | *Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Sessions 3-4 |
| PO 2. Investigate properties of vertex-edge graphs<br>• circuits in a graph, | *Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |
| • weights on edges, and | *Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |
| • shortest path between two vertices. | *Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |
| PO 3. Solve problems using vertex-edge graphs. | *Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |
| **Strand 3: Patterns, Algebra, and Functions** | |
| **Concept 1: Patterns** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Recognize, describe, extend, create, and find missing terms in a numerical sequence. | *Opportunities to address this standard can be found in the following investigation:*<br>**Things That Come in Groups**<br>Investigation 2: Sessions 1-6 |
| PO 2. Explain the rule for a given numerical sequence and verify that the rule works. | *Opportunities to address this standard can be found in the following investigation:*<br>**Things That Come in Groups**<br>Investigation 2: Sessions 1-6 |
| **Concept 2: Functions and Relationships** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Recognize and describe a relationship between two quantities, given by a chart, table or graph, in which the quantities change proportionally, using words, pictures, or expressions. | **Up and Down the Number Line**<br>Investigation 1: Sessions 1-2<br>Investigation 2: Sessions 1-4 |

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| PO 2. Translate between the different representations of whole number relationships, including symbolic, numerical, verbal, or pictorial. | **Mathematical Thinking at Grade 3**<br>Investigation 1: Session 1 |
| **Concept 3: Algebraic Representations** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Record equivalent forms of whole numbers to six digits by constructing models and using numbers. | **Mathematical Thinking at Grade 3**<br>Investigation 1: Session 1 |
| PO 2. Use a symbol to represent an unknown quantity in a given context. | *Opportunities to address this standard can be found in the following investigation:*<br>**Combining and Comparing**<br>Investigation 4: Session 2 |
| PO 3. Create and solve simple one-step equations that can be solved using addition and multiplication facts. | *Opportunities to address this standard can be found in the following investigation:*<br>**Combining and Comparing**<br>Investigation 4: Session 2 |
| **Concept 4: Analysis of Change** | |
| In Grade 3, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Strand 4: Geometry and Measurement** | |
| **Concept 1: Geometric Properties** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Describe sequences of 2-dimensional figures created by increasing the number of sides, changing size, or changing orientation. | See Grade 4:<br>**Mathematical Thinking at Grade 4**<br>Investigation 4: Sessions 1-2 |
| PO 2. Recognize similar figures. | See Grade 5:<br>**Picturing Polygons**<br>Investigation 3: Session 4 |
| PO 3. Identify and describe 3-dimensional figures including their relationship to real world objects: sphere, cube, cone, cylinder, pyramids, and rectangular prisms. | **Exploring Solids and Boxes**<br>Investigation 1: Sessions 1-2<br>Investigation 2: Sessions 3-5 |
| PO 4. Describe and compare attributes of two- and three-dimensional figures. | **Turtle Paths**<br>Investigation 2: Sessions 3-4<br>Investigation 3: Sessions 1-2<br>**Exploring Solids and Boxes**<br>Investigation 1: Sessions 1-2<br>Investigation 2: Sessions 1-5 |

| **Concept 2: Transformation of Shapes** | |
|---|---|
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Identify a translation, reflection, or rotation and model its effect on a 2-dimensional figure. | **Flips, Turns, and Area**<br>Investigation 1: Sessions 1-3, 5<br>Investigation 2: Sessions 2-3 |
| PO 2. Identify, with justification, all lines of symmetry in a 2-dimensional figure. | See Grade 4:<br>**Sunken Ships and Grid Patterns**<br>Investigation 2: Sessions 2-3 |
| **Concept 3: Coordinate Geometry** | |
| In Grade 3, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Concept 4: Measurement** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Determine elapsed time<br>• across months using a calendar | **Combining and Comparing**<br>Investigation 5: Session 1 |
| • by hours and half hours using a clock. | See Grade 2:<br>**Timelines and Rhythm Patterns**<br>Investigation 1: Sessions 3-4<br>Investigation 2: Session 4 |
| PO 2. Apply measurement skills to measure length, weight, and capacity using US Customary units. | **From Paces to Feet**<br>Investigation 2: Sessions 1-4<br>**Combining and Comparing**<br>Investigation 2: Session 1 |
| PO 3. Convert units of length, weight, and capacity<br>• inches or feet to yards, | *Opportunities to address this standard can be found in the following investigation:*<br>**From Paces to Feet**<br>Investigation 2: Session 2 |
| • ounces to pounds, and | *Opportunities to address this standard can be found in the following investigation:*<br>**Combining and Comparing**<br>Investigation 2: Session 1 |
| • cups to pints, pints to quarts, quarts to gallons. | See Grade 5<br>**Measurement Benchmarks**<br>Investigation 2: Session 4 |
| PO 4. Determine the area of a rectangular figure using an array model. | **Things That Come In Groups**<br>Investigation 3: Sessions 1-5 |
| PO 5. Measure and calculate perimeter of 2-dimensional figures. | **Turtle Paths**<br>Investigation 3: Sessions 1-5 |

| **Strand 5: Structure and Logic** | |
|---|---|
| **Concept 1: Algorithms and Algorithmic Thinking** | |
| In Grade 3, there are no performance objectives in this concept. Performance objectives begin in Grade 4. | |
| **Concept 2: Logic, Reasoning, Problem Solving and Proof** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Analyze a problem situation to determine the question(s) to be answered. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 3**<br>Investigation 2: Sessions 5-7<br>**Things That Come In Groups**<br>Investigation 4: Sessions 3-4<br>**Flips, Turns, and Area**<br>Investigation 1: Session 1<br>**From Paces to Feet**<br>Investigation 3: Sessions 2-3<br>**Landmarks in the Hundreds**<br>Investigation 2: Sessions 5-6<br>**Up and Down the Number Line**<br>Investigation 1: Sessions 6-7<br>**Combining and Comparing**<br>Investigation 3: Sessions 1-2<br>**Turtle Paths**<br>Investigation 3: Sessions 1-2<br>**Fair Shapes**<br>Investigation 3: Session 3<br>**Exploring Solids and Boxes**<br>Investigation 3: Session 2 |
| PO 2. Identify relevant, missing, and extraneous information related to the solution to a problem. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 3**<br>Investigation 2: Sessions 5-7<br>**Things That Come In Groups**<br>Investigation 4: Sessions 3-4<br>**Flips, Turns, and Area**<br>Investigation 1: Session 1<br>**From Paces to Feet**<br>Investigation 3: Sessions 2-3<br>**Landmarks in the Hundreds**<br>Investigation 2: Sessions 5-6<br>**Up and Down the Number Line**<br>Investigation 1: Sessions 6-7<br>**Combining and Comparing**<br>Investigation 3: Sessions 1-2<br>**Turtle Paths** |

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| PO 2. continued | Investigation 3: Sessions 1-2<br>**Fair Shapes**<br>Investigation 3: Session 3<br>**Exploring Solids and Boxes**<br>Investigation 3: Session 2 |
| PO 3. Select and use one or more strategies to efficiently solve the problem and justify the selection. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 3**<br>Investigation 2: Sessions 5-7<br>**Things That Come In Groups**<br>Investigation 4: Sessions 3-4<br>**Flips, Turns, and Area**<br>Investigation 1: Session 1<br>**From Paces to Feet**<br>Investigation 3: Sessions 2-3<br>**Landmarks in the Hundreds**<br>Investigation 2: Sessions 5-6<br>**Up and Down the Number Line**<br>Investigation 1: Sessions 6-7<br>**Combining and Comparing**<br>Investigation 3: Sessions 1-2<br>**Turtle Paths**<br>Investigation 3: Sessions 1-2<br>**Fair Shapes**<br>Investigation 3: Session 3<br>**Exploring Solids and Boxes**<br>Investigation 3: Session 2 |
| PO 4. Determine whether a problem to be solved is similar to previously solved problems, and identify possible strategies for solving the problem | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 3**<br>Investigation 2: Sessions 5-7<br>**Things That Come In Groups**<br>Investigation 4: Sessions 3-4<br>**Flips, Turns, and Area**<br>Investigation 1: Session 1<br>**From Paces to Feet**<br>Investigation 3: Sessions 2-3<br>**Landmarks in the Hundreds**<br>Investigation 2: Sessions 5-6<br>**Up and Down the Number Line**<br>Investigation 1: Sessions 6-7<br>**Combining and Comparing**<br>Investigation 3: Sessions 1-2<br>**Turtle Paths**<br>Investigation 3: Sessions 1-2<br>**Fair Shapes**<br>Investigation 3: Session 3<br>**Exploring Solids and Boxes**<br>Investigation 3: Session 2 |

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| PO 5. Represent a problem situation using any combination of words, numbers, pictures, physical objects, or symbols. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 3**<br>Investigation 2: Sessions 5-7<br>**Things That Come In Groups**<br>Investigation 4: Sessions 3-4<br>**Flips, Turns, and Area**<br>Investigation 1: Session 5<br>**From Paces to Feet**<br>Investigation 3: Sessions 2-3<br>**Landmarks in the Hundreds**<br>Investigation 2: Sessions 5-6<br>**Up and Down the Number Line**<br>Investigation 1: Sessions 1-2<br>**Combining and Comparing**<br>Investigation 4: Session 2<br>**Turtle Paths**<br>Investigation 3: Sessions 6-7<br>**Fair Shapes**<br>Investigation 1: Sessions 1-2<br>**Exploring Solids and Boxes**<br>Investigation 3: Session 2 |
| PO 6. Summarize mathematical information, explain reasoning, and draw conclusions. | *Found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 3**<br>Investigation 1: Session 1<br>**Things That Come In Groups**<br>Investigation 2: Session 1<br>**Flips, Turns, and Area**<br>Investigation 1: Session 5<br>**From Paces to Feet**<br>Investigation 3: Sessions 1-3<br>**Landmarks in the Hundreds**<br>Investigation 1: Session 1<br>**Up and Down the Number Line**<br>Investigation 1: Sessions 6-7<br>**Combining and Comparing**<br>Investigation 4: Session 2<br>**Turtle Paths**<br>Investigation 3: Sessions 6-7<br>**Fair Shapes**<br>Investigation 2: Session 3<br>**Exploring Solids and Boxes**<br>Investigation 2: Session 3 |

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| PO 7. Analyze and evaluate whether a solution is reasonable, is mathematically correct, and answers the question. | *Opportunities to address this standard can be found throughout the series. See, for example:*<br>**Mathematical Thinking at Grade 3**<br>Investigation 2: Sessions 5-7<br>**Things That Come In Groups**<br>Investigation 4: Sessions 3-4<br>**Flips, Turns, and Area**<br>Investigation 1: Session 1<br>**From Paces to Feet**<br>Investigation 3: Sessions 2-3<br>**Landmarks in the Hundreds**<br>Investigation 2: Sessions 5-6<br>**Up and Down the Number Line**<br>Investigation 1: Sessions 6-7<br>**Combining and Comparing**<br>Investigation 3: Sessions 1-2<br>**Turtle Paths**<br>Investigation 3: Sessions 1-2<br>**Fair Shapes**<br>Investigation 3: Session 3<br>**Exploring Solids and Boxes**<br>Investigation 3: Session 2 |
| PO 8. Make and test conjectures based on data (or information) collected from explorations and experiments. | **From Paces to Feet**<br>Investigation 2: Sessions 2-4<br>Investigation 3: Sessions 1-3<br>**Combining and Comparing**<br>Investigation 2: Sessions 1-2<br>Investigation 4: Session 1 |

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To the
Arizona Mathematics Standard Articulated by Grade Level 2008

# Grade 4

| **Strand 1: Number and Operations** | |
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| **Concept 1: Number Sense** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Express whole numbers, fractions, decimals, and percents using and connecting multiple representations. | **Money, Miles, and Large Numbers**<br>Investigation 2: Sessions 1-2<br>**Different Shapes, Equal Pieces**<br>Investigation 1: Sessions 1-5<br>Investigation 2: Sessions 1-4<br>Investigation 3: Sessions 1-2, 4-5 |
| PO 2. Compose and decompose whole numbers using factors and multiples. | **Packages and Groups**<br>Investigation 1: Sessions 3-5<br>Investigation 3: Sessions 7-9<br>**Landmarks in the Thousands**<br>Investigation 1: Session 1<br>Investigation 2: Sessions 1-5<br>Investigation 3: Session 2<br>**Arrays and Shares**<br>Investigation 1: Sessions 1-2 |
| PO 3. Express fractions as fair sharing, parts of a whole, parts of a set, and locations on a real number line. | **Different Shapes, Equal Pieces**<br>Investigation 1: Sessions 1-5<br>Investigation 2: Sessions 1-4<br>**Three out of Four Like Spaghetti**<br>Investigation 1: Sessions 1-2 |
| PO 4. Compare and order decimals to hundredths. | See Grade 5:<br>**Name That Portion**<br>Investigation 3: Sessions 3-6 |
| PO 5. Use simple ratios to describe problems in context. | See Grade 5:<br>**Name That Portion**<br>Investigation 1: Sessions 1-2 |
| **Concept 2: Numerical Operations** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Add and subtract decimals through hundredths including money to $1000.00 and fractions with like denominators. | **Money, Miles, and Large Numbers**<br>Investigation 1: Sessions 1-8 |
| PO 2. Use multiple strategies to multiply whole numbers<br>• two-digit by two-digit and | **Packages and Groups**<br>Investigation 1: Sessions 4-5<br>Investigation 2: Sessions 2-3<br>Investigation 3: Sessions 4-6 |

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| • multi-digit by one-digit. | **Packages and Groups**<br>Investigation 1: Sessions 4-5<br>Investigation 2: Session 1-5<br>**Arrays and Shares**<br>Investigation 3: Session 1 |
| PO 3. Demonstrate fluency of multiplication and division facts through 12. | **Packages and Groups**<br>Investigation 1: Sessions 1-3<br>Investigation 3: Sessions 3<br>**Arrays and Shares**<br>Investigation 1: Session 3<br>Investigation 3: Session 1-4 |
| PO 4. Use multiple strategies to divide whole numbers. | **Packages and Groups**<br>Investigation 3: Sessions 3-10<br>**Arrays and Shares**<br>Investigation 2: Sessions 7-8<br>Investigation 3: Session 2-4 |
| PO 5. Apply associative and distributive properties to solve multiplication and division problems. | **Packages and Groups**<br>Investigation 3: Sessions 3<br>**Arrays and Shares**<br>Investigation 2: Sessions 5-6 |
| PO 6. Apply order of operations with whole numbers. | *Opportunities to address this standard can be found in the following investigation:*<br>**Packages and Groups**<br>Investigation 3: Sessions 1-2<br><br>See also Grade 5<br>**Building on Numbers you Know**<br>Investigations 5: Sessions 4, 5, 6 (Exploring Operations) |
| **Concept 3: Estimation** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Use benchmarks as meaningful points of comparison for whole numbers, decimals, and fractions. | **Money, Miles, and Large Numbers**<br>Investigation 2: Session 4 |
| PO 2. Make estimates appropriate to a given situation or computation with whole numbers and fractions. | **Landmarks in the Thousands**<br>Investigation 3: Sessions 3-5<br>**Mathematical Thinking at Grade 4**<br>Investigation 1: Sessions 1-3 |

| **Strand 2: Data Analysis, Probability, and Discrete Mathematics** | |
|---|---|
| **Concept 1: Data Analysis (Statistics)** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Collect, record, organize, and display data using double bar graphs, single line graphs, or circle graphs. | *Opportunities to address this standard can be found in the following investigation:*<br>**Three out of Four Like Spaghetti**<br>Investigation 2: Sessions 5-7 |
| PO 2. Formulate and answer questions by interpreting and analyzing displays of data, including double bar graphs, single line graphs, or circle graphs. | **The Shape of the Data**<br>Investigation 1: Sessions 1-3<br>Investigation 2: Sessions 1-7<br>Investigation 3: Sessions 1-5 |
| PO 3. Use median, mode, and range to describe the distribution of a given data set. | **The Shape of the Data**<br>Investigation 1: Session 1<br>Investigation 2: Sessions 2-3, 5-7 |
| PO 4. Compare two sets of related data. | **The Shape of the Data**<br>Investigation 1: Sessions 2-3<br>Investigation 2: Sessions 2-3, 5-7<br>**Three out of Four Like Spaghetti**<br>Investigation 1: Sessions 3-4<br>Investigation 2: Sessions 5-7 |
| **Concept 2: Probability** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Describe elements of theoretical probability by listing or drawing all possible outcomes of a given event and predicting the outcome using word and number benchmarks. | See Grade 5:<br>**Between Never and Always**<br>Investigation 1: Sessions 3-4<br>Investigation 2: Sessions 1-2 |
| **Concept 3: Systematic Listing and Counting** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Construct tree diagrams to solve problems in context by<br>• representing all possibilities for a variety of counting problems, | See Grade 5:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Between Never and Always**<br>Investigation 2: Sessions 1-2 |
| • explaining how its properties relate to the problem, | See Grade 5:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Between Never and Always**<br>Investigation 2: Sessions 1-2 |

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| • representing the same counting problem in multiple ways, and | See Grade 5:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Between Never and Always**<br>Investigation 2: Sessions 1-2 |
| • drawing conclusions. | See Grade 5:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Between Never and Always**<br>Investigation 2: Sessions 1-2 |
| PO 2. Justify that all possibilities have been enumerated without duplication.<br>Connections: M04-S2C3-01 | See Grade 5:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Between Never and Always**<br>Investigation 2: Sessions 1-2 |
| **Concept 4: Vertex-Edge Graphs** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Demonstrate the connection between map coloring and vertex coloring. | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |
| PO 2. Construct vertex-edge graphs to represent concrete situations and identify paths and circuits. | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Sessions 3-4 |
| PO 3. Solve conflict problems by constructing and coloring vertex-edge graphs. | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |
| **Strand 3: Patterns, Algebra, and Functions** | |
| **Concept 1: Patterns** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Recognize, describe, create, extend, and find missing terms in a numerical sequence involving whole numbers using all four basic operations. | *Opportunities to address this standard can be found in the following investigation:*<br>**Packages and Groups**<br>Investigation 1: Sessions 1-3 |
| PO 2. Explain the rule for a given numerical sequence, verify that the rule works, and use the rule to make predictions. | *Opportunities to address this standard can be found in the following investigation:*<br>**Packages and Groups**<br>Investigation 1: Sessions 1-3 |

| **Concept 2: Functions and Relationships** | |
|---|---|
| In Grade 4, there are no performance objectives in this concept. Performance objectives begin in Grade 2. | |
| **Concept 3: Algebraic Representations** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Use a symbol to represent an unknown quantity in a simple algebraic expression involving all operations. | *Opportunities to address this standard can be found in the following investigations:*<br>**Mathematical Thinking at Grade 4**<br>Investigation 3: Sessions 4-5<br>**Packages and Groups**<br>Investigation 3: Sessions 1-2, 10 |
| PO 2. Create and solve one-step equations that can be solved using addition, subtraction, multiplication, and division of whole numbers. | *Opportunities to address this standard can be found in the following investigations:*<br>**Mathematical Thinking at Grade 4**<br>Investigation 3: Sessions 4-5<br>**Packages and Groups**<br>Investigation 3: Sessions 1-2, 10 |
| **Concept 4: Analysis of Change** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Identify the change in a quantity over time and make simple predictions. | **Changes Over Time**<br>Investigation 1: Sessions 1-4<br>Investigation 2: Sessions 1-2<br>Investigation 3: Sessions 1-4, 6 |
| **Strand 4: Geometry and Measurement** | |
| **Concept 1: Geometric Properties** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Draw and describe the relationships between points, lines, line segments, rays, and angles including parallelism and perpendicularity. | **Sunken Ships and Grid Patterns**<br>Investigation 1: Sessions 3, 4<br>Investigation 2 Sessions 4-7 |
| PO 2. Justify which objects in a collection match a given geometric description. | **Sunken Ships and Grid Patterns**<br>Investigation 2: Sessions 1, 6-7 |
| PO 3. Describe and classify triangles by angles and sides. | See Grade 3:<br>**Turtle Paths**<br>Investigation 3: Sessions 3-4 |
| PO 4. Recognize which attributes (such as shape or area) change and which do not change when 2-dimensional figures are cut up or rearranged. | See Grade 4:<br>**Different Shapes, Equal Pieces**<br>Investigation 1: Sessions 1, 2-4 |

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| PO 5. Recognize and draw congruent figures, and match them in a given collection. | See Grade 3:<br>**Flips, Turns, and Area**<br>Investigation 2: Sessions 2-5 |
| PO 6. Draw right, acute, obtuse, and straight angles and identify these angles in other geometric figures. | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 2: Sessions 1-2 |
| PO 7. Recognize the relationship between a 3-dimensional figure and its corresponding net(s). | *Opportunities to address this standard can be found in the following investigation:*<br>**Seeing Solids and Silhouettes**<br>Investigation 2: Sessions 1-4 |
| **Concept 2: Transformation of Shapes** | |
| In Grade 4, there are no performance objectives in this concept. Performance objectives begin in Grade 2. | |
| **Concept 3: Coordinate Geometry** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Name, locate, and graph points in the first quadrant of the coordinate plane using ordered pairs. | **Sunken Ships and Grid Patterns**<br>Investigation 1: Sessions 1-4 |
| PO 2. Plot line segments in the first quadrant of the coordinate plane using a set of ordered pairs in a table. | *Opportunities to address this standard can be found in the following investigation:*<br>**Sunken Ships and Grid Patterns**<br>Investigation 1: Session 1 |
| PO 3. Construct geometric figures with vertices at points on the coordinate plane. | **Sunken Ships and Grid Patterns**<br>Investigation 21: Sessions 2-4 |
| **Concept 4: Measurement** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Compute elapsed time to the minute. | See Grade 3<br>Students plan the activities for a party that will begin at 5:00 PM and end at 7:00 PM.<br>Students give the starting time and duration for each activity.<br>**Combining and Comparing**<br>Investigation 3: Session 3 |
| PO 2. Apply measurement skills to measure length, mass, and capacity using metric units. | See Grade 3:<br>**From Paces to Feet**<br>Investigation 2: Sessions 5-7 |

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| PO 3. Solve problems involving conversions within the same measurement system. | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**From Paces to Feet**<br>Investigation 2: Sessions 1-7 |
| PO 4. Solve problems involving perimeter of 2-dimensional figures and area of rectangles. | See Grade 3:<br>**Flips, Turns, and Area**<br>Investigation 1: Sessions 4-5 |
| PO 5. Describe the change in perimeter or area when one attribute (length or width) of a rectangle changes. | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Flips, Turns, and Area**<br>Investigation 1: Session 4 |
| **Strand 5: Structure and Logic** | |
| **Concept 1: Algorithms and Algorithmic Thinking** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Analyze common algorithms for computing (adding, subtracting, multiplying, and dividing) with whole numbers using the associative, commutative, and distributive properties. | *Opportunities to address this standard can be found in the following investigation:*<br>**Building on Numbers You Know**<br>Investigation 3: Session 10 |
| **Concept 2: Logic, Reasoning, Problem Solving and Proof** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Analyze a problem situation to determine the question(s) to be answered. | *Found throughout the series. See, for example:*<br>**Sunken Ships and Grid Patterns**<br>Investigation 1: Sessions 5-6<br>**Packages and Groups**<br>Investigation 3: Sessions 1-2<br>**Changes Over Time**<br>Investigation 1: Sessions 5-6<br>**Money, Miles, and Large Numbers**<br>Investigation 1: Sessions 3-8<br>**The Shape of the Data**<br>Investigation 2: Session 1<br>**Landmarks in the Thousands**<br>Investigation 2: Session 5<br>**Arrays and Shares**<br>Investigation 2: Sessions 7-8 |

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| PO 2. Identify relevant, missing, and extraneous information related to the solution to a problem. | *Found throughout the series. See, for example:*<br>**Sunken Ships and Grid Patterns**<br>Investigation 1: Sessions 5-6<br>**Packages and Groups**<br>Investigation 3: Sessions 1-2<br>**Changes Over Time**<br>Investigation 1: Sessions 5-6<br>**Money, Miles, and Large Numbers**<br>Investigation 1: Sessions 3-8<br>**The Shape of the Data**<br>Investigation 2: Session 1<br>**Landmarks in the Thousands**<br>Investigation 2: Session 5<br>**Arrays and Shares**<br>Investigation 2: Sessions 7-8 |
| PO 3. Select and use one or more strategies to efficiently solve the problem and justify the selection. | *Found throughout the series. See, for example:*<br>**Sunken Ships and Grid Patterns**<br>Investigation 1: Sessions 5-6<br>**Packages and Groups**<br>Investigation 3: Sessions 1-2<br>**Changes Over Time**<br>Investigation 1: Sessions 5-6<br>**Money, Miles, and Large Numbers**<br>Investigation 1: Sessions 3-8<br>**The Shape of the Data**<br>Investigation 2: Session 1<br>**Landmarks in the Thousands**<br>Investigation 2: Session 5<br>**Arrays and Shares**<br>Investigation 2: Sessions 7-8 |
| PO 4. Determine whether a problem to be solved is similar to previously solved problems, and identify possible strategies for solving the problem. | *Found throughout the series. See, for example:*<br>**Sunken Ships and Grid Patterns**<br>Investigation 1: Sessions 5-6<br>**Packages and Groups**<br>Investigation 3: Sessions 1-2<br>**Changes Over Time**<br>Investigation 1: Sessions 5-6<br>**Money, Miles, and Large Numbers**<br>Investigation 1: Sessions 3-8<br>**The Shape of the Data**<br>Investigation 2: Session 1<br>**Landmarks in the Thousands**<br>Investigation 2: Session 5<br>**Arrays and Shares**<br>Investigation 2: Sessions 7-8 |

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| PO 5. Represent a problem situation using any combination of words, numbers, pictures, physical objects, or symbols. | *Found throughout the series. See, for example:*<br>**Sunken Ships and Grid Patterns**<br>Investigation 1: Sessions 5-6<br>**Packages and Groups**<br>Investigation 3: Sessions 1-2<br>**Changes Over Time**<br>Investigation 1: Sessions 5-6<br>**Money, Miles, and Large Numbers**<br>Investigation 1: Sessions 3-8<br>**The Shape of the Data**<br>Investigation 2: Session 1<br>**Landmarks in the Thousands**<br>Investigation 2: Session 5<br>**Arrays and Shares**<br>Investigation 2: Sessions 7-8 |
| PO 6. Summarize mathematical information, explain reasoning, and draw conclusions | *Found throughout the series. See, for example:*<br>**Sunken Ships and Grid Patterns**<br>Investigation 2: Sessions 2-3<br>**Packages and Groups**<br>Investigation 1: Session 3<br>**Changes Over Time**<br>Investigation 3: Session 3<br>**Money, Miles, and Large Numbers**<br>Investigation 1: Session 6<br>**The Shape of the Data**<br>Investigation 2: Session 1<br>**Different Shapes, Equal Pieces**<br>Investigation 1: Sessions 2-4<br>**Landmarks in the Thousands**<br>Investigation 2: Session 1<br>**Arrays and Shares**<br>Investigation 2: Sessions 2-3<br>**Mathematical Thinking at Grade 4**<br>Investigation 4: Session 2 |
| PO 7. Analyze and evaluate whether a solution is reasonable, is mathematically correct, and answers the question. | *Opportunities to address this standard can be found throughout the series. See, for example:*<br>**Sunken Ships and Grid Patterns**<br>Investigation 1: Sessions 5-6<br>**Packages and Groups**<br>Investigation 3: Sessions 1-2<br>**Changes Over Time**<br>Investigation 1: Sessions 5-6<br>**Money, Miles, and Large Numbers**<br>Investigation 1: Sessions 3-8<br>**The Shape of the Data**<br>Investigation 2: Session 1<br>**Landmarks in the Thousands**<br>Investigation 2: Session 5 |

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| PO 7. continued | **Arrays and Shares**<br>Investigation 2: Sessions 7-8 |
| PO 8. Make and test conjectures based on data (or information) collected from explorations and experiments. | **Three out of Four Like Spaghetti**<br>Investigation 2: Sessions 3, 5-7 |

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To the
Arizona Mathematics Standard Articulated by Grade Level 2008

# Grade 5

| **Strand 1: Number and Operations** | |
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| **Concept 1: Number Sense** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Determine equivalence by converting between benchmark fractions, decimals, and percents. | **Name That Portion**<br>Investigation 1: Sessions 1-6<br>Investigation 2: Sessions 7-8<br>Investigation 3: Sessions 1, 5-6, 8<br>Investigation 4: Session 1<br>**Between Never and Always**<br>Investigation 1: Session 1<br>**Data: Kids, Cats, and Ads**<br>Investigation 3: Sessions 1, 4 |
| PO 2. Differentiate between prime and composite numbers; differentiate between factors and multiples for whole numbers | **Building on Numbers You Know**<br>Investigation 1: Sessions 1-5<br>**Mathematical Thinking at Grade 5**<br>Investigation 1: Sessions 1-6<br>Investigation 2: Sessions 1-5<br>Investigation 3: Sessions 1, 5<br>Investigation 4: Sessions 2-6 |
| PO 3. Locate integers on a number line. | See Grade 3:<br>**Up and Down the Number Line**<br>Investigation 1: Sessions 1-2 |
| PO 4. Compare and order positive fractions, decimals, and percents. | **Name That Portion**<br>Investigation 1: Sessions 5-7<br>Investigation 2: Sessions 3-9<br>Investigation 3: Sessions 2-4, 7-8<br>**Data: Kids, Cats, and Ads**<br>Investigation 4: Sessions 1, 3 |
| PO 5. Use ratios and unit rates to model, describe and extend problems in context. | **Name That Portion**<br>Investigation 3: Session 7 |
| PO 6. Express or interpret positive and negative numbers in context. | See Grade 3:<br>**Up and Down the Number Line**<br>Investigation 1: Sessions 1-2 |
| **Concept 2: Numerical Operations** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Add and subtract decimals through thousandths and fractions expressing solutions in simplest form. | **Name That Portion**<br>Investigation 2: Sessions 6-9<br>Investigation 3: Sessions 2-4, 7 |

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| PO 2. Multiply multi-digit whole numbers. | **Building on Numbers You Know**<br>Investigation 2: Sessions 1-2, 5-7<br>Investigation 3: Sessions 1-3, 7-10<br>Investigation 5: Session 3-7<br>**Mathematical Thinking at Grade 5**<br>Investigation 3: Sessions 2-4 |
| PO 3. Divide multi-digit whole numbers by whole number divisors with and without remainders. | **Building on Numbers You Know**<br>Investigation 2: Sessions 1-4, 7<br>Investigation 3: Sessions 4-10<br>Investigation 5: Session 3-7<br>**Mathematical Thinking at Grade 5**<br>Investigation 3: Sessions 2-4 |
| PO 4. Apply the associative, commutative, and distributive properties to solve numerical problems. | See Grade 4:<br>**Packages and Groups**<br>Investigation 3: Sessions 3<br>**Arrays and Shares**<br>Investigation 2: Sessions 5-6 |
| PO 5. Simplify numerical expressions (including fractions and decimals) using the order of operations with or without grouping symbols. | *Opportunities to address this standard can be found in the following investigations:*<br>**Name That Portion**<br>Investigation 2: Session 9<br>Investigation 3: Session 7 |
| **Concept 3: Estimation** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Make estimates appropriate to a given situation or computation with whole numbers, fractions, and decimals | **Building on Numbers You Know**<br>Investigation 3: Sessions 1-6<br>Investigation 5: Sessions 1-2 |
| **Strand 2: Data Analysis, Probability, and Discrete Mathematics** | |
| **Concept 1: Data Analysis (Statistics)** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Collect, record, organize, and display data using multi-bar graphs or double line graphs. | *Opportunities to address this standard can be found in the following investigations:*<br>**Data: Kids, Cats, and Ads**<br>Investigation 1: Sessions 1-4<br>Investigation 2: Sessions 1-3<br>Investigation 4: Sessions 1-3<br>Investigation 5: Sessions 1-5 |
| PO 2. Formulate and answer questions by interpreting and analyzing displays of data, including multi-bar graphs or double line graphs. | **Data: Kids, Cats, and Ads**<br>Investigation 1: Sessions 1-4<br>Investigation 2: Sessions 1-3<br>Investigation 5: Sessions 3-5<br>**Measurement Benchmarks**<br>Investigation 3: Session 2 |

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| PO 3. Use mean, median, mode, and range to analyze and describe the distribution of a given data set. | **Data: Kids, Cats, and Ads**<br>Investigation 1: Sessions 1-2 |
| **Concept 2: Probability** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Describe the theoretical probability of events and represent the probability as a fraction, decimal, or percent. | **Between Never and Always**<br>Investigation 1: Sessions 3-5 |
| PO 2. Explore probability when performing experiments by<br>• predicting the outcome, | **Between Never and Always**<br>Investigation 1: Sessions 3-6 |
| • recording the data, | **Between Never and Always**<br>Investigation 1: Sessions 3-5 |
| • comparing outcomes of the experiment to predictions, and | **Between Never and Always**<br>Investigation 1: Sessions 3-6 |
| • comparing the results of multiple repetitions of the experiment. | **Between Never and Always**<br>Investigation 1: Sessions 3-4 |
| **Concept 3: Systematic Listing and Counting** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Analyze relationships among representations and make connections to the multiplication principle of counting. | *Opportunities to address this standard can be found in the following investigation:*<br>**Between Never and Always**<br>Investigation 2: Sessions 1-2 |
| PO 2. Solve a variety of counting problems and explain the multiplication principle of counting. | *Opportunities to address this standard can be found in the following investigation:*<br>**Between Never and Always**<br>Investigation 2: Sessions 1-2 |
| **Concept 4: Vertex-Edge Graphs** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Investigate properties of vertex-edge graphs<br>• Euler paths, | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |
| • Euler circuits, and | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |

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| • degree of a vertex. | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |
| PO 2. Solve problems related to Euler paths and circuits. | See Grade 3:<br>*Opportunities to address this standard can be found in the following investigation:*<br>**Turtle Paths**<br>Investigation 1: Session 1 |
| **Strand 3: Patterns, Algebra, and Functions** | |
| **Concept 1: Patterns** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Recognize, describe, create, and analyze a numerical sequence involving fractions and decimals using addition and subtraction. | *Opportunities to address this standard can be found in the following investigation:*<br>**Name That Portion**<br>Investigation 3: Sessions 3-6 |
| **Concept 2: Functions and Relationships** | |
| In Grade 5, there are no performance objectives in this concept. | |
| **Concept 3: Algebraic Representations** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Create and solve two-step equations that can be solved using inverse operations with whole numbers. | *Opportunities to address this standard can be found in the following investigation:*<br>**Building on Numbers You Know**<br>Investigation 2: Sessions 4-6 |
| **Concept 4: Analysis of Change** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Describe patterns of change including constant rate and increasing or decreasing rate. | **Patterns of Change**<br>Investigation 1: Sessions 1-2<br>Investigation 2: Sessions 1, 3-4 |
| **Strand 4: Geometry and Measurement** | |
| **Concept 1: Geometric Properties** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Draw and label 2-dimensional figures given specific attributes including angle measure and side length. | **Picturing Polygons**<br>Investigation 1: Sessions 1-4<br>Investigation 2: Sessions 4-5 |

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| PO 2. Solve problems by understanding and applying the property that the sum of the interior angles of a triangle is 180˚. | **Picturing Polygons**<br>Investigation 2: Session 1-3 |
| PO 3. Classify quadrilaterals by their properties. | **Picturing Polygons**<br>Investigation 2: Session 1-5 |
| PO 4. Compare attributes of 2-dimensional figures with 3-dimensional figures by drawing and constructing nets and models. | *Opportunities to address this standard can be found in the following investigations:*<br>**Containers and Cubes**<br>Investigation 1: Sessions 1-4<br>Investigation 2: Sessions 1-5 |
| **Concept 2: Transformation of Shapes** | |
| In Grade 5, there are no performance objectives in this concept. | |
| **Concept 3: Coordinate Geometry** | |
| In Grade 5, there are no performance objectives in this concept. | |
| **Concept 4: Measurement** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Solve problems using elapsed time. | See Grade 4<br>Students measure and record plant growth data over time, and construct and interpret graphs of data which change over time.<br>**Changes Over Time**<br>Unit Preparation: Sessions 1-3<br>Investigation 1: Sessions 1-4<br>Investigation 2: Sessions 1-2<br>Investigation 3: Sessions 1-8 |
| PO 2. State an appropriate measure and degree of accuracy in a given context. | **Picturing Polygons**<br>Investigation 2: Sessions 8-9<br>**Measurement Benchmarks**<br>Investigation 1: Sessions 1-8<br>Investigation 2: Sessions 3-4 |
| PO 3. Measure angles between 0 and 360 degrees. | **Picturing Polygons**<br>Investigation 2: Sessions 8-9 |
| PO 4. Solve problems involving the area of 2-dimensional figures by using the properties of parallelograms and triangles. | *Opportunities to address this standard can be found in the following investigation:*<br>**Picturing Polygons**<br>Investigation 3: Sessions 5-6 |
| PO 5. Solve problems involving area and perimeter of regular and irregular polygons using reallotment of square units. | *Opportunities to address this standard can be found in the following investigations:*<br>**Picturing Polygons**<br>Investigation 3: Sessions 5-6 |

| **Strand 5: Structure and Logic** | |
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| **Concept 1: Algorithms and Algorithmic Thinking** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Analyze common algorithms for adding and subtracting fractions and decimals using the associative, commutative, and distributive properties. | *Opportunities to address this standard can be found in the following investigation:*<br>**Name that Portion**<br>Investigation 2: Session 9 |
| PO 2. Develop an algorithm or formula to calculate areas and perimeters of simple polygons. | *Opportunities to address this standard can be found in the following investigation:*<br>**Picturing Polygons**<br>Investigation 3: Sessions 5-6 |
| **Concept 2: Logic, Reasoning, Problem Solving and Proof** | |
| **Performance Objectives** | **Investigations in Number, Data, and Space © 2004** |
| Students are expected to: | |
| PO 1. Analyze a problem situation to determine the question(s) to be answered. | *Found throughout the series. See, for example:*<br>**Building on Numbers You Know**<br>Investigation 2: Session 7<br>Investigation 5: Sessions 4-6<br>**Name That Portion**<br>Investigation 1: Session 7<br>Investigation 2: Session 9<br>Investigation 3: Session 7<br>**Containers and Cubes**<br>Investigation 1: Sessions 3-4<br>Investigation 2: Sessions 1-2, 5<br>Investigation 3: Sessions 1-4<br>Investigation 4: Sessions 6-9<br>**Measurement Benchmarks**<br>Investigation 1: Sessions 7-8 |
| PO 2. Identify relevant, missing, and extraneous information related to the solution to a problem | *Found throughout the series. See, for example:*<br>**Building on Numbers You Know**<br>Investigation 2: Session 7<br>Investigation 5: Sessions 4-6<br>**Name That Portion**<br>Investigation 1: Session 7<br>Investigation 2: Session 9<br>Investigation 3: Session 7<br>**Containers and Cubes**<br>Investigation 1: Sessions 3-4<br>Investigation 2: Sessions 1-2, 5<br>Investigation 3: Sessions 1-4<br>Investigation 4: Sessions 6-9 |

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| PO 2. continued | **Measurement Benchmarks**<br>Investigation 1: Sessions 7-8 |
| PO 3. Select and use one or more strategies to efficiently solve the problem and justify the selection. | *Found throughout the series. See, for example:*<br>**Building on Numbers You Know**<br>Investigation 2: Session 7<br>Investigation 5: Sessions 4-6<br>**Name That Portion**<br>Investigation 1: Session 7<br>Investigation 2: Session 9<br>Investigation 3: Session 7<br>**Containers and Cubes**<br>Investigation 1: Sessions 3-4<br>Investigation 2: Sessions 1-2, 5<br>Investigation 3: Sessions 1-4<br>Investigation 4: Sessions 6-9<br>**Measurement Benchmarks**<br>Investigation 1: Sessions 7-8 |
| PO 4. Determine whether a problem to be solved is similar to previously solved problems, and identify possible strategies for solving the problem. | *Found throughout the series. See, for example:*<br>**Building on Numbers You Know**<br>Investigation 2: Session 7<br>Investigation 5: Sessions 4-6<br>**Name That Portion**<br>Investigation 1: Session 7<br>Investigation 2: Session 9<br>Investigation 3: Session 7<br>**Containers and Cubes**<br>Investigation 1: Sessions 3-4<br>Investigation 2: Sessions 1-2, 5<br>Investigation 3: Sessions 1-4<br>Investigation 4: Sessions 6-9<br>**Measurement Benchmarks**<br>Investigation 1: Sessions 7-8 |
| PO 5. Represent a problem situation using any combination of words, numbers, pictures, physical objects, or symbols. | *Found throughout the series. See, for example:*<br>**Building on Numbers You Know**<br>Investigation 2: Session 7<br>Investigation 5: Sessions 4-6<br>**Name That Portion**<br>Investigation 1: Session 7<br>Investigation 2: Session 9<br>Investigation 3: Session 7<br>**Containers and Cubes**<br>Investigation 1: Sessions 3-4<br>Investigation 2: Sessions 1-2, 5<br>Investigation 3: Sessions 1-4<br>Investigation 4: Sessions 6-9<br>**Measurement Benchmarks**<br>Investigation 1: Sessions 7-8 |

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| PO 6. Summarize mathematical information, explain reasoning, and draw conclusions. | *Found throughout the series. See, for example:*<br>**Building on Numbers You Know**<br>Investigation 1: Sessions 1-2, 8<br>**Mathematical Thinking at Grade 5**<br>Investigation 1: Sessions 4-6<br>Investigation 3: Session 5<br>Investigation 4: Sessions 5-6<br>**Data: Kids, Cats, and Ads**<br>Investigation 4: Sessions 3-5<br>**Name That Portion**<br>Investigation 1: Sessions 2, 7<br>**Measurement Benchmarks**<br>Investigation 1: Session 3<br>**Patterns of Change**<br>Investigation 2: Session 1<br>**Picturing Polygons**<br>Investigation 2: Sessions 4-8<br>**Between Never and Always**<br>Investigation 1: Sessions 1-4<br>**Containers and Cubes**<br>Investigation 1: Sessions 1-2 |
| PO 7. Analyze and evaluate whether a solution is reasonable, is mathematically correct, and answers the question. | *Opportunities to address this standard can be found throughout the series. See, for example:*<br>**Building on Numbers You Know**<br>Investigation 2: Session 7<br>Investigation 5: Sessions 4-6<br>**Name That Portion**<br>Investigation 1: Session 7<br>Investigation 2: Session 9<br>Investigation 3: Session 7<br>**Containers and Cubes**<br>Investigation 1: Sessions 3-4<br>Investigation 2: Sessions 1-2, 5<br>Investigation 3: Sessions 1-4<br>Investigation 4: Sessions 6-9<br>**Measurement Benchmarks**<br>Investigation 1: Sessions 7-8 |
| PO 8. Make and test conjectures based on data or information collected from explorations and experiments | **Data: Kids, Cats, and Ads**<br>Investigation 1: Sessions 1-4<br>Investigation 2: Sessions 2-3<br>Investigation 4: Session 3<br>Investigation 5: Sessions 3-5 |

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| PO 9. Identify simple valid arguments using if…then statements based on graphic organizers. | *Opportunities to address this standard can be found in the following investigations:*<br>**Data: Kids, Cats, and Area**<br>Investigation 1: Sessions 2-3<br>Investigation 2: Sessions 2-3<br>Investigation 3: Session 4 |
| PO 10. Construct if… then statements to generalize rules for computation, geometric properties and algebraic functions. | *Opportunities to address this standard can be found in the following investigations:*<br>**Building on Numbers You Know**<br>Investigation 1: Session 8<br>Investigation 2: Sessions 1-3 |