

A Correlation of



to the

Washington
Grade Level Content Expectations
EALR's
Grades K-5



M/M-112

INTRODUCTION

This document demonstrates how well ***Investigations in Number, Data, and Space®*** integrates with the Washington Grade Level Content Expectations—EALR's. The citations within this correlation provide Investigation Curriculum Unit titles, the Investigation numbers and Session numbers or Focus Time/Choice Time titles correlated to the Washington Grade Level Content Expectations. Thus, teachers know exactly where instruction is located to prepare students for mastery of Washington's Mathematics Curriculum.

Investigations in Number, Data, and Space® is a Kindergarten through Grade 5 curriculum consisting of a series of Teacher's Editions that focus on major mathematical ideas, content, and pedagogy. Each book emphasizes depth of mathematical thinking over fragmented topics. Students invent strategies and approaches to solving problems and rely less on rote learning stressed in traditional textbooks. The program blends concrete materials with appropriate technology, including calculators in everyday mathematical lessons.

Developed by TERC under a grant from the National Science Foundation, ***Investigations in Number, Data, and Space®*** is comprehensive in its approach to students of diverse cultural, ethnic and language groups. In an effort to give mathematical lessons a broader spectrum, students are encouraged to explore working in groups, individually and as a whole class. By incorporating these methods into everyday learning, students learn to express mathematical thinking through talking, drawing, and writing.

Investigations in Number, Data and Space® was developed after three years of nationwide field-testing and includes teacher's practical suggestions, student dialogues, and teacher notes.

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**Investigations in Number, Data, and Space
to the
Washington Grade Level Content Expectations—EALR’s
Kindergarten**

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.1: Understand and apply concepts and procedures from number sense - number, numeration, computation, and estimation.

Number and Numeration

1.1.1 Understand the concept of number.

- **Count objects to at least 10 items using one-to-one correspondence.**

References:

Mathematical Thinking in Kindergarten

Investigations 1, 2, 3

Collecting, Counting, and Measuring

Investigations 1, 2, 3, 4, 5

Counting Ourselves and Others

Investigations 1, 3, 4

How Many in All?

Investigations 1, 2, 3, 4

All Units: Appendix: About Classroom Routines: The Counting Jar

- **Represent a number to at least 31 in different ways (e.g., words, numerals, pictures, physical models). [CU]**

References:

Mathematical Thinking in Kindergarten

Investigations 1, 2, 3

Collecting, Counting, and Measuring

Investigations 1, 2, 3, 4, 5

Counting Ourselves and Others

Investigations 1, 3, 4

How Many in All?

Investigations 1, 2, 3, 4

All Units: Appendix: About Classroom Routines: The Counting Jar

- **Recognize that the last count word names the quantity of the set (cardinality). [CU, MC]**

References:

Mathematical Thinking in Kindergarten

Investigations 1, 2, 3

Collecting, Counting, and Measuring

Investigations 1, 2, 3, 4, 5

Counting Ourselves and Others

Investigations 1, 3, 4

How Many in All?

Investigations 1, 2, 3, 4

All Units: Appendix: About Classroom Routines: The Counting Jar

- **Identify the base ten digits 0-9.**

References:

Mathematical Thinking in Kindergarten

Investigations 1, 2, 3

Collecting, Counting, and Measuring

Investigations 1, 2, 3, 4, 5

Counting Ourselves and Others

Investigations 1, 3, 4

How Many in All?

Investigations 1, 2, 3, 4

All Units: Appendix: About Classroom Routines: The Counting Jar

1.1.2 Understand sequential relationships among whole numbers.

- **Tell what number comes before or after a given number. [CU]**

References:

Mathematical Thinking in Kindergarten

Investigation 2: Teacher Note, page 36

Pattern Trains and Hopscotch Paths

Investigation 4: Choice Time: Staircase Patterns

Collecting, Counting, and Measuring

Investigation 1: Teacher Note, page 16

Counting Ourselves and Others

Investigation 1: Teacher Note, page 12

All Units: Appendix: About Classroom Routines: Calendar

- **Use comparative language (e.g., less than, more than, equal to) to compare numbers to at least 20. [CU]**

References:

Mathematical Thinking in Kindergarten

Investigation 2: Choice Time, pages 32-33

Investigation 4

Collecting, Counting, and Measuring

Investigations 3, 4, 5, 6

How Many in All?

Investigation 2: Choice Time: Grab Two Handfuls

All Units: Appendix: About Classroom Routines: Attendance, Counting Jar

- **Use a known quantity to at least 10 (benchmark) to compare sets (e.g., sets of counters).**

References:

Mathematical Thinking in Kindergarten

Investigation 4: page 57

Collecting, Counting, and Measuring

Investigations 3, 4, 5, 6

How Many in All?

Investigation 2: Choice Time: Grab Two Handfuls

- **Identify the ordinal position of objects at least through tenth. [SP, CU, RL, MC]**

References:

Mathematical Thinking in Kindergarten

Investigation 2: Teacher Note, page 36

Collecting, Counting, and Measuring

Investigation 1: Teacher Note, page 16

Counting Ourselves and Others

Investigation 1: Teacher Note, page 12

Computation

1.1.5 Understand meaning of operations and how they relate to one another.

- **Express stories involving addition and subtraction (e.g., join, separate) with models, pictures, and symbols. [SP, CU, RL, MC]**

References:

Collecting, Counting, and Measuring

Investigation 4: Choice Time: Collect 10 Together

How Many in All?

Investigations 2-4

- **Use addition in the classroom environment (e.g., boys and girls in attendance).**

References:

Collecting, Counting, and Measuring

Investigation 4: Choice Time: Collect 10 Together

How Many in All?

Investigations 2-4

Component 1.2: Understand and apply concepts and procedures from measurement.**Attributes, Units, and Tools****1.2.1 Understand and apply appropriate terminology to compare attributes.**

- **Use comparative vocabulary to describe objects (e.g., longer/shorter, heavier/lighter, nearer/further, thicker/thinner, shorter/taller). [CU]**

References:

Collecting, Counting, and Measuring

Investigations 3, 4

Investigation 5: Dialogue Box, pages 76-77

How Many in All?

Investigation 1

- **Use terms to describe the duration of events (e.g., long time or short time). [CU]**

Kindergarten students using *Investigations in Number, Data, and Space* use a calendar to explore concepts of time.**References:**

Mathematical Thinking in Kindergarten

Investigation 3

*All Units: Appendix: About Classroom Routines: Calendar***1.2.3 Understand that objects can be used as tools for nonstandard measurement.**

- **Use nonstandard units to measure (e.g., paper strips, cubes, beans).**

References:

Collecting, Counting, and Measuring

Investigations 3, 4

Investigation 5: Dialogue Box, pages 76-77

How Many in All?

Investigation 1

Component 1.3: Understand and apply concepts and procedures from geometric sense.

Properties and Relationships

1.3.1 Recall and understand characteristics of familiar 3-D objects.

- **Describe objects based on characteristics (e.g., big, small, like a box). [CU, MC]**

References:

Mathematical Thinking in Kindergarten

Investigation 1

Choice Time, pages 16-17

Teacher Note, page 22

Making Shapes and Building Blocks

Investigations 3, 4, 5

- **Identify objects based on their characteristics. [MC]**

References:

Mathematical Thinking in Kindergarten

Investigation 1

Choice Time, pages 16-17

Teacher Note, page 22

Making Shapes and Building Blocks

Investigations 3, 4, 5

1.3.2 Understand how to sort and compare 3-D objects using characteristics.

- **Identify and sort 3-D objects in their environment by characteristics (e.g., cans, balls, boxes). [MC,RL]**

References:

Mathematical Thinking in Kindergarten

Investigation 1

Choice Time, pages 16-17

Teacher Note, page 22

Making Shapes and Building Blocks

Investigations 3, 4, 5

- **Compare 3-D objects using comparative language (e.g., bigger, taller, shorter, fatter). [CU]**

References:

Mathematical Thinking in Kindergarten

Investigation 1

Choice Time: Exploring Geoblocks, pages 16-17

Teacher Note, page 22

Making Shapes and Building Blocks

Investigations 3

Extension, page 44

Choice Time: Exploring Geoblocks, pages 48-49

Investigation 4: Choice Time: Build a Block, pages 73-74

Investigation 5

1.3.3 Understand the relative position of 3-D objects in their environment.

- **Describe the location of objects relative to each other (e.g., in, out, over, under, behind, above, below, next to, etc.). [MC, CU]**

In addition to physical manipulation of shapes and objects, Kindergarten students using *Investigations in Number, Data, and Space* apply concepts of relative position or direction through the use of *Shapes*, a software program which allows students to construct and manipulate geometric shapes, see objects move according to rules they specify, and explore rotation and reflection.

References:

Making Shapes and Building Blocks

Investigations 2, 3, 4

Shapes Teacher Tutorial: pages 117-154**Component 1.4:** Understand and apply concepts and procedures from probability and statistics.**Statistics****1.4.3 Understand that data can be collected and organized.**

- **Sort and classify data.**

References:

Counting Ourselves and Others

Investigations 1-4

Making Shapes and Building Blocks

Investigation 1, page 16

Investigation 3

- **Use physical objects and/or pictures to build bar graphs.**

References:

Mathematical Thinking in Kindergarten

Investigation 1

Counting Ourselves and Others

Investigations 1, 2, 3

All Units: Appendix: About Classroom Routines: Attendance, Today's Question

- **Answer questions about class-made graphs (e.g., How many cats? How many dogs?).**

In addition to the following references, the end of each unit of *Investigations in Number, Data, and Space* contains a feature entitled, About Classroom Routines. In Kindergarten this includes a section entitled, *Today's Question*, which consists of an activity involving students collecting, displaying, and interpreting data. Students may represent data using charts or graphs. Students are asked to think about "what a graph represents and what it is communicating." The following references are specifically to graphical representations of data and their implications.

References:

Counting Ourselves and Others

Investigation 3: Focus Time, pages 58-60

Investigation 3: Teacher Note, page 70

Component 1.5: Understand and apply concepts and procedures from algebraic sense.

Patterns and Relationships**1.5.1 Understand that objects are grouped by common attributes.**

- **Sort objects by easily distinguishable attributes (e.g., color, size, shape).**

References:

Mathematical Thinking in Kindergarten

Investigation 1: Teacher Note, page 22

Counting Ourselves and Others

Investigation 1: Choice Time: Self-Portraits

Investigation 2

Making Shapes and Building Blocks

Investigations 1, 2, 3, 4, 5

- **Describe and extend a repeating pattern (e.g., ABAB, green-green-blue). [CU, RL]**

References:

Mathematical Thinking in Kindergarten

Investigation 3

Pattern Trains and Hopscotch Paths

Investigations 1, 2, 3, 4

All Units: Appendix: About Classroom Routines: Calendar and Patterns on the Pocket Chart

Symbols and Representations

1.5.2 Understand the meaning of equality and inequality.

- **Use concrete objects to model language (e.g., same, different, equal, not equal, more, less). [CU]**

References:

Mathematical Thinking in Kindergarten

Investigation 4: page 57

Collecting, Counting, and Measuring

Investigations 3, 4, 5, 6

How Many in All?

Investigation 2: Choice Time: Grab Two Handfuls

- **Model/act out story problems to solve whole number equations and inequalities. [SP, CU, MC]**

References:

How Many in All?

Investigations 1, 2, 3, 4

EALR 2: The student uses mathematical reasoning to define and solve problems.**Component 2.1: Investigate and Analyze Situations****2.1.1 Analyze situations to determine known and unknown information in familiar situations.**

Kindergarten students using *Investigations in Number, Data, and Space* analyze situations to determine known and unknown information in familiar situations as they investigate the operations of addition and subtraction of whole numbers and solve combining and separating problems.

References:

Collecting, Counting, and Measuring
Investigation 4

How Many in All?

Investigations 2-4

Pattern Trains and Hopscotch Paths
Investigation 2

All units: Appendix: About Classroom Routines: Calendar and Patterns on the Pocket Chart

2.1.2 Analyze situations to determine when information is missing or extraneous.

Kindergarten students using *Investigations in Number, Data, and Space* implicitly analyze situations to determine when information is missing or extraneous on a daily basis as they perform the investigations of this series. For example, in one activity students determine what information is necessary to determine the number of absent students on a given day, i.e., the total number of students in the class and the number of students in class on that particular day. As students explore patterns, they must determine how much information is sufficient for them to be able to extend the pattern. They grow in their understanding of how much information determines the shape of a triangle or differentiates between a rectangle and a square, or a pyramid and a triangle.

Sample References:

Mathematical Thinking in Kindergarten
Investigation 1

Pattern Trains and Hopscotch Paths
Investigation 2

Collecting, Counting, and Measuring
Investigation 3

Counting Ourselves and Others
Investigation 1: Teacher Note, page 15

Making Shapes and Building Blocks
Investigation 1: Teacher Note, pages 22-23

How Many in All?
Investigation 3

Component 2.2: Formulate Questions and Define the Problem**2.2.1 Understand the problem to be solved involving number sense, measurement, geometric sense, and statistics.**

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). For example, students discuss the difference between using numbers to count how many children are present in the classroom and using numbers to describe students' ages. They explore basic concepts of geometry and measurement. They collect and analyze data based on observations and surveys.

Sample References:

Mathematical Thinking in Kindergarten

Investigation 1: Dialogue Box, page 11

Pattern Trains and Hopscotch Paths

Investigation 3

Collecting, Counting, and Measuring

Investigation 3

Counting Ourselves and Others

Investigation 1

Making Shapes and Building Blocks

Investigation 5

How Many in All?

Investigation 1: Teacher Note, pages 23-25

2.2.2 Generate questions to be answered in familiar situations.**References:**

Mathematical Thinking in Kindergarten

Investigation 1

Counting Ourselves and Others

Investigations 1-4

All Units: About Classroom Routines: Today's Question, Attendance

Component 2.3: Construct Solutions**2.3.1 Apply a variety of strategies and approaches to problem situations from number sense, measurement, geometric sense, and statistics to construct a solution.**

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and

space (including geometry and measurement). In the course of their investigations students apply a variety of strategies and approaches to solve problems. For example, students develop strategies for doing an inventory of a set of objects. They apply different strategies in spatial reasoning to arrange six tiles and to build three-dimensional objects using smaller-sized blocks. They use a variety of measuring units and use different strategies to compare measures. They represent data in different ways.

Sample References:

Mathematical Thinking in Kindergarten

Investigation 1

Pattern Trains and Hopscotch Paths

Investigation 2

Collecting, Counting, and Measuring

Investigation 2

Counting Ourselves and Others

Investigation 1

Making Shapes and Building Blocks

Investigation 4: Choice Time: Build a Block, pages 73-74

How Many in All?

Investigation 2

Component 2.4: Draw Conclusions**2.4.1 Understand how to make conjectures and support them with evidence.**

Kindergarten students using *Investigations in Number, Data, and Space* make and investigate mathematical conjectures throughout the course by conducting the investigations around which the curriculum is organized; in fact, this is a fundamental emphasis of the series. For example, Kindergarten students predict “what comes next” in a pattern.

Sample References:

Mathematical Thinking in Kindergarten

Investigation 1

Pattern Trains and Hopscotch Paths

Investigation 1

Collecting, Counting, and Measuring

Investigation 2

Counting Ourselves and Others

Investigation 4

Making Shapes and Building Blocks

Investigation 3

How Many in All?

Investigation 4

2.4.2 Analyze solutions to draw conclusions and support them with evidence.

Kindergarten students using *Investigations in Number, Data, and Space* analyze solutions to draw conclusions and support them with evidence throughout the course. For example, students use interlocking cubes to represent students to support their conclusions about school attendance. They use cubes to explore, relate, and extend patterns. They use a variety of concrete, pictorial, and symbolic models as evidence to support their solutions and conclusions.

Sample References:

Mathematical Thinking in Kindergarten

Investigation 1

Pattern Trains and Hopscotch Paths

Investigation 1

Collecting, Counting, and Measuring

Investigation 1

Counting Ourselves and Others

Investigation 1

Making Shapes and Building Blocks

Investigation 4

How Many in All?

Investigation 2

Component 2.5: Evaluate and Verify Results**2.5.1 Evaluate strategies and procedures for accuracy and appropriateness.**

Kindergarten students using *Investigations in Number, Data, and Space* evaluate strategies and procedures for accuracy and appropriateness throughout the course as they conduct and evaluate the investigations on which the curriculum is based. For example, Kindergarten students develop and evaluate mathematical procedures involving the use of one-to-one and two-to-one correspondences.

Sample References:

Mathematical Thinking in Kindergarten

Investigation 2

Pattern Trains and Hopscotch Paths

Investigation 3

Collecting, Counting, and Measuring

Investigation 6

Counting Ourselves and Others

Investigation 1

Making Shapes and Building Blocks

Investigation 4

How Many in All?

Investigation 3

2.5.2 Evaluate results for reasonableness.

Students using *Investigations in Number, Data, and Space* determine the reasonableness of results throughout the curriculum as they perform the activities for each investigation. The Dialogue Box is a feature that appears with many investigations and contains the text of discussions between teachers and students in which the teacher encourages students to describe their solution processes and assert the reasonableness of their results.

Sample References:

Mathematical Thinking in Kindergarten
Investigation 1
Pattern Trains and Hopscotch Paths
Investigation 2
Collecting, Counting, and Measuring
Investigation 5
Counting Ourselves and Others
Investigation 2
Making Shapes and Building Blocks
Investigation 4
How Many in All?
Investigation 2

2.5.3 Evaluate conclusions using evidence.

Students using *Investigations in Number, Data, and Space* use models, facts, and relationships as evidence to evaluate their conclusions and explain their thinking throughout the curriculum. For example, in Kindergarten students use interlocking cubes to represent students as they examine school attendance. They use cubes to explore and relate patterns. They represent quantities with pictures and numerals as they develop counting strategies and relate numerals to the quantities they represent. They look at the relationships between different representations of the same set of data. They examine spatial relationships. They relate combinations of numbers and arrangements of objects.

Sample References:

Mathematical Thinking in Kindergarten
Investigation 1
Pattern Trains and Hopscotch Paths
Investigation 1
Collecting, Counting, and Measuring
Investigation 1
Counting Ourselves and Others
Investigation 1
Making Shapes and Building Blocks
Investigation 4
How Many in All?
Investigation 2

EALR 3 The student communicates knowledge and understanding in both everyday and mathematical language.

Component 3.1: Gather Information

3.1.1 Apply a simple plan for collecting information for a given purpose, which requires using number sense, measurement, geometric sense, or statistics.

References:

Mathematical Thinking in Kindergarten

Investigation 1

Counting Ourselves and Others

Investigations 1-4

All units: Appendix: About Classroom Routines: Today's Question, Attendance

3.1.2 Analyze mathematical information for a given purpose requiring number sense, measurement, geometric sense, or statistics, from one or two different sources using reading, listening, and observation.

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). The investigations around which the curriculum is organized involve reading, listening, and observing on a daily basis. In fact, one investigation is devoted to developing students' observation skills by "Watching and Looking." Students examine calendars, read books, and observe attributes as they collect and sort data.

Sample References:

Mathematical Thinking in Kindergarten

Investigation 3

Pattern Trains and Hopscotch Paths

Investigation 1

Collecting, Counting, and Measuring

Investigation 3

Counting Ourselves and Others

Investigations 1-4

Making Shapes and Building Blocks

Investigation 5

How Many in All?

Investigation 3

Component 3.2: Organize and Interpret Information**3.2.1 Understand how to organize and interpret numerical, measurement, geometric or statistical information for a given purpose in at least one way (reflecting, verbalizing, discussing, or writing).**

Kindergarten students use pictures, charts, and graphs to organize information. They interpret information by reflecting, verbalizing, discussing, and writing on a daily basis as they conduct the investigations around which the curriculum is organized. As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement).

Sample References:

Mathematical Thinking in Kindergarten

Investigation 1

Pattern Trains and Hopscotch Paths

Investigation 1

Collecting, Counting, and Measuring

Investigation 4

Counting Ourselves and Others

Investigations 1-4

Making Shapes and Building Blocks

Investigation 1

How Many in All?

Investigation 3

All units: Appendix: About Classroom Routines: Attendance, Today's Question

Component 3.3: Represent and Share Information**3.3.1 Understand how to express ideas involving number sense, measurement, geometric sense, or statistics, using mathematical language and notation.**

Kindergarten students using *Investigations of Number, Data, and Space* use mathematical language as they solve problems throughout the course. The Dialogue Box feature integrated throughout the curriculum illustrates the development of mathematical language through teacher-student guidance and student-student discussion. Students progress through the curriculum by completing investigations which consist of multiple cooperative learning activities. These explorations entail a great deal of group discussion and communication. For example, students describe patterns, collect data about their classmates, and solve story problems. They use mathematical notation to write number sentences.

Sample References:

Mathematical Thinking in Kindergarten
Investigation 1
Pattern Trains and Hopscotch Paths
Investigation 1
Collecting, Counting, and Measuring
Investigation 3: Dialogue Box, pages 48-49
Counting Ourselves and Others
Investigation 2
Making Shapes and Building Blocks
Investigation 1
How Many in All?
Investigations 1, 2, 3, 4
Teacher Note, page 45

3.3.2 Understand how to represent numerical, measurement, geometric, or statistical ideas and information to familiar people for a real-world purpose.

Kindergarten students using *Investigations in Number, Data, and Space* represent ideas and information to familiar people when they conduct surveys of family and community members. Students are given homework assignments which often include the involvement of one or more family members, and they bring home family letters for each unit describing the activities the child will be participating in, and the mathematics the child will be learning, for each unit.

Sample References:

Mathematical Thinking in Kindergarten
Investigation 1: Family Connection, page 10
Pattern Trains and Hopscotch Paths
Investigation 3: Extension, page 54
Collecting, Counting, and Measuring
Investigation 3: Homework, page 41
Counting Ourselves and Others
Investigation 1: Focus Time Follow-Up, page 23
Making Shapes and Building Blocks
Investigation 3: Looking for Shapes at Home: page 44
How Many in All?
Investigation 3: Homework, page 62

EALR 4: The student understands how mathematical ideas connect within mathematics, other subject areas, and real-world situations.

Component 4.1: Relate Concepts and Procedures within Mathematics

4.1.1 Apply concepts and procedures from two of the content strands (number sense, measurement, geometric sense, or statistics) in a given problem or situation.

Each unit of study in *Investigations in Number, Data, and Space* is organized to enable students to recognize and use connections among mathematical ideas. The titles of each of these units are listed in the Sample References below. While conducting the Investigations within each of these units, students directly experience the connections between the mathematical ideas presented in each unit. For example, in Kindergarten, Making Shapes and Building Blocks consists of activities which give students opportunities to explore interrelated components of the study of geometry and spatial reasoning: 2-D Shapes Around Us, Exploring Shapes with the Computer, Looking at 3-D Shapes, Making Shapes and Building Blocks, and 2-D Faces on 3-D Blocks. In Counting and Measuring (How Many In All: Investigation 1), students relate the concepts of using numbers to count objects and using numbers to represent lengths of objects.

Sample References:

Mathematical Thinking in Kindergarten

Investigation 1

Pattern Trains and Hopscotch Paths

Investigation 2

Collecting, Counting, and Measuring

Investigation 2

Counting Ourselves and Others

Investigation 1

Making Shapes and Building Blocks

Investigation 5

How Many in All?

Investigation 1

4.1.2 Analyze mathematical models and representations to determine equivalence in familiar situations from number sense, measurement, geometric sense, or statistics.

Students using *Investigations in Number, Data, and Space* use a variety of models and representations, including manipulative materials and diagrams, to represent and check mathematical reasoning in a variety of situations throughout the curriculum as they perform the activities in the sessions for each investigation. For example, students use red and blue crayons to model combinations of five.

Sample References:

Mathematical Thinking in Kindergarten
Investigation 1
Pattern Trains and Hopscotch Paths
Investigation 3
Collecting, Counting, and Measuring
Investigation 1
Counting Ourselves and Others
Investigation 1
Making Shapes and Building Blocks
Investigation 2
How Many in All?
Investigation 4

Component 4.2: Relate Mathematical Concepts Procedures to Other Disciplines**4.2.1 Analyze the concepts, strategies, and procedures from other disciplines to recognize mathematical patterns and concepts in familiar situations.**

Kindergarten students using *Investigations in Number, Data, and Space* analyze the concepts, strategies, and procedures from other disciplines to recognize mathematical patterns and concepts in familiar situations throughout the course. For example, students relate art, architecture, and geometry as they use pattern blocks to depict flowers and dancers and to construct a wall, recognizing patterns within the figures they created. They study a book which depicts different types of patterns in snakeskins. They create self-portraits as a way of studying attributes and sorting. They read children's literature which contains some of the mathematical concepts which they are studying.

Sample References:

Mathematical Thinking in Kindergarten
Investigation 1: Dialogue Box, page 23
Investigations 2-3
Pattern Trains and Hopscotch Paths
Investigation 1
Investigation 2: Choice Time: Pattern Block Snakes, pages 34-35
Collecting, Counting, and Measuring
Investigations 1, 4
Counting Ourselves and Others
Investigation 1: Choice Time: Self-Portraits, pages 25-27
Making Shapes and Building Blocks
Investigation 1
How Many in All?
Investigation 1
Investigation 3: Extensions: Literature Connections, page 61

4.2.2 Apply mathematical thinking and modeling in other disciplines.

Kindergarten students using *Investigations in Number, Data, and Space* apply mathematical thinking and modeling to solve problems that arise in other disciplines throughout the course. For example, students apply mathematical concepts to understand stories in counting books, and even create their own counting books. They create self-portraits as they explore the concepts of attributes and sorting.

Sample References:

Mathematical Thinking in Kindergarten

Investigation 2

Pattern Trains and Hopscotch Paths

Investigation 1

Investigation 2: Choice Time: Pattern Block Snakes, pages 34-35

Collecting, Counting, and Measuring

Investigations 1, 4

Counting Ourselves and Others

Investigation 1: Choice Time: Self-Portraits, pages 25-27

Making Shapes and Building Blocks

Investigation 1

How Many in All?

Investigation 1

Investigation 3: Extensions: Literature Connections, page 61

4.2.3 Understand the importance of contributions to the development of mathematics such as the contributions of women, men, and different cultures.

Kindergarten students using *Investigations in Number, Data, and Space* are exposed to the contributions of women, men, and different cultures to the development of mathematics as they read counting stories and other books written and illustrated by male and female authors, artists, and poets with different cultural backgrounds, including one book available in more than one language.

Sample References:

Mathematical Thinking in Kindergarten

Investigations 2-3

Pattern Trains and Hopscotch Paths

Investigations 1-2

Collecting, Counting, and Measuring

Investigations 1, 4

Counting Ourselves and Others

Investigation 2

Making Shapes and Building Blocks

Investigation 1

How Many in All?

Investigation 1

Component 4.3: Relate Mathematical Concepts and Procedures to Real-World Situations**4.3.1 Understand how mathematics is used in everyday life.**

Kindergarten students using *Investigations in Number, Data, and Space* give examples of how mathematics is used in everyday life throughout the course as they perform the investigations on which the curriculum is based. For example, students apply mathematics to the game of hopscotch. In addition to the following sample references, every unit of study concludes with a section entitled, "About Classroom Routines." The pages in this section include suggestions for applying mathematical concepts and skills to everyday situations in the classroom. In *Attendance* students compare groups and determine which group has more and how much more. *Counting Jar* consists of activities involving counting and estimating. *Today's Question* consists of a daily activity involving students collecting, displaying, and interpreting data.

Sample References:

Mathematical Thinking in Kindergarten

Investigation 3

Pattern Trains and Hopscotch Paths

Investigation 3

Collecting, Counting, and Measuring

About Classroom Routines:

Attendance, pages 99-101

Calendar, pages 104-105

Today's Question, pages 106-107

Counting Ourselves and Others

Investigation 3

Making Shapes and Building Blocks

Investigation 3

How Many in All?

Investigation 3

4.3.2 Understand how mathematics is used in career settings.

Kindergarten students using *Investigations in Number, Data, and Space* observe mathematics used in career settings as they are exposed to the works of a variety of authors who write books with a mathematical theme.

Sample References:

Mathematical Thinking in Kindergarten

Investigations 2-3

Pattern Trains and Hopscotch Paths

Investigations 1-2

Collecting, Counting, and Measuring

Investigations 1, 4

Counting Ourselves and Others

Investigation 2

Making Shapes and Building Blocks

Investigation 1

How Many in All?

Investigation 1

**Investigations in Number, Data, and Space
to the
Washington Grade Level Content Expectations—EALR's**

Grade One

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.1: Understand and apply concepts and procedures from number sense - number, numeration, computation, and estimation.

Number and Numeration

1.1.1 Understand ways of representing whole numbers.

- **Represent a number to at least 100 in different ways (e.g., words, numerals, pictures, physical models) and translate from one representation to another. [CU, RL, MC]**

References:

Mathematical Thinking at Grade 1

Investigation 2: Sessions 4-6

Investigation 4: Sessions 4-6

Building Number Sense

Investigation 1: Sessions 1-8

Investigation 2: Sessions 1-9

Investigation 3: Sessions 1-9

Investigation 4: Sessions 1-10

Quilt Squares and Block Towns

Investigation 3: Sessions 6-7

Number Games and Story Problems

Investigation 2: Sessions 1-8, 10-12

Bigger, Taller, Heavier, Smaller

Investigation 2: Sessions 2-4: Teacher Note, page 48

- **Group and regroup objects into 1's and 10's. [SP, CU, MC]**

References:

Building Number Sense

Investigation 1: Session 2: Teacher Note, pages 11-12

Investigation 2: Session 2

Investigation 3

Sessions 1-2

Session 9: Extension, page 113

Number Games and Story Problems

Investigation 2: Sessions 6-12

- **Read, write, and recite numbers to at least 100.**

References:

Mathematical Thinking in Grade 1

Investigation 2: Sessions 1-6

Investigation 4: Sessions 2-6

Investigation 5: Sessions 2-4

Building Number Sense

Investigation 1: Sessions 5-6, 9

Investigation 2: Sessions 1-9

Investigation 3: Sessions 1-7, 9

Investigation 4: Sessions 1-10

Number Games and Story Problems

Investigation 1: Sessions 1-10

Investigation 2: Sessions 1-13

Investigation 3: Sessions 1-13

- **Count sets of objects less than 100 using a variety of grouping strategies.**

References:

Mathematical Thinking at Grade 1

Investigation 2: Sessions 1-6

Investigation 4: Sessions 1-6

Investigation 5: Sessions 1-4

Building Number Sense

Investigation 1: Sessions 1-9

Investigation 2: Sessions 1-9

Investigation 3: Sessions 1-9

Investigation 4: Sessions 1-10

Number Games and Story Problems

Investigation 2: Sessions 1-13

- **Identify coins (penny, nickel, dime, quarter) and state their value.**

References:

Number Games and Story Problems

Investigation 2: Sessions 3-8

1.1.2 Understand sequential relationships among whole numbers.

- **Order three or more numbers to at least 100 from smallest to largest. [CU, RL]**

References:

Mathematical Thinking at Grade 1

Investigation 2: Sessions 2-3

Building Number Sense

Investigation 3: Sessions 1-2, 5-7, 9

- **Use comparative language (e.g., less than, more than, equal to) to compare numbers to at least 100.**

References:

Mathematical Thinking at Grade 1

Investigation 2: Sessions 1-3

Building Number Sense

Investigation 1: Session 2

Investigation 2: Session 3

Investigation 3: Sessions 1-7

- **Skip count by 2, 5, and 10.**

References:

Building Number Sense

Investigation 1: Session 2: Teacher Note, pages 11-12

Investigation 3: Session 9: Extension, page 113

Number Games and Story Problems

Investigation 2: Sessions 6-12

- **Count forwards and backwards from a given number.**

References:

Mathematical Thinking at Grade 1

Investigation 2: Sessions 1-6

Investigation 4: Sessions 1-6

Investigation 5: Sessions 1-4

Building Number Sense

Investigation 1: Sessions 1-9

Investigation 2: Sessions 1-9

Investigation 3: Sessions 1-9

Investigation 4: Sessions 1-10

Number Games and Story Problems

Investigation 2: Sessions 1-13

All Units: About Classroom Routines: Counting

Computation

1.1.5 Understand meaning of addition and subtraction on whole numbers.

- **Express stories involving addition and subtraction (e.g., join, separate) with models, pictures, and symbols. [SP, CU, RL, MC]**

References:

Mathematical Thinking in Grade 1

Investigation 2: Sessions 1-6

Investigation 4: Sessions 2-6

Investigation 5: Sessions 2-4

Building Number Sense

Investigation 1: Sessions 1-6, 9

Investigation 2: Sessions 1-9

Investigation 4: Sessions 1-10

Number Games and Story Problems

Investigation 1: Sessions 1-10

Investigation 2: Sessions 1-8, 10-13

Investigation 3: Sessions 1-13

- **Show relationships between addition and subtraction using physical models, diagrams, and acting out problems.**

References:

Mathematical Thinking in Grade 1

Investigation 2: Sessions 1, 4-6

Investigation 4: Session 4

Building Number Sense

Investigation 2: Sessions 1-2

Investigation 4: Session 2

Number Games and Story Problems

Investigation 1: Sessions 1-10

1.1.6 Apply the procedures for addition and subtraction of simple whole numbers with fluency.

- **Use strategies (e.g., count on, count back, doubles) for addition and subtraction facts to at least sums to 12.**

References:

Mathematical Thinking in Grade 1

Investigation 2: Sessions 1-6

Investigation 4: Sessions 1-4, 6

Investigation 5: Sessions 2-4

Building Number Sense

Investigation 1: Sessions 1-6, 9

Investigation 2: Sessions 1-9

Investigation 4: Sessions 1-10

Number Games and Story Problems

Investigation 1: Sessions 1-10

Investigation 2: Sessions 1-8, 10-13

Investigation 3: Sessions 1-13

- **Recall addition and subtraction facts through at least sums to 12.**

References:

Mathematical Thinking in Grade 1

Investigation 2: Sessions 1-6

Investigation 4: Sessions 1-4, 6

Investigation 5: Sessions 2-4

Building Number Sense

Investigation 1: Sessions 1-6, 9

Investigation 2: Sessions 1-9

Investigation 4: Sessions 1-10

Number Games and Story Problems

Investigation 1: Sessions 1-10

Investigation 2: Sessions 1-8, 10-13

Investigation 3: Sessions 1-13

- **Solve problems involving addition and subtraction using and explaining student-invented procedures [SP, RL, CU]**

References:

Mathematical Thinking in Grade 1

Investigation 2: Sessions 1-6

Investigation 4: Sessions 1-4, 6

Investigation 5: Sessions 2-4

Building Number Sense

Investigation 1: Sessions 1-6, 9

Investigation 2: Sessions 1-9

Investigation 4: Sessions 1-10

Number Games and Story Problems

Investigation 1: Sessions 1-10

Investigation 2: Sessions 1-8, 10-13

Investigation 3: Sessions 1-13

1.1.7 Apply appropriate strategies and tools for computing whole numbers.

- **Identify when to use mental math, paper/pencil, or calculator to solve problems.**

References:

Mathematical Thinking in Grade 1

Investigation 2: Sessions 1-6

Investigation 4: Sessions 1-4, 6

Investigation 5: Sessions 2-4

Building Number Sense

Investigation 1: Sessions 1-6, 9

Investigation 2: Sessions 1-9

Investigation 4: Sessions 1-10

Number Games and Story Problems

Investigation 1: Sessions 1-10

Investigation 2: Sessions 1-8, 10-13

Investigation 3: Sessions 1-13

Estimation

1.1.8 Apply estimation strategies to determine the reasonableness of answers.

- **Use a known quantity (e.g., chunking) to make reasonable estimates. [RL]**

References:

Building Number Sense

Investigation 3

Sessions 3-4: Choice 4: Exploring Calculators, pages 95-96

Session 9, page 110

<p>Component 1.2: Understand and apply concepts and procedures from measurement.</p>

Attributes, Units, and Tools

1.2.1 Understand and apply attributes to describe and compare objects.

- **Order three or more objects according to an attribute (e.g., pencil lengths, students' heights, and thickness of books). [SP, CU]**

References:

Building Number Sense

Investigation 3: Sessions 3-4

Quilt Squares and Block Towns

Investigation 3: Sessions 6-7

Bigger, Taller, Heavier, Smaller

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

- **Use physical models of measuring units to fill, cover, match, or make the desired comparison of the attribute with the unit. [SP]**

References:

Quilt Squares and Block Towns

Investigation 1: Sessions 2-10, 13-15

Investigation 2: Sessions 4-10

Investigation 3: Sessions 1-5

Appendix: *Shapes* Teacher Tutorial

Bigger, Taller, Heavier, Smaller

Investigation 2: Sessions 2-4

- **Read a clock with only the hour hand and use approximate language (e.g., almost 7, a little after 7). [CU]**

Time concepts taught in the Grade 1 series of *Investigations in Number, Data, and Space* include calendar features: the cyclical nature of the sequence of months and dates, units of time and relationships among them, birthday data, and problem solving.

References:

Survey Questions and Secret Rules

Investigation 3: Sessions 1-3

All Units: About Classroom Routines: Understanding Time and Changes

1.2.2 Understand the importance of appropriate and consistent units.

- **Select units appropriate to the object being measured (e.g., measure length of classroom with footprints, not beans).**

References:

Building Number Sense

Investigation 3: Sessions 3-4

Quilt Squares and Block Towns

Investigation 3: Sessions 6-7

Bigger, Taller, Heavier, Smaller

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

- **Use a uniform unit to measure an object (e.g., cubes, paper strips).**

References:

Building Number Sense

Investigation 3: Sessions 3-4

Quilt Squares and Block Towns

Investigation 3: Sessions 6-7

Bigger, Taller, Heavier, Smaller

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

- **Use a calendar as a record of time (e.g., yesterday, today, tomorrow, weeks, months, years).**

References:

Survey Questions and Secret Rules

Investigation 3: Sessions 1-3

All Units: About Classroom Routines: Understanding Time and Changes

1.2.3 Understand the need for and apply appropriate tools to measure.

- **Measure a variety of objects using appropriate nonstandard tools.**

References:

Building Number Sense

Investigation 3: Sessions 3-4

Quilt Squares and Block Towns

Investigation 3: Sessions 6-7

Bigger, Taller, Heavier, Smaller

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Component 1.3: Understand and apply concepts and procedures from geometric sense.
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Properties and Relationships**1.3.1 Recall and understand characteristics of 2-D shapes and figures.**

- **Name and identify characteristics of 2-D shapes and figures, including those in their surroundings. [CU, MC]**

References:

Mathematical Thinking in Grade 1

Investigation 1: Sessions 1-4

Building Number Sense

Investigation 1: Sessions 5-6

Quilt Squares and Block Towns

Investigation 1: Sessions 1-15

1.3.2 Understand how to sort and compare 2-D shapes and figures using characteristics.

- **Identify and sort 2-D shapes and figures in their surroundings. [MC, RL]**

References:

Quilt Squares and Block Towns
Investigation 1: Session 1

- **Compare 2-D shapes and figures using comparative language (e.g., longer, wider). [CU]**

Kindergarten students using *Investigations in Number, Data, and Space* compare lengths of objects.

References:

Bigger, Taller, Heavier, Smaller
Investigation 3: Sessions 1-5

Component 1.4: Understand and apply concepts and procedures from probability and statistics.

Statistics**1.4.3 Understand that data can be organized and displayed.**

- **Construct bar graphs with concrete materials and record pictorially. [CU]**

References:

Mathematical Thinking at Grade 1
Investigation 5: Sessions 3-6
Survey Questions and Secret Rules
Investigation 3: Sessions 1-3
Investigation 4: Sessions 2-5
All Units : About Classroom Routines : Exploring Data

- **Display results of data collection by making student-invented and conventional displays. [CU]**

References:

Mathematical Thinking at Grade 1
Investigation 5: Sessions 1-6
Survey Questions and Secret Rules
Investigation 2: Sessions 1-6
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-5

Bigger, Taller, Heavier, Smaller

Investigation 2: Session 1

All Units: About Classroom Routines: Exploring Data, Understanding Time and Changes

1.4.5 Understand how a display provides information about a question.

- **Conduct a survey for a predetermined question and collect data using tallies, charts, lists, and/or pictures.**

References:

Mathematical Thinking at Grade 1

Investigation 5: Sessions 1-6

Survey Questions and Secret Rules

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-5

All Units: About Classroom Routines: Exploring Data

- **Identify a question being answered on a display.**

References:

Mathematical Thinking at Grade 1

Investigation 5: Sessions 3-6

Survey Questions and Secret Rules

Investigation 2: Sessions 1-2, 5-6

Investigation 3: Sessions 1-3

Investigation 4: Sessions 2-5

All Units: About Classroom Routines: Exploring Data, Understanding Time and Changes

- **Name an appropriate title for a display of data.**

References:

Mathematical Thinking at Grade 1

Investigation 5: Sessions 3-6

Survey Questions and Secret Rules

Investigation 2: Sessions 1-2, 5-6

Investigation 3: Sessions 1-3

Investigation 4: Sessions 2-5

All Units: About Classroom Routines: Exploring Data, Understanding Time and Changes

1.4.6 Understand information presented in student-made displays.

- **Explain how a display answers the survey question. [CU]**

References:

Mathematical Thinking at Grade 1

Investigation 5: Sessions 3-6

Survey Questions and Secret Rules

Investigation 2: Sessions 1-2, 5-6

Investigation 3: Sessions 1-3

Investigation 4: Sessions 2-5

All Units: About Classroom Routines: Exploring Data

- **Interpret results and draw conclusions from student-made displays using comparative language (e.g. more, fewer). [CU, MC]**

References:

Mathematical Thinking at Grade 1

Investigation 5: Sessions 1-6

Survey Questions and Secret Rules

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-5

Bigger, Taller, Heavier, Smaller

Investigation 2: Session 1

All Units: About Classroom Routines: Exploring Data, Understanding Time and Changes

Component 1.5: Understand and apply concepts and procedures from algebraic sense.

Patterns and Relationships**1.5.1 Understand classification concepts for identifying patterns.**

- **Create and describe a variety of repeating patterns using sounds, objects, and symbols. [CU]**

References:

Mathematical Thinking at Grade 1

Investigation 3: Sessions 1-6

Investigation 4: Sessions 2-3, 5

Building Number Sense

Investigation 3: Sessions 1-8

Investigation 4: Session 10: Activity, page 163

Survey Questions and Secret Rules
Investigation 3: Sessions 2-3
Quilt Squares and Block Towns
Investigation 1: Sessions 13-15
Number Games and Story Problems
Investigation 2: Sessions 2, 6-9

- **Describe and extend a complex repeating pattern (e.g., ABAC, ABAC; snap, snap, clap, snap, stomp). [CU]**

References:

Mathematical Thinking at Grade 1
Investigation 3: Sessions 1-6
Investigation 4: Sessions 2-3, 5
Building Number Sense
Investigation 3: Sessions 1-8
Investigation 4: Session 10: Activity, page 163
Survey Questions and Secret Rules
Investigation 3: Sessions 2-3
Quilt Squares and Block Towns
Investigation 1: Sessions 13-15
Number Games and Story Problems
Investigation 2: Sessions 2, 6-9

- **Identify the unit in a repeating pattern (e.g., in A-A-B-A-A-B the unit is A-A-B).**

References:

Mathematical Thinking at Grade 1
Investigation 3: Sessions 1-6
Investigation 4: Sessions 2-3, 5
Building Number Sense
Investigation 3: Sessions 1-8
Investigation 4: Session 10: Activity, page 163
Survey Questions and Secret Rules
Investigation 3: Sessions 2-3
Quilt Squares and Block Towns
Investigation 1: Sessions 13-15
Number Games and Story Problems
Investigation 2: Sessions 2, 6-9

- **Identify and describe numerical patterns in the 100's chart. [CU]**

References:

Building Number Sense
Investigation 3: Sessions 1-2, 5-7
Investigation 3: Session 8, page 107
Number Games and Story Problems
Investigation 2: Sessions 6-9

Symbols and Representations

1.5.2 Understand the meaning of the equality symbol (=).

- **Demonstrate equality by recording number sentences with balance (e.g., $9 = 4 + 5$, $4 + 5 = 2 + 7$, $9 = 9$).**

References:

Mathematical Thinking in Grade 1

Investigation 2: Sessions 4-6

Building Number Sense

Investigation 2: Sessions 1-2, 6-8

Investigation 4: Sessions 1-2, 6-10

Number Games and Story Problems

Investigation 1: Sessions 1-10

Investigation 2: Sessions 1-8, 10-13

Investigation 3: Sessions 1-13

- **Complete open sentences showing equalities (e.g. $5 = \underline{\quad}$).**

Grade 1 students using *Investigations in Number, Data, and Space* represent problem situations and solutions by writing number sentences.

References:

Mathematical Thinking at Grade 1

Investigation 2: Sessions 4-6

Investigation 4: Sessions 4-6

Building Number Sense

Investigation 2: Sessions 1-2, 6-9

Investigation 4: Sessions 1-5, 7-10

Number Games and Story Problems

Investigation 1: Sessions 1-3, 6, 10

Investigation 2: Sessions 2, 10-13

Investigation 3: Sessions 1-13

EALR 2: The student uses mathematical reasoning to define and solve problems.

Component 2.1: Investigate and Analyze Situations
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2.1.1 Analyze situations to determine known and unknown information in familiar situations.

Grade 1 students using *Investigations in Number, Data, and Space* analyze problem situations and write number sentences reflecting known and unknown information in the problem.

References:

Mathematical Thinking at Grade 1

Investigation 2: Session 4

Investigation 4: Session 4

Investigation 5: Session 2

Building Number Sense

Investigation 2: Sessions 1-2

Investigation 4: Sessions 1-5, 7-10

Number Games and Story Problems

Investigation 1: Sessions 6-10

Investigation 2: Session 1

Investigation 3: Sessions 1-13

2.1.2 Analyze situations to determine when information is missing or extraneous.

Grade 1 students using *Investigations in Number, Data, and Space* determine relevant, irrelevant, and/or sufficient information to solve mathematical problems throughout the course. Informational analysis is a fundamental component of the problem-solving process. For example, students determine whether they have sufficient information to find a number of missing counters.

Sample References:

Mathematical Thinking at Grade 1

Investigation 4: Session 5

Building Number Sense

Investigation 2: Sessions 4-5

Survey Questions and Secret Rules

Investigation 1: Sessions 1-2

Quilt Squares and Block Towns

Investigation 1: Sessions 11-12

Number Games and Story Problems

Investigation 1: Sessions 7-9

Bigger, Taller, Heavier, Smaller

Investigation 2: Sessions 5-7

Component 2.2: Formulate Questions and Define the Problem**2.2.1 Understand the problem to be solved involving number sense, measurement, geometric sense, and statistics.**

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). For example, students gain understanding of problems involving number comparison through games and discussion of strategies. They participate in hands-on activities by building blocks and using cupfuls of sand to help them understand problems of geometry and measurement. They conduct surveys inside and outside the classroom to gain an understanding of statistics.

Sample References:

Mathematical Thinking at Grade 1

Investigation 2: Session 1

Building Number Sense

Investigation 4: Sessions 1-2

Survey Questions and Secret Rules

Investigation 1: Sessions 1-2

Quilt Squares and Block Towns

Investigation 1: Session 7

Number Games and Story Problems

Investigation 3: Session 13

Bigger, Taller, Heavier, Smaller

Investigation 2: Sessions 5-7

2.2.2 Generate questions to be answered in familiar situations.**References:**

Mathematical Thinking at Grade 1

Investigation 5: Sessions 1-6

Survey Questions and Secret Rules

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-5

All Units: About Classroom Routines: Exploring Data

Component 2.3: Construct Solutions**2.3.1 Apply a variety of strategies and approaches to problem situations from number sense, measurement, geometric sense, and statistics to construct a solution.**

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). In the course of their investigations students apply a variety of strategies and approaches to solve problems. For example, students use pictures, numbers, words, and equations to solve combining and separating story problems.

Sample References:

Mathematical Thinking at Grade 1

Investigation 2: Session 1

Building Number Sense

Investigation 4: Session 10

Survey Questions and Secret Rules

Investigation 2: Sessions 5-6

Quilt Squares and Block Towns

Investigation 3: Sessions 1-2

Number Games and Story Problems

Investigation 3: Sessions 10-12

Bigger, Taller, Heavier, Smaller

Investigation 2: Sessions 5-7

Component 2.4: Draw Conclusions**2.4.1 Understand how to make conjectures and support them with evidence.**

Grade 1 students using *Investigations in Number, Data, and Space* make mathematical conjectures and support them with evidence throughout the course by conducting the investigations into which the curriculum is organized; in fact, this is a fundamental emphasis of the series. For example, students make and investigate conjectures regarding sorting rules.

Sample References:

Mathematical Thinking at Grade 1

Investigation 3: Sessions 3-4

Building Number Sense

Investigation 3: Sessions 3-4

Survey Questions and Secret Rules

Investigation 1: Sessions 1-2

Quilt Squares and Block Towns

Investigation 2: Session 7

Number Games and Story Problems

Investigation 2: Session 2

Bigger, Taller, Heavier, Smaller

Investigation 1: Sessions 1-2

2.4.2 Analyze solutions to draw conclusions and support them with evidence.

Grade 1 students using *Investigations in Number, Data, and Space* analyze solutions to draw conclusions and support them with evidence throughout the course as they conduct the investigations into which the curriculum is organized. For example, first graders develop and evaluate mathematical arguments for solving combining and separating story problems, and support their conclusions with pictures, words, and number sentences.

Sample References:

Mathematical Thinking at Grade 1

Investigation 2: Session 1

Building Number Sense

Investigation 4: Sessions 3-5

Survey Questions and Secret Rules

Investigation 2: Sessions 1-2

Quilt Squares and Block Towns

Investigation 3: Sessions 6-7

Number Games and Story Problems

Investigation 2: Session 13

Bigger, Taller, Heavier, Smaller

Investigation 2: Sessions 5-7

Component 2.5: Evaluate and Verify Results

2.5.1 Evaluate strategies and procedures for accuracy and appropriateness.

Grade 1 students using *Investigations in Number, Data, and Space* develop and evaluate a variety of strategies and procedures for solving problems; for example, students explore a variety of strategies for solving a problem involving combinations of objects, a problem which has multiple solutions.

Sample References:

Mathematical Thinking at Grade 1

Investigation 4: Session 4

Building Number Sense

Investigation 2: Session 1

Survey Questions and Secret Rules

Investigation 1: Session 3

Quilt Squares and Block Towns

Investigation 1: Sessions 7-10

Number Games and Story Problems

Investigation 1: Sessions 2-3

Bigger, Taller, Heavier, Smaller

Investigation 1: Sessions 5-6

2.5.2 Evaluate results for reasonableness.

Students using *Investigations in Number, Data, and Space* determine the reasonableness of results throughout the curriculum as they perform the activities in the sessions for each investigation. The Dialogue Box is a feature that appears with many investigations and contains the text of discussions between teachers and students in which the teacher encourages students to describe their solution processes and assert the reasonableness of their results.

Sample References:

Mathematical Thinking at Grade 1

Investigation 4: Session 4

Building Number Sense

Investigation 2: Session 2

Survey Questions and Secret Rules

Investigation 4: Sessions 2-3

Quilt Squares and Block Towns

Investigation 2: Session 7

Number Games and Story Problems

Investigation 3: Sessions 1-2

Bigger, Taller, Heavier, Smaller

Investigation 3: Session 2

2.5.3 Evaluate conclusions using evidence.

Grade 1 students using *Investigations in Number, Data, and Space* use a variety of forms of evidence, including physical models, facts and properties, and numerical and spatial relationships to evaluate conclusions. For example, students use “kid pins” to model students for survey votes. They use counters, cubes, and dot cards to model combinations of numbers and relationships between numbers. They use attribute blocks to model and sort geometric shapes. They use grid paper and geoblocks to construct three-dimensional buildings based on a two-dimensional plan. They use maps and models of paths to determine the shortest path from one location to another. They use facts about geometric shapes and solids to draw conclusions about their related properties. They use relationships between numbers and shapes to create patterns.

Sample References:

- Mathematical Thinking at Grade 1
 - Investigation 5: Session 2
- Building Number Sense
 - Investigation 2: Session 2
- Survey Questions and Secret Rules
 - Investigation 1: Sessions 1-2
- Quilt Squares and Block Towns
 - Investigation 3: Session 5
- Number Games and Story Problems
 - Investigation 1: Sessions 4-5
- Bigger, Taller, Heavier, Smaller
 - Investigation 3: Sessions 4-5

EALR 3 The student communicates knowledge and understanding in both everyday and mathematical language.

Component 3.1: Gather Information

3.1.1 Apply a simple plan for collecting information for a given purpose, which requires using number sense, measurement, geometric sense, or statistics.

References:

- Mathematical Thinking at Grade 1
 - Investigation 5: Sessions 1-6
- Survey Questions and Secret Rules
 - Investigation 1: Session 6
 - Investigation 2: Sessions 1-6
 - Investigation 3: Sessions 1-3
 - Investigation 4: Sessions 1-5

All Units: Appendix: About Classroom Routines: Exploring Data, Understanding Time and Changes

3.1.2 Analyze mathematical information for a given purpose requiring number sense, measurement, geometric sense, or statistics, from one or two different sources using reading, listening, and observation.

Grade 1 students using *Investigations in Number, Data, and Space* analyze mathematical information from one or more sources using reading, listening, and observation throughout the course. In fact, this is fundamental to the organization of the curriculum into investigations. As is evident from the title of the series, the activities focus on the concepts of number, data (including statistics), and space (including geometry and measurement). For example, analyze mathematical information in patterns in order to create, compare, relate, and extend them. They analyze mathematical information in story problems to determine whether they should add or subtract.

Sample References:

Mathematical Thinking at Grade 1

Investigation 3: Sessions 3-4

Building Number Sense

Investigation 4: Sessions 7-10

Survey Questions and Secret Rules

Investigation 1: Sessions 1-2

Quilt Squares and Block Towns

Investigation 2: Sessions 1-10

Number Games and Story Problems

Investigation 3: Session 13

Bigger, Taller, Heavier, Smaller

Investigation 3: Session 2

Component 3.2: Organize and Interpret Information

3.2.1 Understand how to organize and interpret numerical, measurement, geometric or statistical information for a given purpose in at least one way (reflecting, verbalizing, discussing, or writing).

Grade 1 students using *Investigations in Number, Data, and Space* organize and interpret information by displaying data in charts and graphs.

References:

Mathematical Thinking at Grade 1

Investigation 5: Sessions 1-6

Survey Questions and Secret Rules

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-5

Bigger, Taller, Heavier, Smaller

Investigation 2: Session 1

All Units: About Classroom Routines: Exploring Data, Understanding Time and Changes

Component 3.3: Represent and Share Information**3.3.1 Understand how to express ideas involving number sense, measurement, geometric sense, or statistics, using mathematical language and notation.**

Grade 1 students using *Investigations in Number, Data, and Space* express ideas using mathematical language and notation throughout the course. The Dialogue Box is a feature that appears with many investigations and contains the text of discussions between teachers and students in which the teacher encourages students to use the language of mathematics to express mathematical ideas precisely. Students gain experience using mathematical notation, including the equal sign and symbols for addition and subtraction.

Sample References:

Mathematical Thinking in Grade 1

Investigation 2: Session 4

Investigation 4: Sessions 4, 6

Building Number Sense

Investigation 2: Sessions 1-2, 6-8

Investigation 4: Sessions 1-10

Number Games and Story Problems

Investigation 1: Sessions 1-10

Investigation 2: Sessions 1-8, 10-13

Investigation 3: Sessions 1-13

Teacher Note: Introducing Notation, p. 162

3.3.2 Understand how to represent numerical, measurement, geometric, or statistical ideas and information to familiar people for a real-world purpose.

Grade 1 students using *Investigations in Number, Data, and Space* represent ideas and information to familiar people when they conduct surveys of family and community members. Students are given homework assignments which often include the involvement of one or more family members, and they bring home family letters for each unit describing the activities the child will be participating in, and the mathematics the child will be learning, for each unit. For one activity, students are asked to bring items from home for an exhibit of patterns.

Sample References:

Mathematical Thinking at Grade 1

Investigation 3: Sessions 5-6

Building Number Sense

Investigation 2: Session 3: Homework, page 55

Survey Questions and Secret Rules

Investigation 4

Session 1: Homework, page 79

Sessions 2-3

Quilt Squares and Block Towns

Investigation 3: Sessions 6-7: Homework, page 126

Number Games and Story Problems

Investigation 1: Sessions 4-5: Homework, page 21

Bigger, Taller, Heavier, Smaller

Investigation 2: Sessions 5-7: Homework, page 57

EALR 4: The student understands how mathematical ideas connect within mathematics, other subject areas, and real-world situations.

Component 4.1: Relate Concepts and Procedures within Mathematics

4.1.1 Apply concepts and procedures from two of the content strands (number sense, measurement, geometric sense, or statistics) in a given problem or situation.

In the series, *Investigations in Number, Data, and Space*, the sessions within each investigation involve students directly experiencing how the mathematical ideas presented in each unit are interconnected and can be applied together to a given problem or situation. In Quilt Squares and Block Towns, students design a town and apply and relate concepts of number, geometry and space, and direction and measurement. Recurring features in the series, including About Classroom Routines and software applications, allow teachers opportunities to integrate all of the units of study with a common thread.

Sample References:

Mathematical Thinking at Grade 1

Investigation 3: Sessions 1-6

Building Number Sense

Investigation 3: Sessions 1-9

Survey Questions and Secret Rules

Investigation 1: Sessions 1-6

Quilt Squares and Block Towns

Investigation 1: Sessions 1-15

Number Games and Story Problems

Investigation 2: Sessions 1-13

Bigger, Taller, Heavier, Smaller

Investigation 3: Sessions 1-5

4.1.2 Analyze mathematical models and representations to determine equivalence in familiar situations from number sense, measurement, geometric sense, or statistics.

Grade 1 students using *Investigations in Number, Data, and Space* analyze mathematical models and representations and use them to determine equivalence and solve problems in familiar situations throughout the course. Students construct physical models using an extensive array of concrete manipulatives, including number cubes, dot cubes, square color tiles, hundred charts, balances, pattern blocks, buttons, coins, counters, attribute logic blocks, geoblocks, tetrominoes, and snap cubes. They also draw pictures and write and use symbolic representations of problem situations.

Sample References:

Mathematical Thinking at Grade 1

Investigation 2: Sessions 1-6

Building Number Sense

Investigation 3: Sessions 3-4

Survey Questions and Secret Rules

Investigation 1: Session 6

Quilt Squares and Block Towns

Investigation 3: Sessions 1-7

Number Games and Story Problems

Investigation 1: Session 6

Bigger, Taller, Heavier, Smaller

Investigation 3: Sessions 4-5

Component 4.2: Relate Mathematical Concepts Procedures to Other Disciplines**4.2.1 Analyze the concepts, strategies, and procedures from other disciplines to recognize mathematical patterns and concepts in familiar situations.**

Grade 1 students using *Investigations in Number, Data, and Space* apply mathematical thinking and modeling to solve problems that arise in other disciplines throughout the course. For example, students explore math concepts in children's literature.

Sample References:

Mathematical Thinking at Grade 1

Investigation 4: Session 5

Building Number Sense

Investigation 1: Sessions 3-4

Survey Questions and Secret Rules

Investigation 3: Session 3

Quilt Squares and Block Towns

Investigation 3: Sessions 1-7

Number Games and Story Problems

Investigation 1: Session 10

Bigger, Taller, Heavier, Smaller

Investigation 1: Sessions 3-4

4.2.2 Apply mathematical thinking and modeling in other disciplines.

Grade 1 students using *Investigations in Number, Data, and Space* identify practical applications of mathematical principles that can be applied to other disciplines throughout the course. For example, students apply concepts of geometry, number, and measurement to build a simulated town.

Sample References:

Mathematical Thinking at Grade 1

Investigation 5: Sessions 1-6

Building Number Sense

Investigation 4: Sessions 1-10

Survey Questions and Secret Rules

Investigation 3: Sessions 1-3

Quilt Squares and Block Towns

Investigation 3: Sessions 1-7

Number Games and Story Problems

Investigation 3: Sessions 1-13

Bigger, Taller, Heavier, Smaller

Investigation 2: Session 1

4.2.3 Understand the importance of contributions to the development of mathematics such as the contributions of women, men, and different cultures.

Grade 1 students using *Investigations in Number, Data, and Space* are exposed to the contributions of women, men, and different cultures to the development of mathematics as they read counting stories and other books written and illustrated by male and female authors, artists, and poets with different cultural backgrounds. One book describes African styles of finger counting.

Sample References:

Mathematical Thinking at Grade 1

Investigation 4: Sessions 4-6

Building Number Sense

Investigation 1: Session 9, page 34

Survey Questions and Secret Rules

Investigation 1: Session 4, page 18

Investigation 2: Sessions 5-6: Extension, page 52

Investigation 3: Session 3, page 70

Quilt Squares and Block Towns

Investigation 3: Sessions 3-4: Extension, page 111

Number Games and Story Problems

Investigation 1: Session 10, pages 40-41

Bigger, Taller, Heavier, Smaller

Investigation 1: Sessions 1-2, page 11

Component 4.3: Relate Mathematical Concepts and Procedures to Real-World Situations
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4.3.1 Understand how mathematics is used in everyday life.

Grade 1 students using *Investigations in Number, Data, and Space* experience how mathematics is used in everyday life throughout the course as they perform the investigations on which the curriculum is based. In addition to the following sample references, every unit of study concludes with a section entitled, “About Classroom Routines.” The pages in this section include suggestions for applying mathematical concepts and skills to everyday situations in the classroom. Students practice counting routines, examine attendance and weather data, conduct surveys, and explore the calendar.

Sample References:

Mathematical Thinking at Grade 1

Investigation 5: Sessions 1-6

Building Number Sense

Investigation 4: Sessions 1-10

Survey Questions and Secret Rules

Investigation 3: Sessions 1-3

Quilt Squares and Block Towns

Investigation 3: Sessions 1-7

Number Games and Story Problems

Investigation 3: Sessions 1-13

Bigger, Taller, Heavier, Smaller

Investigation 2: Session 1

4.3.2 Understand how mathematics is used in career settings.

Grade 1 students using *Investigations in Number, Data, and Space* observe mathematics used in career settings as they are exposed to the works of a variety of authors who write books with a mathematical theme. The organization of a pattern exhibit is compared to the setting up of a museum exhibit. Students act as urban planners as they design a block town. When measuring, the teacher points out the common practice of leveling off a cup when cooking or baking.

Sample References:

Mathematical Thinking at Grade 1

Investigation 3: Sessions 3-4, page 73

Investigation 4: Sessions 5-6

Building Number Sense

Investigation 3: Session 9, page 110

Survey Questions and Secret Rules

Investigation 1: Session 4, page 18

Investigation 2: Sessions 5-6: Extension, page 52

Investigation 3: Session 3, page 70

Quilt Squares and Block Towns

Investigation 3: Sessions 3-4

Number Games and Story Problems

Investigation 1: Session 10, pages 40-41

Bigger, Taller, Heavier, Smaller

Investigation 2: Session 1, page 37

**Investigations in Number, Data, and Space
to the
Washington Grade Level Content Expectations—EALR's**

Grade Two

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.1: Understand and apply concepts and procedures from number sense - number, numeration, computation, and estimation.

Number and Numeration

1.1.1 Understand place value in whole numbers.

- **Group and regroup objects into 1's, 10's, and 100's and explain relationships.**

References:

Coins, Coupons, and Combinations

Investigation 4: Sessions 1-4

Putting Together and Taking Apart

Investigation 2: Sessions 1-7

Investigation 4: Sessions 2-4

Investigation 5: Sessions 2-3, 6

- **Make combinations and name total value of coins.**

References:

Mathematical Thinking at Grade 2

Investigation 4: Session 2

Coins, Coupons, and Combinations

Investigation 2: Sessions 6-9

Putting Together and Taking Apart

Investigation 2: Sessions 5-6

Investigation 4: Sessions 3-4

- **Determine the value of a digit based on its position in a number.**

References:

Coins, Coupons, and Combinations

Investigation 4: Sessions 1-4

Putting Together and Taking Apart

Investigation 2: Sessions 1-7

Investigation 4: Sessions 2-4

Investigation 5: Sessions 2-3, 6

- **Read and write numbers to at least 1,000.**

References:

Mathematical Thinking at Grade 2
Investigation 1: Session 1
Investigation 2: Sessions 1-6, 8
Investigation 4: Sessions 1, 5
Investigation 5: Sessions 1-3
Coins, Coupons, and Combinations
Investigation 1: Sessions 1-11
Investigation 2: Session 10
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-4
Putting Together and Taking Apart
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-5
Investigation 4: Sessions 1-4
Investigation 5: Sessions 1-8
Timelines and Rhythm Patterns
Investigation 1: Sessions 1-5

1.1.2 Understand sequential relationships among whole numbers.

- **Order three or more numbers to at least 1,000 from smallest to largest. [CU, RL]**

References:

Mathematical Thinking at Grade 2
Investigation 4: Sessions 3-4
Timelines and Rhythm Patterns
Investigation 1: Sessions 1-5

- **Use comparative language (e.g., less than, more than, equal to) to compare numbers to at least 1,000.**

References:

Mathematical Thinking at Grade 2
Investigation 4: Sessions 1, 5
Investigation 5: Session 3
Coins, Coupons, and Combinations
Investigation 2: Session 10: Activity, pages 83-84
Investigation 3: Session 1: Activity, page 89
Investigation 3: Session 3: Activity, page 100
Investigation 3: Sessions 4-5: Teacher Note, page 107

Putting Together and Taking Apart

Investigation 1: Session 1: Teacher Note, page 11

Investigation 5: Session 1

- **Demonstrate equal sharing of regions and sets.**

References:

Shapes, Halves, and Symmetry

Investigation 3: Sessions 1-8

1.1.3 Understand and apply the concepts of odd and even numbers.

- **Identify a number as odd or even.**

Students gain experience with even numbers as they count by twos.

References:

Mathematical Thinking at Grade 2

Investigation 4: Session 2: Teacher Note, page 91

Coins, Coupons, and Combinations

Investigation 2: Sessions 1-5

- **Use concepts of odd and even numbers (e.g., even+even=even, odd+odd=even, even+odd=odd). [RL, SP]**

Students gain experience with even numbers as they count by twos.

References:

Mathematical Thinking at Grade 2

Investigation 4: Session 2: Teacher Note, page 91

Coins, Coupons, and Combinations

Investigation 2: Sessions 1-5

Computation

1.1.5 Understand meaning of addition, and subtraction, and how they relate to one another.

- **Represent addition and subtraction problems using models, pictures, and symbols.**

References:

Mathematical Thinking at Grade 2

Investigation 2: Sessions 1-3, 8

Investigation 4: Sessions 1, 5

Investigation 5: Sessions 1-3

Coins, Coupons, and Combinations

Investigation 1: Sessions 1-11

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-5

Shapes, Halves, and Symmetry

Investigation 3: Sessions 7-8

Putting Together and Taking Apart

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-8

- **Show relationships between addition and subtraction using physical models, diagrams, and acting out problems.**

References:

Mathematical Thinking at Grade 2

Investigation 5: Session 3, page 115

Putting Together and Taking Apart

Investigation 1: Session 1

Teacher Notes, pages 13-14 and 15-16

Dialogue Box, page 18

Investigation 2

Sessions 3-4: Dialogue Box, page 65

Investigation 3: Sessions 1-5

Investigation 5: Sessions 7-8

- **Model real life situations involving addition and subtraction using physical models, diagrams, and acting out problems. [SP, CU, MC]**

References:

Mathematical Thinking at Grade 2

Investigation 2: Sessions 1, 8

Investigation 4: Sessions 1, 5

Coins, Coupons, and Combinations

Investigation 3: Sessions 1-5

Putting Together and Taking Apart

Investigation 1: Sessions 1-6

Investigation 2: Sessions 3-7

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1, 3-4

Investigation 5: Sessions 1-8

1.1.6 Apply the procedures for addition and subtraction of whole numbers with fluency.

- **Use strategies for addition and subtraction facts through at least 20.**

References:

Mathematical Thinking at Grade 2

Investigation 2: Sessions 1-3, 8

Investigation 4: Sessions 1, 5

Investigation 5: Sessions 1-3

Coins, Coupons, and Combinations

Investigation 1: Sessions 1-11

Investigation 2: Session 10

Investigation 3: Sessions 1-5

Investigation 4: Sessions 2-4

Putting Together and Taking Apart

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-8

- **Recall addition and subtraction facts through at least 20.**

References:

Mathematical Thinking at Grade 2

Investigation 2: Sessions 1-3, 8

Investigation 4: Sessions 1, 5

Investigation 5: Sessions 1-3

Coins, Coupons, and Combinations

Investigation 1: Sessions 1-11

Investigation 2: Session 10

Investigation 3: Sessions 1-5

Investigation 4: Sessions 2-4

Putting Together and Taking Apart

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-8

- **Solve problems involving addition and subtraction with three digit numbers using and explaining student-invented procedures. [SP, RL, CU]**

Grade 2 students using *Investigations in Number, Data, and Space* do not receive explicit instruction in the addition and subtraction of 3-digit numbers; rather, they are encouraged to explore and investigate strategies for adding and subtracting whole numbers with and without regrouping. The following reference is to a discussion between a teacher and students regarding a variety of techniques which could be used to add 2-digit numbers with regrouping, including the use of the 100 chart and breaking apart and recombining addends.

Reference:

Putting Together and Taking Apart

Investigation 1: Session 1: Dialogue Box, pages 18-19

1.1.7 Apply appropriate strategies and tools for computing whole numbers.

- **Use mental math strategies to compute (e.g., composing and decomposing numbers, friendly numbers, neighbors) through 100.**

References:

Mathematical Thinking at Grade 2

Investigation 1: Session 1

Investigation 2: Sessions 1-3, 6, 8

Investigation 4: Sessions 1-5

Investigation 5: Sessions 1-3

Coins, Coupons, and Combinations

Investigation 1: Sessions 1-11

Investigation 2: Session 10

Investigation 3: Sessions 1-5

Investigation 4: Sessions 2-4

Putting Together and Taking Apart

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-8

- **Use calculator and/or paper/pencil to solve problems. [SP]**

References:

Mathematical Thinking at Grade 2

Investigation 2: Sessions 1-3, 8

Investigation 4: Sessions 1, 5

Investigation 5: Sessions 1-3

Coins, Coupons, and Combinations

Investigation 1: Sessions 1-11

Investigation 2: Session 10

Investigation 3: Sessions 1-5

Investigation 4: Sessions 2-4

Putting Together and Taking Apart

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-8

Estimation

1.1.8 Apply estimation strategies to predict computation results and to determine the reasonableness of answers.

- **Use estimation strategies (e.g., front-end estimation, clustering) to predict computation results and to determine the reasonableness of answers. [SP, RL].**

References:

Coins, Coupons, and Combinations

Investigation 1: Session 7

Investigation 1: Sessions 8-9: Choice 1: Close to 20, p. 41

Investigation 2: Session 10

- **Justify reasonableness of an estimate in addition and subtraction. [CU, RL]**

References:

Coins, Coupons, and Combinations

Investigation 1: Session 7

Investigation 1: Sessions 8-9: Choice 1: Close to 20, p. 41

Investigation 2: Session 10

Component 1.2: Understand and apply concepts and procedures from measurement.

Attributes, Units, and Tools

1.2.1 Understand and apply attributes to measure objects.

- **Identify attributes of an object that are measurable (e.g., time, length, distance around, capacity, area, and/or weight of objects). [CU, MC]**

References:

Shapes, Halves, and Symmetry

Investigation 1: Sessions 2-8

Investigation 2: Sessions 3-6

How Long? How Far?

Investigation 1: Sessions 1-8

Investigation 2: Sessions 4-8

Timelines and Rhythm Patterns

Investigation 1: Sessions 4-6

- **Compare lengths or distances where direct comparison is not possible (e.g., use a string or paper strip to compare the height and width of a table). [SP, MC]**

Students explore linear measurement using direct and indirect comparison, nonstandard units, and *GeoLogo* software. They construct, compare, and measure simple paths in both on-computer and off-computer activities.

References:

How Long? How Far?

Investigation 1: Sessions 1-8

Investigation 2: Sessions 4-5

1.2.2 Understand that unit size affects the outcome of the measurement.

- **Explain why more small paper clips than large are needed to measure the same length. [CU]**

References:

How Long? How Far?

Investigation 1: Sessions 2-8

- **Select the most appropriate unit to measure a given time (e.g., Would you use minutes or hours to measure brushing your teeth, eating dinner, sleeping?).**

[MC]

References:

Timelines and Rhythm Patterns

Investigation 1: Sessions 4-6

All Units: Appendix: About Classroom Routines: Time and Time Again

1.2.3 Understand the need for and apply appropriate tools to measure.

- **Select a tool that can measure the given attribute (e.g., analogue clock: time, string: length, tiles: area, balance: weight, interlocking cubes: capacity).**

References:

Shapes, Halves, and Symmetry

Investigation 1

Sessions 2-3: Choice 2, pages 19-21

Sessions 6-8

How Long? How Far?

Investigation 1: Sessions 1-8

Investigation 2: Sessions 1-8

- **Demonstrate measurement procedure (e.g., place units end-to-end, not overlapping, straight line, and start at end point).**

References:

How Long? How Far?

Investigation 1: Sessions 2-8

Procedures, Precision, and Estimation

1.2.6 Understand the concept of estimation in measurement.

- **Estimate length, area, capacity, and weight using nonstandard units.**

References:

Shapes, Halves, and Symmetry

Investigation 1: Sessions 2-5

Investigation 2: Sessions 4-5

How Long? How Far?

Investigation 1: Sessions 1-7

- **Use important benchmarks or referents (e.g., 5 or 10) to make initial and revised estimates.**

References:

Shapes, Halves, and Symmetry

Investigation 1: Sessions 2-5

Investigation 2: Sessions 4-5

How Long? How Far?

Investigation 1: Sessions 1-7

Investigation 2: Sessions 2-3

- **Explain how a referent helps to make a reasonable estimate. [CU]**

References:

Shapes, Halves, and Symmetry

Investigation 1: Sessions 2-5

Investigation 2: Sessions 4-5

How Long? How Far?

Investigation 1: Sessions 1-7

Investigation 2: Sessions 2-3

Component 1.3: Understand and apply concepts and procedures from geometric sense.

Properties and Relationships**1.3.1 Understand characteristics of 2-D geometric shapes.**

- **Sort and describe characteristics of 2-D geometric figures (e.g., various polygons). [PS, CU]**

References:

Mathematical Thinking at Grade 2

Investigation 1: Sessions 2-3

Investigation 3: Sessions 1-6

Appendix: *Shapes* Teacher Tutorial

Shapes, Halves, and Symmetry

Investigation 1: Sessions 1-8

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-8

Investigation 4: Sessions 1-7

1.3.3 Understand the locations of numbers on a positive number line.

- **Indicate if a number is above or below a benchmark number (e.g., greater than or less than 10). [CU]**

References:

Mathematical Thinking at Grade 2

Investigation 5: Session 3

Coins, Coupons, and Combinations

Investigation 2: Session 10: Activity, pages 83-84

Investigation 3: Session 1: Activity, page 89

Investigation 3: Session 3: Activity, page 100

Timelines and Rhythm Patterns

Investigation 1: Sessions 1-6

- **Describe the location of a given number on a number line. [CU]**

References:

Mathematical Thinking at Grade 2

Investigation 2: Session 1, pages 23-24

Investigation 4: Sessions 3-4

How Many Pockets? How Many Teeth?

Investigation 1: Session 1

Investigation 2: Sessions 1-5

Timelines and Rhythm Patterns

Investigation 1: Sessions 1-6

- **Identify a point on a number line.**

References:

Mathematical Thinking at Grade 2

Investigation 2: Session 1, pages 23-24

Investigation 4: Sessions 3-4

How Many Pockets? How Many Teeth?

Investigation 1: Session 1

Investigation 2: Sessions 1-5

Timelines and Rhythm Patterns

Investigation 1: Sessions 1-6

Component 1.4: Understand and apply concepts and procedures from probability and statistics.

Statistics

1.4.3 Understand the components of a graph.

- **Identify title, horizontal and vertical axes, and key.**

References:

Mathematical Thinking

Investigation 5: Sessions 1-2

Does It Walk, Crawl, or Swim?

Investigation 1: Sessions 1-2

Investigation 4: Sessions 2-3

How Long? How Far?

Investigation 2: Sessions 6-8

How Many Pockets? How Many Teeth?

Investigation 1: Sessions 2-3

Investigation 2: Sessions 3-6

Investigation 3: Session 5

- **Construct a bar graph with a title, key, and single unit increment.**

References:

Does It Walk, Crawl, or Swim?

Investigation 4: Sessions 2-3, page 83

How Many Pockets? How Many Teeth?

Investigation 1: Sessions 2-3, page 19

Investigation 2: Sessions 3-6

Investigation 3: Session 5

1.4.6 Understand how to read and interpret data from graphs.

- **Interpret a bar graph for comparative information (e.g., How many more than, less than?).**

References:

Does It Walk, Crawl, or Swim?

Investigation 4: Sessions 2-3, page 83

How Many Pockets? How Many Teeth?

Investigation 1: Sessions 2-3, page 19

Investigation 2: Sessions 3-6

Investigation 3: Session 5

Component 1.5: Understand and apply concepts and procedures from algebraic sense.

Patterns and Relationships

1.5.1 Understand how simple patterns are generated.

- **Translate a pattern from one representation to another (e.g., snap-clap-stomp translates to ABC). [CU]**

References:

Mathematical Thinking at Grade 2

Investigation 3: Sessions 1-4, 6

Coins, Coupons, and Combinations

Investigation 2: Sessions 1-2, 4-5, 10

Investigation 3: Session 1

Investigation 4: Sessions 1-4

Putting Together and Taking Apart

Investigation 2: Sessions 1-2

Timelines and Rhythm Patterns

Investigation 2: Sessions 1-5

- **Model growing patterns using objects and pictures (e.g., a stair step sequence, or a “growing” L shape in which a unit is added to each leg to show 3, 5, 7, 9, . . .) [SP, RL]**

References:

Mathematical Thinking at Grade 2

Investigation 2: Session 1, pages 23-24

Investigation 4: Sessions 3-4

Coins, Coupons, and Combinations

Investigation 2: Sessions 1-2, 4-5

Investigation 3: Session 1

Shapes, Halves, and Symmetry

Investigation 4: Sessions 1-4

- **Identify, extend, create, and explain patterns of addition and subtraction represented in charts and tables. [CU,MC]**

References:

Coins, Coupons, and Combinations

Investigation 2: Sessions 1-5, 10

Investigation 3: Session 1, pages 91 and 93

Investigation 4: Session 1

Investigation 4: Sessions 2-4: Choice 3: 100 Chart, pages 116-117

Shapes, Halves, and Symmetry

Investigation 3: Sessions 3-5, page 85

Symbols and Representations

1.5.2 Understand symbols and labels used to represent situations.

- **Explain and use the symbols $<$ and $>$ to express relationships. [CU].**

References:

Mathematical Thinking at Grade 2

Investigation 5: Session 3

Coins, Coupons, and Combinations

Investigation 3: Sessions 1-5

Putting Together and Taking Apart

Investigation 1: Sessions 5-6

Investigation 3: Sessions 3-5: Teacher Note, p. 85

Investigation 5: Session 7

- **Use number sentences with symbols and labels to represent real-world problems involving addition and subtraction. [SP, MC]**

References:

Mathematical Thinking at Grade 2

Investigation 2: Sessions 1-3, 8

Investigation 4: Sessions 1, 5

Investigation 5: Sessions 1-3

Coins, Coupons, and Combinations

Investigation 1: Sessions 1-11

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-5

Shapes, Halves, and Symmetry

Investigation 3: Sessions 7-8

Putting Together and Taking Apart

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-8

Evaluating and Solving

1.5.3 Understand and apply the procedures for evaluating and solving for the unknown using addition and subtraction.

- **Solves equations with an “unknown” (e.g., $6 + \square = 11$).**

References:

Coins, Coupons, and Combinations

Investigation 1: Session 6

Putting Together and Taking Apart

Investigation 1: Sessions 3-4

Investigation 3: Sessions 3-5 : Teacher Note, page 85

Investigation 4: Sessions 1: Teacher Note, page 94

Investigation 4: Session 6

Investigation 5: Session 7, page 129

EALR 2: The student uses mathematical reasoning to define and solve problems.

Component 2.1: Investigate and Analyze Situations
--

2.1.1 Analyze situations to determine known and unknown information in familiar situations.

References:

Mathematical Thinking at Grade 2

Investigation 2: Sessions 1-3, 8

Investigation 4: Sessions 1, 5

Investigation 5: Sessions 1-3

Coins, Coupons, and Combinations

Investigation 1: Sessions 1-11

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-5

Shapes, Halves, and Symmetry

Investigation 3: Sessions 7-8

Putting Together and Taking Apart

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-8

2.1.2 Analyze situations to determine when information is missing or extraneous.

Grade 2 students using *Investigations in Number, Data, and Space* analyze situations to determine when information is missing or extraneous throughout the course.

Informational analysis is a fundamental component of the problem-solving process. For example, students analyze the information given in a problem to determine whether it involves combining, separating, comparing, or missing change.

Sample References:

Mathematical Thinking at Grade 2

Investigation 3: Session 6

Coins, Coupons, and Combinations

Investigation 1: Sessions 8-9

Does It Walk, Crawl, or Swim?

Investigation 1: Sessions 1-2

Shapes, Halves, and Symmetry

Investigation 4: Sessions 5-6

Putting Together and Taking Apart

Investigation 3: Session 3-5

How Long? How Far?

Investigation 1: Session 8

How Many Pockets? How Many Teeth?

Investigation 1: Sessions 2-3

Timelines and Rhythm Patterns

Investigation 2: Sessions 2-3

Component 2.2: Formulate Questions and Define the Problem**2.2.1 Understand the problem to be solved involving number sense, measurement, geometric sense, and statistics.**

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). For example, students are introduced to and gain practice in recognizing and solving problems involving combining and separating. They explore the meanings of fractions and apply them in problem situations.

Sample References:

Mathematical Thinking at Grade 2

Investigation 1: Session 4

Coins, Coupons, and Combinations

Investigation 3: Sessions 1-5

Does It Walk, Crawl, or Swim?

Investigation 1: Session 6

Shapes, Halves, and Symmetry

Investigation 3: Sessions 1-7

Putting Together and Taking Apart

Investigation 1: Sessions 4-6

How Long? How Far?

Investigation 1: Session 8

How Many Pockets? How Many Teeth?

Investigation 3: Sessions 1-5

Timelines and Rhythm Patterns

Investigation 1: Sessions 1-6

2.2.2 Generate questions to be answered in familiar situations.

References:

Mathematical Thinking at Grade 2

Investigation 2: Session 6

Investigation 5: Sessions 1-3

Coins, Coupons, and Combinations

Investigation 1: Session 11

Investigation 2: Sessions 4-5, 10

Does It Walk, Crawl, or Swim?

Investigation 1: Sessions 1-3

Investigation 4: Sessions 1-3

How Many Pockets? How Many Teeth?

Investigation 1: Sessions 4-5

Investigation 2: Sessions 1-2, 4-5

Investigation 3: Sessions 1-5

Component 2.3: Construct Solutions

2.3.1 Apply a variety of strategies and approaches to problem situations from number sense, measurement, geometric sense, and statistics to construct a solution.

Grade 2 students using *Investigations in Number, Data, and Space* apply a variety of strategies and approaches to problems situations throughout the course. As is evident from the title of the series, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). For example, students explore strategies for creating and representing symmetrical figures.

Sample References:

Mathematical Thinking at Grade 2

Investigation 3: Session 6

- Coins, Coupons, and Combinations
 - Investigation 1: Sessions 8-9
- Does It Walk, Crawl, or Swim?
 - Investigation 1: Sessions 1-2
- Shapes, Halves, and Symmetry
 - Investigation 4: Sessions 5-6
- Putting Together and Taking Apart
 - Investigation 3: Session 1
- How Long? How Far?
 - Investigation 1: Session 8
- How Many Pockets? How Many Teeth?
 - Investigation 1: Sessions 2-3
- Timelines and Rhythm Patterns
 - Investigation 2: Sessions 2-3

Component 2.4: Draw Conclusions

2.4.1 Understand how to make conjectures and support them with evidence.

Grade 2 students using *Investigations in Number, Data, and Space* make conjectures and support them with evidence throughout the course by conducting the investigations into which the curriculum is organized; in fact, this is a fundamental emphasis of the series. For example, students make conjectures regarding the identity of mystery photos.

Sample References:

- Mathematical Thinking at Grade 2
 - Investigation 2: Sessions 4-5
- Coins, Coupons, and Combinations
 - Investigation 2: Session 1
- Does It Walk, Crawl, or Swim?
 - Investigation 1: Sessions 1-2
- Shapes, Halves, and Symmetry
 - Investigation 1: Sessions 2-3
- Putting Together and Taking Apart
 - Investigation 2: Session 1
- How Long? How Far?
 - Investigation 1: Sessions 2-4
- How Many Pockets? How Many Teeth?
 - Investigation 2: Session 6
- Timelines and Rhythm Patterns
 - Investigation 2: Session 4

2.4.2 Analyze solutions to draw conclusions and support them with evidence.

Students using *Investigations in Number, Data, and Space* analyze solutions to draw conclusions and support them with evidence throughout the curriculum. For example, students use play coins to support conclusions involving counting and money. They use the 100 Chart to demonstrate patterns and draw conclusions. They use timelines to represent the occurrence of events over time and to show the relationship between these events and when they occurred.

Sample References:

Mathematical Thinking at Grade 2

Investigation 4: Session 2

Coins, Coupons, and Combinations

Investigation 4: Sessions 1-4

Does It Walk, Crawl, or Swim?

Investigation 1: Session 6

Shapes, Halves, and Symmetry

Investigation 4: Sessions 1-7

Putting Together and Taking Apart

Investigation 1: Sessions 1-2

How Long? How Far?

Investigation 2: Sessions 1-8

How Many Pockets? How Many Teeth?

Investigation 1: Sessions 2-3

Timelines and Rhythm Patterns

Investigation 1: Sessions 1-6

Component 2.5: Evaluate and Verify Results**2.5.1 Evaluate strategies and procedures for accuracy and appropriateness.**

Grade 2 students using *Investigations in Number, Data, and Space* develop and evaluate a variety of strategies and procedures for solving problems; for example, students explore patterns and use them to express numbers in different ways, and they explore different strategies for counting and recording data.

Sample References:

Mathematical Thinking at Grade 2

Investigation 2: Session 6

Coins, Coupons, and Combinations

Investigation 1: Session 1

Does It Walk, Crawl, or Swim?

Investigation 1: Sessions 1-2

Shapes, Halves, and Symmetry

Investigation 3: Sessions 7-8

Putting Together and Taking Apart

Investigation 2: Sessions 1-4

How Long? How Far?

Investigation 2: Sessions 2-3

How Many Pockets? How Many Teeth?

Investigation 1: Sessions 1-5

Timelines and Rhythm Patterns

Investigation 2: Session 1

2.5.2 Evaluate results for reasonableness.

Students using *Investigations in Number, Data, and Space* determine the reasonableness of results throughout the curriculum as they perform the activities in the sessions for each investigation. The Dialogue Box is a feature that appears with many investigations and contains the text of discussions between teachers and students in which the teacher encourages students to describe their solution processes and assert the reasonableness of their results.

Sample References:

Mathematical Thinking at Grade 2

Investigation 4: Session 5

Coins, Coupons, and Combinations

Investigation 1: Session 1

Does It Walk, Crawl, or Swim?

Investigation 2: Sessions 1-2

Shapes, Halves, and Symmetry

Investigation 2: Session 6

Putting Together and Taking Apart

Investigation 5: Session 1

How Long? How Far?

Investigation 1: Sessions 2-4

How Many Pockets? How Many Teeth?

Investigation 2: Sessions 4-5

Timelines and Rhythm Patterns

Investigation 1: Session 3

2.5.3 Evaluate conclusions using evidence.

Students using *Investigations in Number, Data, and Space* use models, facts, and relationships to evaluate conclusions throughout the curriculum. For example, students use play coins to explore counting and money. They use the 100 Chart to explore patterns and solve problems. They use Venn diagrams to represent attributes and sort objects. They explore geometric relationships, including symmetry. They examine the relationship between addition and subtraction. They use *Geo-Logo* on the computer to model shapes, pictures, paths, and mazes. They create models to represent numerical data. They use timelines to represent the occurrence of events over time and to show the relationship between these events and when they occurred.

Sample References:

- Mathematical Thinking at Grade 2
 - Investigation 4: Session 2
- Coins, Coupons, and Combinations
 - Investigation 4: Sessions 1-4
- Does It Walk, Crawl, or Swim?
 - Investigation 1: Session 6
- Shapes, Halves, and Symmetry
 - Investigation 4: Sessions 1-7
- Putting Together and Taking Apart
 - Investigation 1: Sessions 1-2
- How Long? How Far?
 - Investigation 2: Sessions 1-8
- How Many Pockets? How Many Teeth?
 - Investigation 1: Sessions 2-3
- Timelines and Rhythm Patterns
 - Investigation 1: Sessions 1-6

EALR 3 The student communicates knowledge and understanding in both everyday and mathematical language.

Component 3.1: Gather Information

3.1.1 Apply a simple plan for collecting information for a given purpose, which requires using number sense, measurement, geometric sense, or statistics.

References:

- Mathematical Thinking at Grade 2
 - Investigation 2: Session 6
 - Investigation 5: Sessions 1-6
- Coins, Coupons, and Combinations
 - Investigation 1: Session 11
 - Investigation 2: Sessions 2, 4-5, 10
- Does It Walk, Crawl, or Swim?
 - Investigation 1: Sessions 1-6
 - Investigation 2: Sessions 1-4
 - Investigation 3: Sessions 1-3
 - Investigation 4: Sessions 1-3
- How Many Pockets? How Many Teeth?
 - Investigation 1: Sessions 1-5
 - Investigation 2: Sessions 1-6
 - Investigation 3: Sessions 1-5

Timelines and Rhythm Patterns

Investigation 1: Sessions 1-6

All Units: Appendix: About Classroom Routines: How Many Pockets?

3.1.2 Analyze mathematical information for a given purpose requiring number sense, measurement, geometric sense, or statistics, from one or two different sources using reading, listening, and observation.

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). The investigations around which the curriculum is organized involve reading, listening, and observing on a daily basis. For example, students collect data by observing the number of pockets their classmates are wearing, and they read and listen to story problems involving combining, separating, and comparing; they analyze the information so that they can draw conclusions from the data and solve the problems.

Sample References:

Mathematical Thinking at Grade 2

Investigation 5: Sessions 1-6

Coins, Coupons, and Combinations

Investigation 4: Session 5

Does It Walk, Crawl, or Swim?

Investigation 3: Sessions 1-3

Shapes, Halves, and Symmetry

Investigation 1: Sessions 1-8

Putting Together and Taking Apart

Investigation 5: Sessions 1-8

How Long? How Far?

Investigation 1: Sessions 1-8

How Many Pockets? How Many Teeth?

Investigation 2: Sessions 1-6

Timelines and Rhythm Patterns

Investigation 1: Sessions 1-6

Component 3.2: Organize and Interpret Information
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3.2.1 Understand how to organize and interpret numerical, measurement, geometric or statistical information for a given purpose in at least one way (reflecting, verbalizing, discussing, or writing).

Grade 2 students using *Investigations in Number, Data, and Space* organize information in charts and graphs. They interpret the information in these displays by reflecting, verbalizing, discussing, and writing.

References:

- Mathematical Thinking at Grade 2
 - Investigation 5: Sessions 1-2
- Does It Walk, Crawl, or Swim?
 - Investigation 1: Sessions 1-2
 - Investigation 4: Sessions 2-3
- How Long? How Far?
 - Investigation 2: Sessions 6-8
- How Many Pockets? How Many Teeth?
 - Investigation 1: Sessions 2-3
 - Investigation 2: Sessions 3-6
 - Investigation 3: Session 5

Component 3.3: Represent and Share Information

3.3.1 Understand how to express ideas involving number sense, measurement, geometric sense, or statistics, using mathematical language and notation.

Grade 2 students using *Investigations in Number, Data, and Space* use mathematical language and notation to express ideas involving number sense, measurement, geometric sense, and statistics throughout the course. For example, students use the equal sign and operational symbols for addition and subtraction to write number sentences, and they use symbols to represent rhythm patterns.

Sample References:

- Mathematical Thinking at Grade 2
 - Investigation 2: Session 8
- Coins, Coupons, and Combinations
 - Investigation 3: Session 2
- Does It Walk, Crawl, or Swim?
 - Investigation 4: Sessions 2-3
- Shapes, Halves, and Symmetry
 - Investigation 3: Sessions 1-2, page 76
- Putting Together and Taking Apart
 - Investigation 3: Sessions 3-5: Teacher Note, page 85
- How Long? How Far?
 - Investigation 1: Session 8
- How Many Pockets? How Many Teeth?
 - Investigation 2: Sessions 4-5
- Timelines and Rhythm Patterns
 - Investigation 2: Sessions 2-3

3.3.2 Understand how to represent numerical, measurement, geometric, or statistical ideas and information to familiar people for a real-world purpose.

Grade 2 students using *Investigations in Number, Data, and Space* represent ideas and information to familiar people when they conduct surveys of family and community members. Students are given homework assignments which often include the involvement of one or more family members, and they bring home family letters for each unit describing the activities the child will be participating in, and the mathematics the child will be learning, for each unit.

Sample References:

Mathematical Thinking at Grade 2

Investigation 2: Session 1: Homework, page 25

Coins, Coupons, and Combinations

Investigation 1: Session 10: Homework, page 47

Does It Walk, Crawl, or Swim?

Investigation 4: Session 1, page 75

Shapes, Halves, and Symmetry

Investigation 1: Session 1, page 11

Putting Together and Taking Apart

Investigation 3: Session 2: Homework, page 78

How Long? How Far?

Investigation 1: Sessions 5-7: Homework, page 36

How Many Pockets? How Many Teeth?

Investigation 3: Sessions 2-4: Homework, page 7

Timelines and Rhythm Patterns

Investigation 1: Sessions 4-5: Homework, page 27

EALR 4: The student understands how mathematical ideas connect within mathematics, other subject areas, and real-world situations.**Component 4.1: Relate Concepts and Procedures within Mathematics****4.1.1 Apply concepts and procedures from two of the content strands (number sense, measurement, geometric sense, or statistics) in a given problem or situation.**

Each unit of study in *Investigations in Number, Data, and Space* is organized to enable students to recognize and use connections among mathematical ideas. The titles of each of these units are listed in the Sample References below. The Investigations within each of these units and the Sessions within each Investigation involve students directly experiencing the connections between the mathematical ideas presented in each unit. For example, in *Mathematical Thinking at Grade 2*, one investigation relates the concept of number to the concepts of data collection, time measurement, and arithmetic operations. Recurring features at all grade levels of the series, including About Classroom Routines and software applications, allow teachers opportunities to integrate all of the units of study with a common thread.

Sample References:

Mathematical Thinking at Grade 2

Investigation 2: Sessions 1-8

Coins, Coupons, and Combinations

Investigation 1: Sessions 1-11

Does It Walk, Crawl, or Swim?

Investigation 1: Sessions 1-6

Shapes, Halves, and Symmetry

Investigation 2: Sessions 1-6

Putting Together and Taking Apart

Investigation 5: Sessions 1-8

How Long? How Far?

Investigation 2: Sessions 1-8

How Many Pockets? How Many Teeth?

Investigation 1: Sessions 1-5

Timelines and Rhythm Patterns

Investigation 1: Sessions 1-6

4.1.2 Analyze mathematical models and representations to determine equivalence in familiar situations from number sense, measurement, geometric sense, or statistics.

Grade 2 students using *Investigations in Number, Data, and Space* analyze mathematical models and representations to determine equivalence in familiar situations throughout the course as they use physical materials, models, pictures, and writing to represent equivalent mathematical ideas. Students use number cubes, dot cubes, square color tiles, hundred charts, balances, pattern blocks, buttons, coins, counters, attribute logic blocks, geoblocks, tetrominoes, and snap cubes to model numbers, operations, patterns, and problem situations. They create graphs, charts, drawings, and tables to represent and solve problems. They draw pictures and write number phrases and sentences to model the solution to a problem.

Sample References:

Mathematical Thinking at Grade 2

Investigation 2: Sessions 4-5

Coins, Coupons, and Combinations

Investigation 2: Session 6

Does It Walk, Crawl, or Swim?

Investigation 4: Sessions 1-3

Shapes, Halves, and Symmetry

Investigation 1: Sessions 6-8

Putting Together and Taking Apart

Investigation 2: Sessions 5-6

How Long? How Far?

Investigation 2: Sessions 2-3

How Many Pockets? How Many Teeth?

Investigation 2: Sessions 1-2

Timelines and Rhythm Patterns

Investigation 2: Sessions 2-3

Component 4.2: Relate Mathematical Concepts Procedures to Other Disciplines
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4.2.1 Analyze the concepts, strategies, and procedures from other disciplines to recognize mathematical patterns and concepts in familiar situations.

Grade 2 students using *Investigations in Number, Data, and Space* analyze the concepts, strategies, and procedures from other disciplines to recognize mathematical patterns and concepts in familiar situations throughout the course. For example, students employ the scientific method of research and experimentation as they sort objects that sink or float.

Sample References:

Mathematical Thinking at Grade 2

Investigation 2: Session 7

Coins, Coupons, and Combinations

Investigation 1: Sessions 4-5

Does It Walk, Crawl, or Swim?

Investigation 2: Sessions 3-4

Shapes, Halves, and Symmetry

Investigation 4: Sessions 5-7

Putting Together and Taking Apart

Investigation 2: Sessions 5-6

How Long? How Far?

Investigation 2: Sessions 2-3

How Many Pockets? How Many Teeth?

Investigation 3: Sessions 1-5

Timelines and Rhythm Patterns

Investigation 2: Session 5

4.2.2 Apply mathematical thinking and modeling in other disciplines.

Grade 2 students using *Investigations in Number, Data, and Space* apply mathematical thinking and modeling in other disciplines throughout the course. For example, students describe uses of numbers both within and also outside mathematics.

Sample References:

Mathematical Thinking at Grade 2

Investigation 2: Session 1, page 25

Coins, Coupons, and Combinations

Investigation 2: Sessions 7-9

Does It Walk, Crawl, or Swim?

Investigation 3: Session 1

Shapes, Halves, and Symmetry

Investigation 1: Sessions 6-8

Putting Together and Taking Apart

Investigation 4: Sessions 1-4

How Long? How Far?

Investigation 2: Session 1

How Many Pockets? How Many Teeth?

Investigation 2: Sessions 1-6

Timelines and Rhythm Patterns

Investigation 1: Session 6

4.2.3 Understand the importance of contributions to the development of mathematics such as the contributions of women, men, and different cultures.

Grade 2 students using *Investigations in Number, Data, and Space* are exposed to the contributions of different cultures as they share designs of flags of countries around the world as examples of fractional parts. Tips for Linguistically Diverse Classrooms enable children from other cultures and countries with limited proficiency in English to enhance their participation in classroom activities and discussions. Students are exposed to children's literature of which the authors and illustrators are men and women from various cultures.

Sample References:

Mathematical Thinking at Grade 2

Investigation 2: Sessions 4-5

Coins, Coupons, and Combinations

Investigation 1: Sessions 4-5, page 22

Does It Walk, Crawl, or Swim?

Investigation 1: Sessions 4-5, pages 23-24

Investigation 4: Session 1: pages 72-73

Shapes, Halves, and Symmetry

Page I-21

Investigation 3: Session 6

Putting Together and Taking Apart

Investigation 1: Session 2, page 21

How Long? How Far?

Investigation 2: Session 1, page 49

How Many Pockets? How Many Teeth?

Investigation 2: Sessions 1-2: Teacher Note, page 38

Timelines and Rhythm Patterns

Investigation 1: Sessions 1-2, page 5

Investigation 1: Sessions 4-5, page 27

Component 4.3: Relate Mathematical Concepts and Procedures to Real-World Situations**4.3.1 Understand how mathematics is used in everyday life.**

Grade 2 students using *Investigations in Number, Data, and Space* apply mathematics in everyday situations throughout the course as they perform the investigations on which the curriculum is based. In one session, students construct timelines of their lives and of “a special day.” In addition to the following sample references, every unit of study concludes with a section entitled, “About Classroom Routines.” The pages in this section include suggestions for applying mathematical concepts and skills to everyday situations in the classroom. Students keep track of the number of days they have been in school, they collect data on how many pockets students are wearing on a given day, and they investigate concepts of time, including schedules, clock time, timelines, and duration of units of time.

Sample References:

Mathematical Thinking at Grade 2

Investigation 5: Sessions 1-6

Coins, Coupons, and Combinations

Investigation 3: Sessions 1-5

Does It Walk, Crawl, or Swim?

Investigation 4: Sessions 1-3

Shapes, Halves, and Symmetry

Investigation 1: Session 1

Putting Together and Taking Apart

Investigation 1: Sessions 1-6

How Long? How Far?

Investigation 1: Session 8

How Many Pockets? How Many Teeth?

Investigation 3: Sessions 1-5

Timelines and Rhythm Patterns

Investigation 1: Session 3

4.3.2 Understand how mathematics is used in career settings.

Grade 2 students using *Investigations in Number, Data, and Space* learn about and practice the thinking and problem-solving approaches of mathematicians and scientists. They learn about the need for representing three-dimensional objects using a two-dimensional drawing, as in a blueprint. They read children’s literature with mathematical themes.

Sample References:

Mathematical Thinking at Grade 2

Investigation 2: Session 8

Coins, Coupons, and Combinations

Investigation 1: Session 1, page 9

Does It Walk, Crawl, or Swim?

Investigation 1: Sessions 1-2, page 5

Shapes, Halves, and Symmetry

Investigation 1: Sessions 2-3: Teacher Note, page 23

Putting Together and Taking Apart

Investigation 1, page 9

How Long? How Far?

Investigation 2: Session 1, page 48

How Many Pockets? How Many Teeth?

Investigation 1: Session 1, page 5

Timelines and Rhythm Patterns

Investigation 1: Sessions 1-2, page 5

Investigation 1: Sessions 4-5, page 27

**Investigations in Number, Data, and Space
to the
Washington Grade Level Content Expectations—EALR’s**

Grade Three

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.1: Understand and apply concepts and procedures from number sense - number, numeration, computation, and estimation.

Number and Numeration

1.1.1 Understand the concepts of whole numbers.

- **Represent a number to at least 1,000 in different ways (e.g., words, numerals, pictures, physical models).**

Grade 3 students using *Investigations in Number, Data, and Space* represent numbers using physical models, pictures, words, and numerals, including numerical expressions generated by the decomposition of numbers and properties of numbers and operations.

Sample References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1-2

Investigation 3: Sessions 3-4

Investigation 4: Session 2

Ten-Minute Math: Calendar Math

Things That Come in Groups

Investigation 1: Session 2

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-2

Flips, Turns, and Area

Investigation 2: Sessions 1-5

Ten-Minute Math: Broken Calculator

Fair Shares

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-3

Landmarks in the Hundreds
Investigation 1: Sessions 1-7
Investigation 2: Sessions 1-6
Investigation 3: Session 1
Ten-Minute Math: Calendar Math
Up and Down the Number Line
Investigation 1: Sessions 3-4, 6-7

- **Translate from one representation of a whole number to another in standard, expanded, and word forms. [SR, CU, RL, MC]**

Grade 3 students using *Investigations in Number, Data, and Space* identify and use equivalent representations of numbers using manipulatives, symbols, words, and pictorial models, including decomposition of numbers and properties of numbers and operations.

Sample References:

Mathematical Thinking at Grade 3
Investigation 2: Sessions 1-2
Investigation 3: Sessions 3-4
Investigation 4: Session 2
Ten-Minute Math: Calendar Math
Things That Come in Groups
Investigation 1: Session 2
Investigation 3: Sessions 1-5
Investigation 4: Sessions 1-2
Flips, Turns, and Area
Investigation 2: Sessions 1-5
Ten-Minute Math: Broken Calculator
Fair Shares
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-3
Landmarks in the Hundreds
Investigation 1: Sessions 1-7
Investigation 2: Sessions 1-6
Investigation 3: Session 1
Ten-Minute Math: Calendar Math
Up and Down the Number Line
Investigation 1: Sessions 3-4, 6-7

- **Read and write numbers to at least 100,000.**

References:

Mathematical Thinking at Grade 3
Investigation 1: Sessions 1-3
Investigation 4: Session 2
Landmarks in the Hundreds
Investigation 2: Sessions 1-3
Investigation 3: Session 1
Ten-Minute Math: Counting Around the Class
Flips, Turns, and Area
Ten-Minute Math: Broken Calculator
Combining and Comparing
Investigation 4: Sessions 3-4
Fair Shares
Investigation 3: Sessions 1-2
Ten-Minute Math: Broken Calculator

- **Generate equivalent representations for a given number by decomposing and composing.**

References:

Mathematical Thinking at Grade 3
Investigation 2: Sessions 1-2
Investigation 3: Sessions 3-4
Investigation 4: Session 2
Ten-Minute Math: Calendar Math
Things That Come in Groups
Investigation 1: Session 2
Investigation 3: Sessions 1-5
Investigation 4: Sessions 1-2
Flips, Turns, and Area
Investigation 2: Sessions 1-5
Ten-Minute Math: Broken Calculator
Landmarks in the Hundreds
Investigation 1: Sessions 1-7
Investigation 2: Sessions 1-6
Investigation 3: Session 1
Ten-Minute Math: Calendar Math
Up and Down the Number Line
Investigation 1: Sessions 3-4, 6-7

- **Represent the place value of a number in multiple ways using physical models and pictures.**

Grade 3 students using *Investigations in Number, Data, and Space* explore concepts of place value as they construct and investigate patterns on hundred and thousand charts. They learn the significance of the decimal point and examine decimal place value in relation to the calculator and problems involving money. Counting by tens and hundreds supports students' familiarity with the base-ten system.

References:

Mathematical Thinking at Grade 3

Investigation 1: Sessions 1-3

Investigation 4: Session 2

Landmarks in the Hundreds

Investigation 2: Sessions 1-3

Investigation 3: Session 1

Ten-Minute Math: Counting Around the Class

Combining and Comparing

Investigation 4: Sessions 3-4

1.1.2 Understand relative values of whole numbers.

- **Compare whole number values to at least 1,000,000 using the symbols for "greater than", "less than", and "equal to".**

References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 3-4

Combining and Comparing

Investigation 1: Sessions 1-2

Investigation 4: Session 2

- **Order 3 or more numbers to at least 1,000,000 from smallest to largest.**

References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 3-4

Combining and Comparing

Investigation 4: Session 1

1.1.3 Understand the commutative, associative, and identity properties of addition on whole numbers.

- **Describe how the commutative property works with addition and not subtraction, using models. [RL, CU]**

References:

Mathematical Thinking in Grade 3

Investigation 2: Session 1: Teacher Note, pages 22-23

Investigation 2: Session 2

Up and Down the Number Line

Investigation 1: Sessions 1-8

- **Describe how the identity property works with both addition and subtraction using pictures. [RL, CU]**

References:

Mathematical Thinking in Grade 3

Investigation 2: Session 1: Teacher Note, pages 22-23

Investigation 2: Session 2

Up and Down the Number Line

Investigation 1: Sessions 1-8

- **Evaluate simple equations as true or false and explain based on any of the properties (e.g., $14 + (62 + 38) = (14 + 62) + 38$). [RL]**

References:

Mathematical Thinking in Grade 3

Investigation 2: Session 1: Teacher Note, pages 22-23

Investigation 2: Session 2

Up and Down the Number Line

Investigation 1: Sessions 1-8

1.1.5 Understand the meaning of multiplication and division of whole numbers.

- **Illustrate multiplication and division using models and diagrams.**

References:

Things That Come in Groups

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-4

Ten-Minute Math: Counting Around the Class

Landmarks in the Hundreds

Investigation 1: Sessions 1-7

Investigation 2: Sessions 1-6

Ten-Minute Math: Counting Around the Class

- **Illustrate and explain the inverse relationship between multiplication and division using physical diagrams, words, and symbols (e.g., arrays, fact families).**

References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 3-4

Things That Come in Groups

Investigation 1: Session 3: Dialogue Box, page 15

Investigation 4: Sessions 1-4

- **Describe and compare strategies to solve problems involving multiplication and division (e.g., alternative algorithms, decomposition, properties of multiplication). [CU, RL]**

References:

Things That Come in Groups

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-4

Ten-Minute Math: Counting Around the Class

Landmarks in the Hundreds

Investigation 1: Sessions 1-7

Investigation 2: Sessions 1-6

Ten-Minute Math: Counting Around the Class

Computation

1.1.6 Understand and apply procedures for addition and subtraction on whole numbers with fluency.

- **Describe and compare strategies to solve three-digit addition and subtraction problems (e.g., child developed algorithms, decomposition). [SP, RL, CU, MC]**

References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 3-4

Investigation 4: Session 1

Ten-Minute Math: Calendar Math

Up and Down the Number Line

Investigation 1: Sessions 1-8

Combining and Comparing

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-3

Ten-Minute Math: Estimation and Number Sense

- **Use joining, separating, adding-on, and finding the difference to solve problems.**

References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 3-4

Investigation 4: Session 1

Ten-Minute Math: Calendar Math

Up and Down the Number Line

Investigation 1: Sessions 1-8

Combining and Comparing

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-3

- **Write and solve multi-step problem situations that involve addition and subtraction. [SP, RL, CU, MC]**

References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 3-4

Investigation 4: Session 1

Ten-Minute Math: Calendar Math

Up and Down the Number Line

Investigation 1: Sessions 1-8

Combining and Comparing

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-3

1.1.7 Apply strategies for mental arithmetic, pencil and paper, or calculator as appropriate to the task involving addition and subtraction of whole numbers.

- **Use appropriate strategies and tools from among mental computation, estimation, calculators, and paper and pencil to compute in a problem situation.**

References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 3-4

Investigation 4: Sessions 1-2

Ten-Minute Math: Calendar Math

Things That Come in Groups

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-4

Ten-Minute Math: Counting Around the Class

Landmarks in the Hundreds

Investigation 1: Sessions 1-7

Investigation 2: Sessions 1-6

Ten-Minute Math: Counting Around the Class

Up and Down the Number Line

Investigation 1: Sessions 1-8

Combining and Comparing

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-4

Investigation 5: Sessions 1-3

1.1.8 Understand situations in which estimation is appropriate and apply estimation strategies to determine the reasonableness of answers involving addition and subtraction of whole numbers.

- **Describe and justify reasonableness of an estimate in computation.**

References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 3-4, page 60

From Paces to Feet

Ten-Minute Math: Estimation and Number Sense

Up and Down the Number Line

Ten-Minute Math: Estimation and Number Sense

Combining and Comparing

Investigation 3: Sessions 1-2

Ten-Minute Math: Estimation and Number Sense

- **Defend situations in which estimation is sufficient (e.g., grocery shopping, lunch count, party supplies).**

References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 3-4, page 60

From Paces to Feet

Ten-Minute Math: Estimation and Number Sense

Landmarks in the Hundreds

Investigation 2: Sessions 5-6: Extension, page 49

Investigation 3: Sessions 2-3

Up and Down the Number Line

Ten-Minute Math: Estimation and Number Sense

Combining and Comparing

Investigation 3: Sessions 1-2

Ten-Minute Math: Estimation and Number Sense

- **Use a variety of estimation strategies (e.g., multiples of 10 and 100, rounding, front-end estimation, compatible numbers, clustering).**

References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 3-4, page 60

From Paces to Feet

Ten-Minute Math: Estimation and Number Sense

Landmarks in the Hundreds

Investigation 2: Sessions 5-6: Extension, page 49

Investigation 3: Sessions 2-3

Up and Down the Number Line

Ten-Minute Math: Estimation and Number Sense

Combining and Comparing

Investigation 3: Sessions 1-2

Ten-Minute Math: Estimation and Number Sense

Component 1.2: Understand and apply concepts and procedures from measurement.
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Attributes and Units

1.2.1 Understand the attributes of length, perimeter, time, weight, and temperature.

- **Describe the different measures of the hour and minute hand of a clock. [CU]**
Grade 3 students using *Investigations in Number, Data, and Space* plan the activities for a party that will begin at 5:00 PM and end at 7:00 PM. Students give the starting time and duration for each activity.
Reference:
Combining and Comparing
Investigation 3: Session 3
- **Given an object, name the attributes that can be measured. [CU, MC]**
References:
From Paces to Feet
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-3
Combining and Comparing
Investigation 3: Sessions 1-2
Turtle Paths
Investigation 2: Sessions 1-2
Ten-Minute Math: Lengths and Perimeters
- **Identify temperature on thermometers with different scales (e.g., increments of 1, 2, 5, or 10 degrees).**
There are no specific references to temperature scales or thermometers in the third grade series.
- **Explain purposes for linear measurements. [CU]**
References:
From Paces to Feet
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-3
Combining and Comparing
Investigation 3: Sessions 1-2

Turtle Paths

Investigation 2: Sessions 5-6

Investigation 3: Sessions 1-2

Ten-Minute Math: Lengths and Perimeters

- **Place objects in order based on their weight.**

Grade 3 students using *Investigations in Number, Data, and Space* use nonstandard units with a pan balance to weigh and compare objects.

References:

Combining and Comparing

Investigation 2: Sessions 1-2

1.2.2 Understand and apply standard units to measure the attributes of length, perimeter, time, weight, and temperature.

- **Given an attribute, identify an appropriate unit of measurement.**

References:

From Paces to Feet

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-3

Combining and Comparing

Investigation 3: Sessions 1-2

Turtle Paths

Investigation 2: Sessions 1-2

- **Measure objects and compare measurements using standard units.**

References:

From Paces to Feet

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-3

Combining and Comparing

Investigation 3: Sessions 1-2

Turtle Paths

Investigation 2: Sessions 1-2

1.2.3 Apply appropriate tools to measure the attributes of length, perimeter, time, weight, and temperature.

- **Select an appropriate tool to measure and justify the choice.**

References :

From Paces to Feet

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-3

Combining and Comparing

Investigation 3: Sessions 1-2

Turtle Paths

Investigation 2: Sessions 1-2

- **Name and use appropriate tools for measuring length, perimeter, time, weight, and temperature.**

References :

From Paces to Feet

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-3

Combining and Comparing

Investigation 3: Sessions 1-2

Turtle Paths

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-2, 6-7

Ten-Minute Math: Lengths and Perimeters

- **Measure perimeter for regular and irregular shapes with standards units (e.g., centimeters, inches, etc.).**

References:

Turtle Paths

Investigation 3: Sessions 1-2, 6-7

Ten-Minute Math: Lengths and Perimeters

- **Tell time on an analog clock.**

Grade 3 students using *Investigations in Number, Data, and Space* plan the activities for a party that will begin at 5:00 PM and end at 7:00 PM. Students give the starting time and duration for each activity.

Reference:

Combining and Comparing

Investigation 3: Session 3

- **Weigh objects using a variety of tools (e.g., balance scales, calibrated scales).**

References:

Combining and Comparing
Investigation 2: Sessions 1-2

Procedures, Precision, and Estimation

1.2.4 Apply the measurement procedure to measure the attributes of length, perimeter, time, weight, and temperature.

- **Determine the attribute to be measured.**

References:

From Paces to Feet
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-3
Combining and Comparing
Investigation 3: Sessions 1-2
Turtle Paths
Investigation 2: Sessions 1-2

- **Determine the appropriate unit to measure the attribute.**

References:

From Paces to Feet
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-3
Combining and Comparing
Investigation 3: Sessions 1-2
Turtle Paths
Investigation 2: Sessions 1-2

- **Select an appropriate tool according to the unit chosen.**

References :

From Paces to Feet
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-3

Combining and Comparing
Investigation 3: Sessions 1-2
Turtle Paths
Investigation 2: Sessions 1-2

- **Compare the object being measured with the units on the tools and record and label the units.**

References:

From Paces to Feet
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-3
Combining and Comparing
Investigation 3: Sessions 1-2
Turtle Paths
Investigation 2: Sessions 1-2

1.2.5 Understand the benefits of standard units of measurement.

- **Explain why standard units of measurement are more appropriate than nonstandard (e.g., there are different sized hands/feet/paperclips). [RL, CU, MC]**

References:

From Paces to Feet
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-3
Combining and Comparing
Investigation 3: Sessions 1-2
Turtle Paths
Investigation 2: Sessions 1-2

1.2.6 Understand when approximate measurements are sufficient and apply estimation strategies to obtain reasonable measurements of length, perimeter, time, weight, and temperature.

- **Identify situations when approximate measurements are sufficient.**

References:

From Paces to Feet
Investigation 1: Session 1-4

Combining and Comparing
Investigation 3: Sessions 1-2, p. 32
Turtle Paths
Investigation 2: Sessions 1-2, 4

- **Estimate a measurement using standard or nonstandard units (e.g., paper clips, inches, and minutes). [SP]**

References:

From Paces to Feet
Investigation 1: Session 1-4
Combining and Comparing
Investigation 3: Sessions 1-2, p. 32
Turtle Paths
Investigation 2: Sessions 1-2, 4

- **Use referents to standard units (e.g., width of pinkie finger is similar to a centimeter). [MC]**

References:

From Paces to Feet
Investigation 1: Sessions 5-6
Investigation 2: Session 1-4
Combining and Comparing
Investigation 3: Sessions 1-2, p. 32

- **Recognize when a measurement is approximate rather than exact (e.g., string vs. tape measure, paper clip vs. ruler). [RL]**

References:

From Paces to Feet
Investigation 1: Session 1-4
Combining and Comparing
Investigation 3: Sessions 1-2, p. 32
Turtle Paths
Investigation 2: Sessions 1-2, 4

- **Use estimation to justify reasonableness of a measurement (e.g., estimate length of a classroom by pacing it off, select temperature of an ice rink from a range of degrees). [RL]**

References:

From Paces to Feet
Investigation 1: Session 1-4
Combining and Comparing
Investigation 3: Sessions 1-2, p. 32
Turtle Paths
Investigation 2: Sessions 1-2, 4

Component 1.3: Understand and apply concepts and procedures from geometric sense.**Properties and Relationships****1.3.1 Understand the concept of congruence between 2-D shapes and figures.**

- **Identify, describe and compare congruent 2-D geometric figures. [SR, CU, MC]**

References:

Flips, Turns, and Area

Investigation 1: Sessions 1-5

Investigation 2: Sessions 1-5

Turtle Paths

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-7

- **Given a variety of figures, determine which figures are congruent.**

References:

Flips, Turns, and Area

Investigation 1: Sessions 1-3, 5

Investigation 2: Sessions 2-3

Turtle Paths

Investigation 2: Session 4: Teacher Note, pages 50-51

Investigation 3: Sessions 3-5

1.3.2 Understand and analyze attributes and properties of polygons.

- **Identify, name and describe the attributes and properties of polygons.**

References:

Flips, Turns, and Area

Investigation 1: Sessions 1-5

Investigation 2: Sessions 1-5

Turtle Paths

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-6

Investigation 3: Sessions 1-7

- **Sort polygons according to their attributes and properties. [RL]**
References:
Flips, Turns, and Area
 Investigation 1: Sessions 1-5
 Investigation 2: Sessions 1-5
Turtle Paths
 Investigation 1: Sessions 1-4
 Investigation 2: Sessions 1-6
 Investigation 3: Sessions 1-7
- **Identify the degree of each angle in a regular polygon.**
References:
Turtle Paths
 Investigation 2: Session 4
- **Given two polygons, explain how they are alike and different in terms of their attributes and properties (e.g., using a Venn diagram). [RL, CU]**
References:
Flips, Turns, and Area
 Investigation 1: Sessions 1-5
 Investigation 2: Sessions 1-5
Turtle Paths
 Investigation 1: Sessions 1-4
 Investigation 2: Sessions 1-6
 Investigation 3: Sessions 1-7

1.3.3 Understand the location of numbers on a positive number line.

- **Given directions for movement on a number line, identify the point of final destination using real-world examples (e.g., travel back and forth on a street, temperature variation at different times of the day, climbing up and down stairs). [SP, RL, MC]**
References:
Up and Down the Number Line
 Investigation 1: Sessions 1-8
 Investigation 2: Sessions 1-4
 Investigation 3: Sessions 1-3

- **Identify the interval on a given number line (e.g., recognize scale on a graph). [CU]**

References:

Up and Down the Number Line
Investigation 1: Sessions 1-8
Investigation 2: Sessions 1-4
Investigation 3: Sessions 1-3

Component 1.4: Understand and apply concepts and procedures from probability and statistics.**Statistics****1.4.3 Understand how to organize, display, and interpret data in tables, tally charts, line plots, or bar graphs.**

- **Create simple bar graphs including labels for title, both axes, scale units (e.g.,**

References:

Mathematical Thinking at Grade 3
Investigation 3: Sessions 1-2
From Paces to Feet
Investigation 2: Session 2
Combining and Comparing
Ten-Minute Math: Exploring Data

- **Interpret graphs for comparative information (e.g., find the difference in selected data). [SP, CU, MC]**

References:

Mathematical Thinking at Grade 3
Investigation 3: Sessions 1-2
From Paces to Feet
Investigation 2: Session 2
Combining and Comparing
Ten-Minute Math: Exploring Data

1.4.5 Understand how to pose questions and collect data about self and one's surroundings.

- **Make a simple survey and collect data (e.g., use tally marks, make a table). [CU]**

References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1-4

From Paces to Feet

Investigation 1: Session 2

Investigation 3: Sessions 1-3

Combining and Comparing

Investigation 1: Sessions 1-3

Ten-Minute Math: Exploring Data

1.4.6 Analyze data appropriate to the grade level.

- **Pose questions that can be answered from a given graph. [CU, MC]**

References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1-2

From Paces to Feet

Investigation 2: Session 2

Combining and Comparing

Ten-Minute Math: Exploring Data

- **Interpret bar graphs for comparative information. [CU]**

References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1-2

From Paces to Feet

Investigation 2: Session 2

Combining and Comparing

Ten-Minute Math: Exploring Data

- **Make inferences based on the data and/or determine if the data can support inferences made. [CU, MC]**

References:

Mathematical Thinking at Grade 3

Investigation 1: Sessions 2-3

Investigation 3: Sessions 1-4

- Things That Come in Groups
 - Investigation 1: Session 1
 - Investigation 2: Sessions 1, 5-6
 - Investigation 5: Sessions 1-4
- From Paces to Feet
 - Investigation 1: Sessions 1-2, 5-6
 - Investigation 2: Sessions 2-7
 - Investigation 3: Sessions 1-3
 - Investigation 4: Sessions 1-3
- Landmarks in the Hundreds
 - Investigation 1: Sessions 2-3, 6-7
 - Investigation 2: Sessions 1-3
 - Investigation 3: Session 1
- Up and Down the Number Line
 - Investigation 1: Sessions 1-2, 8
 - Investigation 2: Sessions 1-4
- Combining and Comparing
 - Investigation 1: Session 3
 - Investigation 4: Session 1
- Ten-Minute Math: Exploring Data
- Fair Shares
 - Investigation 2: Sessions 5-6

Component 1.5: Understand and apply concepts and procedures from algebraic sense.

Patterns and Representations

1.5.1 Understand rules for number patterns, shapes, and objects based on addition or subtraction between terms.

- **Recognize, extend, and describe numerical patterns (e.g., skip counting, 100 chart, multiplication table). [CU]**

References:

- Mathematical Thinking at Grade 3
 - Investigation 1: Sessions 2-3
 - Investigation 2: Sessions 5-7
- Things That Come in Groups
 - Investigation 2: Sessions 1-6
 - Investigation 5: Session 1
- Ten-Minute Math: Counting Around the Class

Landmarks in the Hundreds

Investigation 1: Sessions 1-5

Investigation 2: Sessions 5-6: Teacher Note, page 49

Ten-Minute Math: Counting Around the Class

Fair Shares

Investigation 2: Sessions 5-6

- **Describe the pattern in a number sequence (e.g., Guess My Rule, Function Machine). [CU]**

References:

Mathematical Thinking at Grade 3

Investigation 1: Sessions 2-3

Investigation 2: Sessions 5-7

Things That Come in Groups

Investigation 2: Sessions 1-6

Investigation 5: Session 1

Ten-Minute Math: Counting Around the Class

Landmarks in the Hundreds

Investigation 1: Sessions 1-5

Investigation 2: Sessions 5-6: Teacher Note, page 49

Ten-Minute Math: Counting Around the Class

Fair Shares

Investigation 2: Sessions 5-6

- **Describe patterns of numbers, shapes and objects and represent them with tables or symbols. [CU]**

References:

Mathematical Thinking at Grade 3

Investigation 1: Sessions 2-3

Investigation 2: Sessions 5-7

Things That Come in Groups

Investigation 2: Sessions 1-6

Investigation 5: Session 1

Ten-Minute Math: Counting Around the Class

Landmarks in the Hundreds

Investigation 1: Sessions 1-5

Investigation 2: Sessions 5-6: Teacher Note, page 49

Ten-Minute Math: Counting Around the Class

Flips, Turns, and Area

Investigation 1: Sessions 1-3

Fair Shares

Investigation 2: Sessions 5-6

- **Identify the rule for a pattern based on a single operation (e.g., add 3).**

References:

Mathematical Thinking at Grade 3

Investigation 1: Sessions 2-3

Investigation 2: Sessions 5-7

Things That Come in Groups

Investigation 2: Sessions 1-6

Investigation 5: Session 1

Ten-Minute Math: Counting Around the Class

Landmarks in the Hundreds

Investigation 1: Sessions 1-5

Investigation 2: Sessions 5-6: Teacher Note, page 49

Ten-Minute Math: Counting Around the Class

Fair Shares

Investigation 2: Sessions 5-6

Symbols and Representations

1.5.2 Understand equations and inequalities that represent simple situations involving addition or subtraction.

- **Write an equation or expression for a given situation. (e.g., There are 23 children in a class. If 15 are present, how many are absent?). [SP]**

References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 3-4

Investigation 4: Sessions 1-2

Things That Come in Groups

Investigation 1: Sessions 2-4

Investigation 2: Sessions 3-4

Investigation 4: Sessions 1-4

Investigation 5: Session 2

Landmarks in the Hundreds

Investigation 1: Sessions 2-3, 6-7

Investigation 2: Sessions 5-6

Up and Down the Number Line

Investigation 1: Sessions 6-7

Combining and Comparing

Investigation 1: Sessions 1-3

Investigation 3: Session 3

- **Given an expression or equation using =, <, >, and ≠ symbols, identify and/or write a situation that represents it. [SP,CU,MC]**

References:

Things That Come in Groups

Investigation 1: Sessions 2-4

Investigation 4: Sessions 1-4

Up and Down the Number Line

Investigation 1: Sessions 1-8

Investigation 2: Sessions 1-4

Evaluating and Solving**1.5.3 Understand and apply the procedures for evaluating and solving one-step equations using addition and subtraction.**

- **Solve problems involving equality (e.g., $5 + 3 = \theta + 2$).**

References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 3-4

Investigation 4: Sessions 1-2

Things That Come in Groups

Investigation 1: Sessions 2-4

Investigation 2: Sessions 3-4

Investigation 4: Sessions 1-4

Investigation 5: Session 2

Landmarks in the Hundreds

Investigation 1: Sessions 2-3, 6-7

Investigation 2: Sessions 5-6

Up and Down the Number Line

Investigation 1: Sessions 6-7

Combining and Comparing

Investigation 1: Sessions 1-3

Investigation 3: Session 3

- **Write, solve, and explain simple mathematical statements (e.g., $7 + \theta > 8$ or $\theta + 8 = 10$). [CU]**

References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 3-4

Investigation 4: Sessions 1-2

Things That Come in Groups

Investigation 1: Sessions 2-4

Investigation 2: Sessions 3-4

Investigation 4: Sessions 1-4

Investigation 5: Session 2

Landmarks in the Hundreds

Investigation 1: Sessions 2-3, 6-7

Investigation 2: Sessions 5-6

Up and Down the Number Line

Investigation 1: Sessions 6-7

Combining and Comparing

Investigation 1: Sessions 1-3

Investigation 3: Session 3

EALR 2: The student uses mathematical reasoning to define and solve problems.

Component 2.1: Investigate and Analyze Situations

2.1.1 Analyze situations to determine known and unknown information in familiar situations.

Grade 3 students using *Investigations in Number, Data, and Space* gain experience and practice in solving problems involving missing information, including on-computer and off-computer activities to find missing lengths and turns.

References:

Up and Down the Number Line

Investigation 1: Sessions 6-7

Turtle Paths

Investigation 2: Sessions 5-6

2.1.2 Analyze situations to determine when information is missing or extraneous.

Grade 3 students using *Investigations in Number, Data, and Space* analyze situations to determine when information is missing or extraneous throughout the course.

Informational analysis is a fundamental component of the problem-solving process. For example, in one activity students collect, sort, classify, organize, and display information as they play a game called Guess My Rule.

Sample References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1-2

Things That Come in Groups

Investigation 5: Session 3

Flips, Turns, and Area

Investigation 1: Session 5

From Paces to Feet

Investigation 2: Session 2

Landmarks in the Hundreds

Investigation 2: Session 4

Up and Down the Number Line

Investigation 2: Session 4

Combining and Comparing

Investigation 1: Sessions 1-3

Turtle Paths

Investigation 3: Sessions 1-2

Fair Shares

Investigation 3: Session 3

Exploring Solids and Boxes

Investigation 2: Sessions 4-5

Component 2.2: Formulate Questions and Define the Problem
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2.2.1 Understand the problem to be solved involving number sense, measurement, geometric sense, and statistics.

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). As an example in the area of geometric sense, students investigate why certain tetrominoes can cover given rectangles, while others cannot, and make generalizations based on their explorations.

Sample References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1-2

Things That Come in Groups

Investigation 5: Session 3

Flips, Turns, and Area

Investigation 1: Session 5

From Paces to Feet

Investigation 2: Session 2

Landmarks in the Hundreds

Investigation 2: Session 4

Up and Down the Number Line

Investigation 2: Session 4

Combining and Comparing

Investigation 1: Sessions 1-3

Turtle Paths

Investigation 3: Sessions 1-2

Fair Shares

Investigation 3: Session 3

Exploring Solids and Boxes

Investigation 2: Sessions 4-5

2.2.2 Generate questions to be answered in familiar situations.

References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1-4

From Paces to Feet

Investigation 1: Session 2

Investigation 3: Sessions 1-3

Combining and Comparing

Investigation 1: Sessions 1-3

Ten-Minute Math: Exploring Data

Component 2.3: Construct Solutions

2.3.1 Apply a variety of strategies and approaches to problem situations from number sense, measurement, geometric sense, and statistics to construct a solution.

Grade 3 students using *Investigations in Number, Data, and Space* apply a variety of strategies and approaches to problems situations throughout the course. As is evident from the title of the series, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). For example, students learn to add integers by moving Up and Down the Number Line in a wide range of investigations and activities in that unit.

Sample References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 5-7

Things That Come in Groups

Investigation 1: Session 4

Flips, Turns, and Area

Investigation 1: Session 4

From Paces to Feet

Investigation 1: Sessions 5-6

Landmarks in the Hundreds

Investigation 1: Sessions 6-7

Up and Down the Number Line

Investigation 1: Session 8

- Combining and Comparing
 - Investigation 5: Sessions 2-3
- Turtle Paths
 - Investigation 1: Sessions 3-4
- Fair Shares
 - Investigation 1: Sessions 3-4
- Exploring Solids and Boxes
 - Investigation 3: Session 2

Component 2.4: Draw Conclusions

2.4.1 Understand how to make conjectures and support them with evidence.

Grade 3 students using *Investigations in Number, Data, and Space* make and support mathematical conjectures throughout the course by conducting the investigations into which the curriculum is organized; in fact, this is a fundamental emphasis of the series. For example, students form conjectures as to whether or not given tetrominoes will cover a rectangular region completely, and they support their conjectures with physical models.

Sample References:

- Mathematical Thinking at Grade 3
 - Investigation 2: Sessions 5-7
- Things That Come in Groups
 - Investigation 5: Session 3
- Flips, Turns, and Area
 - Investigation 1: Sessions 2-3
- From Paces to Feet
 - Investigation 1: Session 1
- Landmarks in the Hundreds
 - Investigation 1: Sessions 6-7
- Up and Down the Number Line
 - Investigation 2: Sessions 1-4
- Combining and Comparing
 - Investigation 4: Sessions 1-4
- Turtle Paths
 - Investigation 2: Sessions 1-2
- Fair Shares
 - Investigation 2: Session 3
- Exploring Solids and Boxes
 - Investigation 3: Session 2

2.4.2 Analyze solutions to draw conclusions and support them with evidence.

Grade 3 students using *Investigations in Number, Data, and Space* analyze solutions to draw conclusions and support them with evidence throughout the course. Students may use a variety of models and representations as evidence to support their conclusions, including different types of graphs, tables, and equations. For example, students use Handfuls of Beans as evidence to support their conclusions regarding counting and comparing.

Sample References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 3-4

Things That Come in Groups

Investigation 3: Sessions 1-3

Flips, Turns, and Area

Ten-Minute Math: Broken Calculator

From Paces to Feet

Investigation 1: Session 2

Landmarks in the Hundreds

Investigation 1: Sessions 1-3

Up and Down the Number Line

Investigation 2: Sessions 1-3

Combining and Comparing

Investigation 4: Session 1

Turtle Paths

Investigation 1: Sessions 3-4

Fair Shares

Investigation 3: Session 3

Exploring Solids and Boxes

Investigation 4: Session 1

Component 2.5: Evaluate and Verify Results**2.5.1 Evaluate strategies and procedures for accuracy and appropriateness.**

Grade 3 students using *Investigations in Number, Data, and Space* apply a variety of strategies and approaches to problems situations throughout the course. As is evident from the title of the series, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). For example, students develop their own strategies for using addition or subtraction to solve comparison problems, they investigate to verify that their strategies work, and they explain their strategies in writing.

Sample References:

Mathematical Thinking at Grade 3

Investigation 2: Session 2

Things That Come in Groups

Investigation 2: Session 1

Flips, Turns, and Area

Investigation 1: Session 5

From Paces to Feet

Investigation 1: Sessions 5-6

Landmarks in the Hundreds

Investigation 3: Session 1

Up and Down the Number Line

Investigation 1: Sessions 3-4

Combining and Comparing

Investigation 4: Sessions 1-2

Turtle Paths

Investigation 2: Sessions 5-6

Fair Shares

Investigation 3: Session 3

Exploring Solids and Boxes

Investigation 2: Session 3

2.5.2 Evaluate results for reasonableness.

Grade 3 students using *Investigations in Number, Data, and Space* evaluate the reasonableness of results throughout the curriculum as they perform the activities in the sessions for each investigation. The Dialogue Box is a feature that appears with many investigations and contains the text of discussions between teachers and students in which the teacher encourages students to describe their solution processes and assert the reasonableness of their results.

Sample References:

Mathematical Thinking at Grade 3

Investigation 4: Session 3

Things That Come in Groups

Investigation 2: Sessions 5-6

Flips, Turns, and Area

Investigation 2: Sessions 4-5

From Paces to Feet

Investigation 2: Session 2

Landmarks in the Hundreds

Investigation 2: Sessions 1-3

Up and Down the Number Line

Investigation 1: Sessions 1-2

Combining and Comparing

Investigation 1: Sessions 1-2

Turtle Paths

Investigation 2: Sessions 5-6

Fair Shares

Investigation 3: Sessions 1-2

Exploring Solids and Boxes

Investigation 3: Session 1

2.5.3 Evaluate conclusions using evidence.

Students in Grade 3 using *Investigations in Number, Data, and Space* evaluate conclusions using evidence throughout the course as they conduct and evaluate the investigations on which the curriculum is based. For example, students work together to decide on a “middle-sized pace,” based on an analysis of data collected in the classroom.

Sample References:

Mathematical Thinking at Grade 3

Investigation 1: Sessions 2-3

Things That Come in Groups

Investigation 2: Sessions 5-6

Flips, Turns, and Area

Investigation 1: Session 5

From Paces to Feet

Investigation 1: Sessions 5-6

Landmarks in the Hundreds

Investigation 3: Session 1

Up and Down the Number Line

Investigation 1: Sessions 3-4

Combining and Comparing

Investigation 5: Session 1

Turtle Paths

Investigation 3: Sessions 1-2

Fair Shares

Investigation 1: Sessions 1-2

Exploring Solids and Boxes

Investigation 2: Sessions 4-5

EALR 3 The student communicates knowledge and understanding in both everyday and mathematical language.

Component 3.1: Gather Information

3.1.1 Apply a simple plan for collecting information for a given purpose, which requires using number sense, measurement, geometric sense, or statistics.

Students in Grade 3 using *Investigations in Number, Data, and Space* apply a simple plan for collecting information for the purpose of solving problems throughout the

course; in fact, this is a fundamental emphasis of the series. For example, students collect information about a group of people; sort and classify information; count and compare sets of data; and use pictures, tables, and graphs to organize and display data to solve problems.

Sample References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1-2

Things That Come in Groups

Investigation 5: Session 3

Flips, Turns, and Area

Investigation 1: Session 5

From Paces to Feet

Investigation 2: Session 2

Landmarks in the Hundreds

Investigation 2: Session 4

Up and Down the Number Line

Investigation 2: Session 4

Combining and Comparing

Investigation 1: Sessions 1-3

Turtle Paths

Investigation 3: Sessions 1-2

Fair Shares

Investigation 3: Session 3

Exploring Solids and Boxes

Investigation 2: Sessions 4-5

3.1.2 Analyze mathematical information for a given purpose requiring number sense, measurement, geometric sense, or statistics, from one or two different sources using reading, listening, and observation.

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). The investigations around which the curriculum is organized involve reading, listening, and observing on a daily basis. For example, Grade 3 students analyze Hundred Charts and Thousand Charts, and use arrays and interlocking cubes, to explore number patterns and relationships.

Sample References:

Mathematical Thinking at Grade 3

Investigation 1: Sessions 2-3

Things That Come in Groups

Investigation 2: Sessions 5-6

Flips, Turns, and Area

Investigation 1: Session 1

From Paces to Feet

Investigation 1: Session 1

Landmarks in the Hundreds

Investigation 3: Sessions 1-3

Up and Down the Number Line

Investigation 1: Sessions 3-4

Combining and Comparing

Investigation 5: Sessions 1-3

Turtle Paths

Investigation 2: Sessions 5-6

Fair Shares

Investigation 2: Session 3

Exploring Solids and Boxes

Investigation 4: Session 2

Component 3.2: Organize and Interpret Information
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3.2.1 Understand how to organize and interpret numerical, measurement, geometric or statistical information for a given purpose in at least one way (reflecting, verbalizing, discussing, or writing).

Grade 3 students using *Investigations in Number, Data, and Space* organize information in charts and graphs. They interpret the information in these displays by reflecting, verbalizing, discussing, and writing.

References:

Mathematical Thinking at Grade 2

Investigation 5: Sessions 1-2

Does It Walk, Crawl, or Swim?

Investigation 1: Sessions 1-2

Investigation 4: Sessions 2-3

How Long? How Far?

Investigation 2: Sessions 6-8

How Many Pockets? How Many Teeth?

Investigation 1: Sessions 2-3

Investigation 2: Sessions 3-6

Investigation 3: Session 5

Component 3.3: Represent and Share Information**3.3.1 Understand how to express ideas involving number sense, measurement, geometric sense, or statistics, using mathematical language and notation.**

Students in Grades 3 using *Investigations in Number, Data, and Space* use mathematical language to express ideas precisely throughout the course. The Dialogue Box is a feature that appears with many investigations and contains the text of discussions between teachers and students in which the teacher encourages students to use the language of mathematics to express mathematical ideas precisely. Students use mathematical notation in a variety of situations. For example, students depict multiplication situations symbolically as mathematical expressions using multiplication and repeated addition.

Sample References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 3-4

Investigation 3: Sessions 3-4

Things That Come in Groups

Investigation 1: Session 2

Investigation 2: Session 2

Flips, Turns, and Area

Investigation 1: Session 5: Follow-Up, page 29

Investigation 2: Sessions 4-5

From Paces to Feet

Investigation 2: Sessions 3-4, 6-7

Landmarks in the Hundreds

Investigation 2: Sessions 5-6

Investigation 1: Sessions 4-5: Teacher Note, page 21

Up and Down the Number Line

Investigation 1: Sessions 3-4

Combining and Comparing

Investigation 1: Sessions 1-2: Activity: Close to 100

Investigation 5: Session 1

Turtle Paths

Investigation 1: Sessions 3-4

Investigation 2: Sessions 5-6

Fair Shares

Investigation 1: Sessions 1-2

Investigation 2: Session 3

Exploring Solids and Boxes

Investigation 1: Session 2

Investigation 4: Session 1

3.3.2 Understand how to represent numerical, measurement, geometric, or statistical ideas and information to familiar people for a real-world purpose.

Grade 3 students using *Investigations in Number, Data, and Space* represent ideas and information to familiar people when they conduct surveys of family and community members. Students are given homework assignments which often include the involvement of one or more family members, and they bring home family letters for each unit describing the activities the child will be participating in, and the mathematics the child will be learning, for each unit.

Sample References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 3-4: Follow-Up, page 64

Things That Come in Groups

Investigation 1: Session 1

Flips, Turns, and Area

Investigation 2: Sessions 2-3: Homework, page 45

From Paces to Feet

Investigation 2: Session 1: Homework, page 33

Landmarks in the Hundreds

Investigation 1: Sessions 4-5: Homework, page 20

Up and Down the Number Line

Investigation 1: Session 8: Homework, page 31

Combining and Comparing

Investigation 1: Sessions 1-2: Homework, page 7

Turtle Paths

Investigation 1: Session 1: Homework, page 10

Fair Shares

Investigation 2: Sessions 1-2: Homework, page 29

Exploring Solids and Boxes

Investigation 2: Session 3: Homework, page 23

EALR 4: The student understands how mathematical ideas connect within mathematics, other subject areas, and real-world situations.

Component 4.1: Relate Concepts and Procedures within Mathematics**4.1.1 Apply concepts and procedures from two of the content strands (number sense, measurement, geometric sense, or statistics) in a given problem or situation.**

Each unit of study in *Investigations in Number, Data, and Space* is organized to enable students to apply concepts and procedures from more than one content strand in a given problem or situation. Each Investigation involves students directly experiencing

the connections between the mathematical ideas presented in each unit. For example, in Grade 3, the following concepts are connected in Combining and Comparing: developing strategies for combining and comparing numbers, collecting and comparing data, numeration through hundreds and thousands, using measurement to combine heights and compare weights, adding amounts to make a sum of money, and exploring mathematical characteristics of the calendar. Recurring features throughout the curriculum, including Ten-Minute Math and software applications, allow teachers opportunities to integrate all of the units of study with a common thread.

Sample References:

Mathematical Thinking at Grade 3

Investigation 4: Sessions 1-3

Things That Come in Groups

Investigation 4: Sessions 1-2

Flips, Turns, and Area

Investigation 1: Sessions 1-5

From Paces to Feet

Investigation 1: Sessions 1-2

Landmarks in the Hundreds

Investigation 1: Sessions 2-3

Up and Down the Number Line

Investigation 1: Sessions 1-4

Combining and Comparing

Investigation 1: Session 3

Turtle Paths

Investigation 2: Session 3

Fair Shares

Investigation 1: Sessions 3-4

Exploring Solids and Boxes

Investigation 2: Sessions 1-5

4.1.2 Analyze mathematical models and representations to determine equivalence in familiar situations from number sense, measurement, geometric sense, or statistics.

Grade 3 students using *Investigations in Number, Data, and Space* analyze mathematical models and representations to determine equivalence in familiar situations throughout the course as they use physical materials, models, pictures, and writing to represent equivalent mathematical ideas. Students use a wide variety of manipulatives, including cubes, tiles, balances, pattern blocks, geoblocks, tetrominoes, and snap cubes to model numbers, operations, patterns, and problem situations. They create graphs, charts, drawings, and tables to organize, record, and communicate mathematical ideas. They write story problems, riddles, descriptions, and problem solutions.

Sample References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 3-4

Things That Come in Groups

Investigation 1: Session 2

Flips, Turns, and Area

Investigation 2: Sessions 2-3

From Paces to Feet

Investigation 4: Sessions 1-3

Landmarks in the Hundreds

Investigation 3: Session 1

Up and Down the Number Line

Investigation 1: Sessions 3-4

Combining and Comparing

Investigation 2: Sessions 1-2

Turtle Paths

Investigation 1: Sessions 3-4

Fair Shares

Investigation 1: Sessions 1-4

Exploring Solids and Boxes

Investigation 2: Sessions 1-2

Component 4.2: Relate Mathematical Concepts Procedures to Other Disciplines**4.2.1 Analyze the concepts, strategies, and procedures from other disciplines to recognize mathematical patterns and concepts in familiar situations.**

Students in Grades 3 using *Investigations in Number, Data, and Space* analyze the concepts, strategies, and procedures from other disciplines to recognize mathematical patterns and concepts in familiar situations throughout the course. For example, students apply statistical analysis to real-world data, apply computation strategies to solve real-world problems, measure objects in their immediate or larger environment, and describe objects in their environment in geometric terms.

Sample References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 5-7

Things That Come in Groups

Investigation 1: Session 4

Flips, Turns, and Area

Investigation 2: Sessions 4-5

From Paces to Feet

Investigation 3: Sessions 1-3

Landmarks in the Hundreds

Investigation 2: Session 4

Up and Down the Number Line
Investigation 1: Sessions 1-2
Combining and Comparing
Investigation 3: Sessions 1-3
Turtle Paths
Investigation 1: Session 1
Fair Shares
Investigation 1: Sessions 1-4

4.2.2 Apply mathematical thinking and modeling in other disciplines.

Grade 3 students using *Investigations in Number, Data, and Space* apply mathematical thinking and modeling to solve problems that arise in other disciplines throughout the course. For example, students apply statistical analysis to real-world data; they study economics, geography, and urban planning; they employ reading and writing to learn and express ideas; and they apply computation strategies to a science problem involving different numbers of legs on different species of animals.

Sample References:

Mathematical Thinking at Grade 3
Investigation 2: Sessions 5-7
Things That Come in Groups
Investigation 5: Session 2
Flips, Turns, and Area
Investigation 2: Sessions 4-5
From Paces to Feet
Investigation 1: Sessions 3-4
Landmarks in the Hundreds
Investigation 2: Session 4
Up and Down the Number Line
Investigation 3: Sessions 2-3
Combining and Comparing
Investigation 3: Sessions 1-3
Turtle Paths
Investigation 1: Sessions 3-4
Fair Shares
Investigation 3: Sessions 1-2
Exploring Solids and Boxes
Investigation 5: Sessions 1-4

4.2.3 Understand the importance of contributions to the development of mathematics such as the contributions of women, men, and different cultures.

Grade 3 students using *Investigations in Number, Data, and Space* are exposed to the contributions of women, men, and different cultures to the development of mathematics as they read literature written and illustrated by male and female authors with different

cultural backgrounds. They read a Liberian folktale with skip counting, research the history of measurement, and learn why the ancient Egyptians and Babylonians divided the circle into 360 degrees.

Sample References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1-2

Things That Come in Groups

Investigation 1: Session 4

Flips, Turns, and Area

Page I-15: Related Children's Literature

From Paces to Feet

Investigation 2: Session 1

Landmarks in the Hundreds

Investigation 1: Session 1, page 4

Up and Down the Number Line

Investigation 3: Session 1

Combining and Comparing

Investigation 1: Sessions 1-2, pages 4-5

Turtle Paths

Investigation 2: Sessions 1-2: Teacher Note, page 39

Fair Shares

Page I-19: Multicultural Extensions for All Students

Exploring Solids and Boxes

Investigation 5: Sessions 1-4: Extensions, page 61

Component 4.3: Relate Mathematical Concepts and Procedures to Real-World Situations**4.3.1 Understand how mathematics is used in everyday life.**

Grade 3 students using *Investigations in Number, Data, and Space* use mathematics in problem situations from everyday life throughout the course. For example, students measure the heights of their classmates and use coupons to make purchases within a budget.

Sample References:

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1-2

Things That Come in Groups

Investigation 3: Sessions 1-2

Flips, Turns, and Area

Investigation 1: Sessions 2-3

From Paces to Feet

Investigation 2: Session 2

Landmarks in the Hundreds

Investigation 2: Session 4

Up and Down the Number Line

Investigation 1: Sessions 1-2

Combining and Comparing

Investigation 3: Sessions 1-2

Turtle Paths

Investigation 1: Session 1

Fair Shares

Investigation 3: Sessions 1-2

Exploring Solids and Boxes

Investigation 3: Sessions 1

4.3.2 Understand how mathematics is used in career settings.

In the course of conducting the investigations of the series *Investigations in Number, Data, and Space*, students encounter mathematics in problem situations which could be applied in career settings. For example, students could utilize skills developed in problems involving periodic savings in a future career as a financial advisor. Other potential career applications can be found in problems involving art, architecture, and urban planning.

Sample References:

Mathematical Thinking at Grade 3

Investigation 2: Sessions 5-7

Things That Come in Groups

Investigation 5: Session 1

Flips, Turns, and Area

Investigation 2: Sessions 4-5

From Paces to Feet

Investigation 1: Sessions 1-6

Landmarks in the Hundreds

Investigation 2: Sessions 5-6

Up and Down the Number Line

Investigation 3: Sessions 2-3

Combining and Comparing

Investigation 3: Sessions 1-3

Turtle Paths

Investigation 3: Sessions 3-5

Fair Shares

Investigation 1: Sessions 1-4

Exploring Solids and Boxes

Investigation 5: Sessions 1-4

**Investigations in Number, Data, and Space
to the
Washington Grade Level Content Expectations—EALR’s**

Grade Four

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.1: Understand and apply concepts and procedures from number sense - number, numeration, computation, and estimation.
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Number and Numeration

1.1.1 Understand the concept of fractions as part/whole.

- **Interpret fractions as parts of a whole.**

References:

Different Shapes, Equal Pieces

Investigation 1: Sessions 1-5

Investigation 2: Sessions 1-4

Investigation 3: Sessions 1-5

Money, Miles, and Large Numbers

Investigation 2: Sessions 1-3

Sunken Ships and Grid Patterns

Investigation 2: Session 5

Three out of Four Like Spaghetti

Investigation 1: Sessions 1-4

- **Symbolically represent parts of a whole and/or parts of a set with common denominators.**

References:

Different Shapes, Equal Pieces

Investigation 1: Sessions 1-5

Investigation 2: Sessions 1-4

Investigation 3: Sessions 1-5

Money, Miles, and Large Numbers

Investigation 2: Sessions 1-3

Sunken Ships and Grid Patterns

Investigation 2: Session 5

Three out of Four Like Spaghetti

Investigation 1: Sessions 1-4

- **Explain how common fractions represent information across the curriculum (e.g., interpreting circle graphs, fraction of states that border an ocean). [CU, MC, SP]**

References:

Different Shapes, Equal Pieces

Investigation 1: Sessions 1-5

Investigation 2: Sessions 1-4

Investigation 3: Sessions 1-5

Money, Miles, and Large Numbers

Investigation 2: Sessions 1-3

Sunken Ships and Grid Patterns

Investigation 2: Session 5

Three out of Four Like Spaghetti

Investigation 1: Sessions 1-4

1.1.2 Understand the relative values of simple fractions.

- **Model and describe equivalent fractions (e.g., paper folding, geo-boards, parallel number lines). [CU]**

References:

Different Shapes, Equal Pieces

Investigation 1: Session 5

Investigation 2: Session 3

Investigation 3: Sessions 1-2

- **Use a number line to approximate and label halves, thirds, and fourths in relationship to whole units. [CU, MC]**

Students name and locate points, determine distances, and graph rectangles and patterns on a coordinate grid.

References:

Sunken Ships and Grid Patterns

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-9

- **Order fractions with like denominators using physical models, pictures, and symbols [CU, MC]**

References:

Different Shapes, Equal Pieces

Investigation 2: Session 4

Investigation 3: Sessions 1-5

Three out of Four Like Spaghetti

Investigation 1: Sessions 1-3

- **Demonstrate equivalent relationships between decimals and simple fractions (e.g., \$.50 is equal to $\frac{1}{2}$ a dollar and $\frac{50}{100}$ using models. [CU]**

References:

Different Shapes, Equal Pieces

Investigation 1: Session 5

Investigation 2: Sessions 1-4

Investigation 3: Sessions 3-5

Three Out of Four Like Spaghetti

Investigation 1: Sessions 2-3

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-2

Investigation 2: Sessions 1-2

1.1.3 Understand the commutative, associative, identity, and zero properties of multiplication on whole numbers.

- **Describe how the commutative property works with multiplication and not division using models. [RL, CU]**

References:

Arrays and Shares

Investigation 2: Sessions 2-6

- **Describe how the identity property for addition is different from the identity property for multiplication using pictures. [RL, CU]**

References:

Arrays and Shares

Investigation 2: Sessions 5-6

Investigation 3: Sessions 2-4: Teacher Note, page 54

Packages and Groups

Investigation 2: Session 1

- **Evaluate simple equations as true or false and explain based on any of the properties for multiplication (e.g., $4 \times (5 \times 6) = (4 \times 5) \times 6$). [RL]**

References:

Arrays and Shares

Investigation 2: Sessions 2-6

Investigation 3: Sessions 1-5

Packages and Groups

Investigation 2: Sessions 1-3

Investigation 3: Sessions 3-8

1.1.5 Understand the meaning of addition and subtraction of non-negative decimals and like-denominator fractions.

- **Show addition and subtraction of decimals through hundredths using models(e.g., base ten blocks, fraction circles with decimal ring, money). [CU]**

References:

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-2, 4-8

Investigation 2: Sessions 1-2, 4

- **Show addition and subtraction of fractions with like denominators using models (e.g., fraction circles, number lines, geo-boards). [CU]**

References:

Different Shares, Equal Pieces

Investigation 1: Session 5

Investigation 2: Session 3

Computation**1.1.6 Understand and apply the procedures for multiplication and division on whole numbers with fluency.**

- **Use a variety of strategies to solve multiplication and division facts through 12's.**

References:

Mathematical Thinking at Grade 4

Investigation 1: Sessions 2-3

Arrays and Shares

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-8

Investigation 3: Sessions 1-5

Ten-Minute Math: Counting Around the Class

Ten-Minute Math: Multiple BINGO

Landmarks in the Thousands

Investigation 2: Session 1

Ten-Minute Math: Counting Around the Class

Packages and Groups

Investigation 1: Sessions 1-5

Investigation 2: Sessions 1-3

Investigation 3: Sessions 1-10

- **Record, share, and evaluate algorithms used in computational situations. [CU, RL]**

References:

Arrays and Shares

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-8

Investigation 3: Sessions 1-5

Ten-Minute Math: Counting Around the Class

Ten-Minute Math: Multiple BINGO

Landmarks in the Thousands

Investigation 1: Sessions 1-2

Investigation 2: Sessions 1, 5

Investigation 3: Session 2

Different Shapes, Equal Pieces

Investigation 1: Session 5

Investigation 2: Session 3

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-2, 4-8

Investigation 2: Sessions 1-2, 4

Packages and Groups

Investigation 1: Sessions 1-5

Investigation 2: Sessions 1-3

Investigation 3: Sessions 1-10

Ten-Minute Math: Guess My Number

- **Write and solve problem situations with whole numbers using a combination of any two operations. [SP, RL, CU, MC]**

References:

Arrays and Shares

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-8

Investigation 3: Sessions 1-5

Ten-Minute Math: Counting Around the Class

Ten-Minute Math: Multiple BINGO

Landmarks in the Thousands

Investigation 1: Sessions 1-2

Investigation 2: Sessions 1, 5

Investigation 3: Session 2

Different Shapes, Equal Pieces

Investigation 1: Session 5

Investigation 2: Session 3

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-2, 4-8

Investigation 2: Sessions 1-2, 4

Packages and Groups

Investigation 1: Sessions 1-5

Investigation 2: Sessions 1-3

Investigation 3: Sessions 1-10

Ten-Minute Math: Guess My Number

- **Interpret remainders of a division problem in a given situation. [SP, RL, MC]**

References:

Packages and Groups

Investigation 3: Sessions 1-2

1.1.7 Apply strategies for mental arithmetic, pencil and paper, or calculator as appropriate to the task involving multiplication and division of whole numbers.

- **Select and justify appropriate strategies and tools from among mental computation, estimation, calculators, and paper and pencil to compute in a problem situation.**

References:

Arrays and Shares

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-8

Investigation 3: Sessions 1-5

Ten-Minute Math: Counting Around the Class

Ten-Minute Math: Multiple BINGO

Landmarks in the Thousands

Investigation 1: Sessions 1-2

Investigation 2: Sessions 1, 5

Investigation 3: Session 2

Different Shapes, Equal Pieces

Investigation 1: Session 5

Investigation 2: Session 3

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-2, 4-8

Investigation 2: Sessions 1-2, 4

Packages and Groups

Investigation 1: Sessions 1-5

Investigation 2: Sessions 1-3

Investigation 3: Sessions 1-10

Ten-Minute Math: Guess My Number

Computation

1.1.8 Understand situations in which estimation is appropriate and apply estimation strategies to determine the reasonableness of answers involving multiplication and division of whole numbers.

- **Identify situations when estimation is not appropriate. [RL]**

References:

Mathematical Thinking at Grade 4

Ten-Minute Math: Estimation and Number Sense

Landmarks in the Thousands

Investigation 3: Sessions 3-5

The Shape of the Data

Ten-Minute Math: Estimation and Number Sense

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-2, 7-8

Investigation 2: Sessions 1-2

Investigation 3: Session 1

- **Make and explain an appropriate adjustment when estimate and solution don't agree. [CU, SR, RL]**

References:

Mathematical Thinking at Grade 4

Investigation 1: Sessions 2-4

Investigation 2: Sessions 3-4: Choice 2, page 42

Ten-Minute Math: Estimation and Number Sense

Landmarks in the Thousands

Investigation 3: Sessions 3-5

The Shape of the Data

Ten-Minute Math: Estimation and Number Sense

Packages and Groups

Investigation 2: Sessions 2-3

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-2, 7-8

Investigation 2: Sessions 1-2

Investigation 3: Session 1

- **Using a variety of strategies mentally approximate sums, differences, products, and quotients.**

References:

Mathematical Thinking at Grade 4

Investigation 1: Sessions 2-4

Investigation 2: Sessions 3-4: Choice 2, page 42

Ten-Minute Math: Estimation and Number Sense

Landmarks in the Thousands
Investigation 3: Sessions 3-5
The Shape of the Data
Ten-Minute Math: Estimation and Number Sense
Packages and Groups
Investigation 2: Sessions 2-3
Money, Miles, and Large Numbers
Investigation 1: Sessions 1-2, 7-8
Investigation 2: Sessions 1-2
Investigation 3: Session 1

Component 1.2: Understand and apply concepts and procedures from measurement.
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Attributes, Units, and Tools

1.2.1 Understand the concept of area.

- **Demonstrate that area is covering a shape and perimeter is surrounding a shape. [CU, MC]**

Students explore concepts of area and perimeter with arrays and rectangles and *Geo-Logo*.

References:

Arrays and Shares
Investigation 2: Sessions 1-6
Landmarks in the Thousands
Investigation 1: Session 2
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-5
Investigation 2: Sessions 1-4
Sunken Ships and Grid Patterns
Ten-Minute Math: Lengths and Perimeters

- **Describe situations where area is the best measurable attribute (e.g., buying carpet, painting a wall, picking largest bedroom). [CU, MC]**
Grade 4 students using *Investigations in Number, Data, and Space* find the areas of rectangles as models of quantities which occur in arrays, and, given a fixed area, find possible dimensions of rectangles.

References:

Arrays and Shares
Investigation 2: Sessions 1-6
Landmarks in the Thousands
Investigation 1: Session 2

- **Compare areas of different shapes and sizes.**

References:

Arrays and Shares
Investigation 2: Sessions 1-6
Landmarks in the Thousands
Investigation 1: Session 2
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-5
Investigation 2: Sessions 1-4

1.2.2 Understand and apply standard units to measure the attribute of area.

- **Measure area for regular and irregular shapes (e.g., tiles, inches, grid paper).**

References:

Arrays and Shares
Investigation 2: Sessions 1-6
Landmarks in the Thousands
Investigation 1: Session 2
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-5
Investigation 2: Sessions 1-4

- **Compare area measurements made using different units (e.g., square inches vs. square centimeters).**

References:

Arrays and Shares
Investigation 2: Sessions 1-6
Landmarks in the Thousands
Investigation 1: Session 2

1.2.3 Apply appropriate tools to measure area using both standard and metric systems.

- **Select an appropriate tool with which to measure and justify the choice. [SP, CU, MC]**

References:

The Shape of the Data
Investigation 2: Sessions 1-4
Money, Miles, and Large Numbers
Investigation 2: Sessions 1-3
Changes Over Time
Unit Preparation: Session 3
Sunken Ships and Grid Patterns
Investigation 1: Sessions 1-6

- **Name and use appropriate tools for measuring area.**

References:

Arrays and Shares
Investigation 2: Sessions 1-6
Landmarks in the Thousands
Investigation 1: Session 2
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-5
Investigation 2: Sessions 1-4

Procedures, Precision, and Estimation

1.2.4 Apply the measurement procedure to measure area.

- **Determine the appropriate unit to measure the area.**

References:

Arrays and Shares
Investigation 2: Sessions 1-6
Landmarks in the Thousands
Investigation 1: Session 2
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-5
Investigation 2: Sessions 1-4

- **Select an appropriate tool according to the unit chosen.**

References:

The Shape of the Data
Investigation 2: Sessions 1-4
Money, Miles, and Large Numbers
Investigation 2: Sessions 1-3
Changes Over Time
Unit Preparation: Session 3
Sunken Ships and Grid Patterns
Investigation 1: Sessions 1-6

- **Compare the object being measured with the units on the tools and record and label the units.**

References:

The Shape of the Data
Investigation 2: Sessions 1-4
Money, Miles, and Large Numbers
Investigation 2: Sessions 1-3

Changes Over Time

Unit Preparation: Session 3

Sunken Ships and Grid Patterns

Investigation 1: Sessions 1-6

1.2.6 Understand when approximate measurements are sufficient and apply estimation strategies to obtain reasonable measurements of area.

- **Identify situations when approximate measurements are sufficient.**

References:

The Shape of the Data

Investigation 1: Sessions 1-4

Money, Miles, and Large Numbers

Investigation 2: Sessions 1-3

Investigation 3: Sessions 2-4

Sunken Ships and Grid Patterns

Investigation 2: Session 5

- **Estimate a measurement using standard or nonstandard units (e.g., tiles, square feet, note cards). [SP]**

References:

The Shape of the Data

Investigation 1: Sessions 1-4

Money, Miles, and Large Numbers

Investigation 2: Sessions 1-3

Investigation 3: Sessions 2-4

Sunken Ships and Grid Patterns

Investigation 2: Session 5

- **Recognize when a measurement is approximate rather than exact. [RL]**

References:

The Shape of the Data

Investigation 1: Sessions 1-4

Money, Miles, and Large Numbers

Investigation 2: Sessions 1-3

Investigation 3: Sessions 2-4

Sunken Ships and Grid Patterns

Investigation 2: Session 5

- **Use estimation to justify reasonableness of a measurement (e.g., estimate length and width of a playground by pacing it off). [RL]**

References:

The Shape of the Data

Investigation 1: Sessions 1-4

Money, Miles, and Large Numbers

Investigation 2: Sessions 1-3

Investigation 3: Sessions 2-4

Sunken Ships and Grid Patterns

Investigation 2: Session 5

Component 1.3: Understand and apply concepts and procedures from geometric sense.

Properties and Relationships**1.3.1 Understand the concept of parallel and perpendicular lines and line symmetry in 2-D shapes and figures.**

- **Identify symmetrical 2-D shapes and figures. [CU]**

References:

Mathematical Thinking at Grade 4

Investigation 4: Sessions 1-6

Sunken Ships and Grid Patterns

Investigation 2: Sessions 2-3, 6-9

- **Complete a picture or design over a line of symmetry.**

References:

Mathematical Thinking at Grade 4

Investigation 4: Sessions 1-6

Sunken Ships and Grid Patterns

Investigation 2: Sessions 2-3, 6-9

- **Identify and draw a line of symmetry (e.g., folding or using a mirror). [CU]**

References:

Mathematical Thinking at Grade 4

Investigation 4: Sessions 1-6

Sunken Ships and Grid Patterns

Investigation 2: Sessions 2-3, 6-9

- **Identify parallel and perpendicular lines in 2-D shapes and figures.**
Grade 4 students using the *Investigations in Number, Data, and Space* series gain experience with parallel lines and perpendicular lines as they use the computer to construct and manipulate points, segments, and rectangles on coordinate grids.

References:

Sunken Ships and Grid Patterns
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-9
Ten-Minute Math: Lengths and Perimeters
Geo-Logo Teacher Tutorial

- **Describe attributes of 2-D geometric figures using appropriate vocabulary (e.g., parallel, perpendicular, symmetric). [MC, CU]**

References:

Mathematical Thinking at Grade 4
Investigation 4: Sessions 2-6
Seeing Solids and Silhouettes
Investigation 2: Sessions 1-2
Ten-Minute Math: Quick Images
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-5
Investigation 2: Sessions 1-4
Changes Over Time
Ten-Minute Math: Quick Images
Sunken Ships and Grid Patterns
Investigation 2: Sessions 1-9

- **Given attributes of parallel, perpendicular, and symmetrical, identify appropriate 2-D shapes (e.g., All my sides are parallel and my angles are perpendicular. What am I?). [RL, CU]**

References:

Mathematical Thinking at Grade 4
Investigation 4: Sessions 2-6
Seeing Solids and Silhouettes
Investigation 2: Sessions 1-2
Ten-Minute Math: Quick Images
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-5
Investigation 2: Sessions 1-4
Changes Over Time
Ten-Minute Math: Quick Images
Sunken Ships and Grid Patterns
Investigation 2: Sessions 1-9

1.3.2 Apply understanding of congruence to identify, name, compare, and sort 2-D shapes and figures in multiple orientations.

- **Identify, describe, and compare attributes of congruent figures in multiple orientations. [CU, SR]**

References:

Mathematical Thinking at Grade 4

Investigation 4: Sessions 5-6

Different Shapes, Equal Pieces

Investigation 1: Session 1

Money, Miles, and Large Numbers

Investigation 2: Session 4

Investigation 3: Sessions 2-4

Sunken Ships and Grid Patterns

Investigation 2: Sessions 1-9

- **Build and draw congruent figures. [CU]**

References:

Mathematical Thinking at Grade 4

Investigation 4: Sessions 5-6

Different Shapes, Equal Pieces

Investigation 1: Session 1

Money, Miles, and Large Numbers

Investigation 2: Session 4

Investigation 3: Sessions 2-4

Sunken Ships and Grid Patterns

Investigation 2: Sessions 1-9

- **Identify, name, compare and sort congruent 2-D shapes and figures in multiple orientations.**

References:

Mathematical Thinking at Grade 4

Investigation 4: Sessions 2-6

Seeing Solids and Silhouettes

Investigation 2: Sessions 1-2

Ten-Minute Math: Quick Images

Different Shapes, Equal Pieces

Investigation 1: Sessions 1-5

Investigation 2: Sessions 1-4

Changes Over Time

Ten-Minute Math: Quick Images

Sunken Ships and Grid Patterns

Investigation 2: Sessions 1-9

1.3.3 Understand location of points on a map or coordinate grid in the first quadrant.

- **Describe the location in the first quadrant on a coordinate grid in terms of horizontal and vertical position (e.g., over and up). [CU, RL]**

References:

Sunken Ships and Grid Patterns
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-9
Ten-Minute Math: Lengths and Perimeters

- **Plot a given set of ordered pairs in the first quadrant of a coordinate grid.**

References:

Sunken Ships and Grid Patterns
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-9
Ten-Minute Math: Lengths and Perimeters

- **Give directions from one location to another using ordered pairs in the first quadrant of a coordinate grid (e.g., given a state map, specify location of landmarks). [RL, CU, MC]**

References:

Sunken Ships and Grid Patterns
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-9
Ten-Minute Math: Lengths and Perimeters

1.3.4 Understand the concepts of translation (slide) and reflection (flip).

- **Simulate translations and reflections using objects (e.g., pattern blocks, geo-blocks). [MC]**

References:

Mathematical Thinking at Grade 4
Investigation 4: Sessions 1-6
Different Shapes, Equal Pieces
Investigation 1: Session 1
Money, Miles, and Large Numbers
Investigation 2: Session 4
Investigation 3: Sessions 2-4
Sunken Ships and Grid Patterns
Investigation 2: Sessions 1-9

- **Record results of a translation and reflections (e.g., plot a set of ordered pairs creating a polygon, translate and reflect it, and list the new ordered pairs). [RL, CU]**
References:
Sunken Ships and Grid Patterns
Investigation 2: Sessions 1-9

Component 1.4: Understand and apply concepts and procedures from probability and statistics.

Probability

1.4.1 Understand when events are certain, impossible, and more, less, or equally likely.

- **Identify the likelihood of events and use the vocabulary of probability (e.g., likely, unlikely, certain, impossible).**
References:
Landmarks in the Thousands
Ten-Minute Math: What Is Likely?
Money, Miles, and Large Numbers
Ten-Minute Math: Likely or Unlikely?
Three Out of Four Like Spaghetti
Ten-Minute Math: What Is Likely?
- **Place events in order of likelihood of occurrence (e.g., use a probability number line). [SP, RL, MC]**
References:
Landmarks in the Thousands
Ten-Minute Math: What Is Likely?
Money, Miles, and Large Numbers
Ten-Minute Math: Likely or Unlikely?
Three Out of Four Like Spaghetti
Ten-Minute Math: What Is Likely?

Statistics**1.4.4 Understand and apply mode, median, and range to describe a set of data.**

- **Find the mode of a data set.**

References:

The Shape of the Data

Investigation 2: Session 4

- **Use a variety of strategies to determine median and range from a set of data (e.g., use a graph, pictures or objects).**

References:

The Shape of the Data

Investigation 2: Sessions 4-7

- **Calculate the range of a data set.**

References:

The Shape of the Data

Investigation 2: Sessions 4-7

- **Compare the mode and median from a set of data and determine which measure better describes the average. [RL]**

Check:**References:**

The Shape of the Data

Investigation 2: Sessions 4-7

1.4.5 Understand how to create appropriate questions and collect data to obtain the desired information.

- **Formulate questions for surveys and collect data. [SP, CU]**

References:

Three out of Four Like Spaghetti

Investigation 2: Sessions 1-7

- **For a given question decide whether to conduct a survey, use observations or measure. [SP, RL]**

References:

Mathematical Thinking at Grade 4

Ten-Minute Math: Exploring Data

The Shape of the Data

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Changes Over Time

Unit Preparation: Sessions 1-3

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-8

Packages and Groups

Ten-Minute Math: Exploring Data

Sunken Ships and Grid Patterns

Investigation 1: Sessions 5-6

Investigation 2: Sessions 1-9

Ten-Minute Math: Lengths and Perimeters

Three out of Four Like Spaghetti

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-7

- **Make a plan to answer a question including how to record and organize data.**

[SP, CU, MC]

References:

Mathematical Thinking at Grade 4

Ten-Minute Math: Exploring Data

The Shape of the Data

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Changes Over Time

Unit Preparation: Sessions 1-3

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-8

Packages and Groups

Ten-Minute Math: Exploring Data

Sunken Ships and Grid Patterns

Investigation 1: Sessions 5-6

Investigation 2: Sessions 1-9

Ten-Minute Math: Lengths and Perimeters

Three out of Four Like Spaghetti

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-7

1.4.6 Analyze and evaluate data appropriate to the grade level.

- **Compare mode, median, and range for two or more sets of data.**

References:

The Shape of the Data

Investigation 2: Sessions 4-7

- **Analyze the distribution of data (e.g., given unlabeled graphs and data sets, match the appropriate data to a graph). [SP, RL]**

References:

The Shape of the Data

Investigation 2: Sessions 2-7

Investigation 3: Sessions 3-5

Changes Over Time

Preparation Session 3

Investigation 1: Sessions 1-4

Investigation 3: Sessions 1-8

Sunken Ships and Grid Patterns

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-9

Three Out of Four Like Spaghetti

Investigation 2: Sessions 1-2, 5-7

- **Make inferences based on a set of data.**

References:

Mathematical Thinking at Grade 4

Ten-Minute Math: Exploring Data

The Shape of the Data

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Changes Over Time

Unit Preparation: Sessions 1-3

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-8

Packages and Groups

Ten-Minute Math: Exploring Data

Sunken Ships and Grid Patterns

Investigation 1: Sessions 5-6

Investigation 2: Sessions 1-9

Ten-Minute Math: Lengths and Perimeters

Three out of Four Like Spaghetti
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-7

- **Judge the appropriateness of inferences made from a set of data and support the judgment. [CU, MC]**

References:

Mathematical Thinking at Grade 4

Ten-Minute Math: Exploring Data

The Shape of the Data

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Changes Over Time

Unit Preparation: Sessions 1-3

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-8

Packages and Groups

Ten-Minute Math: Exploring Data

Sunken Ships and Grid Patterns

Investigation 1: Sessions 5-6

Investigation 2: Sessions 1-9

Ten-Minute Math: Lengths and Perimeters

Three out of Four Like Spaghetti

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-7

Component 1.5: Understand and apply concepts and procedures from algebraic sense.
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Patterns and Representations

1.5.1 Understand and apply rules for number patterns based on a single arithmetic operation.

- **Extend and represent patterns using words, tables, numbers, and pictures. [RL]**

References:

Mathematical Thinking at Grade 4

Investigation 3: Sessions 1-5

Investigation 4: Sessions 1-6

Arrays and Shares

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-3

Landmarks in the Thousands

Investigation 1: Session 3

Investigation 4: Sessions 1-3

Packages and Groups

Investigation 1: Sessions 1-3

Sunken Ships and Grid Patterns

Investigation 2: Sessions 8-9

- **Create a number pattern and explain what makes it a pattern. [CU]**

References:

Landmarks in the Thousands

Investigation 1: Session 1

Investigation 3: Sessions 1-2

Investigation 4: Sessions 1-3

Ten-Minute Math: Counting Around the Class

- **Describe the rules for a pattern based on one operation (e.g., add 4, multiply by 2). [CU]**

References:

Landmarks in the Thousands

Investigation 1: Session 1

Investigation 3: Sessions 1-2

Investigation 4: Sessions 1-3

Ten-Minute Math: Counting Around the Class

Symbols and Representations

- 1.5.2 Understand and apply rules for number patterns based on a single arithmetic operation.**

References:

Landmarks in the Thousands

Investigation 1: Session 1

Investigation 3: Sessions 1-2

Investigation 4: Sessions 1-3

Ten-Minute Math: Counting Around the Class

- **Translate problem-solving situations to expressions and equations involving multiplication or division using appropriate symbols and notations. [SP, CU]**

References:

Arrays and Shares

Investigation 2: Sessions 2-3

Investigation 3: Session 1

Landmarks in the Thousands

Investigation 2: Sessions 2-4

Changes Over Time

Investigation 1: Sessions 5-6

Packages and Groups

Investigation 3: Sessions 1-2

- **Compare multiplication or division number sentences using the symbols $>$, $<$, and $=$ (e.g., $5 \times 3 > 3 \times 2$).**

References:

Arrays and Shares

Investigation 2: Sessions 2-3

Investigation 3: Session 1

Landmarks in the Thousands

Investigation 2: Sessions 2-4

Packages and Groups

Investigation 3: Sessions 1-2

- **Select operational and relational symbols to make a multiplication or division number sentence true (e.g., $4 _ 3 = 12$; $5 \times 12 _ 64$).**

Grade 4 students using *Investigations in Number, Data, and Space* complete open sentences with numbers to make the sentences true.

References:

Arrays and Shares

Investigation 2: Sessions 2-3: Teacher Note, page 23

Landmarks in the Thousands

Investigation 2: Sessions 2-4: Dialogue Box, page 32

Changes Over Time

Investigation 1: Sessions 5-6

Packages and Groups

Investigation 1: Sessions 4-5, page 15

Investigation 3: Sessions 7-8, page 53

Evaluating and Solving**1.5.3 Understand and apply the procedures for evaluating and solving one-step equations with arithmetic operations.**

- **Substitute a symbol for a numeric value in an expression or in equations (e.g., $X = 7$, find $X + 3$; If $H = 12$ and $\tau = 36$, what is $H + \tau$?).**

References:

Arrays and Shares

Investigation 2: Sessions 2-3: Teacher Note, page 23

Landmarks in the Thousands

Investigation 2: Sessions 2-4: Dialogue Box, page 32

Changes Over Time

Investigation 1: Sessions 5-6

Packages and Groups

Investigation 1: Sessions 4-5, page 15

Investigation 3: Sessions 7-8, page 53

- **Solve missing factor equations (e.g., $\theta \times 3 = 12$).**

References:

Arrays and Shares

Investigation 2: Sessions 2-3: Teacher Note, page 23

Landmarks in the Thousands

Investigation 2: Sessions 2-4: Dialogue Box, page 32

Packages and Groups

Investigation 1: Sessions 4-5, page 15

Investigation 3: Sessions 7-8, page 53

EALR 2: The student uses mathematical reasoning to define and solve problems.**Component 2.1: Investigate and Analyze Situations****2.1.1 Analyze situations to determine known and unknown information in familiar situations.****References:**

Arrays and Shares

Investigation 2: Sessions 2-3 : Teacher Note, page 23

Landmarks in the Thousands

Investigation 2: Sessions 2-4 : Dialogue Box, page 32

Changes Over Time

Investigation 1: Sessions 5-6

2.1.2 Analyze situations to determine when information is missing or extraneous.

Grade 4 students using *Investigations in Number, Data, and Space* determine relevant, irrelevant, and/or sufficient information to solve mathematical problems throughout the course. Informational analysis is a fundamental component of the problem-solving process. For example, students analyze the information given in graphs representing the growth patterns of plants and describe in words how each plant grew.

Sample References:

Mathematical Thinking at Grade 4

Investigation 3: Session 3

Arrays and Shares

Investigation 3: Session 5

Seeing Solids and Silhouettes

Investigation 1: Session 1

Landmarks in the Thousands

Investigation 2: Session 5

Different Shapes, Equal Pieces

Investigation 3: Session 3

The Shape of the Data

Investigation 2: Session 4

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-2

Changes Over Time

Investigation 3: Session 6

Packages and Groups

Investigation 3: Sessions 1-2

Sunken Ships and Grid Patterns

Investigation 2: Session 1

Three out of Four Like Spaghetti

Investigation 1: Session 1

Component 2.2: Formulate Questions and Define the Problem**2.2.1 Understand the problem to be solved involving number sense, measurement, geometric sense, and statistics.**

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). As an example in the area of geometric sense, students learn to visualize what objects look like from different perspectives.

Sample References:

Mathematical Thinking at Grade 4

Investigation 3: Sessions 4-5

Arrays and Shares

Investigation 1: Session 3

Seeing Solids and Silhouettes

Investigation 2: Session 5

Landmarks in the Thousands

Investigation 3: Sessions 3-5

Different Shapes, Equal Pieces

Investigation 3: Session 3

The Shape of the Data

Investigation 1: Sessions 1-3

Money, Miles, and Large Numbers

Investigation 3: Session 1

Changes Over Time

Investigation 1: Sessions 5-6

Packages and Groups

Investigation 2: Session 1

Sunken Ships and Grid Patterns

Ten-Minute Math: Lengths and Perimeters

Three out of Four Like Spaghetti

Investigation 2: Sessions 5-7

2.2.2 Generate questions to be answered in familiar situations.

References:

Three out of Four Like Spaghetti

Investigation 2: Sessions 1-7

Component 2.3: Construct Solutions

2.3.1 Apply a variety of strategies and approaches to problem situations from number sense, measurement, geometric sense, and statistics to construct a solution.

Students in Grade 4 using *Investigations in Number, Data, and Space* apply a variety of strategies and approaches to problem situations throughout the course; in fact, this is a fundamental emphasis of the series. For example, students collect, organize, interpret, and display data from a variety of situations and in a variety of forms.

Sample References:

Mathematical Thinking at Grade 4

Investigation 3: Sessions 4-5

Arrays and Shares

Investigation 1: Session 3

Seeing Solids and Silhouettes

Investigation 2: Session 5

Landmarks in the Thousands

Investigation 3: Sessions 3-5

Different Shapes, Equal Pieces

Investigation 3: Session 3

The Shape of the Data

Investigation 1: Sessions 1-3

Money, Miles, and Large Numbers

Investigation 3: Session 1

Changes Over Time

Investigation 1: Sessions 5-6

Packages and Groups

Investigation 2: Session 1

Sunken Ships and Grid Patterns

Ten-Minute Math: Lengths and Perimeters

Three out of Four Like Spaghetti

Investigation 2: Sessions 5-7

Component 2.4: Draw Conclusions
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2.4.1 Understand how to make conjectures and support them with evidence.

Grade 4 students using *Investigations in Number, Data, and Space* make and support mathematical conjectures throughout the course by conducting the investigations into which the curriculum is organized; in fact, this is a fundamental emphasis of the series. For example, students make, investigate, and support conjectures regarding numeric and geometric patterns and symmetry.

Sample References:

Mathematical Thinking at Grade 4

Investigation 4: Session 2

Arrays and Shares

Investigation 2: Sessions 2-3

Seeing Solids and Silhouettes

Investigation 1: Session 1

Landmarks in the Thousands

Investigation 1: Session 3

Different Shapes, Equal Pieces

Investigation 1: Session 1

The Shape of the Data

Investigation 2: Sessions 2-3

Money, Miles, and Large Numbers

Investigation 2: Session 3

Changes Over Time

Investigation 3: Sessions 7-8

Packages and Groups

Investigation 1: Sessions 4-5

Sunken Ships and Grid Patterns

Investigation 1: Sessions 5-6

Three out of Four Like Spaghetti

Investigation 1: Session 3

2.4.2 Analyze solutions to draw conclusions and support them with evidence.

Grade 4 students using *Investigations in Number, Data, and Space* analyze solutions to draw conclusions and support them with evidence throughout the course. For example, students analyze solutions to subtraction problems and support their conclusions with number charts and calculators.

Sample References:

Mathematical Thinking at Grade 4

Investigation 3: Sessions 1-2

Arrays and Shares

Investigation 3: Session 1

Seeing Solids and Silhouettes

Investigation 2: Sessions 3-4

Landmarks in the Thousands

Investigation 1: Session 1

Different Shapes, Equal Pieces

Investigation 1: Sessions 2-4

The Shape of the Data

Investigation 2: Session 4

Money, Miles, and Large Numbers

Investigation 3: Session 1

Changes Over Time

Investigation 3: Sessions 7-8

Packages and Groups

Investigation 1: Session 3

Sunken Ships and Grid Patterns

Investigation 2: Sessions 8-9

Three out of Four Like Spaghetti

Investigation 2: Sessions 5-7

Component 2.5: Evaluate and Verify Results**2.5.1 Evaluate strategies and procedures for accuracy and appropriateness.**

Problem solving is one of the fundamental components of the *Investigations in Number, Data, and Space* series. Every session of every investigation involves students identifying problems to be solved, and planning, carrying out, and evaluating solution

strategies. Many of the investigations are conducted in groups, with students and teacher discussing and evaluating strategies and solutions every step of the way. Both in groups and also independently, students in Grade 4 evaluate strategies and procedures for accuracy and appropriateness throughout the course.

Sample References:

Mathematical Thinking at Grade 4

Investigation 3: Sessions 4-5

Arrays and Shares

Investigation 2: Sessions 7-8

Seeing Solids and Silhouettes

Investigation 3: Session 1

Landmarks in the Thousands

Investigation 3: Sessions 3-5

Different Shapes, Equal Pieces

Investigation 1: Sessions 2-4

The Shape of the Data

Investigation 2: Sessions 2-3

Money, Miles, and Large Numbers

Investigation 1: Session 6

Changes Over Time

Investigation 3: Session 3

Packages and Groups

Investigation 3: Session 10

Sunken Ships and Grid Patterns

Investigation 2: Session 5

Three out of Four Like Spaghetti

Investigation 1: Session 4

2.5.2 Evaluate results for reasonableness.

Grade 4 students using *Investigations in Number, Data, and Space* evaluate results for reasonableness using a variety of estimation techniques, including rounding.

References:

Mathematical Thinking at Grade 4

Investigation 1: Sessions 2-4

Investigation 2: Sessions 3-4: Choice 2, page 42

Ten-Minute Math: Estimation and Number Sense

Landmarks in the Thousands

Investigation 3: Sessions 3-5

The Shape of the Data

Ten-Minute Math: Estimation and Number Sense

Packages and Groups

Investigation 2: Sessions 2-3

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-2, 7-8

Investigation 2: Sessions 1-2

Investigation 3: Session 1

2.5.3 Evaluate conclusions using evidence.

Students in Grade 4 using *Investigations in Number, Data, and Space* evaluate conclusions using evidence throughout the course as they conduct and evaluate the investigations on which the curriculum is based. For example, students devise ways to measure out one-tenth of a mile.

Sample References:

Mathematical Thinking at Grade 4

Investigation 4: Session 2

Arrays and Shares

Investigation 2: Sessions 2-3

Seeing Solids and Silhouettes

Investigation 1: Session 1

Landmarks in the Thousands

Investigation 1: Session 3

Different Shapes, Equal Pieces

Investigation 1: Session 1

The Shape of the Data

Investigation 2: Sessions 2-3

Money, Miles, and Large Numbers

Investigation 2: Session 3

Changes Over Time

Investigation 3: Sessions 7-8

Packages and Groups

Investigation 1: Sessions 4-5

Sunken Ships and Grid Patterns

Investigation 1: Sessions 5-6

Three out of Four Like Spaghetti

Investigation 1: Session 3

EALR 3 The student communicates knowledge and understanding in both everyday and mathematical language.

Component 3.1: Gather Information

3.1.1 Apply a simple plan for collecting information for a given purpose, which requires using number sense, measurement, geometric sense, or statistics.

References:

Mathematical Thinking at Grade 4

Ten-Minute Math: Exploring Data

The Shape of the Data

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Changes Over Time

Unit Preparation: Sessions 1-3

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-8

Packages and Groups

Ten-Minute Math: Exploring Data

Sunken Ships and Grid Patterns

Investigation 1: Sessions 5-6

Investigation 2: Sessions 1-9

Ten-Minute Math: Lengths and Perimeters

Three out of Four Like Spaghetti

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-7

3.1.2 Analyze mathematical information for a given purpose requiring number sense, measurement, geometric sense, or statistics, from one or two different sources using reading, listening, and observation.

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics), and space (including geometry and measurement). The investigations around which the curriculum is organized involve reading, listening, and observing on a daily basis. For example, Grade 4 students analyze mathematical information for the purpose of matching mystery graphs created by students to a list of places and activities.

Sample References:

Mathematical Thinking at Grade 4

Investigation 4: Session 2

Arrays and Shares

Investigation 2: Sessions 2-3

Seeing Solids and Silhouettes

Investigation 1: Session 1

Landmarks in the Thousands

Investigation 1: Session 3

Different Shapes, Equal Pieces

Investigation 1: Session 1

The Shape of the Data

Investigation 2: Sessions 2-3

Money, Miles, and Large Numbers

Investigation 2: Session 3

Changes Over Time

Investigation 3: Sessions 7-8

Packages and Groups

Investigation 1: Sessions 4-5

Sunken Ships and Grid Patterns

Investigation 1: Sessions 5-6

Three out of Four Like Spaghetti

Investigation 1: Session 3

Component 3.2: Organize and Interpret Information**3.2.1 Understand how to organize and interpret numerical, measurement, geometric or statistical information for a given purpose in at least one way (reflecting, verbalizing, discussing, or writing).**

Grade 4 students using *Investigations in Number, Data, and Space* organize information in charts and graphs. They interpret the information in these displays by reflecting, verbalizing, discussing, and writing.

References:

The Shape of the Data

Investigation 2: Sessions 2-7

Investigation 3: Sessions 3-5

Changes Over Time

Preparation Session 3

Investigation 1: Sessions 1-4

Investigation 3: Sessions 1-8

Sunken Ships and Grid Patterns

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-9

Three Out of Four Like Spaghetti

Investigation 1: Session 2

Component 3.3: Represent and Share Information**3.3.1 Understand how to express ideas involving number sense, measurement, geometric sense, or statistics, using mathematical language and notation.**

Students in Grades 4 using *Investigations in Number, Data, and Space* use mathematical language to express mathematical ideas throughout the course. The Dialogue Box is a feature that appears with many investigations and contains the text of discussions between teachers and students in which the teacher encourages students to use the language of mathematics to present mathematical ideas. Students use mathematical notation to communicate and explain mathematical situations throughout the course. For example, students use numbers and operational and relational symbols in expressions and number sentences to represent problem situations.

Sample References:

Mathematical Thinking at Grade 4

Investigation 3: Session 3

Investigation 4: Session 2

Arrays and Shares

Investigation 2: Sessions 2-3, 7-8

Seeing Solids and Silhouettes

Investigation 1: Session 1

Investigation 4: Sessions 1-4

Landmarks in the Thousands

Investigation 1: Session 3

Investigation 2: Session 5

Different Shapes, Equal Pieces

Investigation 1: Session 1

Investigation 3: Sessions 4-5

The Shape of the Data

Investigation 2: Sessions 2-3

Money, Miles, and Large Numbers

Investigation 1: Sessions 4-5

Investigation 2: Session 3

Changes Over Time

Investigation 1: Sessions 5-6

Investigation 3: Sessions 7-8

Packages and Groups

Investigation 1: Sessions 4-5

Investigation 3: Sessions 1-2

Sunken Ships and Grid Patterns

Investigation 1: Sessions 5-6

Three out of Four Like Spaghetti

Investigation 1: Session 3

3.3.2 Understand how to represent numerical, measurement, geometric, or statistical ideas and information to familiar people for a real-world purpose.

Grade 4 students using *Investigations in Number, Data, and Space* represent ideas and information to familiar people when they conduct surveys of family and community members. Students are given homework assignments which often include the involvement of one or more family members, and they bring home family letters for each unit describing the activities the child will be participating in, and the mathematics the child will be learning, for each unit.

Sample References:

Mathematical Thinking at Grade 4

Investigation 1: Session 4: Homework, page 27

Arrays and Shares

Investigation 1: Sessions 1-2: Homework, page 6

Seeing Solids and Silhouettes

Investigation 3: Sessions 2-3: Homework, page 48

Landmarks in the Thousands

Investigation 2: Session 5: Homework, page 35

Different Shapes, Equal Pieces

Investigation 3: Sessions 1-2: Homework, page 43

The Shape of the Data

Investigation 1: Sessions 2-3

Money, Miles, and Large Numbers

Investigation 3: Session 1: Homework, page 50

Changes Over Time

Investigation 1: Sessions 1-2

Sunken Ships and Grid Patterns

Investigation 1: Sessions 3-4: Homework, page 26

Three out of Four Like Spaghetti

Investigation 2: Session 1: Homework, page 31

EALR 4: The student understands how mathematical ideas connect within mathematics, other subject areas, and real-world situations.

Component 4.1: Relate Concepts and Procedures within Mathematics

4.1.1 Apply concepts and procedures from two of the content strands (number sense, measurement, geometric sense, or statistics) in a given problem or situation.

Each unit of study in *Investigations in Number, Data, and Space* is organized to enable students to recognize and use connections among mathematical ideas. Each Investigation involves students directly experiencing the connections between the mathematical ideas presented in the unit. For example, in Grade 4, in Arrays and Shares, students use number patterns and geometric arrays and partitions to identify and create multiplication and division situations.

Sample References:

Mathematical Thinking at Grade 4

Investigation 3: Sessions 1-5

Arrays and Shares

Investigation 1: Sessions 1-3

Seeing Solids and Silhouettes

Investigation 2: Sessions 1-5

Landmarks in the Thousands

Investigation 2: Sessions 1-5

Different Shapes, Equal Pieces

Investigation 2: Sessions 1-4

The Shape of the Data

Investigation 2: Sessions 1-7

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-8

Changes Over Time

Investigation 1: Sessions 1-6

Packages and Groups

Investigation 1: Sessions 1-5

Sunken Ships and Grid Patterns

Investigation 1: Sessions 1-6

Three out of Four Like Spaghetti

Investigation 1: Sessions 1-4

4.1.2 Analyze mathematical models and representations to determine equivalence in familiar situations from number sense, measurement, geometric sense, or statistics.

Grade 4 students using *Investigations in Number, Data, and Space* analyze mathematical models and representations to determine equivalence in familiar situations throughout the course. For example, students use arrays as models for multiplication; they relate cube configurations to two-dimensional drawings, mental images, and verbal descriptions; they model numbers with a 100 Chart, a 1,000 Book, and a 10,000 Wall Chart; they model fractions with “crazy cakes;” they analyze displays of Mystery Data in tables, line plots, and graphs; and they use equations to model problem situations.

Sample References:

Mathematical Thinking at Grade 4

Investigation 2: Sessions 3-4

Arrays and Shares

Investigation 2: Session 1

Seeing Solids and Silhouettes

Investigation 1: Session 1

Landmarks in the Thousands

Investigation 4: Sessions 1-3

Different Shapes, Equal Pieces

Investigation 1: Session 1

The Shape of the Data

Investigation 2: Session 4

Money, Miles, and Large Numbers

Investigation 3: Sessions 2-4

Changes Over Time

Investigation 3: Sessions 7-8

Packages and Groups

Investigation 3: Sessions 1-2

Sunken Ships and Grid Patterns

Investigation 1: Sessions 5-6

Three out of Four Like Spaghetti

Investigation 2: Session 3

Component 4.2: Relate Mathematical Concepts Procedures to Other Disciplines
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4.2.1 Analyze the concepts, strategies, and procedures from other disciplines to recognize mathematical patterns and concepts in familiar situations.

Grade 4 students using *Investigations in Number, Data, and Space* analyze the concepts, strategies, and procedures from other disciplines to recognize mathematical patterns and concepts in familiar situations throughout the course. For example, students conduct a data project investigating bedtimes and sleep.

Sample References:

Mathematical Thinking at Grade 4

Investigation 2: Sessions 1-4

Arrays and Shares

Investigation 2: Session 1

Seeing Solids and Silhouettes

Investigation 4: Sessions 1-4

Landmarks in the Thousands

Investigation 3: Sessions 3-5

Different Shapes, Equal Pieces

Investigation 1: Session 5

The Shape of the Data

Investigation 3: Sessions 1-5

Money, Miles, and Large Numbers

Investigation 3: Sessions 1-4

Changes Over Time

Investigation 3: Sessions 1-8

Packages and Groups

Investigation 1: Session 3

Sunken Ships and Grid Patterns

Investigation 1: Sessions 3-4

Three out of Four Like Spaghetti

Investigation 2: Sessions 1-7

4.2.2 Apply mathematical thinking and modeling in other disciplines.

References:

Mathematical Thinking at Grade 4

Investigation 2: Sessions 1-4

Arrays and Shares

Investigation 2: Session 1

Seeing Solids and Silhouettes

Investigation 1: Sessions 1-2

Investigation 2: Sessions 1-5

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-4

The Shape of the Data

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-8

Investigation 2: Sessions 1-4

Investigation 3: Sessions 1-4

Changes Over Time

Unit Preparation: Sessions 1-3

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-8

Sunken Ships and Grid Patterns

Investigation 1: Sessions 3-4

Three out of Four Like Spaghetti

Investigation 2: Sessions 1-7

4.2.3 Understand the importance of contributions to the development of mathematics such as the contributions of women, men, and different cultures.

Grade 4 students using *Investigations in Number, Data, and Space* are exposed to the contributions of women, men, and different cultures to the development of mathematics as they read children’s literature produced by male and female authors with different cultural backgrounds. For example, students are exposed to artwork by the Dutch graphics artists M. C. Escher.

Sample References:

Mathematical Thinking at Grade 4

Investigation 3: Sessions 4-5: Choice 3: How Much Alexander Spent, page 60

Arrays and Shares

Page I19: Multicultural Extensions for All Students

Seeing Solids and Silhouettes

Investigation 1: Session 1, page 7

Landmarks in the Thousands

Appendix: Vocabulary Support for Second-Language Learners

Different Shapes, Equal Pieces

Investigation 2: Session 3: Extensions, page 31

The Shape of the Data

Investigation 3: Sessions 3-5: Teacher Note, pages 62-64

Money, Miles, and Large Numbers

Investigation 3: Sessions 2-4: Extensions, pages 56-57

Three out of Four Like Spaghetti

Investigation 2: Session 1: Extension, page 31

Component 4.3: Relate Mathematical Concepts and Procedures to Real-World Situations
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4.3.1 Understand how mathematics is used in everyday life.

References:

Mathematical Thinking at Grade 4

Investigation 2: Sessions 1-4

Arrays and Shares

Investigation 2: Session 1

Seeing Solids and Silhouettes

Investigation 1: Sessions 1-2

Investigation 2: Sessions 1-5

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-4

The Shape of the Data

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-5

Money, Miles, and Large Numbers

Investigation 1: Sessions 1-8

Investigation 2: Sessions 1-4

Investigation 3: Sessions 1-4

Changes Over Time

Unit Preparation: Sessions 1-3

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-2

Investigation 3: Sessions 1-8

Sunken Ships and Grid Patterns

Investigation 1: Sessions 3-4

Three out of Four Like Spaghetti

Investigation 2: Sessions 1-7

4.3.2 Understand how mathematics is used in career settings.

In the course of conducting the investigations of the series *Investigations in Number, Data, and Space*, students encounter mathematics in problem situations which could be applied in career settings. For example, students learn about authors of children's literature with mathematical themes; design packaging for a candy merchandising company; and collect, record, and display categorical data on their future careers.

Sample References:

Mathematical Thinking at Grade 4

Investigation 3: Sessions 4-5: Choice 3: How Much Alexander Spent, page 60

Arrays and Shares

Investigation 2: Sessions 7-8, page 36

Seeing Solids and Silhouettes

Investigation 4: Sessions 1-4

Landmarks in the Thousands

Investigation 1: Session 2

Different Shapes, Equal Pieces

Investigation 1: Session 1

The Shape of the Data

Investigation 1: Session 1

Money, Miles, and Large Numbers

Investigation 1: Sessions 7-8

Changes Over Time

Unit Preparation: Growing Plants to Graph

Sunken Ships and Grid Patterns

Investigation 1: Session 1

Three out of Four Like Spaghetti

Investigation 2: Session 3

**Investigations in Number, Data, and Space
to the
Washington Grade Level Content Expectations—EALR’s**

Grade Five

EALR 1: The student understands and applies the concepts and procedures of mathematics.

Component 1.1: Understand and apply concepts and procedures from number sense - number, numeration, computation, and estimation.

Number and Numeration

1.1.1 Understand the concepts of fractions and decimals.

- **Create a model when given a symbolic representation and/or write the fraction when given a model (e.g., number line).**

References:

Name That Portion

Investigation 1: Sessions 1-7

Investigation 2: Sessions 1-9

Investigation 3: Sessions 5-8

Investigation 4: Sessions 1, 3-6

Ten-Minute Math: Seeing Numbers

Between Never and Always

Investigation 1: Sessions 1-4

Building on Numbers You Know

Investigation 2: Session 3: Teacher Note, page 54

Data: Kids, Cats, and Ads

Investigation 3: Sessions 1-4

Investigation 4: Sessions 1-3

- **Explain the value of a given digit in a decimal to at least the thousandths place.**

References:

Name That Portion

Investigation 3: Sessions 1-8

Between Never and Always

Investigation 1: Sessions 1-2

Building on Numbers You Know

Investigation 2: Session 3: Teacher Note, page 54

Containers and Cubes

Ten-Minute Math: Counting Around the Class: Fractions and Decimals

Data: Kids, Cats, and Ads

Investigation 3: Session 1, page 50

- **Explain how the value of a fraction changes in relationship to the size of the whole (e.g., half a pizza vs. half a cookie) [CU]**

References:

Name That Portion

Investigation 1: Sessions 1-7

Investigation 2: Sessions 1-9

Investigation 3: Sessions 5-8

Investigation 4: Sessions 1, 3-6

Ten-Minute Math: Seeing Numbers

Between Never and Always

Investigation 1: Sessions 1-4

Building on Numbers You Know

Investigation 2: Session 3: Teacher Note, page 54

Data: Kids, Cats, and Ads

Investigation 3: Sessions 1-4

Investigation 4: Sessions 1-3

1.1.2 Understand the relative values of non-negative fractions and decimals.

- **Compare, order, and/or illustrate whole numbers, decimals, and fractions using concrete models (e.g., number line or shaded grid) or implementing strategies (e.g., like denominators, benchmarks, conversions). [SP, CU, MC]**

References:

Mathematical Thinking at Grade 5

Investigation 2: Session 5

Name That Portion

Investigation 1: Sessions 5-7

Investigation 2: Sessions 4-8

Investigation 3: Sessions 2-6

Building on Numbers You Know

Investigation 1: Session 2

- **Determine equivalence among fractions.**

References:

Name That Portion

Investigation 1: Sessions 2-6

Investigation 2: Sessions 3-8

Investigation 3: Sessions 1

Between Never and Always
Investigation 1: Sessions 1-2
Data: Kids, Cats, and Ads
Investigation 3: Session 1

1.1.3 Understand and apply the concepts of factors, multiples, prime, and composite numbers.

- **Illustrate prime and/or composite numbers by creating a physical model (e.g., arrays, area models).**

References:

Mathematical Thinking at Grade 5

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-5

Investigation 3: Sessions 1-5

Investigation 4: Sessions 5-6

Picturing Polygons

Ten-Minute Math: Multiple and Factor BINGO

Building on Numbers You Know

Investigation 1: Sessions 1, 3-5

Investigation 4: Session 1

- **Identify the prime numbers from 1-50 and explain why the number is prime or composite. [CU]**

References:

Mathematical Thinking at Grade 5

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-5

Investigation 3: Sessions 1-5

Investigation 4: Sessions 5-6

Picturing Polygons

Ten-Minute Math: Multiple and Factor BINGO

Building on Numbers You Know

Investigation 1: Sessions 1, 3-5

Investigation 4: Session 1

- **Find the least common multiple and greatest common factor of two numbers.**

References:

Mathematical Thinking at Grade 5

Investigation 1: Sessions 1-6

Investigation 2: Sessions 1-5

Investigation 3: Sessions 1-5

Investigation 4: Sessions 5-6

Picturing Polygons
Ten-Minute Math: Multiple and Factor BINGO
Building on Numbers You Know
Investigation 4: Session 1

- **Solve problems in a variety of situations (e.g., find a mystery number, find unit pricing, increase or decrease a recipe, find the portions for a group, characteristics of numbers) [SP, MC]**

Grade 5 students using *Investigations in Number, Data, and Space* solve number problems in a variety of situations throughout the course. For example, students relate rectangles to number pairs and solve number puzzles.

Sample References:

Mathematical Thinking at Grade 5
Investigation 1: Sessions 1-6
Picturing Polygons
Investigation 1: Sessions 3-4
Name That Portion
Investigation 4: Sessions 1-7
Between Never and Always
Investigation 2: Sessions 1-2
Building on Numbers You Know
Investigation 5: Sessions 1-8
Measurement Benchmarks
Ten-Minute Math: Estimation and Number Sense
Patterns of Change
Investigation 1: Sessions 1-4
Containers and Cubes
Investigation 1: Sessions 1-2
Data: Kids, Cats, and Ads
Investigation 1: Sessions 1-4

Computation

1.1.5 Understand the meaning of addition and subtraction of non-negative decimals and simple fractions.

- **Explain meaning of adding and subtracting simple fractions and decimals using visual and physical models. [CU]**

References:

Measurement Benchmarks
Ten-Minute Math: Estimation and Number Sense
Patterns of Change
Ten-Minute Math: Nearest Answer

Name That Portion

Investigation 1: Sessions 1-2

Investigation 4: Sessions 1-7

- **Create a problem situation involving addition and/or subtraction of non-negative decimals or simple fractions. [SP, CU, RL, MC]**

References:

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

Patterns of Change

Ten-Minute Math: Nearest Answer

Name That Portion

Investigation 1: Sessions 1-2

Investigation 4: Sessions 1-7

1.1.6 Understand and apply procedures for addition and subtraction on non-negative decimals and like-denominator fractions with fluency.

- **Find the sums and differences of decimals or simple fractions.**

References:

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

Patterns of Change

Ten-Minute Math: Nearest Answer

Name That Portion

Investigation 1: Sessions 1-2

Investigation 4: Sessions 1-7

- **Write and solve problem situations to find sums and/or differences of decimals or like-denominator fractions. [SP, RL, CU, MC]**

References:

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

Patterns of Change

Ten-Minute Math: Nearest Answer

Name That Portion

Investigation 1: Sessions 1-2

Investigation 4: Sessions 1-7

1.1.7 Apply strategies for mental arithmetic, pencil and paper, or calculator as appropriate to the task involving non-negative decimals and simple fractions.

- **Select and justify appropriate strategies and tools from among mental computation, estimation, calculators, and paper and pencil to compute a problem situation.**

References:

Mathematical Thinking at Grade 5

Investigation 1: Sessions 1-6

Investigation 2: Sessions 2-5

Investigation 3: Sessions 1-5

Investigation 4: Sessions 2-4

Picturing Polygons

Ten-Minute Math: Multiple and Factor BINGO

Name That Portion

Investigation 1: Sessions 1-7

Investigation 2: Sessions 1-9

Investigation 3: Sessions 1-8

Investigation 4: Sessions 1, 7

Ten-Minute Math: Seeing Numbers

Between Never and Always

Investigation 1: Sessions 1-4, 7

Building on Numbers You Know

Investigation 1: Sessions 1, 3-5

Investigation 2: Session 3: Teacher Note

Investigation 4: Session 1

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

Containers and Cubes

Ten-Minute Math: Counting Around the Class: Fractions and Decimals :

Guess My Number: Guess My Fraction

Data, Kids, Cats, and Ads

Investigation 3: Sessions 1-4

Investigation 4: Sessions 1-3

Estimation

1.1.8 Understand situations in which estimation is appropriate and apply estimation strategies to determine the reasonableness of answers involving addition and subtraction on non-negative decimals and like-denominator fractions.

- **Use estimation strategies prior to computation of addition and subtraction of decimals and like-denominator fractions to determine reasonableness of answers.**

References:

Between Never and Always

Ten-Minute Math: Nearest Answer

Building on Numbers You Know

Investigation 1: Session 2

Investigation 3: Sessions 1-6

Investigation 5: Sessions 1-2

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

Data: Kids, Cats, and Ads

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-3

- **Use estimation to predict or check answers.**

References:

Between Never and Always

Ten-Minute Math: Nearest Answer

Building on Numbers You Know

Investigation 1: Session 2

Investigation 3: Sessions 1-6

Investigation 5: Sessions 1-2

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

Data: Kids, Cats, and Ads

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-3

- **Identify appropriate estimated answers for a given situation.**

References:

Between Never and Always

Ten-Minute Math: Nearest Answer

Building on Numbers You Know

Investigation 1: Session 2

Investigation 3: Sessions 1-6

Investigation 5: Sessions 1-2

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

Data: Kids, Cats, and Ads

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-3

- **Articulate various strategies used during estimation. [CU]**

References:

Between Never and Always

Ten-Minute Math: Nearest Answer

Building on Numbers You Know

Investigation 1: Session 2

Investigation 3: Sessions 1-6

Investigation 5: Sessions 1-2

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

Data: Kids, Cats, and Ads

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-3

Component 1.2: Understand and apply concepts and procedures from measurement.

Attributes, Units, and Tools**1.2.1 Understand the attributes of angles.**

- **Describe and compare angles in a variety of objects.**

References:

Picturing Polygons

Investigation 2: Sessions 1-3, 6-9

Investigation 3: Sessions 1-3

- **Recognize angles in the environment.**

References:

Picturing Polygons

Investigation 2: Sessions 1-3, 6-9

Investigation 3: Sessions 1-3

- **Classify angles as right, acute or obtuse.**

References:

Picturing Polygons

Investigation 2: Sessions 1-3, 6-9

Investigation 3: Sessions 1-3

- **Identify types of angles in polygons. [MC]**

References:

Picturing Polygons

Investigation 2: Sessions 1-3, 6-9

Investigation 3: Sessions 1-3

1.2.2 Understand and apply standard units to measure the attribute of angles.

- **Read degrees on a protractor (e.g., simulate a protractor with a paper plate, note cards).**

Grade 5 students using *Investigations in Number, Data, and Space* measure angles by comparing them to a right angle which they constructed using paper folding techniques. They prove constructively that the sum of the measures of the angles of a triangle is 180° and the sum of the measures of a quadrilateral is 360° . They construct angles of specific measures using Geo-Logo turn commands.

References:

Picturing Polygons

Investigation 2: Sessions 1-3, 6-9

Investigation 3: Sessions 1-3

1.2.3 Apply appropriate tools to measure angles.

- **Measure angles using a protractor and label appropriately. [SP, CU]**

Grade 5 students using *Investigations in Number, Data, and Space* measure angles by comparing them to a right angle which they constructed using paper folding techniques. They prove constructively that the sum of the measures of the angles of a triangle is 180° and the sum of the measures of a quadrilateral is 360° . They construct angles of specific measures using Geo-Logo turn commands.

References:

Picturing Polygons

Investigation 2: Sessions 1-3, 6-9

Investigation 3: Sessions 1-3

Procedures, Precision, and Estimation

1.2.4 Apply the measurement procedure to measure angles.

- **Determine the appropriate unit to measure angles.**

References:

Picturing Polygons

Investigation 2: Sessions 1-3, 6-9

Investigation 3: Sessions 1-3

- **Select an appropriate tool according to the unit chosen.**

Grade 5 students using *Investigations in Number, Data, and Space* measure angles by comparing them to a right angle which they constructed using paper folding techniques. They prove constructively that the sum of the measures of the angles of a triangle is 180° and the sum of the measures of a quadrilateral is 360° . They construct angles of specific measures using Geo-Logo turn commands.

References:

Picturing Polygons

Investigation 2: Sessions 1-3, 6-9

Investigation 3: Sessions 1-3

- **Compare the object being measured with the units on the tools and record and label the units.**

References:

Picturing Polygons

Investigation 2: Sessions 1-3, 6-9

Investigation 3: Sessions 1-3

1.2.5 Understand that measurement is approximate.

- **Explain why different tools/people/objects result in different measurements (e.g., different students all measure an object, but come up with different measurements; using a 12-inch ruler vs. a yard stick). [RL, CU]**

References:

Picturing Polygons

Investigation 2: Sessions 1-3, 6-9

Investigation 3: Sessions 1-6

Measurement Benchmarks

Investigation 1: Sessions 1-8

Investigation 2: Sessions 1-8

Containers and Cubes

Investigation 4: Session 6

1.2.6 Understand when approximate measurements are sufficient and apply estimation strategies to obtain reasonable measurements of angles.

- **Identify situations when approximate measurements are sufficient.**

References:

Picturing Polygons

Investigation 2: Sessions 8-9

Measurement Benchmarks

Investigation 1: Sessions 1-3

Investigation 3: Session 1

- **Recognize when a measurement is approximate rather than exact. [SP]**

References:

Picturing Polygons

Investigation 2: Sessions 8-9

Measurement Benchmarks

Investigation 1: Sessions 1-3

Investigation 3: Session 1

- **Use estimation to justify reasonableness of a measurement. [RL]**

References:

Picturing Polygons

Investigation 2: Sessions 8-9

Measurement Benchmarks

Investigation 1: Sessions 1-3

Investigation 3: Session 1

- **Estimate a measurement using standard or nonstandard units. [SP]**

References:

Picturing Polygons

Investigation 2: Sessions 8-9

Measurement Benchmarks

Investigation 1: Sessions 1-3

Investigation 3: Session 1

Component 1.3: Understand and apply concepts and procedures from geometric sense.
--

Properties and Relationships**1.3.1 Understand the properties of 3-D figures and the relationships among 2-D and 3-D figures.**

- **Name and sort 3-D solids according to their attributes (faces, edges, vertices, base, parallel faces).**

References:

Containers and Cubes

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-5

Investigation 3: Sessions 1-4

Investigation 4: Sessions 1-9

Data: Kids, Cats, and Ads

Ten-Minute Math: Volume and Surface Area

- **Combine regular polygons to create given 2-D shapes and represent them on grid paper (e.g., use all pieces of tangrams to create a square). [SP, RL, CU]**

References:

Picturing Polygons

Investigation 2: Session 8

Investigation 3: Session 4

Name That Portion

Investigation 1: Session 2

- **Create 3-D shapes from 2-D figures (e.g., cylinder from two circles and a rectangle) and explain the relationship. [MC]**

References:

Containers and Cubes

Investigation 1: Sessions 1-2

Investigation 3: Sessions 1-2

Investigation 4: Sessions 6-9

- **Create a 3-D shape given its net and draw the net of a given 3-D shape. [RL, MC]**

References:

Containers and Cubes

Investigation 1: Sessions 1-2

Investigation 4: Sessions 6-9

- **Given a variety of figures, sort according to specific attributes (e.g., parallel, perpendicular, lines of symmetry). [CU, MC, RL]**

References:

Picturing Polygons

Investigation 1: Session 1

Investigation 2: Sessions 1-3

Investigation 3: Sessions 1-2

Building on Numbers You Know

Ten-Minute Math: Quick Images

1.3.2 Apply understanding of the properties of parallel and perpendicular lines and line symmetry to identify, name, compare, and sort 2-D shapes and figures.

- **Identify, name, compare and sort parallel and perpendicular lines in 2-D shapes and figures.**

References:

Picturing Polygons

Investigation 2: Sessions 1-7

- **Draw plane figures with parallel and perpendicular lines and explain the attributes. [CU, RL]**

References:

Picturing Polygons

Investigation 2: Sessions 1-7

- **Draw and label a design that includes a given set of attributes. [CU, RL]**

References:

Picturing Polygons

Investigation 1: Sessions 1-4

Investigation 2: Sessions 4-9

Investigation 3: Sessions 1-6

Containers and Cubes

Investigation 2: Sessions 3-4

- **Compare and contrast figures with and without line symmetry. [CU, RL]**

References:

Picturing Polygons

Investigation 3: Session 4

- **Identify places in the environment where parallel and perpendicular lines occur. [MC]**

References:

Picturing Polygons

Investigation 2: Sessions 1-7

1.3.3 Understand location of fractions and decimals on a positive number line.

- **Use a number line to order fractions or decimals from least to greatest (e.g., not limited to a number line marked 0-1).**

References:

Name That Portion

Investigation 1: Sessions 5-6

Investigation 2: Sessions 4-6

Patterns of Change

Ten-Minute Math: Nearest Answer: Number Line Problems

1.3.4 Apply understanding of single transformations (translations and reflections) to draw congruent shapes and figures in multiple orientations.

- **Identify a specific transformation as a translation (slide) or reflection (flip).**

References:

Picturing Polygons

Investigation 2: Sessions 1-7

Investigation 3: Sessions 4-6

- **Given a shape on a grid, perform and draw one or more transformations. [RL]**

References:

Picturing Polygons

Investigation 2: Sessions 4-5, 8-9

Investigation 3: Sessions 5-6

- **Transform congruent shapes and figures in multiple orientations.**

References:

Picturing Polygons

Investigation 2: Sessions 4-5, 8-9

Component 1.4: Understand and apply concepts and procedures from probability and statistics.

Probability**1.4.1 Understand the likelihood (chance) of simple events.**

- **Consider how likely it is that an event will occur (e.g., spinner, coin, dice).**

References:

Between Never and Always

Investigation 1: Sessions 1-7

Investigation 2: Sessions 1-5

Building on Numbers You Know
Ten-Minute Math: What Is Likely?

- **Represent the probability of a simple event on a scale of 0 to 1. [MC]**

References:

Between Never and Always
Investigation 1: Sessions 1-7
Investigation 2: Sessions 1-5
Building on Numbers You Know
Ten-Minute Math: What Is Likely?

- **Given a fair game, create an advantage for one of the players. [SP, RL]**

References:

Between Never and Always
Investigation 2: Sessions 1-5

Statistics

- 1.4.3 Understand how to organize, display, and interpret data in text, histograms, pictographs, and stem-and-leaf plots, and interpret circle graphs**

References:

Mathematical Thinking at Grade 5
Ten-Minute Math: Exploring Data
Name That Portion
Investigation 4: Sessions 1-7
Ten-Minute Math: Exploring Data
Between Never and Always
Investigation 1: Sessions 3-5
Investigation 2: Session 3
Measurement Benchmarks
Investigation 2: Sessions 7-8
Investigation 3: Sessions 1-2
Patterns of Change
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-6
Ten-Minute Math: Graph Stories
Data: Kids, Cats, and Ads
Investigation 1: Sessions 1-3
Investigation 2: Sessions 1-3
Investigation 5: Sessions 3-5

- **Use histograms, pictographs, and stem-and-leaf plots to display data. [CU, MC]**

References:

Mathematical Thinking at Grade 5

Ten-Minute Math: Exploring Data

Name That Portion

Investigation 4: Sessions 1-7

Ten-Minute Math: Exploring Data

Between Never and Always

Investigation 1: Sessions 3-5

Investigation 2: Session 3

Measurement Benchmarks

Investigation 2: Sessions 7-8

Investigation 3: Sessions 1-2

Patterns of Change

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-5

Investigation 3: Sessions 1-6

Ten-Minute Math: Graph Stories

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-3

Investigation 5: Sessions 3-5

- **Construct assorted graphs including labels, appropriate scale, and key. [CU]**

References:

Mathematical Thinking at Grade 5

Ten-Minute Math: Exploring Data

Name That Portion

Investigation 4: Sessions 1-7

Ten-Minute Math: Exploring Data

Between Never and Always

Investigation 1: Sessions 3-5

Investigation 2: Session 3

Measurement Benchmarks

Investigation 2: Sessions 7-8

Investigation 3: Sessions 1-2

Patterns of Change

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-5

Investigation 3: Sessions 1-6

Ten-Minute Math: Graph Stories

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-3

Investigation 5: Sessions 3-5

- **Explain data from given circle graphs. [RL, CU]**

References:

Name That Portion

Investigation 4: Sessions 1-7

1.4.4 Understand and apply the mean from a set of data.

- **Find the mean from a given set of data using models and formulas.**

Students gain experience with measures of central tendency and dispersion as they find the median of a set of data and discuss the spread and clustering of data.

References:

Between Never and Always

Investigation 1: Sessions 3-6

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1-4

Investigation 2: Session 1

- **Use models to represent the mean for a set of data.**

Students gain experience with measures of central tendency and dispersion as they find the median of a set of data and discuss the spread and clustering of data.

References:

Between Never and Always

Investigation 1: Sessions 3-6

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1-4

Investigation 2: Session 1

1.4.5 Understand how different collection methods or different questions can support a point of view.

- **Ask the same question using different data collection methods that result in different points of view being supported. [RL]**

References:

Mathematical Thinking at Grade 5

Ten-Minute Math: Exploring Data

Name That Portion

Investigation 4: Sessions 1-7

Ten-Minute Math: Exploring Data

Data: Kids, Cats, and Ads
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-3
Investigation 3: Sessions 1-4
Investigation 4: Sessions 1-3
Investigation 5: Sessions 1-5

- **With a given question, explain how different data collection methods affect the nature of the data set (e.g., phone survey, internet search, person-to-person survey). [CU]**

References:

Mathematical Thinking at Grade 5
Ten-Minute Math: Exploring Data
Name That Portion

Investigation 4: Sessions 1-7
Ten-Minute Math: Exploring Data

Data: Kids, Cats, and Ads
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-3
Investigation 3: Sessions 1-4
Investigation 4: Sessions 1-3
Investigation 5: Sessions 1-5

1.4.6 Analyze and evaluate data appropriate to the grade level.

- **Propose and justify conclusions and predictions based on data. [CU, RL]**

References:

Mathematical Thinking at Grade 5
Ten-Minute Math: Exploring Data
Name That Portion

Investigation 4: Sessions 1-7
Ten-Minute Math: Exploring Data

Data: Kids, Cats, and Ads
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-3
Investigation 3: Sessions 1-4
Investigation 4: Sessions 1-3
Investigation 5: Sessions 1-5

- **Formulate questions to extend conclusions or verify predictions (e.g., Given that dogs are bigger than cats, do dogs eat more than cats?). [SP, RL]**

References:

Mathematical Thinking at Grade 5

Ten-Minute Math: Exploring Data

Name That Portion

Investigation 4: Sessions 1-7

Ten-Minute Math: Exploring Data

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-3

Investigation 3: Sessions 1-4

Investigation 4: Sessions 1-3

Investigation 5: Sessions 1-5

- **Judge the appropriateness of inferences made from a set of data and support the judgment. [CU, MC]**

References:

Mathematical Thinking at Grade 5

Ten-Minute Math: Exploring Data

Name That Portion

Investigation 4: Sessions 1-7

Ten-Minute Math: Exploring Data

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-3

Investigation 3: Sessions 1-4

Investigation 4: Sessions 1-3

Investigation 5: Sessions 1-5

Component 1.5: Understand and apply concepts and procedures from algebraic sense.
--

Patterns and Relationships**1.5.1 Understand the relationships between two related sets of numbers based on one or two arithmetic operations.**

- **Create, explain, and/or extend number patterns involving two related sets of numbers (e.g., add a missing element in the beginning, middle or end of an in-out chart). [CU]**

References:

Mathematical Thinking at Grade 5

Investigation 2: Sessions 1-4

Investigation 3: Session 1

Name That Portion

Investigation 3: Sessions 5-6:

Activity, pages 86-88

Building on Numbers You Know

Investigation 1: Sessions 1-5

Patterns of Change

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-5

Investigation 3: Sessions 1-7

Ten-Minute Math: Graph Stories

Containers and Cubes

Ten-Minute Math: Counting Around the Class

- **Use appropriate vocabulary to represent, extend and describe patterns using in-out tables (e.g., pattern, rule, sequence). [CU]**

References:

Mathematical Thinking at Grade 5

Investigation 2: Sessions 2-4

Investigation 3: Session 1

Name That Portion

Investigation 3: Sessions 5-6:

Activity, pages 86-88

Patterns of Change

Investigation 1: Sessions 1-4

Investigation 2: Sessions 2-5

Investigation 3: Sessions 1-4

Symbols and Representations

1.5.2 Understand and apply tables, equations, or simple expressions to represent situations involving two arithmetic operations.

- **Represent situations involving two arithmetic operations using symbols, words, pictures, and notations. [CU, RL]**

References:

Mathematical Thinking at Grade 5

Investigation 2: Session 1

Investigation 3: Sessions 2-5

Investigation 4: Session 1

Name That Portion

Ten-Minute Math: Seeing Numbers

Building on Numbers You Know

Investigation 1: Sessions 1, 3-4, 6-8

Investigation 2: Sessions 1-2, 5-6

Investigation 3: Sessions 1-10

Investigation 5: Sessions 4-7

- **Translate between different representations (words, symbols, and pictures) of simple quantitative situations. [MC]**

References:

Mathematical Thinking at Grade 5

Investigation 2: Session 1

Investigation 3: Sessions 2-5

Investigation 4: Session 1

Name That Portion

Ten-Minute Math: Seeing Numbers

Building on Numbers You Know

Investigation 1: Sessions 1, 3-4, 6-8

Investigation 2: Sessions 1-2, 5-6

Investigation 3: Sessions 1-10

Investigation 5: Sessions 4-7

- **Represent and describe patterns using tables and graphs (e.g., interval, rule, and sequence). [CU]**

References:

Mathematical Thinking at Grade 5

Investigation 2: Sessions 2-4

Investigation 3: Session 1

Name That Portion

Investigation 3: Sessions 5-6:

Activity, pages 86-88

Patterns of Change

Investigation 1: Sessions 1-4

Investigation 2: Sessions 2-5

Investigation 3: Sessions 1-4

Evaluating and Solving

1.5.3 Understand and apply the procedures for evaluating and solving simple expressions and one-step equations that include adding and subtracting positive decimals and like-denominator fractions.

- **Solve one-step single variable equations (e.g., $x + 3 = 9$).**

References:

Mathematical Thinking at Grade 5

Investigation 3: Sessions 2-4: Teacher Note, page 63

Building on Numbers You Know

Investigation 1: Sessions 3-4

Investigation 2: Sessions 5-6, page 62

- **Solve real-world situations involving simple, single variable equations. [SP, CU]**

References:

Building on Numbers You Know

Investigation 2: Sessions 5-6, pages 62-63

EALR 2: The student uses mathematical reasoning to define and solve problems.

Component 2.1: Investigate and Analyze Situations
--

2.1.1 Analyze situations to determine known and unknown information in new situations.

References:

Picturing Polygons

Investigation 1: Sessions 3-4

Investigation 2: Sessions 4-7

Investigation 3: Sessions 1-2, 4-6

Data: Kids, Cats, and Ads

Investigation 2: Session 1

Building on Numbers You Know

Investigation 1: Session 1

Investigation 2: Sessions 1-7

Investigation 3: Sessions 1-10

Investigation 5: Sessions 1-8

Containers and Cubes

Investigation 4: Sessions 7-9

2.1.2 Analyze situations to determine when information is missing or extraneous.

Grade 5 students using *Investigations in Number, Data, and Space* determine relevant, irrelevant, and/or sufficient information to solve mathematical problems throughout the course. Informational analysis is a fundamental component of the problem-solving process.

Sample References:

Mathematical Thinking at Grade 5

Investigation 1: Sessions 1-6

Picturing Polygons

Investigation 3: Sessions 5-6

Name That Portion

Investigation 4: Sessions 1-7

Between Never and Always

Investigation 2: Sessions 1-5

Building on Numbers You Know

Investigation 5: Sessions 1-7

Measurement Benchmarks

Investigation 1: Sessions 1-8

Patterns of Change

Investigation 3: Sessions 1-7

Containers and Cubes

Investigation 3: Sessions 1-4

Data: Kids, Cats, and Ads

Investigation 5: Sessions 1-5

Component 2.2: Formulate Questions and Define the Problem**2.2.1 Understand the problem to be solved involving number sense, measurement, geometric sense, and probability and statistics.**

Grade 5 students using *Investigations in Number, Data, and Space* understand, investigate, and solve problems throughout the course. For example, in the area of geometric sense, students create polygons with shape pieces; construct, apply, discuss, and evaluate mathematical definitions of polygons; draw polygons on coordinate grids, on and off the computer; and investigate similar and regular polygons.

Sample References:

Mathematical Thinking at Grade 5

Investigation 1: Sessions 1-3

Picturing Polygons

Investigation 1: Session 3

Name That Portion

Investigation 3: Sessions 5-6

Between Never and Always

Investigation 1: Session 7

Building on Numbers You Know

Investigation 4: Session 1

Measurement Benchmarks

Investigation 3: Session 1

Patterns of Change

Investigation 1: Sessions 1-4

Containers and Cubes

Investigation 1: Sessions 1-4

Data: Kids, Cats, and Ads

Investigation 4: Session 1

2.2.2 Generate questions to be answered in new situations.

References:

Mathematical Thinking at Grade 5

Ten-Minute Math: Exploring Data

Name That Portion

Investigation 4: Sessions 1-7

Ten-Minute Math: Exploring Data

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-3

Investigation 3: Sessions 1-4

Investigation 4: Sessions 1-3

Investigation 5: Sessions 1-5

Component 2.3: Construct Solutions

2.3.1 Apply a variety of strategies and approaches to problem situations from number sense, measurement, geometric sense, and probability and statistics to construct a solution.

Grade 5 students using *Investigations in Number, Data, and Space* apply a variety of strategies and approaches to problem situations throughout the course. For example, students use mathematical reasoning and geometric models, and then explain their thinking, as they explore factors of 1,000 and 10,000.

Sample References:

Mathematical Thinking at Grade 5

Investigation 4: Sessions 5-6

Picturing Polygons

Investigation 3: Sessions 5-6

Name That Portion

Investigation 4: Session 2

Between Never and Always

Investigation 1: Sessions 3-4

Building on Numbers You Know

Investigation 4: Session 2

Measurement Benchmarks

Investigation 3: Session 3

Patterns of Change

Investigation 3: Session 3

Containers and Cubes

Investigation 4: Sessions 7-9

Data: Kids, Cats, and Ads

Investigation 2: Session 3

Component 2.4: Draw Conclusions
--

2.4.1 Understand how to make conjectures and support or contradict them with evidence.

Grade 5 students using *Investigations in Number, Data, and Space* make and support mathematical conjectures throughout the course by conducting the investigations into which the curriculum is organized; in fact, this is a fundamental emphasis of the series. For example, students make, investigate, and support mathematical conjectures as they solve Number Puzzles.

Sample References:

Mathematical Thinking at Grade 5

Investigation 1: Sessions 4-6

Picturing Polygons

Investigation 2: Sessions 1-3

Name That Portion

Investigation 1: Sessions 3-4

Between Never and Always

Investigation 1: Sessions 3-4

Building on Numbers You Know

Investigation 1: Session 1

Measurement Benchmarks

Investigation 1: Session 4

Patterns of Change

Investigation 3: Session 2

Containers and Cubes

Investigation 1: Sessions 1-2

Data: Kids, Cats, and Ads

Investigation 2: Session 2

2.4.2 Analyze solutions to draw conclusions and support them with evidence.

Students at all grade levels using *Investigations in Number, Data, and Space* analyze solutions to draw conclusions and support them with evidence in the form of various models and representations, including graphs, tables, and equations, throughout the course. Students gain experience with several different types of graphs, including real graphs, bar graphs, line graphs, and line plots. Students frequently construct and complete tables as they analyze patterns and functions and collect and interpret data. Students use equations to represent and solve problems.

Sample References:

Mathematical Thinking at Grade 5

Investigation 1: Sessions 3-4

Picturing Polygons

Investigation 1: Sessions 3-4

Name That Portion

Investigation 4: Sessions 1-7

Between Never and Always

Investigation 2: Sessions 1-2

Building on Numbers You Know

Investigation 5: Sessions 1-8

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

Patterns of Change

Investigation 1: Sessions 1-4

Containers and Cubes

Investigation 1: Sessions 1-2

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1-4

Component 2.5: Evaluate and Verify Results**2.5.1 Evaluate strategies and procedures for accuracy and appropriateness.**

Grade 5 students using *Investigations in Number, Data, and Space* evaluate strategies and procedures for accuracy and appropriateness throughout the course. For example, students develop efficient methods for locating numbers on rectangular grids, and they formulate problem-solving strategies by trying several options and discovering “what works.”

Sample References:

Mathematical Thinking at Grade 5

Investigation 2: Session 5

Picturing Polygons

Investigation 2: Sessions 1-3

Name That Portion

Investigation 4: Sessions 5-6

Between Never and Always

Investigation 1: Session 5

Building on Numbers You Know

Investigation 1: Sessions 3-4

Measurement Benchmarks

Investigation 1: Sessions 7-8

Patterns of Change

Investigation 1: Sessions 3-4

Containers and Cubes

Investigation 2: Session 5

Data: Kids, Cats, and Ads

Investigation 1: Session 4

2.5.2 Evaluate results for reasonableness.

Grade 5 students using *Investigations in Number, Data, and Space* evaluate results for reasonableness using a variety of estimation techniques.

References:

Between Never and Always

Ten-Minute Math: Nearest Answer

Building on Numbers You Know

Investigation 1: Session 2

Investigation 3: Sessions 1-6

Investigation 5: Sessions 1-2

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

Patterns of Change

Ten-Minute Math: Nearest Answer

Data: Kids, Cats, and Ads

Investigation 3: Sessions 1-3

Investigation 4: Sessions 1-3

2.5.3 Evaluate conclusions using evidence.

Students in Grade 5 using *Investigations in Number, Data, and Space* evaluate conclusions using evidence throughout the course as they conduct and evaluate the investigations on which the curriculum is based. For example, students outline mathematical arguments to justify conclusions regarding the equivalence of fractions, decimals, and percents.

Sample References:

Mathematical Thinking at Grade 5

Investigation 1: Sessions 4-6

Picturing Polygons

Investigation 2: Sessions 1-3

Name That Portion

Investigation 1: Sessions 3-4

Between Never and Always

Investigation 1: Sessions 3-4

Building on Numbers You Know

Investigation 1: Session 1

Measurement Benchmarks

Investigation 1: Session 4

Patterns of Change

Investigation 3: Session 2

Containers and Cubes

Investigation 1: Sessions 1-2

Data: Kids, Cats, and Ads

Investigation 2: Session 2

EALR 3 The student communicates knowledge and understanding in both everyday and mathematical language.

Component 3.1: Gather Information

3.1.1 Apply a plan for collecting information for a given purpose, which requires using number sense, measurement, geometric sense, or probability and statistics.

Students in Grade 5 using *Investigations in Number, Data, and Space* apply a plan for collecting information for the purpose of solving problems throughout the course; in fact, this is a fundamental emphasis of the series. For example, students plan and conduct surveys on age and gender distribution.

Sample References:

Mathematical Thinking at Grade 5

Investigation 2: Sessions 2-4

Picturing Polygons

Investigation 2: Sessions 1-3

Name That Portion

Investigation 4: Sessions 1-7

Between Never and Always

Investigation 1: Session 6

Building on Numbers You Know

Investigation 2: Session 7

Measurement Benchmarks

Investigation 1: Sessions 5-6

Patterns of Change

Investigation 3: Session 4

Containers and Cubes

Investigation 4: Session 6

Data: Kids, Cats, and Ads

Investigation 4: Session 2

3.1.2 Analyze mathematical information for a given purpose, requiring number sense, measurement, geometric sense, or probability and statistics from multiple sources using reading, listening, and observation.

As is evident from the title of the series, *Investigations in Number, Data, and Space*, the focus of the activities includes the concepts of number, data (including statistics and probability), and space (including geometry and measurement). The investigations around which the curriculum is organized involve reading, listening, and observing on a daily basis. For example, Grade 4 students listen and observe as they collect data, and they read, analyze, and interpret tables and graphs.

Sample References:

Mathematical Thinking at Grade 5

Investigation 1: Sessions 1-6

Picturing Polygons

Investigation 1: Session 4

Name That Portion

Investigation 3: Sessions 5-6

Between Never and Always

Investigation 2: Session 3

Building on Numbers You Know

Investigation 2: Sessions 5-6

Measurement Benchmarks

Investigation 1: Session 4

Patterns of Change

Investigation 2: Sessions 1-5

Containers and Cubes

Investigation 1: Sessions 1-4

Data: Kids, Cats, and Ads

Investigation 1: Sessions 2-3

Component 3.2: Organize and Interpret Information**3.2.1 Understand how to organize and interpret information for a given purpose (reflecting, verbalizing, discussing, and writing).**

Grade 5 students using *Investigations in Number, Data, and Space* are encouraged to organize and represent data using a variety of displays, including tables, circle graphs, line graphs, line plots, and bar graphs. Tables may be provided to the students, or created by the students in various problem situations. Students are asked to choose an appropriate means to display their data, and are asked to explain or justify their choices. They interpret the information in these displays by reflecting, verbalizing, discussing, and writing.

References:

Mathematical Thinking at Grade 5

Investigation 3: Session 1

Picturing Polygons

Investigation 1: Session 4

Investigation 2: Sessions 4-5

Investigation 3: Sessions 1-2, 4-6

Name That Portion

Investigation 1: Session 1

Investigation 3: Sessions 1, 5-7

Investigation 4: Sessions 2-4, 7

Between Never and Always

Investigation 1: Sessions 6-7

Investigation 2: Sessions 1-3**Building on Numbers You Know**

Investigation 1: Sessions 3-4

Investigation 4: Sessions 1-2

Investigation 5: Sessions 4-6

Measurement Benchmarks

Investigation 1: Sessions 7-8

Investigation 2: Sessions 1-2, 7-8

Investigation 3: Sessions 2-3

Patterns of Change

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-5

Investigation 3: Sessions 1-7

Ten-Minute Math: Nearest Answer Number Line Problems

Containers and Cubes

Investigation 4: Sessions 2-5, 7-9

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1-3

Investigation 2: Sessions 1-3

Investigation 3: Sessions 1-3

Investigation 4: Sessions 2-3

Investigation 5: Sessions 1, 3-5

Component 3.3: Represent and Share Information**3.3.1 Understand how to express and present ideas using mathematical language and notation.**

Students in Grades 5 using *Investigations in Number, Data, and Space* use mathematical language and notation to express and present ideas throughout the course. The Dialogue Box is a feature that appears with many investigations and contains the text of discussions between teachers and students in which the teacher encourages students to use the language of mathematics to present mathematical ideas precisely.

Sample References:

Mathematical Thinking at Grade 5

Investigation 1: Sessions 4-6

Picturing Polygons

Investigation 2: Sessions 1-3, 6-7

Name That Portion

Investigation 1: Sessions 3-4, 7

Between Never and Always

Investigation 1: Sessions 3-4

Building on Numbers You Know

Investigation 1: Session 1

Measurement Benchmarks

Investigation 1: Session 4

Patterns of Change

Investigation 3: Session 2

Containers and Cubes

Investigation 1: Sessions 1-2

Data: Kids, Cats, and Ads

Investigation 2: Session 2

3.3.2 Understand how to represent ideas and information from number sense, measurement, geometric sense, and probability and statistics in ways appropriate to audience and purpose.

Grade 5 students using *Investigations in Number, Data, and Space* discuss and exchange ideas about mathematics with their teacher and their classmates as a part of learning throughout the investigation-based curriculum. The Dialogue Box is a feature that appears with many investigations and contains the text of discussions between teacher and students in which the teacher encourages the students to express and share mathematical ideas and solution strategies.

Sample References:

Mathematical Thinking at Grade 5

Investigation 2: Session 1

Picturing Polygons

Investigation 2: Sessions 6-7

Name That Portion

Investigation 2: Session 6

Between Never and Always

Investigation 1: Session 5

Building on Numbers You Know

Investigation 1: Sessions 3-4: Dialogue Box, page 25

Measurement Benchmarks

Investigation 3: Session 2

Patterns of Change

Investigation 1: Sessions 3-4

Containers and Cubes

Investigation 2: Sessions 3-4

Data: Kids, Cats, and Ads

Investigation 5: Sessions 3-5

EALR 4: The student understands how mathematical ideas connect within mathematics, other subject areas, and real-world situations.

Component 4.1: Relate Concepts and Procedures within Mathematics

4.1.1 Apply concepts and procedures from a variety of content strands (number sense, measurement, geometric sense, and probability and statistics) in a given problem or situation.

Each unit of study in *Investigations in Number, Data, and Space* is organized to enable students to apply concepts and procedures from more than one content strand in a given problem or situation. Each Investigation involves students directly experiencing the connections between the mathematical ideas presented in each unit. For example, in Grade 5, use geometric figures to represent and solve number theory problems as they construct rectangles using factors of 1,000 as dimensions.

Sample References:

Mathematical Thinking at Grade 5

Investigation 2: Sessions 1-5

Picturing Polygons

Investigation 1: Sessions 1-4

Name That Portion

Investigation 1: Sessions 1-7

Between Never and Always

Investigation 1: Sessions 1-7

Building on Numbers You Know

Investigation 2: Sessions 1-7

Measurement Benchmarks

Investigation 2: Sessions 1-8

Patterns of Change

Investigation 2: Sessions 1-5

Containers and Cubes

Investigation 3: Sessions 1-4

Data: Kids, Cats, and Ads

Investigation 3: Sessions 1-4

4.1.2 Analyze relationships between equivalent mathematical models and representations.

Grade 5 students using *Investigations in Number, Data, and Space* analyze relationships between equivalent mathematical models and representations throughout the course. Students choose between and among concrete materials and symbols, tables and graphs, drawings and diagrams, and computer models.

Sample References:

Mathematical Thinking at Grade 5

Investigation 4: Sessions 5-6

Picturing Polygons

Investigation 3: Sessions 5-6

Name That Portion

Investigation 4: Session 2

Between Never and Always

Investigation 1: Sessions 3-4

Building on Numbers You Know

Investigation 4: Session 2

Measurement Benchmarks

Investigation 3: Session 3

Patterns of Change

Investigation 3: Session 3

Containers and Cubes

Investigation 4: Sessions 7-9

Data: Kids, Cats, and Ads

Investigation 2: Session 3

Component 4.2: Relate Mathematical Concepts Procedures to Other Disciplines**4.2.1 Analyze the concepts, strategies, and procedures from other disciplines.**

Grade 5 students using *Investigations in Number, Data, and Space* identify practical applications of mathematical principles that can be applied to other disciplines throughout the course. For example, students use scientific procedures to conduct statistical studies of age and gender.

Sample References:

Mathematical Thinking at Grade 5

Ten-Minute Math: Exploring Data

Picturing Polygons

Investigation 1: Session 4

Name That Portion

Investigation 4: Sessions 5-6

Between Never and Always

Investigation 2: Sessions 1-2

Building on Numbers You Know

Investigation 2: Session 7

Measurement Benchmarks

Investigation 1: Sessions 7-8

Patterns of Change

Investigation 2: Session 1

Containers and Cubes

Investigation 2: Sessions 3-4

Data: Kids, Cats, and Ads

Investigation 3: Session 2-3

4.2.2 Apply mathematical thinking and modeling in other disciplines.

Grade 5 students using *Investigations in Number, Data, and Space* apply mathematical thinking and modeling to solve problems that arise in other disciplines throughout the course. For example, students apply probability to gaming strategies.

Sample References:

Mathematical Thinking at Grade 5

Ten-Minute Math: Exploring Data

Picturing Polygons

Investigation 3: Session 4

Name That Portion

Investigation 4: Session 1

Between Never and Always

Investigation 2: Session 3

Building on Numbers You Know

Investigation 2: Session 4

Measurement Benchmarks

Investigation 2: Sessions 7-8

Patterns of Change

Investigation 3: Session 7

Containers and Cubes

Investigation 4: Sessions 7-9

Data: Kids, Cats, and Ads

Investigation 5: Sessions 1-5

4.2.3 Understand the importance of contributions to the development of mathematics such as the contributions of women, men, and different cultures.

The focus of the series *Investigations in Number, Data, and Space* is on student exploration and discovery. Teachers have the opportunity to introduce background information regarding historical and cultural contributions to the development of the mathematical concepts the students are investigating, as well as to bring up current cultural and societal issues. For example, students are inspired by an illustration of the main polygonal forms in a Picasso drawing to create their own picture using only polygons.

Sample References:

Picturing Polygons

Appendix: Student Sheet 2

Name That Portion

Investigation 4: Session 1: Teacher Note, page 108

Component 4.3: Relate Mathematical Concepts and Procedures to Real-World Situations**4.3.1 Understand the extensive uses of mathematics outside the classroom.**

Grade 5 students using *Investigations in Number, Data, and Space* observe and participate in mathematics outside the classroom on a number of occasions throughout the course. Students conduct investigations and surveys at home, they apply mathematics to everyday life, and they observe mathematics in the outside world.

Sample References:

Mathematical Thinking at Grade 5

Ten-Minute Math: Exploring Data

Picturing Polygons

Investigation 1: Session 1, page 7

Name That Portion

Investigation 4: Session 7

Between Never and Always

Investigation 1: Sessions 1-2

Building on Numbers You Know

Investigation 2: Session 4

Measurement Benchmarks

Investigation 1: Sessions 7-8

Patterns of Change

Investigation 2: Sessions 1-5

Containers and Cubes

Investigation 3: Session 4

Data: Kids, Cats, and Ads

Investigation 5: Sessions 1-5

4.3.2 Understand how mathematics is used in several occupations/careers of interest.

In the course of conducting the investigations of the series *Investigations in Number, Data, and Space*, Grade 5 students encounter situations which could be applied to a variety of future careers, including computer technology and statistical research.

Sample References:

Picturing Polygons

Investigation 1: Session 4

Investigation 2: Sessions 4-9

Investigation 3: Sessions 1-6

Appendix: *Geo-Logo* Teacher Tutorial

Name That Portion

Investigation 4: Sessions 1-7

Measurement Benchmarks

Investigation 2: Sessions 1-8

Patterns of Change

Investigation 3: Sessions 1-7

Appendix: Computer Help for *Trips*

Containers and Cubes

Investigation 2: Sessions 1-5

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1-4

Investigation 2: Sessions 1-3

Investigation 3: Sessions 2-4

Investigation 4: Sessions 1-3

Investigation 5: Sessions 1-5