A Correlation of

to the

New Jersey Core Curriculum

Content Standards for Mathematics

Grades K-5

O/M-146

INTRODUCTION

This document demonstrates how well ***Investigations in Number, Data, and Space®*** integrates with the *New Jersey Core Curriculum Content Standards for Mathematics*. The citations within this correlation provide Investigation Curriculum Unit titles, Investigation number and Session number or Focus Time/Choice Time title correlated to the *New Jersey Core Curriculum Content Standards for Mathematics*. Thus, teachers know exactly where instruction is located to prepare students for mastery of *New Jersey Core Curriculum Content Standards for Mathematics.*

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.

Table of Contents

Investigations in Number, Data, & Space
to the
New Jersey Core Curriculum
Content Standards for Mathematics

Grades K- 5

STANDARD 4.1 (NUMBER AND NUMERICAL OPERATIONS) ALL STUDENTS WILL DEVELOP NUMBER SENSE AND WILL PERFORM STANDARD NUMERICAL OPERATIONS AND ESTIMATIONS ON ALL TYPES OF NUMBERS IN A VARIETY OF WAYS.

Cumulative Progress Indicators

*By the end of **Grade 2**, students will:*

A. Number Sense

1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 2 pertain to these sets of numbers as well).

- **Whole numbers through hundreds**
- **Ordinals**
- **Proper fractions (denominators of 2, 3, 4, 8, 10)**

K: *Mathematical Thinking in Kindergarten*
Investigation 1: Focus Time
Investigation 2: Focus Time
Classroom Routines

Pattern Trains and Hopscotch Paths
Classroom Routines

Collecting, Counting, and Measuring
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 4: Focus Time
Classroom Routines

Counting Ourselves and Others
Investigation 1: Focus Time, Choice Time
Classroom Routine

Making Shapes and Building Blocks
Classroom Routines

How Many in All?
Investigation 1: Focus Time
Investigation 2: Choice Time
Classroom Routines

1: *Mathematical Thinking at Grade 1*
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-6
Investigation 4: Sessions 1-4, 6
Building Number Sense
Investigation 1: Sessions 1-8
Investigation 2: Sessions 1-6, 8-9
Investigation 3: Sessions 1-7, 9
Investigation 4: Sessions 1-10
Number Games and Story Problems
Investigation 2: Sessions 10-12
Bigger, Taller, Heavier, Smaller
Investigation 2: Sessions 1-7
This concept is covered throughout this grade level in Classroom Routines

2: *Mathematical Thinking at Grade 2*
Investigation 2: Sessions 1, 4-5, 7
Coins, Coupons, and Combinations
Investigation 2: Sessions 2-5, 10
Investigation 4: Sessions 1-4
Shapes, Halves, and Symmetry
Investigation 3: Sessions 1-8

2. Demonstrate an understanding of whole number place value concepts.

K: This concept is introduced in Grade 1.

1: *Mathematical Thinking at Grade 1*
Investigation 2: Sessions 1-3, 5-6
Investigation 4: Sessions 1-3
Investigation 5: Sessions 2-4
Building Number Sense
Investigation 1: Sessions 5-8
Investigation 2: Sessions 1-2, 9
Investigation 3: Sessions 5-7, 9
Investigation 4: Sessions 1-5, 7-10
Number Games and Story Problems
Investigation 2: Sessions 10-12

2: *Coins, Coupons, and Combinations*
Investigation 1: Sessions 1-3
Investigation 4: Sessions 1-4
Putting Together and Taking Apart
Investigation 2: Sessions 1-6
Investigation 5: Sessions 2-3, 6
This concept is covered throughout this grade level in Classroom Routines.

3. Understand that numbers have a variety of uses.

K: *Mathematical Thinking in Kindergarten*
Investigation 1: Focus Time
Investigation 2: Focus Time
Classroom Routines

Pattern Trains and Hopscotch Paths
Classroom Routines

Collecting, Counting, and Measuring
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 4: Focus Time
Classroom Routine

Counting Ourselves and Others
Investigation 1: Focus Time, Choice Time
Classroom Routine

Making Shapes and Building Blocks
Classroom Routine

How Many in All?
Investigation 1: Focus Time
Investigation 2: Choice Time
Classroom Routines

1: *Mathematical Thinking at Grade 1*
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-6
Investigation 4: Sessions 1-4, 6

Building Number Sense
Investigation 1: Sessions 1-8
Investigation 2: Sessions 1-6, 8-9
Investigation 3: Sessions 1-7, 9
Investigation 4: Sessions 1-10

Number Games and Story Problems
Investigation 2: Sessions 10-12

Bigger, Taller, Heavier, Smaller
Investigation 2: Sessions 1-7

This concept is covered throughout this grade level in Classroom Routines

2: *Mathematical Thinking at Grade 2*
Investigation 1: Session 1
Investigation 2: Sessions 1, 4-6
Investigation 3: Session 5

Coins, Coupons, and Combinations
Investigation 1: Sessions 1, 6, 8-10
Investigation 2: Sessions 1-5, 7-10
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-4

Shapes, Halves and Symmetry
Investigation 2: Sessions 2-3
Investigation 3: Sessions 3-5
Putting Together and Taking Apart
Investigation 2: Sessions 1-4
Investigation 5: Sessions 2-3, 6, 8
How Long? How Far?
Investigation 2: Sessions 2-8
Timelines and Rhythm Patterns
Investigation 1: Sessions 3-5
This concept is covered throughout this grade level in Classroom Routines.

4. Count and perform simple computations with coins.

- **Amounts up to $1.00 (using cents notation)**

K: This concept is introduced in Grade 1.
1: *Number Games and Story Problems*
Investigation 2: Sessions 3-8
Investigation 3: Session 9
2: *Mathematical Thinking at Grade 2*
Investigation 4: Sessions 2-4
Coins, Coupons, and Combinations
Investigation 2: Sessions 2-10

5. Compare and order whole numbers.

K: *Collecting, Counting, and Measuring*
Investigation 3: Focus Time, Choice Time
Investigation 4: Choice Time
Investigation 5: Focus Time, Choice Time
Investigation 6: Choice Time
How Many in All?
Investigation 2: Choice Time
Investigation 3: Choice Time
Investigation 4: Choice Time
1: *Mathematical Thinking at Grade* 1
Investigation 2: Sessions 1-3, 5-6
Investigation 4: Sessions 1-3
Investigation 5: Sessions 2-4
Building Number Sense
Investigation 1: Sessions 2-6
Investigation 2: Sessions 3-5
Investigation 3: Sessions 3-7

Quilt Squares and Block Towns
Investigation 1: Sessions 2-10
Investigation 3: Sessions 6-7
Number Games and Story Problems
Investigation 2: Sessions 6-9

2: *Mathematical Thinking at Grade 2*
Investigation 4: Sessions 1-5
Investigation 5: Sessions 1-5
Putting Together and Taking Apart
Investigation 2: Sessions 3-7
Investigation 4: Session 1
Investigation 5: Sessions 1-3, 6, 8

B. Numerical Operations

1. Develop the meanings of addition and subtraction by concretely modeling and discussing a large variety of problems.

- **Joining, separating, and comparing**

K: *Collecting, Counting, and Measuring*
Investigation 5: Focus Time, Choice Time
Investigation 6: Choice Time
How Many in All?
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time

1: *Mathematical Thinking at Grade 1*
Investigation 2: Sessions 1-6
Investigation 4: Sessions 2-4, 6
Investigation 5: Sessions 2-4
Building Number Sense
Investigation 1: Sessions 1-9
Investigation 2: Sessions 1-9
Investigation 3: Sessions 5-7
Investigation 4: Sessions 1-10
Quilt Squares and Block Towns
Investigation 1: Sessions 2-10
Investigation 3: Sessions 6-7
Number Games and Story Problems
Investigation 1: Sessions 1-10
Investigation 2: Sessions 1-8, 10-12
Investigation 3: Sessions 1-8, 10-13
This concept is covered throughout this grade level in Classroom Routines.

2: *Mathematical Thinking at Grade 2*
Investigation 2: Sessions 4-5
Investigation 4: Sessions 1-5
Coins, Coupons, and Combinations
Investigation 1: Sessions 1-6, 8-9
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-5
Putting Together and Taking Apart
Investigation 1: Sessions 1-4
Investigation 2: Sessions 2-4
Investigation 3: Sessions 2-5
Investigation 5: Sessions 2-3, 6, 8
This concept is covered throughout this grade level in Classroom Routines.

2. Explore the meanings of multiplication and division by modeling and discussing problems.

K: This concept is introduced in Grade 1.
1: *Number Games and Story Problems*
Investigation 2: Sessions 1-8, 10-13
2: *Coins, Coupons, and Combinations*
Investigation 2: Sessions 2-5, 10

3. Develop proficiency with basic addition and subtraction number facts using a variety of fact strategies (such as "counting on" and "near doubles") and then commit them to memory.

K: *How Many in All?*
Investigation 2: Focus Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
1: *Mathematical Thinking at Grade 1*
Investigation 2: Sessions 1-6
Investigation 4: Sessions 2-4, 6
Investigation 5: Sessions 2-4
Building Number Sense
Investigation 1: Sessions 1-9
Investigation 2: Sessions 1-9
Investigation 4: Sessions 1-10
Quilt Squares and Block Towns
Investigation 1: Sessions 2-10
Investigation 3: Sessions 6-7

Number Games and Story Problems
Investigation 1: Sessions 1-10
Investigation 2: Sessions 1-8, 10-12
Investigation 3: Sessions 1-8, 10-13
This concept is covered throughout this grade level in Classroom Routines.

2: *Mathematical Thinking at Grade 2*
Investigation 2: Sessions 2-3, 6, 8
Coins, Coupons, and Combinations
Investigation 1: Sessions 1-6, 8-9
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-4
This concept is covered throughout this grade level in Classroom Routines.

4. Construct, use, and explain procedures for performing addition and subtraction calculations with:

- **Pencil-and-paper**
- **Mental math**
- **Calculator1**

K: *How Many in All?*
Investigation 4: Focus Time, Choice Time

1: *Mathematical Thinking at Grade 1*
Investigation 2: Sessions 1-6
Investigation 4: Sessions 2-4, 6
Investigation 5: Sessions 2-4
Building Number Sense
Investigation 4: Sessions 1-5, 7-10
Number Games and Story Problems
Investigation 2: Sessions 10-12

2: *Mathematical Thinking at Grade 2*
Investigation 2: Sessions 2-3, 6, 8
Coins, Coupons, and Combinations
Investigation 1: Sessions 1-9
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-5
Putting Together and Taking Apart
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-4, 7
Investigation 3: Sessions 1-5
Investigation 5: Sessions 1-5, 7
This concept is covered throughout this grade level in Classroom Routines.

5. Use efficient and accurate pencil-and-paper procedures for computation with whole numbers.

- **Addition of 2-digit numbers**
- **Subtraction of 2-digit numbers**

K: This concept is introduced in Grade 1.

1: *Number Games and Story Problems*
Investigation 2: Session 13

2: *Mathematical Thinking at Grade 2*
Investigation 4: Sessions 1, 5

Putting Together and Taking Apart
Investigation 2: Sessions 1-4
Investigation 4: Sessions 1-4

6. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers.

K: This concept is introduced in Grade 2.

1: This concept is introduced in Grade 2.

2: *Coins, Coupons, and Combinations*
Investigation 1: Sessions 7-9

7. Check the reasonableness of results of computations.

K: *How Many in All?*
Investigation 3: Choice Time
Investigation 4: Choice Time

1: *Number Games and Story Problems*
Investigation 3, Sessions 6-8, 10-12

2: *Coins, Coupons, and Combinations*
Investigation 1: Session 10
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-4

Putting Together and Taking Apart
Investigation 1: Sessions 1-4
Investigation 2: Sessions 3-4, 7
Investigation 3: Sessions 3-5
Investigation 5: Sessions 1-3, 4-7

8. Understand and use the inverse relationship between addition and subtraction.

K: This concept is introduced in Grade 2.

1: This concept is introduced in Grade 2.

2: *Putting Together and Taking Apart*
Investigation 1: Sessions 1-2
Investigation 3: Session 2

C. Estimation

1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.

K: *Counting, Collecting, and Measuring*
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Investigation 5: Focus Time, Choice Time
Investigation 6: Choice Time

1: *Number Games and Story Problems*
Investigation 1: Sessions 7-9

2: *Mathematical Thinking at Grade 2*
Investigation 5: Session 3
Coins, Coupons, and Combinations
Classroom Routines
How Long? How Far?
Investigation 1: Sessions 1-7
Investigation 2: Session 2

2. Determine the reasonableness of an answer by estimating the result of computations (e.g., 15 + 16 is not 211).

K: This concept is introduced in Grade 2.

1: This concept is introduced in Grade 2.

2: *Coins, Coupons, and Combinations*
Investigation 1: Sessions 6, 10
Investigation 4: Sessions 2-5
Putting Together and Taking Apart
Investigation 1: Sessions 1-4
Investigation 2: Sessions 3-4
Investigation 3: Sessions 1-2
Investigation 4: Session 1
Investigation 5: Sessions 1, 4-5, 7-8

3. Explore a variety of strategies for estimating both quantities (e.g., the number of marbles in a jar) and results of computation.

K: This concept is introduced in Grade 1.

1: *Building Number Sense*
Investigation 3: Session 9
Bigger, Taller, Heavier, Smaller
Investigation 2: Session 1
This concept is covered throughout this grade level in Classroom Routines.

2: *Mathematical Thinking at Grade 2*
Investigation 5: Session 3
Coins, Coupons, and Combinations
Classroom Routines
How Long? How Far?
Investigation 1: Sessions 1-7
Investigation 2: Session 2

Building upon knowledge and skills gained in preceding grades, by the end of ***Grade 3****, students will:*

A. Number Sense

1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 3 pertain to these sets of numbers as well).

- **Whole numbers through hundred thousands**
- **Commonly used fractions (denominators of 2, 3, 4, 5, 6, 8, 10) as part of a whole, as a subset of a set, and as a location on a number line**

3: *Mathematical Thinking at Grade 3*
Investigation 1: Sessions 1-3
Combining and Comparing
Investigation 3: Session 2
Investigation 4: Sessions 1-4
Investigation 5: Sessions 1-3
Fair Shares
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-7

2. Demonstrate an understanding of whole number place value concepts.

3: *Mathematical Thinking at Grade 3*
Investigation 1: Sessions 2-3
Landmarks in the Hundreds
Investigation 2; Sessions 1-3

3. Identify whether any whole number is odd or even.

3: *Mathematical Thinking at Grade 3*
Investigation 4: Sessions 1-3

4. Explore the extension of the place value system to decimals through hundredths.

3: *Mathematical Thinking at Grade 3*
Investigation 4: Session 2

5. Understand the various uses of numbers.

- **Counting, measuring, labeling (e.g., numbers on baseball uniforms)**

3: *Mathematical Thinking at Grade 3*
Investigation 1: Session 1
Investigation 3: Sessions 3-4
Things That Come in Groups
Investigation 5: Sessions 1, 3
Flips, Turns, and Area
Investigation 1: Sessions 4-5
From Paces to Feet
Investigation 1: Sessions 1-4
Investigation 2: Session 2
Exploring Solids and Boxes
Investigation 4: Session 1
Investigation 5: Sessions 1-4

6. Compare and order numbers.

3: *Mathematical Thinking at Grade 3*
Investigation 2: Sessions 2, 5-7
Investigation 3: Sessions 3-4
Investigation 4: Session 1
Ten-Minute Math
Combining and Comparing
Investigation 1: Session 1
Investigation 4: Sessions 1-4

B. Numerical Operations

1. Develop the meanings of the four basic arithmetic operations by modeling and discussing a large variety of problems.

- **Addition and subtraction: joining, separating, comparing**
- **Multiplication: repeated addition, area/array**
- **Division: repeated subtraction, sharing**

3: *Mathematical Thinking at Grade 3*
Investigation 2: Sessions 1-4
Investigation 3: Sessions 3-4
Investigation 4: Sessions 1-2

Ten-Minute Math

Things That Come in Groups
Investigation 1: Sessions 1-4
Investigation 2: Sessions 3-4
Investigation 3: Sessions 1-3

Landmarks in the Hundreds
Investigation 2: Sessions 1-3, 5-6

Combining and Comparing
Investigation 1: Sessions 1-2
Investigation 2: Session 2
Investigation 3: Sessions 1-2
Investigation 4: Sessions 3-4
Ten-Minute Math

2. Develop proficiency with basic multiplication and division number facts using a variety of fact strategies (such as "skip counting" and "repeated subtraction").

3: *Things That Come in Groups*
Investigation 1: Session 4
Investigation 2: Sessions 1-4
Investigation 3: Sessions 1-3
Investigation 5: Session 1
Ten-Minute Math

Landmarks in the Hundreds
Investigation 1: Sessions 2-3

3. Construct, use, and explain procedures for performing whole number calculations with:

- **Pencil-and-paper**
- **Mental math**
- **Calculator**

3: *Mathematical Thinking at Grade 3*
Investigation 1: Sessions 1-3
Investigation 3: Sessions 3-4
Investigation 4: Session 2
Ten-Minute Math

Up and Down the Number Line
Investigation 1: Session 5
Ten-Minute Math

4. Use efficient and accurate pencil-and-paper procedures for computation with whole numbers.

- **Addition of 3-digit numbers**
- **Subtraction of 3-digit numbers**
- **Multiplication of 2-digit numbers by 1-digit numbers**

3: *Things That Come in Groups*
Investigation 2: Sessions 1-4
Investigation 5: Session 3
Ten-Minute Math

Up and Down the Number Line
Investigation 1: Session 5
Investigation 3: Sessions 3-5
Ten-Minute Math

Combining and Comparing
Investigation 3: Sessions 1-3
Ten-Minute Math

Fair Shares
Investigation 2: Sessions 1-2, 4-7
Investigation 3: Sessions 1-2

5. Count and perform simple computations with money.

- **Cents notation (¢)**

3 *Mathematical Thinking at Grade 3*
Investigation 2: Sessions 5-7
Ten-Minute Math

Combining and Comparing
Investigation 3: Session 2
Investigation 5: Sessions 1-3

6. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers.

3: *Mathematical Thinking at Grade 3*
Investigation 1: Sessions 1-3
Investigation 3: Sessions 3-4
Investigation 4: Session 2
Ten-Minute Math

7. Check the reasonableness of results of computations.

3: *Combining and Comparing*
Investigation 3: Session 1
Investigation 4: Session 1
Investigation 5: Sessions 2-3
Ten-Minute Math

C. Estimation

1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.

3: *Mathematical Thinking at Grade 3*
Investigation 3: Sessions 3-4
Landmarks in the Hundreds
Investigation 2: Sessions 5-6
Investigation 3: Sessions 2-3
Combining and Comparing
Investigation 1: Session 1
Investigation 2: Sessions 1-2
Investigation 3: Session 1

2. Construct and use a variety of estimation strategies (e.g., rounding and mental math) for estimating both quantities and the result of computations.

3: *Mathematical Thinking at Grade 3*
Investigation 3: Sessions 3-4
From Paces to Feet
Investigation 1: Sessions 2, 5-6
Ten-Minute Math
Landmarks in the Hundreds
Investigation 2: Sessions 5-6
Investigation 3: Sessions 2-3
Combining and Comparing
Investigation 3: Sessions 1-2
Ten-Minute Math

3. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.

3: *Combining and Comparing*
Ten-Minute Math

4. Use estimation to determine whether the result of a computation (either by calculator or by hand) is reasonable.

3: *From Paces to Feet*

Investigation 1: Sessions 2, 5-6
Ten-Minute Math
Combining and Comparing
Ten-Minute Math

Building upon knowledge and skills gained in preceding grades, by the end of ***Grade 4,*** *students will:*

A. Number Sense

1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 4 pertain to these sets of numbers as well).

- **Whole numbers through millions**
- **Commonly used fractions (denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 16) as part of a whole, as a subset of a set, and as a location on a number line**
- **Decimals through hundredths**

4: *Landmarks in the Thousands*
Investigation 3: Sessions 1-2
Investigation 4: Sessions 1-3
Different Shapes, Equal Pieces
Investigation 1: Sessions 2-5
Investigation 2: Sessions 1-4
Three out of Four Like Spaghetti
Investigation 1: Sessions 2-3

2. Demonstrate an understanding of place value concepts.

4: *Landmarks in the Thousands*
Investigation 3: Sessions 1-2
Investigation 4: Sessions 1-3

3. Demonstrate a sense of the relative magnitudes of numbers.

4: *Landmarks in the Thousands*
Investigation 3: Sessions 3-5
Investigation 4: Sessions 1-3
Money, Miles, and Large Numbers
Investigation 2: Sessions 1-3
Three out of Four Like Spaghetti
Investigation 1: Session 3

4. Understand the various uses of numbers.

- **Counting, measuring, labeling (e.g., numbers on baseball uniforms), locating (e.g., Room 235 is on the second floor)**

4: *Mathematical Thinking at Grade 4*
Investigation 2: Sessions 1, 3-4
Investigation 3: Sessions 4-5
Money, Miles, and Large Numbers
Investigation 2: Session 4
Investigation 3: Sessions 4-5

5. Use concrete and pictorial models to relate whole numbers, commonly used fractions, and decimals to each other, and to represent equivalent forms of the same number.

4: *Money, Miles, and Large Numbers*
Investigation 2: Sessions 1-3

6. Compare and order numbers.

4: *Mathematical Thinking at Grade 4*
Investigation 1: Session 4
Investigation 2: Sessions 1, 3-4
Landmarks in the Thousands
Investigation 3: Sessions 1-2
Investigation 4: Sessions 1-3
Money, Miles, and Large Numbers
Investigation 1: Sessions 1-8
Investigation 3: Sessions 1-4

7. Explore settings that give rise to negative numbers.

- **Temperatures below 0°, debts**
- **Extension of the number line**

4: *Sunken Ships and Grid Patterns*
Investigation 1: Sessions 2-4

B. Numerical Operations

1. Develop the meanings of the four basic arithmetic operations by modeling and discussing a large variety of problems.

- **Addition and subtraction: joining, separating, comparing**
- **Multiplication: repeated addition, area/array**
- **Division: repeated subtraction, sharing**

4: *Arrays and Shares*
Investigation 1: Session 3
Investigation 2: Sessions 1-8
Investigation 3: Sessions 2-4
Ten-Minute Math

Money, Miles, and Large Numbers
Investigation 1: Sessions 1-8
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-4

Packages and Groups
Investigation 3: Sessions 1-6, 10

2. Develop proficiency with basic multiplication and division number facts using a variety of fact strategies (such as "skip counting" and "repeated subtraction") and then commit them to memory.

4: *Arrays and Shares*
Investigation 1: Sessions 1-2
Investigation 2: Sessions 1-3, 7-8
Investigation 3: Sessions 2-4
Ten-Minute Math

Packages and Groups
Investigation 3: Session 10

3. Construct, use, and explain procedures for performing whole number calculations and with:

- **Pencil-and-paper**
- **Mental math**
- **Calculator**

4: *Mathematical Thinking at Grade 4*
Investigation 1: Session 4
Investigation 3: Sessions 1-2, 4-5
Ten-Minute Math

Arrays and Shares
Investigation 3: Sessions 1-5

Money, Miles, and Large Numbers
Investigation 1: Sessions 1-8
Investigation 3: Sessions 1-4
Packages and Groups
Investigation 2: Session 1
Investigation 3: Sessions 4-6, 10

4. Use efficient and accurate pencil-and-paper procedures for computation with whole numbers.

- **Addition of 3-digit numbers**
- **Subtraction of 3-digit numbers**
- **Multiplication of 2-digit numbers**
- **Division of 3-digit numbers by 1-digit numbers**

4: *Mathematical Thinking at Grade 4*
Investigation 1: Session 1
Landmarks in the Thousands
Investigation 3: Sessions 3-5
Packages and Groups
Investigation 2: Sessions 2-3
Investigation 3: Sessions 4-6

5. Construct and use procedures for performing decimal addition and subtraction.

4: *Money, Miles, and Large Numbers*
Investigation 1: Sessions 6-8
Investigation 2: Sessions 1-2, 4

6. Count and perform simple computations with money.

- **Standard dollars and cents notation**

4: *Mathematical Thinking at Grade 4*
Investigation 2: Sessions 1, 3-4
Investigation 3: Sessions 4-5
Money, Miles, and Large Numbers
Investigation 1: Sessions 4-5, 7-8
Investigation 3: Sessions 1-4

7. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers.

4: *Landmarks in the Thousands*
Investigation 2: Sessions 2-4
Investigation 3: Sessions 3-5
Money, Miles, and Large Numbers
Investigation 1: Sessions 1-3, 6-8
Investigation 3: Sessions 1-4

8. Check the reasonableness of results of computations.

4: *The Shape of the Data*
Investigation 1: Sessions 2-3
Investigation 2: Session 1
Ten-Minute Math

9. Use concrete models to explore addition and subtraction with fractions.

4: *Different Shapes, Equal Pieces*
Investigation 2: Session 3

10. Understand and use the inverse relationships between addition and subtraction and between multiplication and division.

4: *Packages and Groups*
Investigation 3: Sessions 1-6

C. Estimation

1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.

4: *Mathematical Thinking at Grade 4*
Investigation 1: Session 4
Investigation 2: Sessions 3-4

2. Construct and use a variety of estimation strategies (e.g., rounding and mental math) for estimating both quantities and the results of computations.

4: *Mathematical Thinking at Grade 4*
Investigation 1: Sessions 1, 4
Ten-Minute Math
Landmarks in the Thousands
Investigation 3: Sessions 3-5

The Shape of the Data
Investigation 1: Sessions 2-3
Investigation 2: Session 1
Ten-Minute Math

Money, Miles, and Large Numbers
Investigation 1: Sessions 1-5, 7-8
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-4

3. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.

4: *Packages and Groups*
Investigation 2: Sessions 2-3
Investigation 3: Sessions 4-6

4. Use estimation to determine whether the result of a computation (either by calculator or by hand) is reasonable.

4: *The Shape of the Data*
Investigation 1: Sessions 2-3
Investigation 2: Session 1
Ten-Minute Math

Building upon knowledge and skills gained in preceding grades, by the end of ***Grade 5****, students will:*

A. Number Sense

1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 5 pertain to these sets of numbers as well).

- **All fractions as part of a whole, as subset of a set, as a location on a number line, and as divisions of whole numbers**
- **All decimals**

5: *Mathematical Thinking at Grade 5*
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1, 5
Investigation 4: Sessions 5-6

Name That Portion
Investigation 1: Sessions 1-2, 7
Investigation 2: Session 9
Investigation 3: Sessions 1, 7
Investigation 4: Sessions 1-4

2. Recognize the decimal nature of United States currency and compute with money.

5: *Name That Portion*
Investigation 3: Session 1

3. Demonstrate a sense of the relative magnitudes of numbers.

5: *Mathematical Thinking at Grade 5*
Investigation 2: Sessions 2-5
Investigation 4: Sessions 5-6
Building on Numbers You Know
Investigation 2: Session 7
Investigation 4: Sessions 1-2
Investigation 5: Sessions 4-6

4. Use whole numbers, fractions, and decimals to represent equivalent forms of the same number.

5: *Name That Portion*
Investigation 1: Sessions 1-7
Investigation 2: Sessions 1-9
Investigation 3: Sessions 1, 3-8
Investigation 4: Sessions 1-7
Data: Kids, Cats, and Ads
Investigation 3: Sessions 1-4
Investigation 4: Session 3
Investigation 5: Sessions 3-5

5. Develop and apply number theory concepts in problem solving situations.

- **Primes, factors, multiples**

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 3-7
Investigation 4: Sessions 2-4
Name That Portion
Investigation 1: Sessions 3-4
Investigation 2: Sessions 3, 6
Ten-Minute Math
Between Never and Always
Investigation 1: Session 7

6. Compare and order numbers.

5: *Mathematical Thinking at Grade 5*
Investigation 2: Session 5
Name That Portion
Investigation 1: Sessions 2-7
Investigation 2: Sessions 1-9
Investigation 3: Sessions 1-8
Investigation 4: Sessions 1-7
Building on Numbers You Know
Investigation 1: Sessions 2, 5-8
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-2, 4-6

B. Numerical Operations

1. Recognize the appropriate use of each arithmetic operation in problem situations.

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 1-2
Investigation 3: Sessions 2-5
Investigation 4: Session 1
Building on Numbers You Know
Investigation 1: Sessions 1-8
Investigation 2: Sessions 1-3, 5-6
Investigation 3: Sessions 4-10
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-8

2. Construct, use, and explain procedures for performing addition and subtraction with fractions and decimals with:

- **Pencil-and-paper**
- **Mental math**
- **Calculator**

5: *Name That Portion*
Investigation 1: Session 7
Investigation 2: Sessions 1-9
Investigation 3: Sessions 1-8
Investigation 4: Sessions 1-7

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 3-5

3. Use an efficient and accurate pencil-and-paper procedure for division of a 3-digit number by a 2-digit number.

5: *Building on Numbers You Know*
Investigation 2: Sessions 1-6
Investigation 3: Sessions 4-10
Investigation 5: Sessions 3-7

4. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers.

5: *Building on Numbers You Know*
Investigation 2: Sessions 2-8
Investigation 3: Sessions 1-10
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-8

5. Check the reasonableness of results of computations.

5: *Data: Kids, Cats, and Ads*
Investigation 1: Sessions 2-3
Investigation 2: Session 2
Ten-Minute Math

6. Understand and use the various relationships among operations and properties of operations.

5: *Picturing Polygons*
Investigation 1: Session 2
Investigation 2: Sessions 4-5
Ten-Minute Math
Building on Numbers You Know
Investigation 1: Sessions 1-8
Investigation 2: Sessions 1-3, 5-6
Investigation 3: Sessions 4-10
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-8

Containers and Cubes
Investigation 1: Sessions 1-2
Investigation 2: Sessions 3-4
Ten-Minute Math

C. Estimation

1. Use a variety of estimation strategies for both number and computation.

5: *Name That Portion*
Investigation 1: Sessions 1-2
Investigation 4: Sessions 1-7
Between Never and Always
Investigation 1: Sessions 3-4
Investigation 2: Sessions 1-2
Ten-Minute Math
Building on Numbers You Know
Investigation 1: Sessions 2-8
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-10
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-8
Measurement Benchmarks
Investigation 2: Session 3
Patterns of Change
Investigation 1: Sessions 2-4
Investigation 2: Session 1
Ten-Minute Math

2. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.

5: *Measurement Benchmarks*
Investigation 1: Sessions 7-8

3. Determine the reasonableness of an answer by estimating the result of operations.

5: *Between Never and Always*
Investigation 1: Sessions 3-4
Investigation 2: Sessions 1-2
Ten-Minute Math

Building on Numbers You Know
Investigation 1: Sessions 2-8
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-10
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-8
Patterns of Change
Investigation 1: Sessions 2-4
Investigation 2: Session 1
Ten-Minute Math

4. Determine whether a given estimate is an overestimate or an underestimate.

5: *Between Never and Always*
Investigation 1: Sessions 3-4
Investigation 2: Sessions 1-2
Ten-Minute Math
Patterns of Change
Investigation 1: Sessions 2-4
Investigation 2: Session 1
Ten-Minute Math

STANDARD 4.2 (GEOMETRY AND MEASUREMENT) ALL STUDENTS WILL DEVELOP SPATIAL SENSE AND THE ABILITY TO USE GEOMETRIC PROPERTIES, RELATIONSHIPS, AND MEASUREMENT TO MODEL, DESCRIBE AND ANALYZE PHENOMENA.

Cumulative Progress Indicators

*By the end of **Grade 2**, students will:*

A. Geometric Properties

1. Identify and describe spatial relationships among objects in space and their relative shapes and sizes.

- **Inside/outside, left/right, above/below, between**
- **Smaller/larger/same size, wider/ narrower, longer/shorter**
- **Congruence (i.e., same size and shape)**

K: *Making Shapes and Building Blocks*
Investigation 4: Choice Time

1: *Building Number Sense*
Investigation 1: Sessions 1-9
Investigation 2: Sessions 1-2, 4-10

2: *Shapes, Halves, and Symmetry*
Investigation 1: Sessions 2-4
Investigation 2: Sessions 4-6

2. Use concrete objects, drawings, and computer graphics to identify, classify, and describe standard three-dimensional and two-dimensional shapes.

- **Vertex, edge, face, side**
- **3D figures – cube, rectangular prism, sphere, cone, cylinder, and pyramid**
- **2D figures – square, rectangle, circle, triangle**
- **Relationships between three- and two-dimensional shapes (i.e., the face of a 3D shape is a 2D shape)**

K: *Mathematical Thinking in Kindergarten*
Investigation 1: Choice Time
Making Shapes and Building Blocks
Investigation 1: Focus Time, Choice Time
Investigation 2: Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Investigation 5: Focus Time, Choice Time

1: *Quilt Squares and Block Towns*
Investigation 1: Sessions 1, 3-6, 8-15
Investigation 2: Sessions 1-10
Investigation 3: Sessions 1-5

2: *Mathematical Thinking at Grade 2*
Investigation 1: Sessions 2-4
Investigation 3: Sessions 1-5
Shapes, Halves, and Symmetry
Investigation 1: Sessions 1-8
Investigation 2: Session 2
Investigation 3: Sessions 7-8

3. Describe, identify and create instances of line symmetry.

K: This concept is introduced in Grade 2.
1: This concept is introduced in Grade 2.
2: *Shapes, Halves, and Symmetry*
Investigation 4: Sessions 1-6

4. Recognize, describe, extend and create designs and patterns with geometric objects of different shapes and colors.

K: *Mathematical Thinking in Kindergarten*
Investigation 1: Choice Time
Investigation 2: Choice Time
Pattern Trains and Hopscotch Patterns
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Classroom Routines
Making Shapes and Building Blocks
Investigation 2: Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
1: *Mathematical Thinking at Grade 1*
Investigation 1: Sessions 1-4
Investigation 3: Sessions 1-6
Investigation 4: Sessions 2-3
Quilt Squares and Block Towns
Investigation 1: Sessions 13-15
2: *Mathematical Thinking at Grade 2*
Investigation 3: Sessions 1-4, 6
Timelines and Rhythm Patterns
Investigation 2: Sessions 1-3

B. Transforming Shapes

1. Use simple shapes to make designs, patterns, and pictures.

K: *Pattern Trains and Hopscotch Paths*
Investigation 1: Choice Time
Investigation 2: Focus Time
Investigation 3: Focus Time
Making Shapes and Building Blocks
Investigation 2: Choice Time
Investigation 3: Choice Time

1: *Quilt Squares and Block Towns*
Investigation 1: Sessions 2-10, 13-15

2: *Mathematical Thinking at Grade 2*
Investigation 3: Sessions 1-4, 6
Shapes, Halves, and Symmetry
Investigation 2: Sessions 3-6
Investigation 3: Sessions 1-8

2. Combine and subdivide simple shapes to make other shapes.

K: *Making Shapes and Building Blocks*
Investigation 2: Choice Time
Investigation 3: Choice Time
Investigation 4: Focus Time

1: *Quilt Squares and Block Towns*
Investigation 1: Sessions 3-10
Investigation 3: Sessions 1-5

2: *Shapes, Halves, and Symmetry*
Investigation 1: Sessions 2-8

C. Coordinate Geometry

1. Give and follow directions for getting from one point to another on a map or grid.

K: *Pattern Trains and Hopscotch Patterns*
Investigation 3: Focus Time

1: *Quilt Squares and Block Towns*
Investigation 3: Sessions 6-7

2: *How Long? How Far?*
Investigation 2: Session 1

D. Units of Measurement

1. Directly compare and order objects according to measurable attributes.

- **Attributes – length, weight, capacity, time, temperature**

K: *Pattern Trains and Hopscotch Patterns*
Investigation 1: Focus Time
Collecting, Counting, and Measuring
Investigation 3: Focus Time, Choice Time
How Many in All?
Investigation 1: Choice Time

1: *Bigger, Taller, Heavier, Smaller*
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-5

2: *How Long? How Far?*
Investigation 1: Sessions 1-7

2. Recognize the need for a uniform unit of measure.

K: *How Many in All?*
Investigation 1: Choice Time

1: *Bigger, Taller, Heavier, Smaller*
Investigation 3: Sessions 2, 4-5

2: *How Long? How Far?*
Investigation 1: Session 8

3. Select and use appropriate standard and non-standard units of measure and standard measurement tools to solve real-life problems.

- **Length – inch, foot, yard, centimeter, meter**
- **Weight – pound, gram, kilogram**
- **Capacity – pint, quart, liter**
- **Time – second, minute, hour, day, week, month, year**
- **Temperature – degrees Celsius, degrees Fahrenheit**

K: *Mathematical Thinking in Kindergarten*
Investigation 3: Focus Time
How Many in All?
Investigation 1: Focus Time

1: *Bigger, Taller, Heavier, Smaller*
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 2-5

2: *How Long? How Far?*
Investigation 1: Sessions 2-7
Timelines and Rhythm Patterns
Investigation 1: Sessions 3-5
Classroom Routines

4. Estimate measures.

K: This concept is introduced in Grade 1.
1: *Bigger, Taller, Heavier, Smaller*
Investigation 2: Session 1
2: *How Long? How Far?*
Investigation 1: Sessions 1-7
Investigation 2: Session 2

E. Measuring Geometric Objects

1. Directly measure the perimeter of simple two-dimensional shapes.
K: This concept is introduced in Grade 3.
1: This concept is introduced in Grade 3.
2: This concept is introduced in Grade 3.

2. Directly measure the area of simple two-dimensional shapes by covering them with squares.
K: This concept is introduced in Grade 3.
1: This concept is introduced in Grade 3.
2: This concept is introduced in Grade 3.

Building upon knowledge and skills gained in preceding grades, by the end of ***Grade 3****, students will:*

A. Geometric Properties

1. Identify and describe spatial relationships of two or more objects in space.
- **Direction, orientation, and perspectives (e.g., which object is on your left when you are standing here?**
- **Relative shapes and sizes**

3: *Flips, Turns, and Area*
Investigation 1: Sessions 1-3, 5

Investigation 2: Sessions 2-3
From Paces to Feet
Investigation 2: Sessions 2, 5
Ten-Minute Math
Turtle Paths
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-2
Investigation 3: Sessions 6-7
Exploring Solids and Boxes
Investigation 2: Sessions 1, 3-5
Investigation 3: Sessions 1-2
Investigation 4: Session 3
Investigation 5: Sessions 1-4

2. Use properties of standard three-dimensional and two-dimensional shapes to identify, classify, and describe them.

- **Vertex, edge, face, side, angle**
- **3D figures – cube, rectangular prism, sphere, cone, cylinder, and pyramid**
- **2D figures – square, rectangle, circle, triangle, pentagon, hexagon, octagon**

3: *Turtle Paths*
Investigation 2: Sessions 3-4
Exploring Solids and Boxes
Investigation 1: Sessions 1-2
Investigation 2: Sessions 1-3

3. Identify and describe relationships among two-dimensional shapes.

- **Same size, same shape**
- **Lines of symmetry**

3: *Flips, Turns, and Area*
Investigation 2: Sessions 2-5
Turtle Paths
Investigation 2: Session 4
Investigation 3: Sessions 3-5

4. Understand and apply concepts involving lines, angles, and circles.

- **Line, line segment, endpoint**

3: This concept is introduced in Grade 4.

5. Recognize, describe, extend, and create space-filling patterns.

3: *Exploring Solids and Boxes*
Investigation 3: Sessions 1-2
Investigation 4: Session 2

B. Transforming Shapes

1. Describe and use geometric transformations (slide, flip, turn).

3: *Flips, Turns, and Area*
Investigation 1: Sessions 1-3, 5
Investigation 2: Sessions 2-5
Turtle Paths
Investigation 1: Sessions 1, 3-4
Investigation 2: Sessions 1-2

2. Investigate the occurrence of geometry in nature and art.

3: *Turtle Paths*
Investigation 2: Sessions 3-4
Investigation 3: Sessions 1-2, 6-7
Exploring Solids and Boxes
Investigation 1: Session 1

C. Coordinate Geometry

1. Locate and name points in the first quadrant on a coordinate grid.

3: This concept is introduced in Grade 4.

D. Units of Measurement

1. Understand that everyday objects have a variety of attributes, each of which can be measured in many ways.

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

2. Select and use appropriate standard units of measure and measurement tools to solve real-life problems.

- **Length – fractions of an inch (1/4, 1/2), mile, decimeter, kilometer**
- **Area – square inch, square centimeter**
- **Weight – ounce**
- **Capacity – fluid ounce, cup, gallon, milliliter**

3: *Flips, Turns, and Area*
Investigation 2: Sessions 1, 4-5
From Paces to Feet
Investigation 2: Sessions 1-7
Investigation 4: Sessions 1-3
Combining and Comparing
Investigation 2: Sessions 1-2

3. Incorporate estimation in measurement activities (e.g., estimate before measuring).

3: *From Paces to Feet*
Investigation 1: Sessions 1-4

E. Measuring Geometric Objects

1. Determine the area of simple two-dimensional shapes on a square grid.

3: *Things That Come in Groups*
Investigation 3: Sessions 1-3
Flips, Turns, and Area
Investigation 1: Sessions 1-3
Investigation 2: Sessions 1-5

2. Determine the perimeter of simple shapes by measuring all of the sides.

3: *Turtle Paths*
Investigation 3: Sessions 1-2, 6-7
Ten-Minute Math

3. Measure and compare the volume of three–dimensional objects using materials such as rice or cubes.

3: *Exploring Solids and Boxes*
Investigation 4: Session 1
Investigation 5: Sessions 1-4

Building upon knowledge and skills gained in preceding grades, by the end of ***Grade 4,*** *students will:*

A. Geometric Properties

1. Identify and describe spatial relationships of two or more objects in space.

- **Direction, orientation, and perspectives (e.g., which object is on your left when you are standing here?)**
- **Relative shapes and sizes**
- **Shadows (projections) of everyday objects**

4: *Seeing Solids and Silhouettes*
Investigation 1: Sessions 1-2
Investigation 2: Sessions 1-4
Changes Over Time
Investigation 1: Sessions 3-4
Investigation 2: Sessions 1-2
Ten-Minute Math

2. Use properties of standard three-dimensional and two-dimensional shapes to identify, classify, and describe them.

- **Vertex, edge, face, side, angle**
- **3D figures – cube, rectangular prism, sphere, cone, cylinder, and pyramid**
- **2D figures – square, rectangle, circle, triangle, quadrilateral, pentagon, hexagon, octagon**
- **Inclusive relationships – squares are rectangles, cubes are rectangular prisms**

4: *Seeing Solids and Silhouettes*
Investigation 1: Session 1
Investigation 4: Session 1
Sunken Ships and Grid Patterns
Investigation 2: Sessions 1, 6-7

3. Identify and describe relationships among two-dimensional shapes.

- **Congruence**
- **Lines of symmetry**

4: *Mathematical Thinking at Grade 4*
Investigation 4: Sessions 1-6
Sunken Ships and Grid Patterns
Investigation 2: Sessions 2-3, 6-9

4. Understand and apply concepts involving lines, angles, and circles.

- **Point, line, line segment, endpoint**
- **Parallel, perpendicular**
- **Angles – acute, right, obtuse**
- **Circles – diameter, radius, center**

4: *Sunken Ships and Grid Patterns*
Investigation 1: Sessions 1-4

5. Recognize, describe, extend, and create space-filling patterns.

4: *Mathematical Thinking at Grade 4*
Investigation 4: Sessions 1-4
Sunken Ships and Grid Patterns
Investigation 2: Session 4

B. Transforming Shapes

1. Use simple shapes to cover an area (tessellations).

4: *Different Shapes, Equal Pieces*
Investigation 1: Sessions 1-4

2. Describe and use geometric transformations (slide, flip, turn).

4: *Mathematical Thinking at Grade 4*
Investigation 4: Sessions 5-6
Sunken Ships and Grid Patterns
Investigation 2: Sessions 1-9

3. Investigate the occurrence of geometry in nature and art.

4: *Seeing Shapes and Silhouettes*
Investigation 1: Sessions 1-2
Investigation 2: Sessions 1-2

C. Coordinate Geometry

1. Locate and name points in the first quadrant on a coordinate grid.

4: *Sunken Shapes and Grid Patterns*
Investigation 1: Sessions 1-4
Investigation 2: Sessions 2-3

2. Use coordinates to give or follow directions from one point to another on a map or grid.

4: *Sunken Shapes and Grid Patterns*
Investigation 1: Sessions 3-6
Investigation 2: Sessions 2-3

D. Units of Measurement

1. Understand that everyday objects have a variety of attributes, each of which can be measured in many ways.

4: *The Shape of the Data*
Investigation 2: Sessions 1, 4

2. Select and use appropriate standard units of measure and measurement tools to solve real-life problems

- **Length – fractions of an inch (1/8, 1/4, 1/2), mile, decimeter, kilometer**
- **Area – square inch, square centimeter**
- **Volume – cubic inch, cubic centimeter**
- **Weight – ounce**
- **Capacity – fluid ounce, cup, gallon, milliliter**

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

3. Develop and use personal referents to approximate standard units of measure (e.g., a common paper clip is about an inch long).

4: *The Shape of the Data*
Investigation 2: Sessions 1, 4

4. Incorporate estimation in measurement activities (e.g., estimate before measuring).

4: *The Shape of the Data*
Investigation 2: Sessions 1, 4

5. Solve problems involving elapsed time.

4: *Sunken Ships and Grid Patterns*
Investigation 2: Sessions 2-3, 8-9

E. Measuring Geometric Objects

1. Determine the area of simple two-dimensional shapes on a square grid.

4: *Different Shapes, Equal Pieces*
Investigation 1: Sessions 1-4

2. Distinguish between perimeter and area and use each appropriately in problem-solving situations.

4: *Sunken Ships and Grid Patterns*
Investigation 1: Sessions 5-6
Investigation 2: Session 4
Ten-Minute Math

3. Measure and compare the volume of three–dimensional objects using materials such as rice or cubes.

4: *Seeing Shapes and Silhouettes*
Investigation 1: Session 1

Building upon knowledge and skills gained in preceding grades, by the end of ***Grade 5****, students will:*

A. Geometric Properties

1. Understand and apply concepts involving lines and angles.

- **Notation for line, ray, angle, line segment**
- **Properties of parallel, perpendicular, and intersecting lines**
- **Sum of the measures of the interior angles of a triangle is 180°**

5: *Picturing Polygons*
Investigation 1: Sessions 1-7, 9
Investigation 3: Sessions 1-3

2. Identify, describe, compare, and classify polygons.

- **Triangles by angles and sides**
- **Quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi**
- **Polygons by number of sides.**
- **Equilateral, equiangular, regular**
- **All points equidistant from a given point form a circle**

5: *Picturing Polygons*
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-3

3. Identify similar figures.

5: *Picturing Polygons*
Investigation 3: Sessions 1-2, 4-7

4. Understand and apply the concepts of congruence and symmetry (line and rotational).

5: *Containers and Cubes*
Investigation 1: Sessions 1-2

B. Transforming Shapes

1. Use a translation, a reflection, or a rotation to map one figure onto another congruent figure.

5: *Picturing Polygons*
Investigation 2: Sessions 6-7, 9
Investigation 3: Sessions 1-3

2. Recognize, identify, and describe geometric relationships and properties as they exist in nature, art, and other real-world settings.

5: *Mathematical Thinking at Grade 5*
Investigation 3: Session 1
Investigation 4: Session 1
Ten-Minute Math
Building on Numbers You Know
Investigation 3: Sessions 1-3
Investigation 5: Sessions 1-2

C. Coordinate Geometry

1. Create geometric shapes with specified properties in the first quadrant on a coordinate grid.

5: *Picturing Polygons*
Investigation 1: Sessions 3-4
Investigation 2: Sessions 4-7
Investigation 3: Sessions 1-2, 4-7

D. Units of Measurement

1. Select and use appropriate units to measure angles and area.

5: *Picturing Polygons*
Investigation 2: Sessions 1-3, 6-7
Investigation 3: Sessions 1-7

2. Convert measurement units within a system (e.g., 3 feet = ___ inches).

5: *Measurement Benchmarks*
Investigation 1: Sessions 4-6

3. Know approximate equivalents between the standard and metric systems (e.g., one kilometer is approximately 6/10 of a mile).

5: *Measurement Benchmarks*
Investigation 2: Sessions 1-8

4. Use measurements and estimates to describe and compare phenomena.

5: *Measurement Benchmarks*
Investigation 1: Sessions 2-8

E. Measuring Geometric Objects

1. Use a protractor to measure angles.

5: *Picturing Polygons*
Investigation 2: Sessions 1-3, 6-9
Investigation 3: Sessions 1-3

2. Develop and apply strategies and formulas for finding perimeter and area.

- **Square**
- **Rectangle**

5: *Picturing Polygons*
Investigation 3: Sessions 4-7

3. Recognize that rectangles with the same perimeter do not necessarily have the same area and vice versa.

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 1-3

4. Develop informal ways of approximating the measures of familiar objects (e.g., use a grid to approximate the area of the bottom of one's foot).

5: *Measurement Benchmarks*
Investigation 1: Sessions 2-3

STANDARD 4.3 (PATTERNS AND ALGEBRA) ALL STUDENTS WILL REPRESENT AND ANALYZE RELATIONSHIPS AMONG VARIABLE QUANTITIES AND SOLVE PROBLEMS INVOLVING PATTERNS, FUNCTIONS, AND ALGEBRAIC CONCEPTS AND PROCESSES.

Cumulative Progress Indicators

*By the end of **Grade 2,** students will:*

A. Patterns

1. Recognize, describe, extend, and create patterns.

- **Using concrete materials (manipulatives), pictures, rhythms, & whole numbers**
- **Descriptions using words and symbols (e.g., "add two" or "+ 2")**
- **Repeating patterns**
- **Whole number patterns that grow or shrink as a result of repeatedly adding or subtracting a fixed number (e.g., skip counting forward or backward)**

K: *Pattern Trains and Hopscotch Paths*
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Classroom Routine

1: *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
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

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

B. Functions and Relationships

1. Use concrete and pictorial models of function machines to explore the basic concept of a function.

K: This concept is introduced in Grade 1.

1: *Number Games and Story Problems*
Investigation 1: Sessions 1-3

2: *Mathematical Thinking at Grade 2*
Investigation 2: Sessions 1, 6
Investigation 3: Session 5

Putting Together and Taking Apart
Investigation 1: Sessions 5-6
Investigation 5: Session 7

C. Modeling

1. Recognize and describe changes over time (e.g., temperature, height).

K: This concept is introduced in Grade 1.

1: *Survey Questions and Secret Rules*
Investigation 3: Session 3

2: *Timelines and Rhythm Patterns*
Investigation 2: Sessions 1-5

2. Construct and solve simple open sentences involving addition or subtraction.

- **Result unknown (e.g., 6 – 2 = __ or n = 3 + 5)**
- **Part unknown (e.g., 3 + □= 8)**

K: This concept is introduced in Grade 1.

1: *Number Games and Story Problems*
Investigation 1: Sessions 1-3, 6-10
Investigation 3: Session 9

2: *Mathematical Thinking at Grade 2*
Investigation 2: Sessions 1, 6
Investigation 3: Session 5

Coins, Coupons, and Combinations
Investigation 3: Sessions 2, 4-5
Investigation 4: Sessions 2-4

Putting Together and Taking Apart
Investigation 1: Sessions 1-6
Investigation 3: Sessions 2-5
Investigation 5: Sessions 1-3

D. Procedures

1. Understand and apply (but don't name) the following properties of addition:
- **Commutative (e.g., 5 + 3 = 3 + 5)**
- **Zero as the identity element (e.g., 7 + 0 = 7)**
- **Associative (e.g., 7 + 3 + 2 can be found by first adding either 7 + 3 or 3 + 2)**

K: This concept is introduced in Grade 4.
1: This concept is introduced in Grade 4.
2: This concept is introduced in Grade 4.

Building upon knowledge and skills gained in preceding grades, by the end of ***Grade 3,*** *students will:*

A. Patterns

1. Recognize, describe, extend, and create patterns.
- **Descriptions using words and number sentences/expressions**
- **Whole number patterns that grow or shrink as a result of repeatedly adding, subtracting, multiplying by, or dividing by a fixed number (e.g., 5, 8, 11, . . . or 800, 400, 200, . . .)**

3: *Mathematical Thinking at Grade 3*
Investigation 1: Sessions 2-3
Investigation 2: Session 1
Things That Come in Groups
Investigation 3: Session 3
Investigation 5: Session 1

B. Functions and Relationships

1. Use concrete and pictorial models to explore the basic concept of a function.
- **Input/output tables, T-charts**

3: *Things That Come in Groups*
Investigation 3: Sessions 2-3
Landmarks in the Hundreds
Investigation 1: Sessions 6-7
Ten-Minute Math
Up and Down the Number Line
Investigation 1: Sessions 1-4

C. Modeling

1. Recognize and describe change in quantities.

- **Graphs representing change over time (e.g., temperature, height)**

3: *Up and Down the Number Line*
Investigation 2: Sessions 2-4
Combining and Comparing
Investigation 2: Sessions 1-2

2. Construct and solve simple open sentences involving addition or subtraction (e.g., 3 + 6 = __, n = 15 – 3, 3 + __ = 3, 16 – c = 7).

3: *Things That Come in Groups*
Investigation 1: Sessions 2, 4
Investigation 2: Sessions 3-4
Investigation 4: Session 1
Up and Down the Number Line
Investigation 1: Sessions 6-7
Combining and Comparing
Investigation 5: Sessions 2-3

D. Procedures

1. Understand and apply the properties of operations and numbers.

- **Commutative (e.g., 3 x 7 = 7 x 3)**
- **Identity element for multiplication is 1 (e.g., 1 x 8 = 8)**
- **Any number multiplied by zero is zero**

3: This concept is introduced in Grade 4.

2. Understand and use the concepts of equals, less than, and greater than to describe relations between numbers.

- **Symbols (= , < , >)**

3: *Mathematical Thinking at Grade 3*
Investigation 3: Sessions 3-4
Combining and Comparing
Investigation 1: Sessions 1-3
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-3

Building upon knowledge and skills gained in preceding grades, by the end of ***Grade 4,*** *students will:*

A. Patterns

1. Recognize, describe, extend, and create patterns.

- **Descriptions using words, number sentences/expressions, graphs, tables, variables (e.g., shape, blank, or letter)**
- **Sequences that stop or that continue infinitely**
- **Whole number patterns that grow or shrink as a result of repeatedly adding, subtracting, multiplying by, or dividing by a fixed number (e.g., 5, 8, 11, . . . or 800, 400, 200, . . .)**
- **Sequences can often be extended in more than one way (e.g., the next term after 1, 2, 4, . . . could be 8, or 7, or …)**

4: *Mathematical Thinking at Grade 4*
Investigation 4: Sessions 1-4
Arrays and Shares
Investigation 1: Sessions 1-3
Investigation 2: Sessions 5-6
Investigation 3: Sessions 2-4
Ten-Minute Math
Landmarks in the Thousands
Investigation 1: Session 1
Investigation 3: Sessions 3-5
Investigation 4: Sessions 1-3
Ten-Minute Math
Packages and Groups
Investigation 1: Sessions 1-2
Investigation 3: Sessions 4-6
Sunken Ships and Grid Patterns
Investigation 1: Sessions 3-6
Investigation 2: Sessions 2-4, 8-9

B. Functions and Relationships

1. Use concrete and pictorial models to explore the basic concept of a function.

- **Input/output tables, T-charts**
- **Combining two function machines**
- **Reversing a function machine**

4: *Different Shapes, Equal Pieces*
Investigation 1: Sessions 2-4
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-2
Ten-Minute Math

Three Out of Four Like Spaghetti
Investigation 1: Session 1

C. Modeling

1. Recognize and describe change in quantities.
- **Graphs representing change over time (e.g., temperature, height)**
- **How change in one physical quantity can produce a corresponding change in another (e.g., pitch of a sound depends on the rate of vibration)**

4: *Changes Over Time*
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-2, 6-7

2. Construct and solve simple open sentences involving any one operation (e.g., 3 x 6 = __, n = 15 □ 3, 3 x __ = 0, 16 – c = 7).

4: *Landmarks in the Thousands*
Investigation 2: Sessions 2-4
Investigation 3: Sessions 3-5

Changes Over Time
Investigation 1: Sessions 5-6

D. Procedures

1. Understand, name, and apply the properties of operations and numbers.
- **Commutative (e.g., 3 x 7 = 7 x 3)**
- **Identity element for multiplication is 1 (e.g., 1 x 8 = 8)**
- **Associative (e.g., 2 x 4 x 25 can be found by first multiplying either 2 x 4 or 4 x 25)**
- **Division by zero is undefined**
- **Any number multiplied by zero is zero.**

4: *Arrays and Shares*
Investigation 2: Sessions 2-3

2. Understand and use the concepts of equals, less than, and greater than in simple number sentences.
- **Symbols (= , < , >)**

4: *Mathematical Thinking at Grade 4*
Investigation 1: Session 4

Different Shapes, Equal Pieces
Investigation 1: Session 5

Investigation 3: Sessions 3-5
Money, Miles and Large Numbers
Investigation 1: Session 3
Investigation 2: Sessions 1-2
Packages and Groups
Investigation 2: Sessions 2-3
Three Out of Four Like Spaghetti
Investigation 1: Sessions 2-3

Building upon knowledge and skills gained in preceding grades, by the end of Grade 5, *students will:*

A. Patterns

1. Recognize, describe, extend, and create patterns involving whole numbers.

- **Descriptions using tables, verbal rules, simple equations, and graphs**

5: *Mathematical Thinking at Grade 5*
Investigation 2: Session 1
Investigation 3: Session 1
Investigation 4: Sessions 5-6
Picturing Polygons
Investigation 3: Sessions 1-7
Name That Portion
Investigation 2: Sessions 4-5
Investigation 3: Sessions 5-6
Patterns of Change
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-7

B. Functions & Relationships

1. Describe arithmetic operations as functions, including combining operations and reversing them.

5: *Picturing Polygons*
Investigation 1: Session 2
Investigation 2: Sessions 4-5
Ten-Minute Math
Building on Numbers You Know
Investigation 1: Sessions 1-8
Investigation 2: Sessions 1-3, 5-6
Investigation 3: Sessions 4-10
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-8

2. Graph points satisfying a function from T-charts, from verbal rules, and from simple equations.

5: *Patterns of Change*
Investigation 2: Sessions 2-5
Investigation 3: Sessions 2-6

C. Modeling

1. Use number sentences to model situations.

- **Using variables to represent unknown quantities**
- **Using concrete materials, tables, graphs, verbal rules, algebraic expressions/equations**

5: *Name That Portion*
Investigation 1: Sessions 3-4
Investigation 2: Sessions 3, 6
Ten-Minute Math

2. Draw freehand sketches of graphs that model real phenomena and use such graphs to predict and interpret events.

- **Changes over time**
- **Rates of change (e.g., when is plant growing slowly/rapidly, when is temperature dropping most rapidly/slowly)**

5: *Patterns of Change*
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-7
Ten-Minute Math

D. Procedures

1. Solve simple linear equations with manipulatives and informally

- **Whole-number coefficients only, answers also whole numbers**
- **Variables on one side of equation (e.g., graph to determine whether increasing or decreasing, linear or not).**

5: *Name That Portion*
Investigation 1: Sessions 3-4
Investigation 2: Sessions 3, 6
Ten-Minute Math

STANDARD 4.4 (DATA ANALYSIS, PROBABILITY, AND DISCRETE MATHEMATICS) ALL STUDENTS WILL DEVELOP AN UNDERSTANDING OF THE CONCEPTS AND TECHNIQUES OF DATA ANALYSIS, PROBABILITY, AND DISCRETE MATHEMATICS, AND WILL USE THEM TO MODEL SITUATIONS, SOLVE PROBLEMS, AND ANALYZE AND DRAW APPROPRIATE INFERENCES FROM DATA.

Cumulative Progress Indicators

*By the end of **Grade 2,** students will:*

A. Data Analysis

1. Collect, generate, record, and organize data in response to questions, claims, or curiosity.

- **Data collected from students' everyday experiences**
- **Data generated from chance devices, such as spinners and dice**

K: *Mathematical Thinking in Kindergarten*
Investigation 4: Focus Time
Collecting Ourselves and Others
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time

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

2: *Mathematical Thinking at Grade 2*
Investigation 2: Session 6
Investigation 5: Sessions 1-6
Does It Walk, Crawl, or Swim?
Investigation 1: Sessions 1-3
Investigation 2: Sessions 3-4
Investigation 3: Sessions 2-3
How Many Pockets? How Many Teeth?
Investigation 1: Sessions 1-3
Investigation 2: Sessions 1-5
Investigation 3: Sessions 2-4
This concept is covered throughout this grade level in Classroom Routines.

2. Read, interpret, construct, and analyze displays of data.

- **Pictures, tally chart, pictograph, bar graph, Venn diagram**
- **Smallest to largest, most frequent (mode)**

K: *Collecting Ourselves and Others*
Investigation 1: Focus Time

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

2: *Does It Walk, Crawl, or Swim?*
Investigation 1: Sessions 1-2
Investigation 2: Sessions 3-4
Investigation 3: Sessions 2-3
How Many Pockets? How Many Teeth?
Investigation 1: Sessions 1-5
Investigation 2: Sessions 1-2, 4-6
Investigation 3: Sessions 2-4

B. Probability

1. Use chance devices like spinners and dice to explore concepts of probability.

- **Certain, impossible**
- **More likely, less likely, equally likely**

K: This concept is introduced in Grade 3.
1: This concept is introduced in Grade 3.
2: This concept is introduced in Grade 3.

2. Provide probability of specific outcomes.

- **Probability of getting specific outcome when coin is tossed, when die is rolled, when spinner is spun (e.g., if spinner has five equal sectors, then probability of getting a particular sector is one out of five)**
- **When picking a marble from a bag with three red marbles and four blue marbles, the probability of getting a red marble is three out of seven**

K: This concept is introduced in Grade 3.
1: This concept is introduced in Grade 3.
2: This concept is introduced in Grade 3.

C. Discrete Mathematics—Systematic Listing and Counting

1. Sort and classify objects according to attributes.

- **Venn diagrams**

K: *Collecting Ourselves and Other*
Investigation 1: Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Choice Time

1: *Building Number Sense*
Investigation 1: Sessions 1-9
Investigation 2: Sessions 6-9

Survey Questions and Secret Rules
Investigation 1: Sessions 1-2
Investigation 2: Sessions 3-4

Quilt Squares and Block Towns
Investigation 1: Sessions 11-12
Investigation 2: Sessions 1-3

2: *Mathematical Thinking at Grade 2*
Investigation 1: Session 4
Investigation 3: Sessions 3-5

Does It Walk, Crawl, or Swim?
Investigation 1: Session 6
Investigation 2: Sessions 1-2

Shapes, Halves, and Symmetry
Investigation 1: Session 1
Investigation 2: Session 2

2. Generate all possibilities in simple counting situations (e.g., all outfits involving two shirts and three pants).

K: This concept is introduced in Grade 2.

1: This concept is introduced in Grade 2.

2: *Shapes, Halves, and Symmetry*
Investigation 3: Sessions 1-5

D. Discrete Mathematics—Vertex-Edge Graphs and Algorithms

1. Follow simple sets of directions (e.g., from one location to another, or from a recipe).

K: This concept is introduced in Grade 1.

1: *Quilt Squares and Block Towns*
Investigation 3: Sessions 6-7

2: *How Long? How Far?*
Investigation 2: Sessions 1-4

2. Color simple maps with a small number of colors.

K: *Pattern Train and Hopscotch Paths*
Investigation 3: Focus Time
Investigation 4: Focus Time

1: This topic is not covered in Grade 1.

2: This topic is not covered in Grade 2.

3. Play simple two-person games (e.g., tic-tac-toe) and informally explore the idea of what the outcome should be.

K: *Pattern Trains and Hopscotch Paths*
Investigation 1: Focus Time, Choice Time
Investigation 2: Choice Time
Collecting, Counting and Measuring
Investigation 2: Focus Time
Investigation 3: Focus Time, Choice Time
How Many in All?
Investigation 3: Choice Time
Investigation 4: Choice Time

1: *Mathematical Thinking at Grade 1*
Investigation 3: Sessions 1-6
Investigation 4: Sessions 2-3, 5

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

4. Explore concrete models of vertex-edge graphs (e.g. vertices as "islands" and edges as "bridges").

- **Paths from one vertex to another**
  - **K:** This concept is introduced in Grade 1.
  - **1:** *Quilt Squares and Block Towns*
    Investigation 3: Sessions 6-7
  - **2:** *How Long? How Far?*
    Investigation 2: Sessions 1-4

Building upon knowledge and skills gained in preceding grades, by the end of ***Grade 3,*** *students will:*

A. Data Analysis

1. Collect, generate, organize, and display data in response to questions, claims, or curiosity.

- **Data collected from the classroom environment**
  - **3:** *Mathematical Thinking at Grade 3*
    Investigation 3: Sessions 1-4
    Ten-Minute Math
    From Paces to Feet
    Investigation 2: Sessions 6-7
    Investigation 3: Sessions 2-3
    Combining or Comparing
    Investigation 5: Sessions 2-3
    Ten-Minute Math

2. Read, interpret, construct, analyze, generate questions about, and draw inferences from displays of data.

- **Pictograph, bar graph, table**
  - **3:** *Mathematical Thinking at Grade 3*
    Investigation 3: Sessions 1-4
    Ten-Minute Math
    Things That Come in Groups
    Investigation 5: Sessions 1, 3
    From Paces to Feet
    Investigation 2: Sessions 2-7
    Combining and Comparing
    Investigation 4: Sessions 1-2
    Investigation 5: Sessions 2-3
    Ten-Minute Math

B. Probability

1. Use everyday events and chance devices, such as dice, coins, and unevenly divided spinners, to explore concepts of probability.

- **Likely, unlikely, certain, impossible**
- **More likely, less likely, equally likely**

3: *Things That Come in Groups*
Investigation 4: Session 2
Investigation 5: Session 1
Ten-Minute Math

Exploring Solids and Boxes
Investigation 4: Session 2
Investigation 5: Sessions 1-4
Ten-Minute Math

2. Predict probabilities in a variety of situations (e.g., given the number of items of each color in a bag, what is the probability that an item picked will have a particular color).

- **What students think will happen (intuitive)**
- **Collect data and use that data to predict the probability (experimental)**

3: *Combining and Comparing*
Investigation 1: Sessions 1-2
Investigation 2: Session 2
Investigation 5: Sessions 2-3
Ten-Minute Math

C. Discrete Mathematics—Systematic Listing and Counting

1. Represent and classify data according to attributes, such as shape or color, and relationships.

- **Venn diagrams**
- **Numerical and alphabetical order**

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

2. Represent all possibilities for a simple counting situation in an organized way and draw conclusions from this representation.

- **Organized lists, charts**
  - **3:** *Flips, Turns, and Area*
    Investigation 1: Session 1

D. Discrete Mathematics—Vertex-Edge Graphs and Algorithms

1. Follow, devise, and describe practical sets of directions (e.g., to add two 2-digit numbers).

- **3:** *Turtle Paths*
  Investigation 1: Sessions 2-4
  Investigation 2: Sessions 1-2
  Ten-Minute Math

2. Explore vertex-edge graphs

- **Vertex, edge**
- **Path**
  - **3:** *Turtle Paths*
    Investigation 1: Sessions 1-3
    Investigation 2: Session 2

3. Find the smallest number of colors needed to color a map.

- **3:** *Turtle Paths*
  Investigation 1: Sessions 1-4
  Investigation 2: Sessions 1-2

Building upon knowledge and skills gained in preceding grades, by the end of ***Grade 4****, students will:*

A. Data Analysis

1. Collect, generate, organize, and display data in response to questions, claims, or curiosity.

- **Data collected from the school environment**
  - **4:** *Mathematical Thinking at Grade 4*
    Ten-Minute Math

The Shape of the Data
Investigation 1: Sessions 1-3, 6-7
Investigation 2: Sessions 1, 4, 6-7
Investigation 3: Sessions 1, 3-5

2. Read, interpret, construct, analyze, generate questions about, and draw inferences from displays of data.

- **Pictograph, bar graph, line plot, line graph, table**
- **Average (mean), most frequent (mode), middle term (median)**

4: *Mathematical Thinking at Grade 4*
Ten-Minute Math
The Shape of the Data
Investigation 1: Sessions 1-3
Investigation 2: Sessions 1-4, 6-7
Investigation 3: Sessions 1, 3-5
Changes Over Time
Investigation 1: Sessions 1-4
Investigation 3: Sessions 1-4, 6-7
Packages and Groups
Investigation 1: Sessions 4-5
Ten-Minute Math
Three Out of Four Like Spaghetti
Investigation 1: Session 4
Investigation 2: Sessions 1-2, 5-7

B. Probability

1. Use everyday events and chance devices, such as dice, coins, and unevenly divided spinners, to explore concepts of probability.

- **Likely, unlikely, certain, impossible, improbable, fair, unfair**
- **More likely, less likely, equally likely**
- **Probability of tossing "heads" does not depend on outcomes of previous tosses**

4: *Landmarks in the Thousands*
Investigation 2: Sessions 1, 5
Ten-Minute Math
Money, Miles, and Large Numbers
Investigation 1: Session 3
Investigation 2: Sessions 7-8
Investigation 3: Session 1
Ten-Minute Math

Three Out of Four Like Spaghetti
Investigation 1: Session 3
Investigation 2: Session 2
Ten-Minute Math

2. Determine probabilities of simple events based on equally likely outcomes and express them as fractions.

4: This concept is introduced in Grade 5.

3. Predict probabilities in a variety of situations (e.g., given the number of items of each color in a bag, what is the probability that an item picked will have a particular color).

- **What students think will happen (intuitive)**
- **Collect data and use that data to predict the probability (experimental)**
- **Analyze all possible outcomes to find the probability (theoretical)**

4: *Three out of Four Like Spaghetti*
Investigation 1: Session 3
Investigation 2: Session 2
Ten-Minute Math

C. Discrete Mathematics—Systematic Listing and Counting

1. Represent and classify data according to attributes, such as shape or color, and relationships.

- **Venn diagrams**
- **Numerical and alphabetical order**

4: *The Shape of the Data*
Investigation 1: Sessions 1-3
Investigation 2: Sessions 1-4
Investigation 3: Sessions 1, 3-5

Three Out of Four Like Spaghetti
Investigation 1: Session 1
Investigation 2: Sessions 1-7

2. Represent all possibilities for a simple counting situation in an organized way and draw conclusions from this representation.

- **Organized lists, charts, tree diagrams**
- **Dividing into categories (e.g., to find the total number of rectangles in a grid, find the number of rectangles of each size and add the results)**

4: *Arrays and Shares*
Investigation 1: Sessions 2-3

D. Discrete Mathematics—Vertex-Edge Graphs and Algorithms

1. Follow, devise, and describe practical sets of directions (e.g., to add two 2-digit numbers).

4: *Seeing Shapes and Silhouettes*
Investigation 3: Sessions 1-3
Investigation 4: Session 1
Sunken Shapes and Grid Patterns
Investigation 2: Sessions 1, 4-7

2. Play two-person games and devise strategies for winning the games (e.g., "make 5" where players alternately add 1 or 2 and the person who reaches 5, or another designated number, is the winner).

4: *Mathematical Thinking at Grade 4*
Investigation 1: Session 4
Investigation 2: Sessions 3-4
Investigation 3: Sessions 1-2, 4-5
Investigation 4: Sessions 3-4
Arrays and Shares
Investigation 2: Sessions 5-6
Landmarks in the Thousands
Investigation 2: Sessions 2-4
Money, Miles, and Large Numbers
Investigation 1: Sessions 4-5
Packages and Groups
Investigation 3: Sessions 9-10
Sunken Ships and Grid Patterns
Investigation 1: Sessions 3-4
Three Out of Four Like Spaghetti
Investigation 1: Session 1

3. Explore vertex-edge graphs and tree diagrams.
- **Vertex, edge, neighboring/adjacent, number of neighbors**
- **Path, circuit (i.e., path that ends at its starting point)**

4: *Sunken Ships and Grid Patterns*
Investigation 1: Sessions 1-6

4. Find the smallest number of colors needed to color a map or a graph.

4: *Sunken Ships and Grid Patterns*
Investigation 1: Session 1

Building upon knowledge and skills gained in preceding grades, by the end of ***Grade 5,*** *students will:*

A. Data Analysis

1. Collect, generate, organize, and display data.
- **Data generated from surveys**

5: *Patterns of Change*
Investigation 2: Sessions 2-5
Investigation 3: Sessions 2-6

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

2. Read, interpret, select, construct, analyze, generate questions about, and draw inferences from displays of data.
- **Bar graph, line graph, circle graph, table**
- **Range, median, and mean**

5: *Mathematical Thinking at Grade* 5
Investigation 1: Sessions 5-7
Investigation 2: Session 1
Ten-Minute Math

Name That Portion
Investigation 3: Sessions 2, 5-6
Ten-Minute Math

Between Never and Always
Investigation 2: Session 3

Patterns of Change
Investigation 3: Session 1
Ten-Minute Math
Data: Kids, Cats, and Ads
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-3
Investigation 3: Sessions 1-4
Investigation 4: Session 3
Investigation 5: Sessions 1, 3-5

3. Respond to questions about data and generate their own questions and hypotheses.

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 5-7
Investigation 2: Session 1
Ten-Minute Math
Name That Portion
Investigation 3: Sessions 2, 5-6
Ten-Minute Math
Data: Kids, Cats, and Ads
Investigation 2: Sessions 2-3
Investigation 5: Sessions 1-5

B. Probability

1. Determine probabilities of events.

- **Event, probability of an event**
- **Probability of certain event is 1 and of impossible event is 0**

5: *Between Never and Always*
Investigation 1: Sessions 1-5

2. Determine probability using intuitive, experimental, and theoretical methods (e.g., using model of picking items of different colors from a bag).

- **Given numbers of various types of items in a bag, what is the probability that an item of one type will be picked**
- **Given data obtained experimentally, what is the likely distribution of items in the bag**

5: *Between Never and Always*
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-2

3. Model situations involving probability using simulations (with spinners, dice) and theoretical models.

5: *Between Never and Always*
Investigation 1: Sessions 3-7

C. Discrete Mathematics—Systematic Listing and Counting

1. Solve counting problems and justify that all possibilities have been enumerated without duplication.

- **Organized lists, charts, tree diagrams, tables**

5: *Between Never and Always*
Investigation 1: Session 7
Investigation 2: Sessions 1-2

2. Explore the multiplication principle of counting in simple situations by representing all possibilities in an organized way (e.g., you can make 3 x 4 = 12 outfits using 3 shirts and 4 skirts).

5: *Between Never and Always*
Investigation 1: Session 7
Investigation 2: Sessions 1-2

D. Discrete Mathematics—Vertex-Edge Graphs and Algorithms

1. Devise strategies for winning simple games (e.g., start with two piles of objects, each of two players in turn removes any number of objects from a single pile, and the person to take the last group of objects wins) and express those strategies as sets of directions.

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 2, 5-7
Investigation 3: Sessions 2-5
Investigation 4: Sessions 1-4

Between Never and Always
Investigation 1: Session 7
Investigation 2: Sessions 1-2, 4-5

STANDARD 4.5 (MATHEMATICAL PROCESSES) ALL STUDENTS WILL USE MATHEMATICAL PROCESSES OF PROBLEM SOLVING, COMMUNICATION, CONNECTIONS, REASONING, REPRESENTATIONS, AND TECHNOLOGY TO SOLVE PROBLEMS AND COMMUNICATE MATHEMATICAL IDEAS.

Cumulative Progress Indicators

At each grade level, with respect to content appropriate for that grade level, students will:

A. Problem Solving

1. Learn mathematics through problem solving, inquiry, and discovery.

K: This concept is covered throughout this grade level. Some examples are:

Mathematical Thinking in Kindergarten
- Investigation 1: Focus Time, Choice Time
- Investigation 2: Focus Time, Choice Time
- Investigation 3: Focus Time, Choice Time
- Investigation 4: Focus Time, Choice Time

Pattern Trains and Hopscotch Paths
- Investigation 1: Focus Time, Choice Time
- Investigation 2: Focus Time, Choice Time
- Investigation 3: Focus Time, Choice Time
- Investigation 4: Focus Time, Choice Time

Collecting, Counting and Measuring
- Investigation 1: Focus Time, Choice Time
- Investigation 2: Focus Time, Choice Time
- Investigation 3: Focus Time, Choice Time
- Investigation 4: Focus Time, Choice Time
- Investigation 5: Focus Time, Choice Time
- Investigation 6: Focus Time, Choice Time

Making Shapes and Building Blocks
- Investigation 1: Focus Time, Choice Time
- Investigation 2: Focus Time, Choice Time
- Investigation 3: Focus Time, Choice Time
- Investigation 4: Focus Time, Choice Time
- Investigation 5: Focus Time, Choice Time

How Many in All?
- Investigation 1: Focus Time, Choice Time
- Investigation 2: Focus Time, Choice Time
- Investigation 3: Focus Time, Choice Time
- Investigation 4: Focus Time, Choice Time

1: This concept is covered throughout this grade level. Some examples are:

Mathematical Thinking at Grade 1
- Investigation 2: Sessions 1-5
- Investigation 4: Sessions 1-3
- Investigation 5, Sessions 2-4

Building Number Sense
- Investigation 1: Sessions 3-9
- Investigation 2: Sessions 1-2, 6-9
- Investigation 4: Sessions 1-5, 7-10

Survey Questions and Secret Rules
- Investigation 1: Sessions 1-2
- Investigation 2: Sessions 3-4

Quilt Squares and Block Towns
- Investigation 1: Sessions 2-10, 13-15

Number Games and Story Problems
- Investigation 1: Sessions 4-5, 7-9
- Investigation 2: Sessions 3-8, 10-12

Bigger, Taller, Heavier, Smaller
- Investigation 1: Sessions 1-7
- Investigation 2: Sessions 1-7
- Investigation 3: Sessions 1-5

2: This concept is covered throughout this grade level. Some examples are:

Mathematical Thinking at Grade 2
- Investigation 2: Session 6
- Investigation 3: Sessions 1-2
- Investigation 4: Sessions 1, 5

Coins, Coupons, and Combinations
- Investigation 1: Sessions 1, 6, 8-10
- Investigation 2: Sessions 2-5, 7-10
- Investigation 3: Sessions 1-5
- Investigation 4: Sessions 2-4

Does It Walk, Crawl, or Swim?
- Investigation 1: Sessions 1-6
- Investigation 2: Sessions 1-4
- Investigation 3: Sessions 1-3

Shapes, Halves, and Symmetry
- Investigation 2: Session 1

Putting Together and Taking Apart
- Investigation 1: Sessions 1-2
- Investigation 3: Session 2

How Long? How Far?
- Investigation 2: Sessions 2-8

How Many Pockets? How Many Teeth?
- Investigation 1: Sessions 4-5
- Investigation 2: Sessions 1-6

Timelines and Rhythm Patterns
Investigation 1: Sessions 3-5
Investigation 2; Sessions 1-5

3: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 3
Investigation 2: Sessions 2, 5-7
Investigation 3: Sessions 3-4
Investigation 4: Session 1
Ten-Minute Math
Flips, Turns, and Area
Investigation 1: Sessions 2-3
Investigation 2: Sessions 2-3
Ten-Minute Math
From Paces to Feet
Investigation 1: Sessions 1-4
Ten-Minute Math
L*andmarks in the Hundreds*
Investigation 1: Sessions 6-7
Investigation 2: Sessions 1-6
Up and Down the Number Line
Investigation 1: Sessions 3-5
Ten-Minute Math
Combining and Comparing
Investigation 1: Sessions 1-2
Investigation 2: Session 2
Investigation 3: Sessions 1-2
Investigation 4: Sessions 1, 3-4
Investigation 5: Sessions 2-3
Ten-Minute Math
Turtle Paths
Investigation 2: Sessions 5-6

4: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 4
Investigation 3: Sessions 3-5
Arrays and Shares
Investigation 1: Session 3
Investigation 2: Sessions 5-6
Investigation 3: Sessions 1-4
Seeing Shapes and Silhouettes
Investigation 2: Session 3
Investigation 3: Sessions 2-3
Landmarks in the Thousands
Investigation 2: Sessions 1-5
Investigation 3: Sessions 3-5

D*ifferent Shapes, Equal Pieces*
Investigation 1: Sessions 2-4
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-2
Ten-Minute Math
Money, Miles, and Large Numbers
Investigation 1: Sessions 1-8
Investigation 3: Sessions 1-4
Changes Over Time
Investigation 1: Sessions 5-6

5: This topic is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 5
Investigation 1: Sessions 2, 5-7
Investigation 3: Sessions 2-5
Investigation 4: Sessions 1-4
Picturing Polygons
Investigation 2: Sessions 1-7
Investigation 3: Sessions 4-7
Name That Portion
Investigation 1: Sessions 1-7
Investigation 2: Session 9
Investigation 3: Session 7
Between Never and Always
Investigation 2: Sessions 1-3
Building on Numbers You Know
Investigation 1: Sessions 1-5
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-10
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-8
Measurement Benchmarks
Investigation 1: Sessions 2, 5-6
Investigation 2: Sessions 2-5
Investigation 3: Session 1
Ten-Minute Math
Patterns of Change
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-7
Containers and Cubes
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
Investigation 4: Session 1
Ten-Minute Math

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

2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3).

- **Open-ended problems**
- **Non-routine problems**
- **Problems with multiple solutions**
- **Problems that can be solved in several ways**

K: *Collecting, Counting and Measuring*
Investigation 5: Focus Time
How Many in All?
Investigation 4: Focus Time

1: *Mathematical Thinking at Grade* 1
Investigation 2: Sessions 4-6
Investigation 4: Session 4

2: *Mathematical Thinking at Grade 2*
Investigation 3: Sessions 1-4, 6

3: *Flips, Turns, and Area*
Investigation 1: Sessions 2-3
Investigation 2: Sessions 2-3
Ten-Minute Math
Up and Down the Number Line
Investigation 1: Sessions 3-4, 6-7
Combining and Comparing
Investigation 3: Session 1
Investigation 4: Session 1
Investigation 5: Sessions 2-3
Ten-Minute Math
Fair Shares
Investigation 2: Sessions 1-2
Investigation 3: Session 3
Ten-Minute Math

4: *The Shape of the Data*
Investigation 2: Session 4
Investigation 3: Sessions 1-2
Ten-Minute Math
Changes Over Time
Investigation 3: Sessions 3-4
Ten-Minute Math

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 5-7
Investigation 4: Sessions 2-6
Building on Numbers You Know
Investigation 1: Sessions 2-8
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-10
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-8
Measurement Benchmarks
Investigation 1: Sessions 2, 5-6
Ten-Minute Math

3. Select and apply a variety of appropriate problem-solving strategies (e.g., "try a simpler problem" or "make a diagram") to solve problems.

K: *How Many in All?*
Investigation 3: Focus Time

1: *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 3: Sessions 1-13

2: *Putting Together and Taking Apart*
Investigation 3: Sessions 1-5
Investigation 5: Sessions 1-5, 7

3: *Flips, Turns, and Area*
Investigation 1: Sessions 2-3
Investigation 2: Sessions 2-3
Ten-Minute Math
From Paces to Feet
Investigation 1: Sessions 2, 5-6
Ten-Minute Math
Combining and Comparing
Investigation 3: Session 1
Investigation 4: Session 1
Investigation 5: Session 2-3
Ten-Minute Math
Turtle Paths
Investigation 2: Sessions 5-6

Fair Shares
Investigation 2: Sessions 1-2
Ten-Minute Math

4: *Mathematical Thinking at Grade 4*
Investigation 3: Sessions 3-5
Arrays and Shares
Investigation 1: Session 3
Investigation 2: Sessions 5-6
Investigation 3: Session 1

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 1-2
Investigation 3: Sessions 2-5
Investigation 4: Session 1
Building on Numbers You Know
Investigation 1: Sessions 2-8
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-10
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-8
Measurement Benchmarks
Investigation 2: Session 4
Investigation 3: Session 1
Ten-Minute Math
Containers and Cubes
Investigation 4: Session 1
Ten-Minute Math
Data: Kids, Cats, and Ads
Investigation 3: Sessions 2-4
Investigation 4: Sessions 2-3
Investigation 5: Session 2

4. Pose problems of various types and levels of difficulty.

K: *Mathematical Thinking in Kindergarten*
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Pattern Trains and Hopscotch Paths
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time

Collecting, Counting and Measuring
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Investigation 5: Focus Time, Choice Time
Investigation 6: Focus Time, Choice Time
Making Shapes and Building Blocks
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Investigation 5: Focus Time, Choice Time
How Many in All?
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time

1: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 1
Investigation 2: Sessions 1-5
Investigation 4: Sessions 1-3
Investigation 5, Sessions 2-4
Building Number Sense
Investigation 1: Sessions 3-9
Investigation 2: Sessions 1-2, 6-9
Investigation 4: Sessions 1-5, 7-10
Survey Questions and Secret Rules
Investigation 1: Sessions 1-2
Investigation 2: Sessions 3-4
Quilt Squares and Block Towns
Investigation 1: Sessions 2-10, 13-15
Number Games and Story Problems
Investigation 1: Sessions 4-5, 7-9
Investigation 2: Sessions 3-8, 10-12
Bigger, Taller, Heavier, Smaller
Investigation 1: Sessions 1-7
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-5

2: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 2
Investigation 2: Session 6
Investigation 3: Sessions 1-2
Investigation 4: Sessions 1, 5
Coins, Coupons, and Combinations
Investigation 1: Sessions 1, 6, 8-10
Investigation 2: Sessions 2-5, 7-10
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-4
Does It Walk, Crawl, or Swim?
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-4
Investigation 3: Sessions 1-3
Shapes, Halves, and Symmetry
Investigation 2: Session 1
Putting Together and Taking Apart
Investigation 1: Sessions 1-2
Investigation 3: Session 2
How Long? How Far?
Investigation 2: Sessions 2-8
How Many Pockets? How Many Teeth?
Investigation 1: Sessions 4-5
Investigation 2: Sessions 1-6
Timelines and Rhythm Patterns
Investigation 1: Sessions 3-5
Investigation 2; Sessions 1-5

3: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 3
Investigation 2: Sessions 2, 5-7
Investigation 3: Sessions 3-4
Investigation 4: Session 1
Ten-Minute Math
Flips, Turns, and Area
Investigation 1: Sessions 2-3
Investigation 2: Sessions 2-3
Ten-Minute Math
From Paces to Feet
Investigation 1: Sessions 1-4
Ten-Minute Math
Landmarks in the Hundreds
Investigation 1: Sessions 6-7
Investigation 2: Sessions 1-6

Up and Down the Number Line
Investigation 1: Sessions 3-5
Ten-Minute Math
Combining and Comparing
Investigation 1: Sessions 1-2
Investigation 2: Session 2
Investigation 3: Sessions 1-2
Investigation 4: Sessions 1, 3-4
Investigation 5: Sessions 2-3
Ten-Minute Math
Turtle Paths
Investigation 2: Sessions 5-6

4: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 4
Investigation 3: Sessions 3-5
Arrays and Shares
Investigation 1: Session 3
Investigation 2: Sessions 5-6
Investigation 3: Sessions 1-4
Seeing Shapes and Silhouettes
Investigation 2: Session 3
Investigation 3: Sessions 2-3
Landmarks in the Thousands
Investigation 2: Sessions 1-5
Investigation 3: Sessions 3-5
Different Shapes, Equal Pieces
Investigation 1: Sessions 2-4
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-2
Ten-Minute Math
Money, Miles, and Large Numbers
Investigation 1: Sessions 1-8
Investigation 3: Sessions 1-4
Changes Over Time
Investigation 1: Sessions 5-6

5: This topic is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 5
Investigation 1: Sessions 2, 5-7
Investigation 3: Sessions 2-5
Investigation 4: Sessions 1-4
Picturing Polygons
Investigation 2: Sessions 1-7
Investigation 3: Sessions 4-7

Name That Portion
Investigation 1: Sessions 1-7
Investigation 2: Session 9
Investigation 3: Session 7
Between Never and Always
Investigation 2: Sessions 1-3
Building on Numbers You Know
Investigation 1: Sessions 1-5
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-10
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-8
Measurement Benchmarks
Investigation 1: Sessions 2, 5-6
Investigation 2: Sessions 2-5
Investigation 3: Session 1
Ten-Minute Math
Patterns of Change
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-7
Containers and Cubes
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
Investigation 4: Session 1
Ten-Minute Math
Data: Kids, Cats, and Ads
Investigation 2: Sessions 2-3
Investigation 3: Sessions 2-4
Investigation 4: Sessions 2-3
Investigation 5: Sessions 2-5

5. Monitor their progress and reflect on the process of their problem solving activity.

K: This concept is covered throughout this grade level in Classroom Routines.

1: *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 2: Sessions 1-8, 10-13
Investigation 3: Sessions 1-13

2: *Mathematical Thinking at Grade 2*
Investigation 3: Sessions 1-4, 6
Coins, Coupons, and Combinations
Investigation 1: Session 10
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-4
Does It Walk, Crawl, or Swim?
Investigation 1: Sessions 1-2, 4-6
Investigation 2: Sessions 1-4
Putting Together and Taking Apart
Investigation 1: Sessions 1-2
Investigation 3: Sessions 1-5
Investigation 5: Sessions 1, 4-7
How Long? How Far?
Investigation 1: Sessions 2-4, 5-7

3: *Combining and Comparing*
Investigation 3: Session 1
Investigation 4: Session 1
Investigation 5: Sessions 2-3
Ten-Minute Math
Fair Shares
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-3
Ten-Minute Math

4: *Mathematical Thinking at Grade 4*
Investigation 3: Session 3
Seeing Shapes and Silhouettes
Investigation 3: Sessions 1-3
Investigation 4: Session 1
Landmarks in the Thousands
Investigation 1: Sessions 1-2
Different Shapes, Equal Pieces
Investigation 3: Sessions 4-5

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 2, 5-7
Investigation 3: Sessions 2-5
Investigation 4: Session 1
Building on Numbers You Know
Investigation 1: Sessions 1-8
Investigation 2: Sessions 1-3, 5-6
Investigation 3: Sessions 1-10
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-8

Containers and Cubes
Investigation 4: Session 1
Ten-Minute Math
Data: Kids, Cats, and Ads
Investigation 1: Sessions 2-3
Investigation 2: Session 2
Ten-Minute Math

B. Communication

1. Use communication to organize and clarify their mathematical thinking.

- **Reading and writing**
- **Discussion, listening, and questioning**

K: *Mathematical Thinking in Kindergarten*
Investigation 1: Choice Time
Investigation 2: Focus Time
Classroom Routines
Pattern Trains and Hopscotch Paths
Investigation 4: Choice Time
Classroom Routines
Collecting, Counting and Measuring
Investigation 1: Focus Time
Investigation 3: Focus Time
Investigation 5: Focus Time
Classroom Routines
Collecting Ourselves and Others
Investigation 2: Choice Time
Investigation 3: Choice Time
Classroom Routine

1: *Mathematical Thinking at Grade 1*
Investigation 4: Session 5
Investigation 5: Sessions 2-6
Building Number Sense
Investigation 3: Sessions 1-7, 9
Survey Questions and Secret Rules
Investigation 2: Sessions 1-2, 5-6
Investigation 3: Sessions 1-2
Investigation 4: Sessions 2-5
Number Games and Story Problems
Investigation 2: Sessions 6-9

Bigger, Taller, Heavier, Smaller
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-5

2: *Mathematical Thinking at Grade 2*
Investigation 2: Session 6
Investigation 3: Sessions 1-2
Investigation 4: Sessions 1-5

Coins, Coupons, and Combinations
Investigation 1: Sessions 1, 4-5, 6, 10
Investigation 3: Sessions 1-2

Does It Walk, Crawl, or Swim?
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-4

How Long? How Far?
Investigation 1: Session 8

How Many Pockets? How Many Teeth?
Investigation 1: Sessions 1, 4-5
Investigation 2: Sessions 1-2, 4-5

Timelines and Rhythm Patterns
Investigation 2: Sessions 1-5

3: *From Paces to Feet*
Investigation 1: Session 2

Landmarks in the Hundreds
Investigation 1: Sessions 5-6
Investigation 2: Sessions 5-6

Combining and Comparing
Investigation 4: Sessions 3-4

Turtle Paths
Investigation 2: Sessions 3-4

Fair Shares
Investigation 1: Sessions 1-4
Investigation 2: Sessions 3-4, 7
Investigation 3: Session 3

Exploring Solids and Boxes
Investigation 1: Session 1

4: *Mathematical Thinking at Grade 4*
Investigation 4: Sessions 5-6

Arrays and Shares
Investigation 3: Session 1

Seeing Shapes and Silhouettes
Investigation 1: Sessions 1-2
Investigation 2: Sessions 1-2
Investigation 3: Session 1
Investigation 4: Session 1

Landmarks in the Thousands
Investigation 1: Session 1
Investigation 2: Sessions 1, 5
The Shape of the Data
Investigation 1: Sessions 2-3
Investigation 2: Sessions 1, 4, 6-7
Investigation 3: Sessions 1, 3-5
Changes Over Time
Investigation 1: Sessions 3-4
Investigation 3: Sessions 1-2, 4-7
Packages and Groups
Investigation 1: Session 3
Three Out of Four Like Spaghetti
Investigation 1: Session 4
Investigation 2: Sessions 1-7

5: *Mathematical Thinking at Grade* 5
Investigation 1: Sessions 1-2, 5-7
Investigation 3: Session 5
Investigation 4: Sessions 5-6
Building on Numbers You Know
Investigation 3: Sessions 1-3
Investigation 5: Sessions 1-2
Measurement Benchmarks
Investigation 3: Session 1
Data: Kids, Cats, and Ads
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-2
Investigation 3: Sessions 2-4
Investigation 4: Session 3
Investigation 5: Session 1, 3-5

2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.

K: *Mathematical Thinking in Kindergarten*
Investigation 1: Choice Time
Investigation 2: Focus Time
Classroom Routines
Pattern Trains and Hopscotch Paths
Investigation 4: Choice Time
Classroom Routines
Collecting, Counting and Measuring
Investigation 1: Focus Time
Investigation 3: Focus Time
Investigation 5: Focus Time
Classroom Routines

Collecting Ourselves and Others
Investigation 2: Choice Time
Investigation 3: Choice Time
Classroom Routine

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

2: *Mathematical Thinking at Grade 2*
Investigation 2: Session 6
Investigation 3: Sessions 1-2
Investigation 4: Sessions 1, 5
Coins, Coupons, and Combinations
Investigation 1: Sessions 1, 4-6, 10
Investigation 2: Sessions 1, 4-6
Investigation 3: Sessions 1-2
Does It Walk, Crawl, or Swim?
Investigation 2: Sessions 3-4
How Long? How Far?
Investigation 1: Session 8
How Many Pockets? How Many Teeth?
Investigation 1: Sessions 1-5
Investigation 2: Sessions 1-2, 4-6
Investigation 3: Session 5
Timelines and Rhythm Patterns
Investigation 2: Sessions 1-5

3: *Things That Come in Groups*
Investigation 5: Sessions 1, 3
Flips, Turns, and Area
Investigation 1: Sessions 1-3, 5
Investigation 2: Sessions 2-3
From Paces to Feet
Investigation 1: Session 2
Combining and Comparing
Investigation 1: Sessions 1-2
Investigation 2: Session 2
Investigation 5: Sessions 2-3
Ten-Minute Math

4: This topic is covered throughout this grade level. Some examples are:

Mathematical Thinking at Grade 4
- Investigation 1: Sessions 1, 4
- Investigation 2: Sessions 1-2
- Investigation 4: Session 2

Arrays and Shares
- Investigation 2: Sessions 2-3
- Investigation 3: Sessions 1, 5

Seeing Shapes and Silhouettes
- Investigation 1: Sessions 1-2
- Investigation 2: Sessions 3-4
- Investigation 4: Sessions 1-4

Landmarks in the Thousands
- Investigation 1: Sessions 1, 3
- Investigation 2: Sessions 2-5
- Investigation 3: Session 1

Different Shapes, Equal Pieces
- Investigation 1: Sessions 1-4
- Investigation 3: Session 3

The Shape of the Data
- Investigation 2: Sessions 1-4, 6-7
- Investigation 3: Sessions 1-5

Money, Miles, and Large Numbers
- Investigation 1: Sessions 1-2, 4-5, 7-8
- Investigation 2: Sessions 3-4

Changes Over Time
- Investigation 1: Session 1
- Investigation 3: Sessions 7-8

Packages and Groups
- Investigation 1: Sessions 1-2, 4-5
- Investigation 2: Session 1
- Investigation 3: Sessions 1-3

Sunken Ships and Grid Patterns
- Investigation 1: Sessions 2-5
- Investigation 2: Session 1

Three Out of Four Like Spaghetti
- Investigation 1: Session 1
- Investigation 2: Sessions 3-7

5: This topic is covered throughout this grade level. Some examples are:

Mathematical Thinking at Grade 5
- Investigation 1: Sessions 1-6
- Investigation 2: Sessions 1-4
- Investigation 3: Sessions 1-2

Picturing Polygons
Investigation 1: Session 1
Investigation 2: Sessions 1-8
Investigation 3: Sessions 1-2
Name That Portion
Investigation 1: Sessions 3-4
Investigation 2: Sessions 4-6
Investigation 3: Sessions 2, 5-6
Between Never and Always
Investigation 1: Sessions 3-6
Investigation 2: Sessions 1-3
Building on Number You Know
Investigation 1: Sessions 1-4, 6-7
Investigation 2: Sessions 1-2
Investigation 3: Sessions 4-9
Investigation 5: Sessions 4-6
Measurement Benchmarks
Investigation 1: Sessions 4-6
Investigation 2: Sessions 1-2
Investigation 3: Session 2
Patterns of Change
Investigation 1: Sessions 3-4
Investigation 2: Session 3
Investigation 3: Session 2
Containers and Cubes
Investigation 1: Sessions 1-4
Investigation 3: Sessions 1-2
Investigation 4: Sessions 2-3, 7-9
Data: Kids, Cats, and Ads
Investigation 1: Sessions 2-3
Investigation 2: Session 2
Investigation 3: Session 4
Investigation 4: Session 2
Investigation 5: Session s 1, 3-5

3. Analyze and evaluate the mathematical thinking and strategies of others.

K: This concept is covered throughout this grade level in Classroom Routines.

1: *Survey Questions and Secret Rules*
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-6
Investigation 4: Sessions 4-5

2: *Putting Together and Taking Apart*
Investigation 1: Sessions 1-2

Investigation 3: Sessions 1-5
Investigation 5: Sessions 1, 4-7

3: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 3
Investigation 1: Sessions 2-3
Investigation 3: Sessions 1-2
Things That Come in Groups
Investigation 1: Sessions 2, 4
Investigation 2: Sessions 5-6
Flips, Turns, and Area
Investigation 1: Session 1
From Paces to Feet
Investigation 1: Sessions 1-2
Landmarks in the Hundreds
Investigation 1: Sessions 6-7
Up and Down the Number Line
Investigation 1: Session 8
Combining and Comparing
Investigation 1: Sessions 1-2
Turtle Paths
Investigation 1: Session 1
Fair Shares
Investigation 1: Sessions 3-4
Exploring Solids and Boxes
Investigation 1: Session 1

4: This topic is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 4
Investigation 1: Sessions 1, 4
Investigation 2: Sessions 1-2
Investigation 4: Session 2
Arrays and Shares
Investigation 2: Sessions 2-3
Investigation 3: Sessions 1, 5
Seeing Shapes and Silhouettes
Investigation 1: Sessions 1-2
Investigation 2: Sessions 3-4
Investigation 4: Sessions 1-4
Landmarks in the Thousands
Investigation 1: Sessions 1, 3
Investigation 2: Sessions 2-5
Investigation 3: Session 1
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-4
Investigation 3: Session 3

The Shape of the Data
Investigation 2: Sessions 1-4, 6-7
Investigation 3: Sessions 1-5
Money, Miles, and Large Numbers
Investigation 1: Sessions 1-2, 4-5, 7-8
Investigation 2: Sessions 3-4
Changes Over Time
Investigation 1: Session 1
Investigation 3: Sessions 7-8
Packages and Groups
Investigation 1: Sessions 1-2, 4-5
Investigation 2: Session 1
Investigation 3: Sessions 1-3
Sunken Ships and Grid Patterns
Investigation 1: Sessions 2-5
Investigation 2: Session 1
Three Out of Four Like Spaghetti
Investigation 1: Session 1
Investigation 2: Sessions 3-7

5: This topic is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 5
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-4
Investigation 3: Sessions 1-2
Picturing Polygons
Investigation 1: Session 1
Investigation 2: Sessions 1-8
Investigation 3: Sessions 1-2
Name That Portion
Investigation 1: Sessions 3-4
Investigation 2: Sessions 4-6
Investigation 3: Sessions 2, 5-6
Between Never and Always
Investigation 1: Sessions 3-6
Investigation 2: Sessions 1-3
Building on Number You Know
Investigation 1: Sessions 1-4, 6-7
Investigation 2: Sessions 1-2
Investigation 3: Sessions 4-9
Investigation 5: Sessions 4-6
Measurement Benchmarks
Investigation 1: Sessions 4-6
Investigation 2: Sessions 1-2
Investigation 3: Session 2

Patterns of Change
Investigation 1: Sessions 3-4
Investigation 2: Session 3
Investigation 3: Session 2
Containers and Cubes
Investigation 1: Sessions 1-4
Investigation 3: Sessions 1-2
Investigation 4: Sessions 2-3, 7-9
Data: Kids, Cats, and Ads
Investigation 1: Sessions 2-3
Investigation 2: Session 2
Investigation 3: Session 4
Investigation 4: Session 2
Investigation 5: Session s 1, 3-5

4. Use the language of mathematics to express mathematical ideas precisely.

K: This concept is covered throughout this grade level in Classroom Routines.

1: *Survey Questions and Secret Rules*
Investigation 2: Sessions 1-2, 5-6
Quilt Squares and Block Towns
Investigation 1: Sessions 3-6, 8-15
Investigation 2: Sessions 1-10
Investigation 3: Sessions 1-5
Bigger, Taller, Heavier, Smaller
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-5

2: *Mathematical Thinking at Grade 2*
Investigation 2: Session 6
Investigation 3: Sessions 1-2
Investigation 4: Sessions 1, 5
Coins, Coupons, and Combinations
Investigation 1: Sessions 1, 4-6, 10
Investigation 3: Sessions 1-2
Shapes, Halves, and Symmetry
Investigation 1: Sessions 2-8
Investigation 2: Session 1

3: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 3
Investigation 1: Sessions 2-3
Investigation 3: Sessions 1-2
Things That Come in Groups
Investigation 1: Sessions 2, 4
Investigation 2: Sessions 5-6

Flips, Turns, and Area
Investigation 1: Session 1
From Paces to Feet
Investigation 1: Sessions 1-2
Landmarks in the Hundreds
Investigation 1: Sessions 6-7
Up and Down the Number Line
Investigation 1: Session 8
Combining and Comparing
Investigation 1: Sessions 1-2
Turtle Paths
Investigation 1: Session 1
Fair Shares
Investigation 1: Sessions 3-4
Exploring Solids and Boxes
Investigation 1: Session 1

4: This topic is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 4
Investigation 1: Sessions 1, 4
Investigation 2: Sessions 1-2
Investigation 4: Session 2
Arrays and Shares
Investigation 2: Sessions 2-3
Investigation 3: Sessions 1, 5
Seeing Shapes and Silhouettes
Investigation 1: Sessions 1-2
Investigation 2: Sessions 3-4
Investigation 4: Sessions 1-4
Landmarks in the Thousands
Investigation 1: Sessions 1, 3
Investigation 2: Sessions 2-5
Investigation 3: Session 1
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-4
Investigation 3: Session 3
The Shape of the Data
Investigation 2: Sessions 1-4, 6-7
Investigation 3: Sessions 1-5
Money, Miles, and Large Numbers
Investigation 1: Sessions 1-2, 4-5, 7-8
Investigation 2: Sessions 3-4
Changes Over Time
Investigation 1: Session 1
Investigation 3: Sessions 7-8

Packages and Groups
Investigation 1: Sessions 1-2, 4-5
Investigation 2: Session 1
Investigation 3: Sessions 1-3
Sunken Ships and Grid Patterns
Investigation 1: Sessions 2-5
Investigation 2: Session 1
Three Out of Four Like Spaghetti
Investigation 1: Session 1
Investigation 2: Sessions 3-7

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 1-2, 5-7
Investigation 3: Session 5
Investigation 4: Sessions 5-6
Between Never and Always
Investigation 1: Sessions 1-2
Building on Numbers You Know
Investigation 3: Sessions 1-3
Investigation 5: Sessions 1-2
Measurement Benchmarks
Investigation 3: Session 1

C. Connections

1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).

K: *Pattern Trains and Hopscotch Paths*
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Classroom Routines

1: *Mathematical Thinking at Grade 1*
Investigation 1: Sessions 1-4
Investigation 3: Sessions 1-6
Investigation 4: Sessions 2-3
Building Number Sense
Investigation 3: Sessions 1-8
Investigation 4: Session 10
Survey Questions and Secret Rules
Investigation 3: Sessions 2-3
Quilt Squares and Block Towns
Investigation 1: Sessions 2-3

Number Games and Story Problems
Investigation 2: Sessions 2, 6-9

2: *Mathematical Thinking at Grade 2*
Investigation 1: Session 1
Investigation 3: Sessions 1-2
Putting Together and Taking Apart
Investigation 2: Sessions 1-6
Investigation 5: Sessions 2-3, 6
Timelines and Rhythm Patterns
Investigation 2: Sessions 1-3

3: *Mathematical Thinking at Grade 3*
Investigation 1: Sessions 2-3
Investigation 2: Session 1
Things That Come in Groups
Investigation 2: Sessions 1-6
Investigation 3: Session 3
Investigation 5: Session 1
Flips, Turns, and Area
Investigation 1: Sessions 1-3
From Paces to Feet
Investigation 1: Session 2

4: *Mathematical Thinking at Grade 4*
Investigation 4: Sessions 1-4
Arrays and Shares
Investigation 3: Sessions 2-4
Ten-Minute Math
Landmarks in the Thousands
Investigation 3: Sessions 3-5
Investigation 4: Sessions 1-3
Ten-Minute Math
Sunken Ships and Grid Patterns
Investigation 1: Sessions 3-6
Investigation 2: Sessions 2-4, 8-9

5: *Picturing Polygons*
Investigation 3: Sessions 1-7
Name That Portion
Investigation 2: Sessions 4-5
Investigation 3: Sessions 5-6
Patterns of Change
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-7

2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).

K: *How Many in All?*
- Investigation 1: Focus Time, Choice Time
- Investigation 2: Focus Time, Choice Time
- Investigation 3: Focus Time, Choice Time
- Investigation 4: Focus Time, Choice Time

1: *Mathematical Thinking at Grade 1*
- Investigation 3: Sessions 1-6

Survey Questions and Secret Rules
- Investigation 2: Sessions 1-2, 5-6
- Investigation 3: Sessions 1-2
- Investigation 4: Sessions 2-4

Quilt Squares and Block Towns
- Investigation 2: Sessions 7-10

2: *Mathematical Thinking at Grade 2*
- Investigation 1: Session 1
- Investigation 2: Sessions 1, 6
- Investigation 3: Sessions 3-4
- Investigation 5: Session 3

Coins, Coupons, and Combinations
- Investigation 2: Sessions 2-5, 10

Shapes, Halves, and Symmetry
- Investigation 2: Sessions 2-5
- Investigation 3: Sessions 1-5

Timelines and Rhythm Patterns
- Investigation 2: Sessions 1-5

3: *Flips, Turns, and Area*
- Investigation 2: Sessions 1-5

Up and Down the Number Line
- Investigation 1: Sessions 3-4, 6-7
- Investigation 2: Sessions 1-3

4: *Arrays and Shapes*
- Investigation 3: Sessions 1-5

Seeing Shapes and Silhouettes
- Investigation 2: Sessions 1-4
- Investigation 3: Sessions 2-3

Landmarks in the Thousands
- Investigation 1: Session 3
- Investigation 3: Sessions 3-5
- Investigation 4: Sessions 1-3
- Ten-Minute Math

Different Shapes, Equal Pieces
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-2
Changes Over Time
Investigation 1: Sessions 3-4
Investigation 2: Sessions 1-2
Ten-Minute Math
Packages and Groups
Investigation 2: Sessions 1-3
Investigation 3: Sessions 3-6

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 5-7
Investigation 2: Session 1
Ten-Minute Math
Between Never and Always
Investigation 1: Sessions 3-6
Patterns of Change
Investigation 1: Sessions 1-4
Containers and Cubes
Investigation 1: Sessions 1-4

3. Recognize that mathematics is used in a variety of contexts outside of mathematics.

K: *Mathematical Thinking in Kindergarten*
Investigation 1: Focus Time
Investigation 2: Focus Time
Classroom Routines
Pattern Trains and Hopscotch Paths
Classroom Routines
Collecting, Counting, and Measuring
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 4: Focus Time
Classroom Routines
Counting Ourselves and Others
Investigation 1: Focus Time, Choice Time
Classroom Routine
Making Shapes and Building Blocks
Classroom Routines
How Many in All?
Investigation 1, Focus Time
Investigation 2, Choice Time
Classroom Routines

1: *Mathematical Thinking at Grade 1*
Investigation 5: Sessions 2-6
Survey Questions and Secret Rules
Investigation 2: Sessions 1-2, 5-6
Investigation 3: Sessions 1-2
Investigation 4: Sessions 2-5
Quilt Squares and Block Towns
Investigation 1: Session 1
Investigation 2: Sessions 1-6
Investigation 3: Sessions 1-7
Bigger, Taller, Heavier, Smaller
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-5

2: *Mathematical Thinking at Grade 2*
Investigation 1: Sessions 2-4
Investigation 2: Sessions 1, 4-5, 7
Investigation 3: Sessions 1-5
Investigation 5: Sessions 4-6
Coins, Coupons, and Combinations
Investigation 2: Sessions 6-9
How Long? How Far?
Investigation 1: Session 1
Investigation 2: Sessions 1-8
How Many Pockets? How Many Teeth?
Investigation 2: Sessions 3-5
Investigation 3: Sessions 1-5
Timelines and Rhythm Patterns
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
This concept is covered throughout this grade level in Classroom Routines.

3: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 3
Investigation 4: Session 2
Things That Come in Groups
Investigation 4: Session 2
Investigation 5: Session 1
Ten-Minute Math
Flips, Turns, and Area
Investigation 1: Session 1
Investigation 2: Sessions 2-5
From Paces to Feet
Investigation 1: Sessions 5-6
Investigation 2: Session 1

Up and Down the Number Line
Investigation 2: Sessions 2-3
Combining and Comparing
Investigation 3: Session 2
Investigation 5: Sessions 1-3
Turtle Paths
Investigation 2: Sessions 3-4
Exploring Solids and Boxes
Investigation 2: Sessions 1, 3-5
Investigation 3: Sessions 1-2
Investigation 4: Session 3
Investigation 5: Sessions 1-4

4: *Mathematical Thinking at Grade* 4
Investigation 2: Sessions 1-4
Investigation 3: Sessions 4-5
Seeing Shapes and Silhouettes
Investigation 1: Sessions 1-2
Investigation 2: Sessions 1-2
Investigation 3: Sessions 2-3
The Shape of the Data
Investigation 1: Sessions 1-3
Investigation 2: Sessions 1-3
Investigation 3: Sessions 3-5
Money, Miles, and Large Numbers
Investigation 1: Sessions 1-5, 7-8
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-4
Changes Over Time
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-2
Sunken Ships and Grid Patterns
Investigation 2: Sessions 1, 4-7

5: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 5
Investigation 3: Session 1
Investigation 4: Session 1
Ten-Minute Math
Picturing Polygons
Investigation 1: Sessions 3-4
Investigation 2: Sessions 4-7
Investigation 3: Sessions 1-2, 4-7
Name That Portion
Investigation 1: Sessions 1-2, 7
Investigation 2: Session 9
Investigation 3: Sessions 1, 7
Investigation 4: Sessions 1-7

Between Never and Always
Investigation 1: Sessions 3-5
Investigation 2: Sessions 1-3
Measurement Benchmarks
Investigation 1: Sessions 1, 3-7
Investigation 2: Sessions 3-4
Investigation 3: Session 1
Patterns of Change
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-7
Containers and Cubes
Investigation 2: Sessions 1-5
Data: Kids, Cats, and Ads
Investigation 3: Sessions 2-4
Investigation 4: Sessions 2-3
Investigation 5: Sessions 1-2

4. Apply mathematics in practical situations and in other disciplines.

K: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking in Kindergarten
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Pattern Trains and Hopscotch Paths
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Collecting, Counting and Measuring
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Investigation 5: Focus Time, Choice Time
Investigation 6: Focus Time, Choice Time
Making Shapes and Building Blocks
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
Investigation 5: Focus Time, Choice Time

How Many in All?
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time

1: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 1
Investigation 2: Sessions 1-5
Investigation 4: Sessions 1-3
Investigation 5, Sessions 2-4
Building Number Sense
Investigation 1: Sessions 3-9
Investigation 2: Sessions 1-2, 6-9
Investigation 4: Sessions 1-5, 7-10
Survey Questions and Secret Rules
Investigation 1: Sessions 1-2
Investigation 2: Sessions 3-4
Quilt Squares and Block Towns
Investigation 1: Sessions 2-10, 13-15
Number Games and Story Problems
Investigation 1: Sessions 4-5, 7-9
Investigation 2: Sessions 3-8, 10-12
Bigger, Taller, Heavier, Smaller
Investigation 1: Sessions 1-7
Investigation 2: Sessions 1-7
Investigation 3: Sessions 1-5

2: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 2
Investigation 2: Session 6
Investigation 3: Sessions 1-2
Investigation 4: Sessions 1, 5
Coins, Coupons, and Combinations
Investigation 1: Sessions 1, 6, 8-10
Investigation 2: Sessions 2-5, 7-10
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-4
Does It Walk, Crawl, or Swim?
Investigation 1: Sessions 1-6
Investigation 2: Sessions 1-4
Investigation 3: Sessions 1-3
Shapes, Halves, and Symmetry
Investigation 2: Session 1
Putting Together and Taking Apart
Investigation 1: Sessions 1-2
Investigation 3: Session 2

How Long? How Far?
Investigation 2: Sessions 2-8
How Many Pockets? How Many Teeth?
Investigation 1: Sessions 4-5
Investigation 2: Sessions 1-6
Timelines and Rhythm Patterns
Investigation 1: Sessions 3-5
Investigation 2: Sessions 1-5

3: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 3
Investigation 2: Sessions 2, 5-7
Investigation 3: Sessions 3-4
Investigation 4: Session 1
Ten-Minute Math
Flips, Turns, and Area
Investigation 1: Sessions 2-3
Investigation 2: Sessions 2-3
Ten-Minute Math
From Paces to Feet
Investigation 1: Sessions 1-4
Ten-Minute Math
Landmarks in the Hundreds
Investigation 1: Sessions 6-7
Investigation 2: Sessions 1-6
Up and Down the Number Line
Investigation 1: Sessions 3-5
Ten-Minute Math
Combining and Comparing
Investigation 1: Sessions 1-2
Investigation 2: Session 2
Investigation 3: Sessions 1-2
Investigation 4: Sessions 1, 3-4
Investigation 5: Sessions 2-3
Ten-Minute Math
Turtle Paths
Investigation 2: Sessions 5-6

4: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 4
Investigation 1: Sessions 1, 4
Investigation 2: Sessions 1-2
Investigation 4: Session 2
Arrays and Shares
Investigation 2: Sessions 2-3
Investigation 3: Sessions 1, 5

Seeing Shapes and Silhouettes
Investigation 1: Sessions 1-2
Investigation 2: Sessions 3-4
Investigation 4: Sessions 1-4
Landmarks in the Thousands
Investigation 1: Sessions 1, 3
Investigation 2: Sessions 2-5
Investigation 3: Session 1
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-4
Investigation 3: Session 3
The Shape of the Data
Investigation 2: Sessions 1-4, 6-7
Investigation 3: Sessions 1-5
Money, Miles, and Large Numbers
Investigation 1: Sessions 1-2, 4-5, 7-8
Investigation 2: Sessions 3-4
Changes Over Time
Investigation 1: Session 1
Investigation 3: Sessions 7-8
Packages and Groups
Investigation 1: Sessions 1-2, 4-5
Investigation 2: Session 1
Investigation 3: Sessions 1-3
Sunken Ships and Grid Patterns
Investigation 1: Sessions 2-5
Investigation 2: Session 1
Three Out of Four Like Spaghetti
Investigation 1: Session 1
Investigation 2: Sessions 3-7

5: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 5
Investigation 3: Session 1
Investigation 4: Session 1
Ten-Minute Math
Picturing Polygons
Investigation 1: Sessions 3-4
Investigation 2: Sessions 4-7
Investigation 3: Sessions 1-2, 4-7
Name That Portion
Investigation 1: Sessions 1-2, 7
Investigation 2: Session 9
Investigation 3: Sessions 1, 7
Investigation 4: Sessions 1-7

Between Never and Always
Investigation 1: Sessions 3-5
Investigation 2: Sessions 1-3
Measurement Benchmarks
Investigation 1: Sessions 1, 3-7
Investigation 2: Sessions 3-4
Investigation 3: Session 1
Patterns of Change
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-7
Containers and Cubes
Investigation 2: Sessions 1-5
Data: Kids, Cats, and Ads
Investigation 3: Sessions 2-4
Investigation 4: Sessions 2-3
Investigation 5: Sessions 1-2

5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).

K: This concept is introduced in Grade 3.
1: This concept is introduced in Grade 3.
2: This concept is introduced in Grade 3.
3: *From Paces to Feet*
Investigation 2: Session 5
4: *Changes Over Time*
Investigation 3: Sessions 1-2
5: This concept is not covered in Grade 5.

6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.

K: *How Many in All?*
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time
1: *Mathematical Thinking at Grade 1*
Investigation 3: Sessions 1-6
Survey Questions and Secret Rules
Investigation 2: Sessions 1-2, 5-6
Investigation 3: Sessions 1-2
Investigation 4: Sessions 2-4
Quilt Squares and Block Towns
Investigation 2: Sessions 7-10

2: *Mathematical Thinking at Grade 2*
Investigation 1: Session 1
Investigation 2: Sessions 2-3, 6, 8
Investigation 4: Sessions 1-5
Coins, Coupons, and Combinations
Investigation 1: Sessions 2-3, 6-11
Investigation 2: Sessions 7-9
Investigation 3: Sessions 1-2
Investigation 4: Sessions 2-5
Shapes, Halves, and Symmetry
Investigation 2: Sessions 3-5
Investigation 3: Sessions 1-5
Putting Together and Taking Apart
Investigation 2: Sessions 1-6
Investigation 5: Sessions 2-3, 6, 8

3: *Things That Come in Groups*
Investigation 1: Session 3
Investigation 3: Session 3
Investigation 4: Session 1
Investigation 5: Session 4
Flips, Turns, and Area
Investigation 2: Sessions 2-5
Landmarks in the Hundreds
Investigation 1: Sessions 1-3, 6-7
Investigation 2: Sessions 4-6
Turtle Paths
Investigation 1: Sessions 2-4
Investigation 2: Sessions 1-2
Ten-Minute Math
Fair Shares
Investigation 1: Sessions 1-4
Investigation 3: Sessions 1-2
Exploring Solids and Boxes
Investigation 2: Sessions 1-2
Investigation 3: Session 1

4: *Mathematical Thinking at Grade 4*
Investigation 3: Sessions 3-5
Landmarks in the Thousands
Investigation 2: Sessions 2-4
Investigation 3: Sessions 3-5

5: *Mathematical Thinking at Grade 5*
Investigation 2: Sessions 1-4
Investigation 3: Sessions 1, 5
Investigation 4: Sessions 5-6
Name That Portion
Investigation 1: Sessions 2-7

Investigation 2: Sessions 1-9
Investigation 3: Sessions 1-8
Investigation 4: Sessions 1-7

Containers and Cubes
Investigation 1: Sessions 1-4

D. Reasoning

1. Recognize that mathematical facts, procedures, and claims must be justified.

K: This concept is introduced in Grade 1.

1: *Mathematical Thinking at Grade 1*
Investigation 5: Sessions 2-6

Survey Questions and Secret Rules
Investigation 2: Sessions 1-2, 5-6
Investigation 4: Sessions 4-5

Number Games and Story Problems
Investigation 3: Sessions 6-8, 10-12

2: *Coins, Coupons, and Combinations*
Investigation 1: Session 10
Investigation 2: Sessions 1, 4-5
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-4

Does It Walk, Crawl, or Swim?
Investigation 1: Sessions 1-2, 4-6
Investigation 2: Sessions 1-4

3: *Fair Shares*
Investigation 1: Sessions 3-4
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-3
Ten-Minute Math

4: *Different Shapes, Equal Pieces*
Investigation 2: Sessions 1-2

5: *Containers and Cubes*
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-9

2. Use reasoning to support their mathematical conclusions and problem solutions.

K: *How Many in All?*
Investigation 3: Choice Time
Investigation 4: Choice Time

1: *Number Games and Story Problems*
Investigation 3: Sessions 6-8, 10-12

2: *Coins, Coupons, and Combinations*
Investigation 1: Session 10
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-4

Putting Together and Taking Apart
Investigation 1: Sessions 1-4
Investigation 2: Sessions 3-4, 7
Investigation 3: Sessions 3-5
Investigation 5: Sessions 1-3, 7

3: *Combining and Comparing*
Investigation 3: Session 1
Investigation 4: Session 1
Investigation 5: Sessions 2-3
Ten-Minute Math

4: *The Shape of the Data*
Investigation 1: Sessions 2-3
Investigation 2: Session 1
Ten-Minute Math

5: *Data: Kids, Cats, and Ads*
Investigation 1: Sessions 2-3
Investigation 2: Session 2
Ten-Minute Math

3. Select and use various types of reasoning and methods of proof.

K: *How Many in All?*
Investigation 3: Choice Time
Investigation 4: Choice Time

1: *Number Games and Story Problems*
Investigation 3: Sessions 6-8, 10-12

2: *Coins, Coupons, and Combinations*
Investigation 1: Session 10
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-4

Putting Together and Taking Apart
Investigation 1: Sessions 1-4
Investigation 2: Sessions 3-4, 7
Investigation 3: Sessions 3-5
Investigation 5: Sessions 1-3, 7

3: *Combining and Comparing*
- Investigation 3: Session 1
- Investigation 4: Session 1
- Investigation 5: Sessions 2-3
- Ten-Minute Math

4: *Different Shapes, Equal Pieces*
- Investigation 1: Sessions 2-4
- Investigation 2: Sessions 1-2
- Investigation 3: Sessions 1-2
- Ten-Minute Math

The Shape of the Data
- Investigation 1: Sessions 2-3
- Investigation 2: Session 1
- Ten-Minute Math

5: *Data: Kids, Cats, and Ads*
- Investigation 1: Sessions 2-3
- Investigation 2: Session 2
- Ten-Minute Math

4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.

K: *How Many in All?*
- Investigation 3: Choice Time
- Investigation 4: Choice Time

1: *Number Games and Story Problems*
- Investigation 3: Sessions 6-8, 10-12

2: *Coins, Coupons, and Combinations*
- Investigation 1: Session 10
- Investigation 3: Sessions 1-5
- Investigation 4: Sessions 2-4

Putting Together and Taking Apart
- Investigation 1: Sessions 1-4
- Investigation 2: Sessions 3-4, 7
- Investigation 3: Sessions 3-5
- Investigation 5: Sessions 1-3, 7

3: *Combining and Comparing*
- Investigation 3: Session 1
- Investigation 4: Session 1
- Investigation 5: Sessions 2-3
- Ten-Minute Math

4: *The Shape of the Data*
- Investigation 1: Sessions 2-3
- Investigation 2: Session 1
- Ten-Minute Math

5: *Data: Kids, Cats, and Ads*
Investigation 1: Sessions 2-3
Investigation 2: Session 2
Ten-Minute Math

5. Make and investigate mathematical conjectures.

- **Counterexamples as a means of disproving conjectures**
- **Verifying conjectures using informal reasoning or proofs.**

K: This concept is introduced in Grade 1.

1: *Number Games and Story Problems*
Investigation 3: Sessions 3-8, 10-12

2: *Does It Walk, Crawl, or Swim?*
Investigation 2: Sessions 3-4

3: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 3
Investigation 1: Sessions 2-3
Investigation 3: Sessions 1-2
Things That Come in Groups
Investigation 1: Sessions 2, 4
Investigation 2: Sessions 5-6
Flips, Turns, and Area
Investigation 1: Session 1
From Paces to Feet
Investigation 1: Sessions 1-2
Landmarks in the Hundreds
Investigation 1: Sessions 6-7
Up and Down the Number Line
Investigation 1: Session 8
Combining and Comparing
Investigation 1: Sessions 1-2
Turtle Paths
Investigation 1: Session 1
Fair Shares
Investigation 1: Sessions 3-4
Exploring Solids and Boxes
Investigation 1: Session 1

4: *The Shape of the Data*
Investigation 1: Sessions 2-3
Investigation 2: Sessions 1, 4, 6-7
Investigation 3: Sessions 1, 3-5
Packages and Groups
Investigation 1: Sessions 4-5
Ten-Minute Math

Three Out of Four Like Spaghetti
Investigation 1: Session 4
Investigation 2: Sessions 1-2, 5-7

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 5-7
Investigation 2: Session 1
Ten-Minute Math

Name That Portion
Investigation 3: Sessions 2, 5-6
Ten-Minute Math

Measurement Benchmarks
Investigation 2: Session 4
Investigation 3: Session 1
Ten-Minute Math

Containers and Cubes
Investigation 4: Session 1
Ten-Minute Math

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

6. Evaluate examples of mathematical reasoning and determine whether they are valid.

K: *How Many in All?*
Investigation 3: Choice Time
Investigation 4: Choice Time

1: *Number Games and Story Problems*
Investigation 3: Sessions 3-8, 10-12

2: *Coins, Coupons, and Combinations*
Investigation 1: Sessions 1, 6, 8-10
Investigation 2: Sessions 1-3, 7-9
Investigation 3: Sessions 1-5
Investigation 4: Sessions 2-4

Does It Walk, Crawl, or Swim?
Investigation 2: Sessions 1-4
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-3

3: *Fair Shares*
Investigation 1: Sessions 3-4
Ten-Minute Math

4: *Different Shapes, Equal Pieces*
Investigation 1: Sessions 2-4
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-2
Ten-Minute Math

The Shape of the Data
Investigation 1: Sessions 2-4
Investigation 2: Sessions 1-2
Investigation 3: Sessions 1-2
Ten-Minute Math

5: *Measurement Benchmarks*
Investigation 2: Session 4
Investigation 3: Session 1
Ten-Minute Math

Containers and Cubes
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-9

E. Representations

1. Create and use representations to organize, record, and communicate mathematical ideas.

- **Concrete representations (e.g., base-ten blocks or algebra tiles)**
- **Pictorial representations (e.g., diagrams, charts, or tables)**
- **Symbolic representations (e.g., a formula)**
- **Graphical representations (e.g., a line graph)**

K: *Mathematical Thinking in Kindergarten*
Investigation 4: Focus Time

Collecting Ourselves and Others
Investigation 1: Focus Time, Choice Time
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time, Choice Time
Investigation 4: Focus Time, Choice Time

1: *Mathematical Thinking at Grade 1*
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-6
Investigation 4: Sessions 1-4, 6

Building Number Sense
Investigation 1: Sessions 7-9

Investigation 2: Sessions 1-2, 9
Investigation 3: Session 9
Investigation 4: Sessions 1-5, 7-10

Number Games and Story Problems
Investigation 1: Sessions 1-10
Investigation 2: Session 9

2: *Mathematical Thinking at Grade 2*
Investigation 2: Session 6
Investigation 5: Sessions 1-6

Does It Walk, Crawl, or Swim?
Investigation 1: Sessions 1-3
Investigation 2: Sessions 3-4
Investigation 3: Sessions 1-3
Investigation 4: Sessions 1-3

Shapes, Halves, and Symmetry
Investigation 2: Sessions 3-5
Investigation 3: Sessions 1-5

Putting Together and Taking Apart
Investigation 1: Sessions 1-4
Investigation 3: Sessions 2-5

How Many Pockets? How Many Teeth?
Investigation 1: Sessions 2-5
Investigation 2: Sessions 1-2, 4-6
Investigation 3: Session 5

Timelines and Rhythm Patterns
Investigation 2: Sessions 1-3

3: This concept is covered throughout this grade level. Some examples are:

Mathematical Thinking at Grade 3
Investigation 1: Sessions 1-3
Investigation 2: Sessions 1, 5-7
Investigation 3: Sessions 3-4
Investigation 4: Session 2
Ten-Minute Math

Things That Come in Groups
Investigation 1: Sessions 2, 4
Investigation 2: Sessions 1-6
Investigation 4: Session 1
Investigation 5: Sessions 1, 3

From Paces to Feet
Investigation 2: Sessions 2-7

Landmarks in the Hundreds
Investigation 1: Sessions 3-4, 6-7
Ten-Minute Math

Up and Down the Number Line
Investigation 2: Sessions 1-3
Investigation 3: Sessions 1-2
Combining and Comparing
Investigation 4: Session 1
Ten-Minute Math
Turtle Paths
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-2
Exploring Solids and Boxes
Investigation 3: Sessions 1-2

4: *Arrays and Shares*
Investigation 1: Session 3
Investigation 2: Sessions 1-6
Ten-Minute Math
Seeing Shapes and Silhouettes
Investigation 3: Sessions 1-3
Investigation 4: Session 1
Landmarks in the Thousands
Investigation 4: Sessions 1-3
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-4
The Shape of the Data
Investigation 1: Sessions 1-3
Investigation 2: Sessions 1-3
Investigation 3: Sessions 1, 3-5
Changes Over Time
Investigation 1: Sessions 1-3
Investigation 3: Sessions 1-4, 6-7
Sunken Ships and Grid Patterns
Investigation 1: Sessions 3-6
Three Out of Four Like Spaghetti
Investigation 1: Session 4
Investigation 2: Sessions 1-2, 5-7

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 1-7
Investigation 4: Sessions 2-4
Name That Portion
Investigation 1: Sessions 2-7
Investigation 2: Sessions 1-9
Investigation 3: Sessions 1-8
Investigation 4: Sessions 1-7
Building on Numbers You Know
Investigation 4: Sessions 1-2
Investigation 5: Sessions 4-6

Patterns of Change
Investigation 2: Sessions 2-5
Investigation 3: Sessions 2-6
Containers and Cubes
Investigation 1: Sessions 1-4
Investigation 4: Sessions 7-9
Data: Kids, Cats, and Ads
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-3
Investigation 3: Sessions 1-4
Investigation 4: Sessions 2-3
Investigation 5: Sessions 2-5

2. Select, apply, and translate among mathematical representations to solve problems.

K: *Counting Ourselves and Others*
Investigation 1: Focus Time

1: *Mathematical Thinking at Grade 1*
Investigation 2: Sessions 4-6
Investigation 4: Sessions 4-6

2: *Does It Walk, Crawl, or Swim?*
Investigation 1: Sessions 1-2
Investigation 2: Sessions 3-4
Investigation 3: Sessions 2-3

3: *Combining and Comparing*
Investigation 3: Session 1
Investigation 4: Session 1
Investigation 5: Sessions 2-3
Ten-Minute Math
Exploring Solids and Boxes
Investigation 5: Sessions 1-4

4: *The Shape of the Data*
Investigation 2: Sessions 1-4
Investigation 3: Sessions 3-5
Changes Over Time
Investigation 1: Sessions 1-2

5: *Name That Portion*
Investigation 1: Sessions 2-7
Investigation 2: Sessions 1-9
Investigation 3: Sessions 1-8
Investigation 4: Sessions 1-7
Containers and Cubes
Investigation 4: Sessions 2-9

3. Use representations to model and interpret physical, social, and mathematical phenomena.

K: *Mathematical Thinking in Kindergarten*
- Investigation 4: Focus Time

Collecting Ourselves and Others
- Investigation 1: Focus Time, Choice Time
- Investigation 2: Focus Time, Choice Time
- Investigation 3: Focus Time, Choice Time
- Investigation 4: Focus Time, Choice Time

1: *Building Number Sense*
- Investigation 1: Sessions 7-8
- Investigation 2: Sessions 1-2, 4-9
- Investigation 4: Sessions 1-10

2: *Mathematical Thinking at Grade 2*
- Investigation 2: Session 6
- Investigation 5: Sessions 1-6

Does It Walk, Crawl, or Swim?
- Investigation 1: Sessions 1-3
- Investigation 2: Sessions 3-4
- Investigation 3: Sessions 1-3
- Investigation 4: Sessions 1-3

Shapes, Halves, and Symmetry
- Investigation 2: Sessions 3-5
- Investigation 3: Sessions 1-5

Putting Together and Taking Apart
- Investigation 1: Sessions 1-4
- Investigation 3: Sessions 2-5

How Many Pockets? How Many Teeth?
- Investigation 1: Sessions 2-5
- Investigation 2: Sessions 1-2, 4-6
- Investigation 3: Session 5

Timelines and Rhythm Patterns
- Investigation 2: Sessions 1-3

3: *Landmarks in the Hundreds*
- Investigation 1: Sessions 6-7
- Ten-Minute Math

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

Turtle Paths
- Investigation 2: Sessions 3-5
- Investigation 3: Sessions 1-5
- Ten-Minute Math

4: *Arrays and Shares*
Investigation 1: Session 3
Investigation 2: Sessions 1-6
Ten-Minute Math
Seeing Shapes and Silhouettes
Investigation 3: Sessions 1-3
Investigation 4: Session 1
Landmarks in the Thousands
Investigation 4: Sessions 1-3
Different Shapes, Equal Pieces
Investigation 1: Sessions 1-4
The Shape of the Data
Investigation 1: Sessions 1-3
Investigation 2: Sessions 1-3
Investigation 3: Sessions 1, 3-5
Changes Over Time
Investigation 1: Sessions 1-3
Investigation 3: Sessions 1-4, 6-7
Sunken Ships and Grid Patterns
Investigation 1: Sessions 3-6
Three Out of Four Like Spaghetti
Investigation 1: Session 4
Investigation 2: Sessions 1-2, 5-7

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 1-2
Investigation 4: Sessions 2-4
Name That Portion
Investigation 1: Sessions 2-7
Investigation 2: Sessions 1-9
Investigation 3: Sessions 1-8
Investigation 4: Sessions 1-7
Building on Numbers You Know
Investigation 4: Sessions 1-2
Investigation 5: Sessions 4-6
Patterns of Change
Investigation 3: Session 1
Ten-Minute Math
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 1-4
Investigation 4: Sessions 2-3
Investigation 5: Sessions 2-5

F. Technology

1. Use technology to gather, analyze, and communicate mathematical information.

K: *Making Shapes and Building Blocks*
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time

1: *Quilt Squares and Block Towns*
Investigation 1: Sessions 3-7

2: *Mathematical Thinking at Grade 2*
Investigation 3: Sessions 1-2, 6
Coins, Coupons, and Combinations
Investigation 1: Sessions 7-9
Shapes, Halves, and Symmetry
Investigation 1: Sessions 4-5
Investigation 2: Sessions 4-5
Investigation 4: Sessions 3-4
How Long? How Far?
Investigation 1: Sessions 2-7
Investigation 2: Sessions 2-8

3: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 3
Investigation 3: Sessions 3-4
Investigation 4: Session 2
Things That Come in Groups
Investigation 1: Session 4
Investigation 2: Sessions 2-4
Investigation 3: Sessions 1-2
Investigation 4: Sessions 3-4
Investigation 5: Session 3
Flips, Turns, and Area
Investigation 1: Sessions 2-7
From Paces to Feet
Investigation 1: Sessions 3-4
Landmarks in the Hundreds
Investigation 2: Sessions 1-6
Up and Down the Number Line
Investigation 1: Sessions 3-5
Investigation 3: Sessions 1-3
Combining and Comparing
Investigation 3: Sessions 1-3
Investigation 4: Sessions 3-4
Investigation 5: Sessions 2-3

Turtle Paths
Investigation 1: Sessions 2-4
Investigation 2: Sessions 1-6
Investigation 3: Sessions 1-7
Fair Shares
Investigation 3: Sessions 1-2
Exploring Solids and Boxes
Investigation 5: Sessions 1-4

4: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 4
Investigation 1: Sessions 2-3
Investigation 2: Sessions 1-4
Investigation 3: Sessions 1-2
Arrays and Shares
Investigation 2: Sessions 7-8
Landmarks in the Thousands
Investigation 2: Sessions 2-4
Investigation 3: Sessions 2-5
Investigation 4: Sessions 1-3
Different Shapes, Equal Pieces
Investigation 2: Sessions 1-2
The Shape of the Data
Investigation 2: Sessions 6-7
Money, Miles, and Large Numbers
Investigation 1: Sessions 1-2, 4-5, 7-8
Investigation 2: Sessions 1-2
Investigation 3: Sessions 2-4
Packages and Groups
Investigation 1: Sessions 4-5
Investigation 3: Sessions 1-10
Sunken Ships and Grid Patterns
Investigation 1: Sessions 3-6
Investigation 2: Sessions 1-9

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 1-6
Investigation 3: Session 1
Investigation 4: Sessions 2-6
Picturing Polygons
Investigation 1: Session 4
Investigation 2: Sessions 4-7, 9
Investigation 3: Sessions 1-2, 5-6
Name That Portion
Investigation 1: Sessions 2-7
Investigation 3: Sessions 1, 5-8

Building on Numbers You Know
Investigation 1: Sessions 3-5
Investigation 2: Session 3
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-2, 4-6
Measurement Benchmarks
Investigation 1: Sessions 5-6
Investigation 2: Sessions 7-8
Investigation 3: Sessions 2-3
Patterns of Change
Investigation 3: Sessions 1-3
Containers and Cubes
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-2
Investigation 4: Sessions 4-9
Data: Kids, Cats, and Ads
Investigation 2: Session 3
Investigation 3: Sessions 1-4
Investigation 5: Sessions 3-5

2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information (cf. workplace readiness standard 8.4-D).

K-4: This concept is introduced in Grade 5.
5: *Picturing Polygons*
Investigation 1: Session 4
Investigation 2: Sessions 4-7, 9
Patterns of Change
Investigation 3: Sessions 1-3
Data: Kids, Cats, and Ads
Investigation 2: Session 3
Investigation 5: Sessions 3-5

3. Use graphing calculators and computer software to investigate properties of functions and their graphs.

K-4: See Grade 5 for related content.
5: Related Content:
Picturing Polygons
Investigation 1: Sessions 3-4
Investigation 2: Sessions 4-5
Patterns of Change
Investigation 3: 2-6

4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).

K: This concept is introduced in Grade 1.

1: *Building Number Sense*
Investigation 3:Sessions 3-7
Number Games and Story Problems
Investigation 2: Sessions 10-12

2: *Coins, Coupons, and Combinations*
Investigation 1: Sessions 7-9

3: This concept is covered throughout this grade level. Some examples are:
Mathematical Thinking at Grade 3
Investigation 3: Sessions 3-4
Investigation 4: Session 2
Things That Come in Groups
Investigation 1: Session 4
Investigation 2: Sessions 2-4
Investigation 3: Sessions 1-2
Investigation 4: Sessions 3-4
Investigation 5: Session 3
From Paces to Feet
Investigation 1: Sessions 3-4
Landmarks in the Hundreds
Investigation 2: Sessions 1-6
Up and Down the Number Line
Investigation 1: Sessions 3-5
Investigation 3: Sessions 1-3
Combining and Comparing
Investigation 3: Sessions 1-3
Investigation 4: Sessions 3-4
Investigation 5: Sessions 2-3
Fair Shares
Investigation 3: Sessions 1-2
Exploring Solids and Boxes
Investigation 5: Sessions 1-4

4: *Mathematical Thinking at Grade 4*
Investigation 1: Sessions 2-3
Investigation 2: Sessions 1-4
Investigation 3: Sessions 1-2

Arrays and Shares
Investigation 2: Sessions 7-8
Landmarks in the Thousands
Investigation 2: Sessions 2-4
Investigation 3: Sessions 2-5
Investigation 4: Sessions 1-3
Different Shapes, Equal Pieces
Investigation 2: Sessions 1-2
The Shape of the Data
Investigation 2: Sessions 6-7
Money, Miles, and Large Numbers
Investigation 1: Sessions 1-2, 4-5, 7-8
Investigation 2: Sessions 1-2
Investigation 3: Sessions 2-4
Packages and Groups
Investigation 1: Sessions 4-5
Investigation 3: Sessions 1-10

5: *Mathematical Thinking at Grade 5*
Investigation 1: Sessions 1-6
Investigation 3: Session 1
Investigation 4: Sessions 2-6
Name That Portion
Investigation 1: Sessions 2-7
Investigation 3: Sessions 1, 5-8
Building on Numbers You Know
Investigation 1: Sessions 3-5
Investigation 2: Session 3
Investigation 4: Sessions 1-2
Investigation 5: Sessions 1-2, 4-6
Measurement Benchmarks
Investigation 1: Sessions 5-6
Investigation 2: Sessions 7-8
Investigation 3: Sessions 2-3
Cont*ainers and Cubes*
Investigation 1: Sessions 1-4
Investigation 2: Sessions 1-5
Investigation 3: Sessions 1-2
Investigation 4: Sessions 4-9

5. Use computer software to make and verify conjectures about geometric objects.

K: *Making Shapes and Building Blocks*
Investigation 2: Focus Time, Choice Time
Investigation 3: Focus Time

1: *Quilt Squares and Block Towns*
Investigation 1: Sessions 3-7

2: *Mathematical Thinking at Grade 2*
Investigation 3: Sessions 1-2, 6
Shapes, Halves, and Symmetry
Investigation 1: Sessions 4-5
Investigation 2: Sessions 4-5
Investigation 4: Sessions 3-4
How Long? How Far?
Investigation 1: Sessions 2-7
Investigation 2: Sessions 2-8

3: *Flips, Turns, and Area*
Investigation 1: Sessions 2-7
Turtle Paths
Investigation 1: Sessions 2-4
Investigation 2: Sessions 1-6
Investigation 3: Sessions 1-7

4: *Sunken Ships and Grid Patterns*
Investigation 1: Sessions 3-6
Investigation 2: Sessions 1-9

5: *Picturing Polygons*
Investigation 1: Sessions 4
Investigation 2: Sessions 2, 4-7, 9
Investigation 3: Sessions 1-2, 5-6

6. Use computer-based laboratory technology for mathematical applications in the sciences (cf. science standards).

In grades K-2, the Shapes software offers an environment in which students use pattern block shapes and other sets of shapes to investigate geometric relationships, symmetry, patterns, rotations and reflections, and characteristics of 2-D shapes.
Grades 2-5 include *GeoLogo*, a set of built-in activities and open-ended features that allow students to explore rotations and reflections, coordinate geometry, lengths and directions of paths, the properties of 2-D shapes, and angles. Grade 3 also includes Tumbling Tetrominoes, a computer game in which students consider ideas about rotation, reflection, and measuring turns and area. Grade 5 includes the *Trips* software, a mathematical exploration of motion in which students run experiments and interpret data presented in graphs and tables.
Sample references:

K: *Making Shapes and Building Blocks*
Investigation 2: Focus Time, Choice Time:

1: *Quilt Squares and Block Towns*

Investigation 1: Sessions 3-7

2: *How Long? How Far?*
Investigation 1: Sessions 1-8

3: *Turtle Paths*
Investigation 3: Sessions 1-7

4: *Sunken Ships and Grid Patterns*
Investigation 1: Sessions 3-6
Investigation 2: Sessions 1-9

5: *Picturing Polygons*
Investigation 1: Session 4

Patterns of Change
Investigation 3: Sessions 1-3